



Ulf-Daniel Ehlers

Future Skills

The future of learning and higher education

Ulf-Daniel Ehlers

**Future Skills –
Future Learning and
Future Higher Education**

To all who walked along with me,
and who continue to do so,
with profound gratitude for challenges and inspirations!
And to Joshua and his future...

This book is part of the international Springer Book Series “Future Higher Education – Zukunft der Hochschulbildung”, edited by Prof. Dr. Ulf-Daniel Ehlers (Book Series: ISSN 2662-5768).

About the book series: The book series is focussing on higher education’s dramatic change worldwide. Student enrolment rates of over 70 percent within the next 15 years in industrialized countries and a drastic increase in demand in developing and emerging countries mark a new status and a changed function of higher education in postmodern societies. At the same time, the demands on universities are increasing to prepare their graduates to shape a global and digitalised world of tomorrow. The role that higher education plays in the implementation of the Sustainable Development Goals speaks for itself: without a university of the future that is renewed in terms of content and organisation, it will not be possible to solve social problems such as those associated with climate change, the challenges of migration, which will increase in the future, conflicts that arise as a result of populist social and political concepts and the associated question of the future of democracy. The development of a renewed social consensus on the role of higher education in the future requires the creation of forums and channels in which the question of higher education in the future can be discussed. The “Future of Higher Education” series aims to take up contributions from the whole range of scientific and socio-political topics and thus support the development of viable concepts for the future of higher education.

The topics of the series range from indepth analyses of society, the significance of the science system and higher education system in the society of the future to questions of future higher education management. Empirical studies but also basic approaches to higher education innovation topics are focused on, including detailed topics such as alternative forms of study, micro certificates, digital transformation, block chain for higher education and other topics.

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Our deepest fear is not that we are inadequate.
Our deepest fear is that we are powerful beyond measure.
It is our light, not our darkness
That most frightens us.

We ask ourselves
Who am I to be brilliant, gorgeous, talented, fabulous?
Actually, who are you *not* to be?
You are a child of God.

Your playing small
Does not serve the world.
There's nothing enlightened about shrinking
So that other people won't feel insecure around you.

We are all meant to shine,
As children do.
We were born to make manifest
The glory of God that is within us.

It's not just in some of us;
It's in everyone.
And as we let our own light shine,
We unconsciously give other people permission to do the same.
As we're liberated from our own fear,
Our presence automatically liberates others.

(Marianne Williamson)

Preface

*Also, each effect demands an equally strong counter-effect,
begetting demands equally active receiving. The present
must therefore be prepared already for the future.*

(Wilhelm von Humboldt, *Ideen über Staatsverfassung*)

I wrote this book to open up a conversation about how the new world of skill demands in a post knowledge era, will look like. And to stimulate an exchange about how higher education might evolve their institutions to better align teaching and learning in the light of these new demands. Writing this book was both easy and hard. Easy, because I have the privilege to be fully immersed into the global community of learning innovators in higher education and also businesses in our own institution and across the entire field of higher education. Hard, because the ideas I am presenting here – that we are entering a post-knowledge era with *Future Skills* on the rise and that higher education institutions will change its shape and appearance – are both nascent and contestable. In the book I try to say some new things – and hopefully some true things – about how higher education is changing.

The book is meant to look ahead, to provoke and to inspire. That is why I chose such a title: *Future Skills* – sounds strange, at least at first sight it does! The title is creating doubts and it annoys. At least from an educational science point of view it is fair to say that dealing with the subject of *Future Skills* is a paradox in itself already. Why? Skills, i.e. abilities and competences, are per se aimed at mastering future challenges. So why impregnate such a future concept again with the addition “Future”? If you, however, take time and deal with the subject of *Future Skills* more in-depth it quickly becomes clear that there is more at stake. More than just finding a new terminology for the concept of competence.

Future Skills initiatives are currently being developed all over the world in various shapes and forms, many of whom are discussed in detail in this book. Some are sectoral, for schools or universities, others national, e.g. the initiative *Future Skills*

Canada or also international, e.g. from the OECD, the EU or the World Economic Forum. All approaches have one thing in common – they all reflect the changed social conditions for work, education and life and analyse important *Future Skills*. Many of these concepts focus on skills for employees in a digitised world. In particular those are focussing on digital data-related skills which originated already in the 1990s and 2000s and were discussed there as digital or information literacy. These approaches are now often enriched with important intercultural communication and cooperation skills.

In other *Future Skills* approaches, the topic appears as a continuation of the concept of lifelong learning, in order to ensure a fit between constantly changing requirements on the one hand side and the capabilities of the individual to cope with them on the other hand side. Often this comes along with a strong focus on an economic impetus of participation of the individual in the labour market, sometimes also coloured differently as Skills for Life. And in fact, it is hard to find approaches that attempt to establish a more holistic educational reference frame within a widened understanding. This brief analysis already shows that there is obviously more at stake than just a renaissance of the concept of competence in a new shape and form. Apparently, there is a need to charge the concept of competence and give it direction. The underlying reason is a societal change of the magnitude of a tectonic shift alongside with huge pressures on organisations to change their mode of operation, their way of working, and in consequence also asks for a profound change in the higher education sector. It asks the question how *the university* as an institution can master the future and the question as to what the future of higher education looks like.

How difficult the task is to understand this future is expressed in the fact that under conditions of emergent social developments the understanding of the future results less and less from knowing the past; and also in the recognition that our social, political and economic realities more and more are the result of emergent processes – meaning, they develop self-organised cannot be determined in advance and often appear seemingly without a clear trigger. Emergence comes along as a more and more influential phenomenon in all spheres of life. The ability to deal with these ever faster accelerating contexts in the future is following less and less the known and widely practiced paradigm of knowledge acquisition based on ready-made curricula in higher education but requires a radical situative change. The concept of lifelong learning with its various implementations' varieties, the idea of a post knowledge society, competence orientation in education institutions, and the digitally ubiquitous and constantly available information and knowledge are the ingredients which will form the basis to compose new, flexible and connected learning pathways.

The very concept of *Future Skills* asks for fundamental change. It asks for more than a simple list of skills that schools or higher education institutions can use and base their curricula on in order to be able to guarantee their learners a future-proof and secure preparation for all eventualities. *Future Skills* still goes deeper and reaches wider. It calls for change which is so profound that it touches on the foundations of our educational and labour system. In highly developed organisations in which *Future Skills* play a major role already, work processes are often subject to drastic changes, responsibility structures and patterns of action shift. In higher education the notion of *Future Skills* questions the preparatory proposition according to which students can be prepared through knowledge acquisition for the futures to come.

It is true that the concept of key competences over the last two decades, at least in higher education institutions, has given rise to the idea that, in addition to knowledge transfer, other aspects, precisely those key competences play an important role in preparing for the labour market. In addition, capacity to shape the world we live in, citizenship and competences for life have gained importance. However, the complete integration of a deep competence orientation in the sense of the ability to deal with highly emergent systems, emergent organisations and unknown situations of the future, has so far only been introduced to a limited extent. The emerging discussion about *Future Skills* deals with the question of how this emerging can be done. Adding to this debate is the currently emerging movement of occupationalisation of academic education in an emerging educational society. It is raising the issue how both aspects can be combined – in this this book we argue that both concepts support each other as two sides of the same coin.

This book deals with three topics: Topic 1 is the analysis of the background, the change in organisational structures and the drivers against which the *Future Skills* concept is currently rising. Theme 2 is the appraisal of skills based on various empirical studies, and theme 3 is an elaboration of drivers and scenarios for the university of the future. All three topics are dealt with on basis of empirically validated concepts and follow on from the international discussion that exists in this area and which are being scientifically investigated within this book. This book is therefore not aiming to contribute a finite and finalised list of *Future Skills* to the current discussion in the field – even though a huge further step has been taken through the work, compared with many existing concepts. Its specific and unique contribution consists of working out the underlying structures of *Future Skills* for higher education.

The book develops a model that describes the underlying structures and processes of change which form the base for the development of *Future Skills* and with its *Triple Helix Model* identifies three basic components that constitute *Future Skills*, as the ability of individuals to act in future highly emerging contexts. The

Triple Helix-Model of Future Skills is able to map the areas that are important for *Future Skills* and has a greater explanatory depth than the simple lists presented so far on this topic in other contexts. “*Future Skills – Future of Learning – Future of Universities*” is the first book on the subject of *Future Skills* and is at the same time the first empirical work on the theme, rooted in educational science. It covers not only the question of *Future Skills* for future work, but also *Future Skills* as a fundamental capacity to act in a changing world.

This is a book about the future. It is inspired through the present and informed by the past. It lives out of the concerns voiced in moments of reflection and all the same out of the hopes that higher education can contribute to a culturally rich, personally rewarding, sustainable, prosperous and happy future for all. For us all but especially for our children.

I would like to thank all those involved who have contributed to making this book a reality. This book benefits from conversations with colleagues from near and far and all over the world. From interviews, discussions and contributions from students, friends, colleagues, scholars and business leaders. My wonderful team which supported the important studies which we implemented, and the translation of the German version. A very special thanks to Patricia Bonaudo, Laura Eigbrecht and Silke Huber and to Manfred Daniel. Thanks to all the experts involved in the various *NextSkills* Studies, the Baden-Wuerttemberg Cooperative State University and the many participating organisations, who were ready for interviews, as well the international experts who supported the Delphi Studies.

The book represents an important milestone in the question of how we will further develop our higher education institutions in the future. The project goes beyond digitisation, takes up competence orientation in great depth and presents models and profiles for higher education development over the next 15 years.

Karlsruhe, March 2020
Ulf-Daniel Ehlers

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Future Skills – **The Key to Changing Higher Education**

#lead-in

Future Skills has contributed to a decisive change of the public discussion about higher education, which we refer to as the *Future Skills Turn*. To examine this *turn* and its implications for the future of higher education is the purpose of this book. As a concept, *Future Skills* has gained an importance similar to that which emerged in the seventies of the last century from ideas such as *equal opportunities* or *science orientation* in European education. Such guiding principles usually do not appear as precisely tailored and empirically operationalized concepts, but rather as conceptual condensations of broadly diversified bundles of arguments and objectives – equally in the public, the political and the scientific discourse.

The starting point for the enormous career of the *Future Skills* concept is the insight that current concepts of higher education do not meet the urgent needs of our societies with convincing future concepts. Neither they are fit to help sustain our environment nor associated social or economic challenges. While social challenges are exacerbated by an accelerating process of globalization and digital advancement, at the same time these are the very forces that enable a multitude of new options for human development. In this situation of digital acceleration, the characteristic feature is that of uncertainty and the inevitable necessity is that of creative responsibility. It is a platitude that the future is unpredictable, however we must be prepared to shape it.

In ten to twelve years' time, children who attend primary school next year will be entering vocational training or higher education, and in fifteen years' time they will be the new professionals who as young citizens take over the responsibility in our society. We know little about this future. In the year 2060-2065 they are likely to retire, end their employment and/ or cease working. About this future we do not know anything. Our schools must prepare them for jobs that do not yet exist, for technologies and applications that have not yet been invented, for living in a society

whose social structures we cannot foresee today, and for dealing with challenges that are not yet discernible. It is our shared responsibility to make the most of the opportunities and find ways to deal with this uncertain future. It is about nothing more and nothing less than the preservation of our planet and our livelihoods.

Solving social problems, such as those associated with climate change, the challenges of migration, which will continue to increase in the future, the conflicts arising from populist social and political drafts and the associated question of the future of our democracies – all this requires the ability to develop new and so far unknown approaches, to tread new paths and to relate the hitherto unconnected to one another in a new way. In education and science, this will only succeed if we work inter- and transdisciplinarily in the best sense of the word, to compile solutions and contributions of each of the disciplines and sciences, to reflect critically on them and to relate them to one another. This, however, is a big challenge. Higher education Institutions are struggling with it because they all share a common handicap: The history of science, research and thus also of higher education is a history of “silo-ism”, specialisation and differentiation of disciplines – the almost 18,000 degree programmes offered at German higher education institutions alone are proof of this. The old institution of higher education is faced with the challenge of having to reinvent itself – in a time when academic education is experiencing an enormous growth process and is projected to reach 70 percent plus of an age cohort worldwide by 2050. It’s like having to replace the pilot in a car race, right in the middle of a steep turn and during a risky overtaking manoeuvre.

#futureskills

The research project *NextSkills* aims at finding models and descriptions for future relevant skills, so-called *Future Skills*, within the framework of a multi-methodological research design and through international consultations.¹ *Future Skills* should be the skills that enable university graduates to master the challenges of the future in the best possible way. The results show that to deal with future challenges, students must develop curiosity, imagination, vision, resilience and self-confidence, as well as the ability to act in a self-organised way. They must be able to understand and respect the ideas, perspectives and values of others, and they must be able to

1 More and up to date information about the *NextSkills* project can be found here: <http://www.NextSkills.org>

deal with mistakes and regressions, while at the same time progressing with care, even against difficulties.

In numerous conversations, interviews and analyses, it became clear to us *that Future Skills* must also strive to raise awareness for local and global challenges; to raise awareness and become mindful of how climate change impacts on nature and the environment – and to focus with greatest attention on how students can acquire skills to participate in societal contexts in order to reduce or reverse these impacts. It is also about shaping social issues such as demographic- or migration challenges.

Promoting *Future Skills* also means to strive for creating an educational system that enables future citizens to deal with the challenges involved and to care for greater coherence in society, to value openness, tolerance and an awareness of differences and diversity, and not to succumb to populist explanations. It became clear to us that the question of how young people can be empowered to participate in social systems and processes, and how we can strengthen justice, peace and the integrity of creation and community as values in a future society, will determine the relevance of our higher education Institutions in the future.

At the same time, today's specialist and expert knowledge will only represent a small part of what future generations will be able to draw on in their search for solutions to complex problems. Next generations will be driven by more than career prospects, a good job and a high income. They will also strive for the well-being of their friends and families, their communities and the planet as a whole. Empathy, mindfulness and passion will become explicit educational objectives of the higher education institutions of the future. It will be about realising educational concepts that equip learners with strength, energy and conviction and with the ability to communicate them in an appreciative and effective way. The skills they need must enable them to shape their own lives and contribute to the well-being of others.

Higher education institutions would do well to turn away from the goal of imparting knowledge that is primarily concerned with self-contained and easily verifiable relations for which there are right and wrong answers. In the future it will be important to study on the basis of questions for which there are no immediate correct answers, but in which it is a matter of weighing, plausibly arguing and representing value attitudes and orientations. The *NextSkills* project was launched to find out what these skills are and how they can best be developed. The aim of this project is to provide universities, their management and their teachers with answers on the direction in which educational goals, structures and processes need to be shaped. The focus is on three questions:

1. What skills will people need in the future to shape their world and environment as citizens in an increasing globalised context? What skills do employees need

- in order to cope with the constant development and constant adaptation to new situations in organisations and working life? We call these skills *Future Skills*.
2. How can organisations help their staff to acquire these skills and what organisational forms and structures are needed to develop the optimal organisational cultures for this?
 3. What can higher education institutions do to promote these skills among students? How should studies and teaching be structured, and which forms of higher education didactics and learning designs are suitable?

In this book we describe the results of this work. The concepts presented are backed up by in-depth interviews, expert assessments and international Delphi Studies.

If *Future Skills* are placed at the centre of considerations for higher education, then the need to rethink higher education as a place of research, teaching and learning becomes apparent at many points. And the following applies: Everything that is easy to teach and easy to assess is also easy to digitise – and thus also to automate. *Future Skills* such as creativity, self-organisation-abilities, self- and reflection competence or Design Thinking Competence, however, require ingenious forms of learning, teaching and development. It is therefore a question of how the promotion of *Future Skills* can be anchored in higher education curricula. This involves concentrating on active, creative forms of teaching and learning and educational objectives that require complex assessment scenarios, and that go beyond the mere transfer of knowledge and focuses on the development of specific competences.²

#stateofplay

The *NextSkills* studies does not take place in a vacuum. The question which skills should form the basis of learning concepts is highly relevant in any higher education system for current and future generations – and one that has already been discussed in many different ways and places. After research on graduate attributes was in the foreground in the eighties and nineties of the last century, there is currently a veritable renaissance of scientific work on this topic. These are, firstly, labour

2 The terms competence, skill as well as agency need a careful consideration since they are the conceptual core of the *Future Skills* concept. We have therefore devoted several entire sections to describe, define and delimitate the concept of competence which we understand as ability to act in unknown complex contexts, an understanding which is based on works of Erpenbeck (e.g. Erpenbeck 2012). See chapter A2 (and following) for a comprehensive elaboration.

market studies that raise the question of what the future of increasingly digitised workplaces will look like. Secondly, these are studies of societal scope which pose the question what society will look like in 2030 or 2050. These are questions like: Will work continue to be the sense giving element in our common lives? What are the risks that individuals in a society have to cope with and what are the best strategies to cope with them? Here, too, the digital penetration of the entire private sphere plays a major role. And thirdly, the question which educational concepts are suited best to prepare students for unpredictable futures. And finally, there are numerous approaches emerging in the field of international organisations starting with the famous report by Jacques Delors in 1996 to the European Union (EU) stressing “living together” as a central educational objective, the Organisation for Economic Co-operation and Development (OECD) or the United Nations Educational, Scientific and Cultural Organisation (UNESCO), all raising the question how societies can learn and live together in such a way that global challenges can be adequately and effectively addressed. All these different perspectives, which have been increasingly discussed since the 1990s, are moving into focus through international cooperation, global networking and digitisation. The discussions are reflected in concepts such as the seventeen Sustainable Development Goals (SDG) and further international, cross-border education and society future scenarios.

The question which skills young people of generations to come will need to cope with the challenges described above is therefore a highly topical one. It is much discussed and is currently one of the hot topics, not only in educational science, but also in economics, organisation- and labour market studies. Most of the approaches are empirically analytical and attempt to predict the future by analysing existing developments, projecting them into the future, for example by taking the development of new occupations and occupational fields as a basis or by (linearly) updating the speed of technology development and its application to automation in work processes, thus creating new professional profiles. From these, requirements are derived, which are then developed into competence profiles in schools and universities. This approach has limits that are now becoming increasingly foreseeable.

#emergence

It is clear that the debate on the future capabilities needed to meet the societal challenges of present and future generations must take into account one thing in particular: An ever faster and non-linearly changing context of action. This characteristic is finding its way into more and more educational concepts – initially

on a purely descriptive level. The question is how higher education can deal with situations in which the very nature of knowledge is changing, and knowledge is becoming one amongst many different ingredients of meaningful higher education – and not the most important one. When unpredictability and uncertainty in future professional and private contexts become the rule of the day. Future-ready students need to exercise agency, in their own education and throughout life. Agency implies a sense of responsibility to participate in the world and, in so doing, to influence people, events and circumstances for the better. Agency requires the ability to frame a guiding purpose and identify actions to achieve a goal. Recently, more systematic and scientific-theoretical concepts have been elaborated, in which the question of unpredictability is put into the centre. At present, these include drafts from ecosystem theory, physics in the field of research on emergent systems and self-organisation, and cybernetics in behavioural research and biology. They are based on the realization that developments in systems often lead to new states that cannot be derived from the previous states. The so-called emergent development has the distinct characteristics: irreducibility, i.e. the impossibility of linearly extrapolating a development into a future development, since the future development, as a new status, can no longer be reduced to the previous one; secondly the characteristic of unpredictability, i.e. the impossibility of predicting the next, subsequent state. Applied to social, political and economic processes, as well as communication processes, this means that individuals will have to deal with situations in the future that can neither be predicted nor calculated in advance.

More and more a sense of urgency within the higher education governance community is developing. The question is clear: how to deal with the unforeseen? Contributions to *Future Skills* must provide answers to this question. At present, there are only a few competing approaches that really address this question systematically and go beyond the pure and already known concept of competence. With this book we aim to close this gap. In the present work a model for *Future Skills* is designed. It combines theoretical aspects of education with competence concepts and concepts of self-organisation.

#triplehelix

This is a book about the future. Our current university education concepts are still strongly oriented towards knowledge transfer. Building up and accumulating knowledge in order to then call it up in future professional action contexts is – to put it pointedly – the current game of higher education, studies and the labour market.

However, it seems that we have reached the limits of this way of working. Our study shows that especially in those fields of work that can be regarded both as highly agile and at the same time knowledge-intensive, simple retrievable knowledge is less and less the currency of future labour market success, but *Future Skills* are. In the context of the *NextSkills* Studies, the *Triple Helix-Model* of the capacity to act³ in emergent contexts will be developed and presented in Chapter A 1 Objectives & Methodology of the *NextSkills* Studies.

We see the higher education system worldwide in the midst of a transformation process. In structural terms, all industrialized societies are on the verge of becoming a “Bildungsgesellschaft” (an *educational society*) in which the pressure on individuals to obtain academic education is constantly increasing. This goes hand in hand with an ever-stronger networking demand due to the availability of communication media and the rising competition in globally available information and knowledge. The resulting acceleration of the development and decreasing half-life of knowledge resources necessitates a constant lifelong updating of the knowledge of the individual. However, knowledge is not enough, it merely forms a basis for *Future Skills*. While not all skills are new, the extent to which performance in *future organisations* depends on them gives them a completely new relevance.

Future Skills is a dazzling term that is based on a variety of understandings. The existing approaches are often exhausted in bare listings of future-laden concepts and terms that carry importance for *Future Skills*. List follows list. Beyond this fresh but purely additive view, there are currently only the older and already familiar but barely really implemented *competence-oriented* learning scenarios. It is often emphasised that educational science has always been concerned with *Future Skills*. After all, what, if not *future* capacity to act should educational concepts actually contain? Admittedly, *Future Skills* is therefore a dazzling and (today) popular term which, from an educational science point of view, certainly already contains construction challenges.

If these challenges are left aside, it also offers opportunities. It stands out from the already somewhat entrenched debate about the introduction of competences as constructs of knowledge, skills and attitudes, does not at first glance immediately refer to the discussion about key qualifications and competences and is internationally connectable. The term is therefore attractive but requires a good deal of conceptual sharpening and delimitation.

3 English “Agency”: “Future-ready students need to exercise agency, in their own education and throughout life. Agency implies a sense of responsibility to participate in the world and, in so doing, to influence people, events and circumstances for the better. Agency requires the ability to frame a guiding purpose and identify actions to achieve a goal.”

#agenda

With this book we pursue two main objectives: On the one hand, we want to report in detail on the results of the three-year *NextSkills* project and its content for German and English research on *Future Skills*. On the other hand, our aim is to use the book to establish a theoretical frame of reference for *Future Skills* in higher education and to classify existing research related to the topic within it. The following infographics (Figure 1) illustrate the structure of the book conceived for this purpose.

The book is divided into three large parts, preceded by a foundational chapter on the *Future Skills* Turn (Chapter II. The *Future Skills* Turn). The *Future Skills* Turn is described by means of various real-life organisational examples, which show the increasing importance of *Future Skills* as a future guiding orientation for higher education. In this chapter it becomes clear that *Future Skills* is not so much about a new concept of education or competence, but about the description of those competence profiles that gain importance as *Future Skills* under the conditions of highly emergent contexts in advanced future organisations.

Part A is then dedicated to the very nature, definition and elaboration of *Future Skills*. Chapter A 1 Objectives & Methodology of the *NextSkills* Studies first describes the study design of the *NextSkills* Studies. Chapter A 2 The *Future Skills Triple Helix-Model* develops a basic theoretical framework for *Future Skills* as an educational concept. The so-called *Triple Helix-Model* of capacity to act in highly emergent contexts is developed. The model is based on the recognition of three shifts taking place, three major changes in the basic structure of the world of work, to which the *Future Skill* concept responds. Within the research on *Future Skills* and the *Triple Helix-Model* for *Future Skills*, the *NextSkills* project offers as the first study ever a theoretical frame of reference for *Future Skills*. In Chapter A 3 *Future Skills* for the World of Tomorrow, the seventeen *Future Skills* Profiles are worked out, defined and described. Chapter analyses the results of the international *NextSkills* Delphi Study in terms of the maturity of current higher education and its ability to support the development of *Future Skills* among students.

Part B of the book is dedicated to the task of reviewing the state of the art in *Future Skills* research. There are currently no comprehensive literature reviews on this subject in either German-speaking or English-speaking countries. Chapter B 1 State of Research – Old Bottle, New Wine? presents the state of research, starting with related research on graduate attributes. Chapter B 2 Foundations of the *Future Skills* Revolution: The Theory of *Future Skills* constructs and describes the essential theoretical frame of reference for *Future Skills* research. The so-called “drift to self-organisation” plays a decisive role connecting different theoretical contributions.

Part C of the book is devoted to the question of what the university of the future will look like. First, Chapter C 1 Ten Seconds of the Future of Higher Education describes ten main drivers of the future of universities. Chapter C 2 Rethinking Learning, Teaching and Research: An Agenda for Higher Education of the Future then describes how higher education Institutions will develop on the basis of these drivers from both a pedagogical and an organisational perspective. Chapter C 3 Four Scenarios for the University of the Future concludes by formulating four possible scenarios for the university of the future.

In the glossary, the book develops an important system of cross-references for the partially terminologically complex work. A comprehensive bibliography of German and English literature on the subject is also documented.

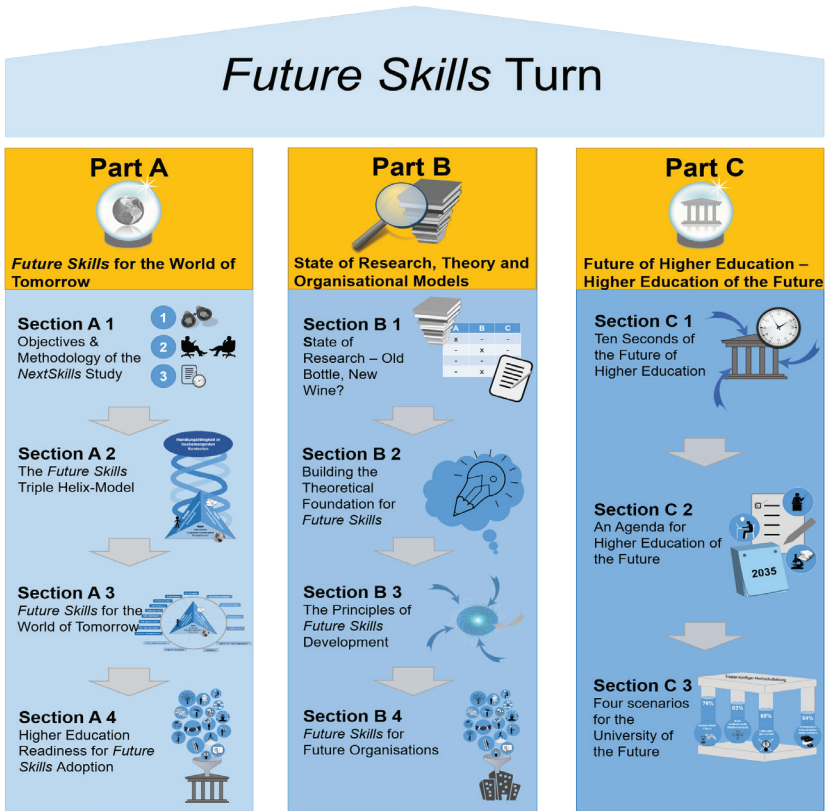


Fig. 1 Agenda – the bigger picture

The *Future Skills* Turn



William Ross Ashby was born on 6 September 1903 in London, England, and died on 15 November 1972. He was a British psychiatrist and pioneer in cybernetics, the study of complex systems, and is regarded as one of the most influential persons in systems science (Klir 1978). His works *Introduction to Cybernetics* (1956) and *Design for a Brain* (1952) have been influential in the sciences of complex systems since their appearance in the 1950s, when they were known as cybernetics. Although he was so important in the science of complex systems, today he is far less well known than Norbert Wiener or Herbert A. Simon. Ashby's law bears his name and provided the scientific basis for the homeostatic principle and the principles of self-organisation. *The Law of Requisite Variety* is one of the central insights of cybernetics (Ashby 1956).

The law states that a system that controls another can compensate the more for disturbances in the control process the greater the variety of its action: the greater the variety of a system, the more it can reduce the variety of its environment by controlling. It follows from this that the variety of the control system must be at least as great as the variety of the malfunctions that occur in order to be able to control it. Following this idea, this means that whenever it is a question of dealing successfully with highly complex and dynamic situations, the acting system must have at least the same complexity and dynamics as the system in which action takes place. If you transfer this thought to today, it means: As the market continues to network, it becomes more and more important to allow and promote free networking within one's own company. Otherwise, one is in danger of getting lost.

How can companies react concretely to complex system requirements? Peter Kruse, professor and founder of the management consultancy *nextpractice*, points out that although hierarchy ensures an orderly and calculable approach, it is not a recommendable answer to the complex dynamics of networks (Kruse 2015). Leadership then no longer means thinking ahead or steering the activities of employees but ensuring that the people in the company can develop the necessary *Future Skills*

in order to recognise interrelationships and thus be able to organise themselves in line with market requirements.

Networking is thus both the problem and the solution.

Adaptation to a new organisational reality through learning becomes a key element. A study by Peter Kruse (2009) shows: 77 percent of the surveyed managers are convinced that a fundamental change in the system of leadership is needed. There is broad consensus among the managers surveyed that it is becoming increasingly important to engage in open-ended processes. There is a consensual call for more courage for *iterative-testing agility* (Kruse 2015). Thus, instead of traditional management between target and actual, there is an invitation to move forward step by step, trying out and learning. Goals are not set or negotiated but are constantly adapted and developed together. Kruse's studies allow the corresponding ideal of leadership to be broken down into three central demands: network organisation instead of line hierarchy, self-organisation instead of control and cooperation instead of competition (ibid.).

Overall, it can be observed that the individual has an increasingly greater responsibility within the organisation. Less responsibility can be transferred to *central* management structures. And thirdly, that the question of which *Future Skills* are actually important and needed in order to successfully work on the respective tasks in the "network organisation" can only be answered in a very personalised way and in the respective context – and that the learning of these skills must also be done by the individual itself.

Examining today's institutions, this connection becomes immediately apparent. Those interviewed for the *Future Skills* Study are aware that the development of the necessary skills is so volatile and constantly changing that 80 percent of the necessary learning takes place "on the job". The externally organised, formal and explicit training plays an ever less important role. According to estimates, 90 percent of the reflection on what employees actually need and where they can learn the necessary skills takes place on their own initiative. The general assessment is that it plays an increasingly subordinate role to have codified knowledge readily available. It is much more important to search for and discriminate against data, information and knowledge, to be able to make distinctions, as well as to be able to carry out the validity and objectivity of the information found in each case. The ability of one's own individual information management is not only a question of subjective knowledge management, i.e. how one organises one's own knowledge area. It is also about having the ability to validate data and information. The widespread view that information validates itself through the reproduction of many people is not always true, contrary to the popular understanding of the *Wisdom of the Crowds*.

The French philosopher and mathematician Marquis de Condorcet already pointed out an important additional condition in the 18th century. The Condorcet jury theorem states: “If the amount of knowledge distributed in the minds of the set of decision-makers involved in an estimation task is a little below chance, then the hit rate of the overall decision is extremely low.⁴ If, on the other hand, the individual’s knowledge is only a little above chance, then the group will rock itself to a surprisingly high marksmanship. Peter Kruse, futurologist, once described this connection as follows:

“If you sit with Günther Jauch (German TV Show Master) and are asked a question about a celebrity’s holiday preferences, you can assume, because “celebrities” become public figures through the media, that the knowledge of the individual studio guests is above chance. Here you should draw the public joker. But if you have a question in the field of nuclear physics, then the probability is quite low that the knowledge is above chance. Then you better roll the dice.”

With regard to organisations, this means that the distributed knowledge is limited in principle by information monopolies, relationship networks or hierarchical thresholds. It is therefore an important task to ensure that this does not happen, and that knowledge is freely available and without the typical knowledge restrictions (e.g. information monopolies) in the organisation. In addition, it is important to carefully consider how to deal with the validity of information on the Internet, no matter how many others cite and multiply it (Kruse in Personalwirtschaft 2015).

II.1 **Towards a Post-Knowledge Era: The Relativity of Knowledge**

In our studies we are suggesting that society is moving towards a new era which we describe as the post-knowledge era. This has to do with what we can call the new relativity of knowledge. During a short period, and following the industrial age, knowledge has first advanced to the prime factor of differentiation in many societies – today resulting also in more academic enrolment rates than ever before – and is currently under pressure from a new regime of evidence-based experience which we describe in our work as competence. A clear sign of this is the rise of alternative credentialing systems, as well as professional online platforms where

4 Also known as *social election theory*, which was invented in the mid-20th century by Kenneth Arrow (Arrow 1963).

individuals can document and present their achievements for application and recruitment purposes (Ehlers 2018). *Future Skills* can be understood as a special profile of such competences.

Thus, we are differentiating between the role knowledge played within three different periods:

- a. the industrial age in which technology was at the forefront and individuals had to succumb to industrial production machinery,
- b. the knowledge age, enabled through massive educational system development leading to knowledge becoming the prime factor for societal mobility and
- c. today's post knowledge era in which a more comprehensive concept of individual and self-organised capacity to act, creativity, innovation and competence form a new vision of individuals, capable to act under new, unknown unprepared circumstances and can perform problem solving complex challenges – with knowledge playing an enabling role but transformed through volition, ability, values and experiences.

During the last century, there were big changes in knowledge – in how people *see* knowledge and how they *use* it. It has been suggested to label this period as the beginning of the *knowledge age* and to distinguish it from the *industrial age*. The knowledge age is an age in which knowledge and ideas are the main source of differentiation for individuals in society as well as for economic growth and became more important than kinship, land, labour, money, or other tangible resources. Bourdieu is writing about it at length when he sharply suggests widening the concept of capital from economic to social and cultural. It is important to understand how our *meaning of knowledge* is changing. Knowledge is no longer being thought of as something that is developed and stored in the minds of students, experts, represented in books, and classified into disciplines. Instead, it becomes more and more apparent that knowledge is now seen more as a fluent, *energy-like* system of networks and flows. Knowledge age knowledge is defined – and valued – not for what it *is*, but for what it can help to *do*.⁵ It is produced, not by individual experts, but by “collective intelligence” – that is, groups of people with complementary expertise who collaborate for specific purposes. These changes have major implications for our higher education system (and for the education system at large).

5 Some of this forefront thinking about the post-knowledge era is taken from the “Shifting thinking community” from New Zealand Research Council, <http://www.shiftingthinking.org/>

In the post-knowledge era, the meaning of knowledge is changing. Knowledge is not viewed as the most important ingredient for action (to do something with it). Its importance for agency and competence in the sense of capacity to act is decreasing, becoming relativized against other factors which come into the picture, like values, personal traits, and the development of a disposition to act – also in unprepared complex challenging contexts. Knowledge in the post-knowledge era is just one factor amongst others. The post-knowledge era is characterised through a new paradigm – the paradigm of self-organisation, in a situation in which emergence and networks become a main organisational paradigm (Castells) of society, business and private life. The term “post-knowledge era” introduces a new distinction, and is an attempt to characterise these new organisational paradigms in our current times, differentiating it from the industrial era and the knowledge era. It is clear that this distinction is not a clear cut one or that societies evolve in a sharp sequential way but rather is expressed in a bundle of beliefs, values, societal developments which show as patches and slowly develop into a majority guiding belief.

In the industrial age mass education began, and in schools trained professionals package “know what” knowledge into a logical, controlled, cumulative sequence. Students are organised into age-related cohorts who receive this knowledge all together, in the same order, at the same pace. Industrial age schools also teach social and citizenship skills. Students are disciplined to follow the rules and respect the authority of certain bodies of knowledge, and to follow the rules and respect authority in the society they live in. The schooling system is managed by a bureaucracy, set up to ensure the efficient and standardized functioning of all parts of the system. The efficiency of the system takes precedence over the needs of individual students. This one-size-fits-all system works reasonably well as a way of sorting people into the different kinds of worker-citizens needed by industrial age societies: however, it produces a great deal of ‘wastage’ – which we call drop-outs (see also the shiftingthinking.org collective, 2019).

In post-knowledge era things are changing. Knowledge is still important, but not an end in itself anymore. It is just one step on the ladder to competence and professionalism. People need more than this. They need to be able to *do things with* this knowledge, to use it to create *new* knowledge. Knowledge is changing its meaning. It is becoming a resource, something to *learn* (or think) *with*. In the knowledge age already, and in the post knowledge era even more so, change, not stability, is a given. The *NextSkills* Studies revealed exactly this shift in views on knowledge. They show that post knowledge age workers and citizens need to be able to locate, assess, and represent new information quickly. They need to be able to communicate this to others, and to be able to work productively in collaborations with others. They need to be adaptable, creative and innovative, and to be able to

understand things at a ‘systems’ or *big picture* level. Most importantly, they need to be able to think and learn for themselves, sometimes with the help of external authorities and/or systems of rules, but more often, without this help.

Because ‘know what’ and ‘know how’ kinds of knowledge have only a short shelf life, it is no longer viable to ask schools to ‘fill up’ students with all the knowledge they need beyond school (ibid.). Nor is it viable to teach students any particular ‘one best way’ of knowing – or doing – things. Instead they need to teach students how to work out *for themselves* what to do. Today’s schools are organised to produce industrial age worker-citizens. If schools are to prepare young people for successful lives in the 21st century, they need to do things differently. 21st century schools need to develop different skills and dispositions from those that were required in the 20th century. This can’t be done simply by adding these ‘new’ skills and dispositions to the existing curriculum.

The *Future Skills* Study shows that the ability to take the initiative, and the self-competence to follow through play an equally important, if not perhaps even more important role than specialist knowledge. However, the polarization of *knowledge* on the one hand and agency, capacity and *competence* – terms which will need to be clarified and defined in the course of this book (see section A2 for this) – on the other is only seemingly a contradiction. Because *knowledge* is not independent of *competence*, but an integral element of competence. Competence, however, goes far beyond knowledge (see also Chapter B 1.2.2 *Future Skills as Competence*). Self-competence, for example, can be described as the

“Willingness and ability as an individual personality to clarify, think through and assess the development opportunities, demands and restrictions in family, career and public life, to develop one’s own talents and to draw up and further develop life plans. It includes qualities such as independence, critical ability, self-confidence, reliability, sense of responsibility and duty. This includes in particular the development of well-thought-out moral concepts and the self-determined attachment to values.” (KMK 2011)

This insight is often the subject of a seeming contradiction, which repeatedly emerges in the recent debate about knowledge/expertise vs. action competence and skills and requires fundamental reflection. It is expressed in statements by large Tech-Companies (Times higher education 2015) about the relativisation of formal certificates as well as in controversial debates among teachers on the question of whether competencies are a realistic goal for learning processes at all, when there is so much knowledge to learn at first.

Overall, there is often a misconception about the connection between competence and knowledge. We have therefore devoted a separate chapter to this topic in

order to show that today we are actually dealing with a *change in competence* (see also Chapter B 1.2.3 Self-Organisation).

In the organisations surveyed, personnel development instruments were increasingly geared towards supporting individual competence development and in particular the development of subject competences (see Chapter A 2 *The Future Skills Triple Helix-Model*). In doing so, coaching oriented methods are largely being used. This in turn places increased demands on managers and in many cases makes it necessary to rethink the existing governance structures of the organisations.

The interviews show that there is an increasing trend away from mediation towards self-organised learning. The development of self-organised learning as *the* future competence par excellence in turn requires new and special models of training, support and development for employees. These are of great importance for personnel development in organisations at all levels, both in programme design, i.e. also in the individual support of employees, and at the didactic level of a single training event.

In almost all organisations surveyed, there are instruments and methods for recording competencies, both at the beginning of measures and later on, which aim to support employees in reflecting on their own development. Managers increasingly see themselves as coaches, learning companions and decreasingly as persons who pre-structure work processes. Personal dominance and strong personality are therefore passé. Efficient achievement of objectives and control via key figures are considered insufficient. Against the background of growing dynamics and complexity, managers intuitively evaluate yesterday's success concepts as tomorrow's risk.

II.2 The Future Skills Turn

A strong turn towards *Future Skills* can be observed. This is also expressed in the instruments that are increasingly being used in personnel development. For example, a medium-sized company in the medical devices sector reports that it uses feedback forms for its employees, which are based on nine competencies, only one of which is actually technical. In personnel development, more and more importance is attached to how cooperation and networking can be promoted. For example, personality models and tests are used in order to help to understand the preferences of employees for cooperation and how mutual understanding and willingness to cooperate can be improved (medium-sized bank).

The new focus on *Future Skills* is also reflected in the range of continuing training opportunities and measures. Further training courses are less *catalogue-oriented*

but increasingly aimed at networking – and thus at self-organisation (see also Chapter B 2 Foundations of the *Future Skills* Revolution: The Theory of *Future Skills*). This is expressed quite practically, for example, in the fact that a human resources manager reports that today there are about 200 offers of personnel development per year, and 80-85 percent of these are organised as *colleague trains colleague* (medium-sized medical device manufacturer). In some organisations there are also explicit departments that emphasise the importance of learning for work and interlink both issues, for example a *learning and work* team in one of the participating organisations (large drugstore chain).

The shift in *Future Skills* – away from specialist knowledge towards *Future Skills* – is also reflected in the fact that coaching, consulting and mentoring are playing an increasingly important role alongside traditional personnel development tools. Coaching stands for open-ended and solution-focused support of personal contexts, consulting for a format in which the main focus is on targeted support for a given problem, while mentoring can also take place between colleagues with different expertise. The dissolution of the boundaries between the private and the professional is a trend-setting development. In one of the organisations surveyed, employees can include topics from their private environment in a coaching session. This makes sense in so far as, especially in coaching as an open-ended format, questions from the private, personal sphere always play a role and the professional context cannot always be clearly defined. The prerequisite for this is the creation of a context in which clear information barriers are defined and a constellation of trust is established.

One of the organisations, building on the mentoring format, has introduced an additional approach: *reverse mentoring*. This does not define a mentoring offer but formulates a mentoring need which can then be served by colleagues – above all from other departments or hierarchical contexts. An apprentice or a trainee may be training the Members of the Board of Managing Directors in a specific software topic or employees from Sales are mentors for the experts from the Development Department (medium-sized bank).

II.3 Conversations with Practitioners: Gaining Insights into the Practice of Supporting *Future Skills* Development

The following examples show how organisational structure, values, leadership and communication structures must interact in order to build an organisational culture for *Future Skills*. We were able to gather them in many conversations – official once

as well as informally – from practitioners of changing learning environments in many organisations.

II.3.1 Building a Networked Organisation

Employees of all departments can register in a one-year competence workshop. The aim of the competence workshop is to tackle a personal learning or development task. For this purpose, training courses, trainings or collegial consulting/training can be used. Important: Topics that are important for the professional work context as well as topics that appear relevant for private interest can be selected. The central element of the competence workshop is the regular Reflection and Sharing Workshop. This is about all participants telling each other what they have learned so far, how it has taken place and what is next. Difficulties, progress, surprising and unexpected aspects are the focus of the competence workshop. The events take place outside the actual day-to-day business and are moderated. The participants regularly reflect on their progress in learning and development and cultivate a language for their own learning.

This format also serves to support networking of employees within the organisation. A new network of employees is created, which runs through the entire organisation and connects employees who have not previously had any contact or connection with each other. The highest premise here is: It may explicitly be about private as well as professional things. In this way, the conditions for a stronger self-organisation are created and improved. Each competence workshop concludes with a one-day event in which the personal learning journeys are told and shared. The organisation's Board of Directors will also participate in this special event.

II.3.2 The End of Instruction: Learners as Experts

In a large drugstore chain, apprentices and (dual) students are not referred to as apprentices or students but with a new creative word creation: "Lernlinge". Behind this is the view that learning does not function through instructing or teaching but is a self-active and self-controlled process. The concept of all related functions has been adapted accordingly: Trainers are learning facilitators, certificates or examinations are documented in a personal learning passport, learning facilitators receive special training as learning facilitators, which is intended in particular to support learning as a self-organised process. There are learning events and learning workshops instead of courses. The format of the learning workshops aims in partic-

ular at supporting the ability to self-organised learning (see also Chapter B 2.1 The “Drift to Self-Organisation”); thematic content is initially of secondary importance.

A world market leader in the IT service sector is turning the tide – it is no longer trainees and students who need to be trained and further educated, but the company wants to benefit from the perspectives of young people and their unbiased view. Individual departments can apply to students with project ideas. Studies, further education and training do not therefore take place as a process defined by the curriculum right from the start, at the beginning of which it is already clear which contents can be learned in which constellation at which point in time but are a situationally compiled portfolio of experiences. These are reflected, documented and also supervised by coaches and mentors. The central feature here is that the projects in which students are deployed represent authentic problem contexts, i.e. real problems that are relevant for the company. In special cases this goes so far that students develop their own business ideas as *intrapreneurs* in teams, which they then further develop for the company and which, carried to business maturity, can then form the company’s own new or further developed products. Students are also involved in the development of future topics by analysing and developing business strategies from their perspective, developing cases on how the company can deal with new topics on the market. An example of this is a student project group that thinks about the topic of blockchain as a business area.

II.3.3 Creativity in Distributed Teams

In the interviews with a globally leading technology group, the experts point out that it is important for an organisation to develop expertise on how complementary competencies of individuals can be put together in teams as “shared expertise”, e.g. in departments or project teams – sometimes even worldwide. The approach is based on the fact that the *Future Skills*, increasingly important in the future, cannot be equally well-developed with all employees, but that from the point of view of the organisation it is important to have a complete spectrum of competencies distributed within a team as far as possible. The focus is not only on the ability to implement projects or expertise to overcome defined challenges, but also on the compilation of employee profiles that lead to a maximum degree of *shared creativity* as joint creativity within the team. In many cases, the teams are distributed all over the world and only work together for a short time. From the point of view of the organisation, the point is that the existing competences and experiences must be known and documented. Establishing such talent management is a comprehensive task of human capital management (Ehlers et al. 2003) and only possible for organ-

isations that have implemented a particularly high level of maturity in personnel management. This also includes a high degree of formalisation of competences and competence requirements. In addition, the support of creativity is located exactly in the field of tension between formalization and informality, which it as an organisation explicitly has to build up – and which is rather over-structured by rules and categories of HCM systems and thereby hindered.

II.3.4 Flexibilisation and Self-Organisation

In all surveyed organisations, learning and working take place in contexts that allow flexibility in workflows, roles, function descriptions and definitions. Examples include the organisation of working time on the shop floor or the abolition of working time regulations (for a large pharmaceuticals company). In a participating organisation of the *Future Skills* Study, the principle of self-organisation in working time regulations was introduced in all branches throughout Germany. Employees can design their duty rosters in consultation with each other without having to obtain approval from superiors. What sounds so simple here is an enormous challenge for very heterogeneous contexts and employees, which requires precisely those *Future Skills* that are regarded as keys to the future working world, namely self-organisation and meta-competencies.

II.3.5 Creating Space, Changing Perspective, Enabling Innovation and Creativity

How do you get the members of an organisation to think outside the box and develop suggestions for new products, new business ideas or production processes? How to build on the intelligence, experience and perspective of all members of the organisation to reflect the position of a company/organisation and to consider starting points for a positioning in ten years?

The case of a world market leader in the medical devices sector shows how this could work. The organisation has initiated an internal competition for this purpose. All members of the company were invited to submit suggestions to the management on what a new corporate strategy could look like; products, market placement, future strengths, USPs for the coming decade were in demand. The special: Each submission could also be explained in a short oral session. Everyone's been heard. From all the proposals, some were selected that were particularly far-reaching and diverse. Those who had brought them in were then sent into a

seven-week retreat as a team. In seven weeks, they were given the task of developing the best future strategy possible for them in a working environment for which the management had rented extra offices. The highlight was that they should all work together on this future task: people from very different areas of the company, with very different perspectives and ideas, who were all able to work together on this major project. The latest research on the topic of innovation and creativity clearly shows one thing: Detaching oneself from work contexts and coming together in new social constellations promotes divergent thinking and thus contributes to creativity (Bezmen et al. 2015).

II.3.6 Self-Regulated Learning

A large pharmaceutical company has developed its own innovative approach to strengthening learning skills. Traditionally, new employees and managers in the organisation were offered various standard training courses, some of which were compulsory and some voluntary. The question then was, how to get from this receptive mode into to an active learning situation? How does one get from the reception mentality into a self-responsible learning process? The organisation recognised that it would not make sense to pretend to provide an all-inclusive learning offer for every single employee, as learning has become the key to future organisational design. The contexts in which employees want, should and are able to learn have become too individual and diverse. Therefore, a new concept was developed. In cooperation with a University of Education, the company discussed concepts for self-organised learning and how these could be introduced and strengthened in the organisation. A radical change has been initiated, away from the structured presence in continuing education towards self-responsible learning via e-learning in virtual worlds. Employees were offered rich learning worlds rather than defined requirements. Initially, twelve modules were developed and made available to the employees. They were able to choose from them according to their needs, what was right and appropriate for them – measured against their respective context. More and more modules were developed, and a rich learning world was created, which is now available to the different target groups. The future lies in the fact that it is no longer centrally determined and controlled who learns what and when, but in the fact that employees themselves are increasingly becoming the managers and designers of their own learning experiences. Only they know what they need to strengthen their professionalism and what knowledge and skills they need to develop their own are of responsibility. Managers take on a new role, creating freedom and structures for self-responsibility and self-organisation. Experience has shown that

managers must be encouraged to coach employees on their way to more personal responsibility and to create flexible work situations in order to enable learning.

II.3.7 Empowering Personal Growth

Future Skills cannot (only) be learned cognitively but have to do with the development of personalities and strengthening professionalism. The fact that the future of competence orientation in organisations is relevant is also shown by the example of personnel and organisational development offers, in which the aim is to strengthen one's own personality. But how does that happen? How can employees strengthen their own self-confidence? In fact, targeted coaching measures are required that lead to more self-organisation ability, autonomy and the ability to act, especially in contexts in which employees have to deal more and more with uncertainty and ambiguity. In these contexts, they have to make decisions and take responsibility in situations of incomplete information availability – often a difficult undertaking. How do you strengthen their self-confidence?

For instance, an organisation participating in the *NextSkills* Studies conducts theatre workshops with employees for this purpose. The participants, who are on stage for the first time and master their part there, experience situations in which they not only experience themselves in a completely new and different way, but also their colleagues. If in everyday life it is perhaps a matter of hiding what is perceived as a personal weakness from colleagues, on stage it is a matter of showing oneself, even and especially in all incapacity. All are in the same boat for the time being. For probably most people the stage experience in the theatre workshop is a new, a reference experience. As a trainer and coach, the aim is to make it clear that it is not brilliance or absolute ability that counts but learning and development that enable you to get involved in the situation. If this is internalized, employees – so the idea – will be able to master all new challenges together in teams, disclosing their strengths and weaknesses.

Other organisations also rely on group experience and group dynamics. It is often a matter of bringing together exactly those in organisations that have nothing else to do with each other, i.e. acting across departments or business units, often in completely new and external environments. This ranges from weekends in the monastery to a visit to the climbing park. Self-confidence, self-competence and a strengthening of self-worth as well as autonomy and performance motivation are the *Future Skills* of which the development is at the forefront of these trainings.

II.3.8 Making Space to Learn

Development needs freedom, needs recognition and the knowledge that one's own commitment is well received and that design proposals can be implemented. One of the organisations participating in *NextSkills* lives this as a practical reality, taking their employee suggestion scheme seriously. Employees can contribute their ideas online and then gradually implement them through participatory selection processes. For example, suggestions are made as to what the factory site of the future might look like. It is then a question of whether the site can also be opened to a part of the public in order to bring the population closer to what is being researched and produced there, or simply to be more integrated into the community, the district, the cityscape. The identity of the individual employees with their actions within their organisation can thus be further strengthened. For example, can a restaurant be opened on the factory premises? Does it make sense to open a laundry for the factory employees directly on the factory premises? The Change Agents, whose larger and smaller proposals are selected for implementation, are given leave to put them into practice. The example shows that *Future Skills* are not stand-alone in order to be effective, but are ideally supported by an open, employee-oriented management concept. These must be tried out and implemented in order to design the organisational structures, processes and the entire organisation in such a way that the future of work, with a high level of identity and freedom for creative rethinking, becomes possible.

II.3.9 Participatory Strategy Development

A final example – this time from the academic world – shows what real participatory design of future organisational strategies can look like and why these are important. Dublin City University in Ireland was undergoing deep restructuring in 2017. In this situation, the president was tasked with developing a new five-year strategy. The university committees insisted that this should be done with the maximum involvement of all participants in order to increase acceptance and assertiveness – and not run the risk of creating a bureaucratic paper tiger. Ten strategy groups were set up to develop future drafts on ten different topics. The core of the strategy development, however, was named “FUSE”. FUSE was a crowdsourcing initiative of Dublin City University to develop key ideas for the university's future five-year strategy – together with all stakeholders of the university. FUSE is conceived as a brainstorming event in which all 17,000 students, 80,000 alumni and 1,200 university members had the opportunity to contribute their ideas online – for 30

hours. The FUSE event was opened by Richard Bruton, TD, Minister for Education & Skills together with the university president. There were debating sessions for students, staff and lecturers, sleep-ins in the university library and live broadcasts of all university campuses, online TV interim summaries and online connections of university partners, local politicians and companies. Over 7,500 posts could be collected in this way. These have been clustered, duplications unified, paraphrased and merged into thematic clusters. Various teams worked out key messages so that the university management could be presented with a rich picture of clear thematic priorities for the future strategy. It is a hallmark of future organisations to allow participation in design processes. The main aim is to increase the identification of the organisation members with their organisations – not only in the world of work, but also in the world of education and schools.

In universities, this reverses the direction of development. Whereas students have so far been the instructed entities, learning at fixed times on the basis of fixed curricula, in future it will be a question of interviewing them and asking them to submit their suggestions for university development. Where do you want to go? What are the important issues of the future that need to be taken into account? What services are required? And how should studying be experienced? Participation and the organisations' members' involvement enable design processes. However, they also promote personal responsibility – as a prerequisite for self-organisation – and make employees aware of their responsibilities. Organisation will no longer be experienced as something externally given, structures that are in a sense inevitably present and into which everyone must insert his own creativity and imagination, but it is in fact the structure that can be influenced through participation – a structure one is also co-responsible for.

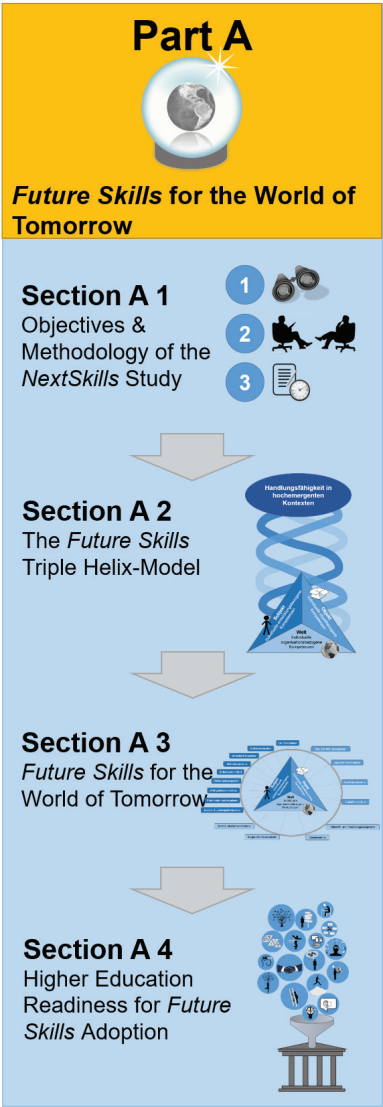
The design of shared responsibility structures is one of the greatest challenges in the future world of work. It is the most important link in the chain: participation – influence and identification – self-responsibility – self-organisation. It has an influence because members of an organisation want and need to develop. Freedom, personal responsibility, the ability to communicate, to participate, all these are at the same time characteristics and results of the new culture of working and learning.

Part A

Future Skills for the World of Tomorrow

#in-a-nutshell

Part A is dedicated to the development of the 17 *Future Skills* profiles and the underlying *Triple Helix-Model*. Chapter A 1 Objectives & Methodology of the *NextSkills* Studies first describes the methodical study design of the *NextSkills* Studies and shows how they build on each other. Chapter A 2 The *Future Skills Triple Helix-Model* develops the basic foundation for the concept of *Future Skills* and elaborates a theoretical framework for *Future Skills* routed in education sciences. Most of today's existing approaches to *Future Skills* are limited to describing future relevant skills – mostly in list form. The *NextSkills* Studies aims to go beyond such summative approaches and provide a theoretical architecture for *Future Skills* with the ambition to explain the nature of *Future Skills*. The so-called *Triple Helix-Model* of the ability to act in emergent practice contexts incorporates basic reference points of the *Future Skills* concept and education theory. The model is based around three shifts, three major changes in the basic structure of the working world today, to which *Future Skills* are a reaction. Within the larger frame of research on *Future Skills*, the *NextSkills* Studies with its *Triple Helix-Model* for *Future Skills* is the first study ever to offer such a far-reaching theoretical frame of reference for *Future Skills*. In Chapter A 3 *Future Skills for the World of Tomorrow*, the seventeen *Future Skills* Profiles are elaborated in detail, defined and described. In addition, Chapter A 4 Higher Education Readiness for *Future Skills* Adoption analyses the results of the international *NextSkills* Delphi Study on the maturity of current higher education in terms of its readiness to absorb the *Future Skills* approach and support the development of *Future Skills* among students.



Objectives & Methodology of the *NextSkills* Studies

A 1

The *NextSkills* project consists of a series of studies around the theme of *Future Skill* demands. The aim of these *NextSkills* Studies is to take up the different strands of research on the topic of *Future Skills* and to investigate empirically how these can be harnessed for universities. A methodically sophisticated design was conceived for this purpose. In this study, skill developments, requirements and needs for future competences from the practice of organisations are collected by analysing extensive qualitative interview data through inductive approaches. The results, indications of *Future Skills* and demands on future higher education, were then validated by international experts from science and business. The combination of different methods and different perspectives pursues the objective of obtaining data of greater reach and precision, thus enabling the formulation of skill constructs with greater depth and content.

A 1.1 Research Objectives

The study is based on the insight that organisations and the world of work are changing. For certain areas descriptions and analyses are already available, which were merged into one single framework for the first time through the *NextSkills* Studies, focusing *Future Skill* requirements. They are documented in Chapter B 2 Foundations of the *Future Skills* Revolution: The Theory of *Future Skills*, Chapter B 4 *Future Skills* for Future Organisations: An Analysis, as well as Chapter C 1 Ten Seconds of the Future of Higher Education.

The constantly changing contexts of work, life and learning cause that actors in organisations must constantly develop and make adjustments in order to continue to act in a successful manner. This consists in constantly developing their capacity to deal successfully with uncertain, complex situations, i.e. to build up compe-

tences (Erpenbeck et al. 2017). Updating expertise is no longer sufficient. From the analysis of the existing literature there are indications that the organisational change to agile, networked, team-oriented organisations with flat hierarchies and participation-oriented management structures has an explicit idea of a type of employee who, among other things, possesses *Future Skills*. On the basis of the literature study, it was initially assumed that these were marked by the following characteristics, among others:

- a high degree of self-efficacy,
- Ability to learn independently and autonomously,
- a high degree of self-organisation in relation to one's own work,
- Reflection competence on your own positioning,
- Communicative competence to articulate one's own goals and needs.

These characteristics therefore formed the starting point for the initial qualitative investigation, in which it was further asked which of these and other aspects

1. are perceived as important and relevant,
2. are implemented and supported by explicit and describable measures, and
3. where barriers and obstacles exist and how to deal with them concerning future competences requirements.

The aim of the study was to use explorative, qualitative approaches to identify an inventory of those competences in particular that are of importance to individuals in coping with tasks and designing environments in highly agile fields of work. Secondly, it was about determining which methods and procedures are suitable from the point of view of those responsible for the organisation as well as from the point of view of students in organisations in order to promote these skills among employees⁶. Thirdly, it was about identifying what role higher education Institutions can play in this. Figure 2 shows that the study focuses on three specific questions:

1. Which skills are necessary for this and how can these be formulated in terms of competence theory (*Future Skills*)?
2. How can employees be successfully supported in this?
3. And how can higher education Institutions support these skills already during studies?

6 In addition to those responsible for human resources and organisation, students were also included in the interviews during their practical phase.

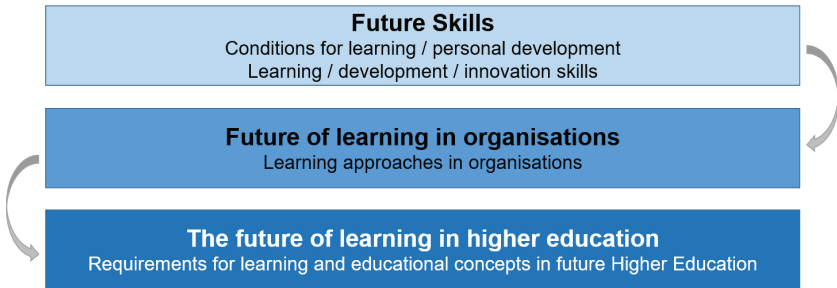


Fig. 2 Research questions of the *NextSkills* Studies

The empirical study concentrates on so-called *Future Organisations* (see Chapter A 1.3.1 Step 1: Identification of Future Organisations). These are organisations that have already expressed explicit, elaborated and developed concepts of human resource development and an explicit understanding of the promotion of empowerment among their members. In order to identify these, organisations were first selected within the framework of a competition on the topic of *competence-oriented study concepts* through criteria-based expert evaluations.

A 1.2 Methodological Framework

The combination of qualitative and quantitative data follows the concept of triangulation, on which the study is based as a methodological guiding concept. Triangulation is the combination of different methods, different researchers, research groups, local and temporal settings as well as different theoretical perspectives in the investigation of a phenomenon (cf. Denzin 1978). The prerequisite for such a multidimensional research orientation is to regard *quantitative* material and *qualitatively* determined interpretations as basically equal.

Denzin (ibid.) is one of the first to point out that a method triangulation in the investigation of the same object of research by different methods emphasises validity by identifying congruent results.⁷ In contrast, the criticism of Denzin's approach by Wilson (1982) and later Lamnek (1988) has pushed the validation aspect into the

⁷ The principle of triangulation originates from land surveying, where the exact position of a point is usually determined by measuring from at least two different positions.

background (cf. Sohr 1997). Since then, the results of triangulatively collected data have been seen as *complementary*, i.e. mutually adjuvant. The original intention of Denzins (1978) to achieve more reliable and valid results with triangulation than with the application of a single research method (“integration thesis”, cf. Treumann 1998 or “convergence model”, cf. Kelle & Erzberger 1999) has thus been replaced by the insight that method triangulation is capable of providing broader and more diverse insights into the phenomena studied (“complementarity thesis”, cf. Treumann 1998).

Sohr (1997) explains that Denzin (1978) distinguishes four types of multi-methodological approach: data triangulation (use of different data sources for analysis), observer triangulation (use of different researchers for data collection), theoretical triangulation (application of different theories to the same subject) and eventually method triangulation. This can be applied as “within-method” (e.g. different scaling methods within a method setting) and as “across-method” (as the use of different methods to apprehend the same object of investigation). The aim of the procedure is always “that the sociologist should examine his problem from as many methodological perspectives as possible.” (ibid.: 297)

Erzberger (1995) vividly compares a study that tries to establish a connection between quantitative and qualitative survey methods to the construction of a ladder,

“[...] where the two rails represent the different methods (standardised survey and open interview) and the results produced by each of them, connected by rungs, which means – provided the ladder shall be solid – they must be anchored in both rails. The question of exactly what the rungs look like, whether they – transferred to the research process – require their own survey steps and where they are used in the process can only be answered based on theoretical preliminary considerations and the research question. This research question, encompassing both qualitative and quantitative party of the survey, thus forms the glue that binds the individual parts of the ladder and makes it accessible. (ibid.: 43f.)

The research design of the *NextSkills* Studies (see Figure 3) is designed according to the methodological guiding principle of triangulation as a combination of qualitative and quantitative methods (see Figure 3 and Figure 4). By linking the two method categories, a broader, more diverse and deeper understanding of the subject area examined shall be obtained than by using only one single method (according to the “complementarity thesis”, cf. Treumann 1998: 162, Ehlers 2003 and 2004). In this survey, the concept of triangulation is anchored as a guiding concept in the study design.

According to *data triangulation*, both data and results from expert discussions, qualitative interview data in organisations (face-to-face interviews, different target

groups: expert interviews, learner interviews), data from interviews with experts for validation and data from the two-level *NextSkills* Delphi are triangulated and used to analyse an object: The development of *Future Skills*, the definition of learning methods, processes and concepts and the identification of starting points for the development of future higher education. In the sense of *theory triangulation*, the following theories of educational research (on the structural concept of education, see Meder 2006), competence research (definition and operationalisation of competence according to Erpenbeck et al. 2007), organisational research (on emergence Haken 1991 and on self-organisation Haken 2008), and Bronfenbrenner’s ecosystemic approach (1976 and 1981, on the use of the ecosystemic model approach in empirical social research see Epp 2018) were used to examine the subject of *Future Skills*. Finally, in line with method triangulation, different qualitative methods are linked with quantitative methods – both in data collection and in data analysis (“across-method”).

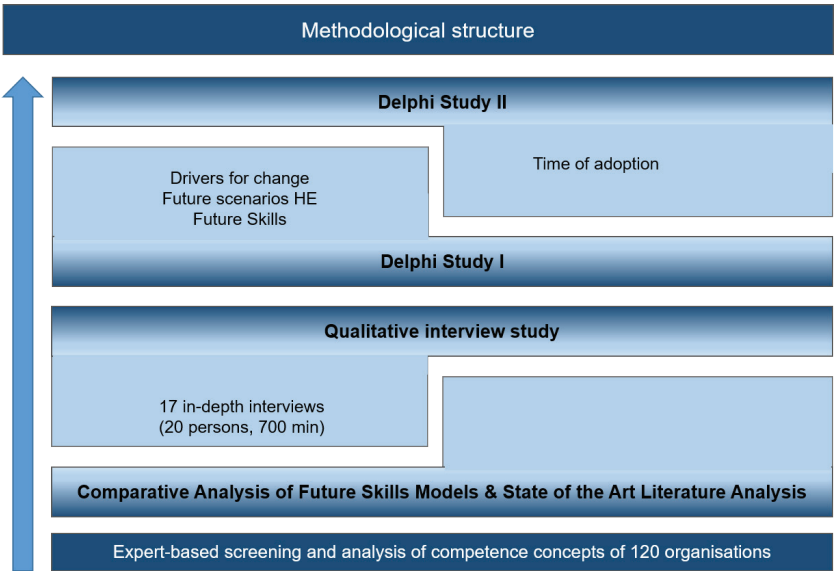


Fig. 3 Methodological design of the *NextSkills* Studies

A 1.3 Research Design

The *NextSkills* research project aims to analyse which skills are needed for a productive and proactive design of future work contexts in order to derive requirements for higher education institutions (see Figure 3).

A 1.3.1 Step 1: Identification of Future Organisations

In a first step, it was necessary to identify organisations that already had explicit experience in implementing competence models, presenting *Future Skills* and a high degree of maturity in designing future work contexts. For this purpose, so-called *Future Organisations* were identified, having developed suitable contexts as an empirical field for determining *Future Skills*. The selection procedure took place in 2015 as part of a competition in which more than 8.500 partner organisations of the Baden-Wuerttemberg Cooperative State University were contacted and had the opportunity to present their concepts for human resource development and, in particular, their concepts for mentoring and coaching students. 124 organisations took part in the competition.⁸ All submitted concepts were evaluated within the framework of a criteria-based expert rating. The criteria for selection related in particular to the analysis of the support for competence development and international experience in the submitted concepts. The resulting ranking was then discursively validated by 15 experts in an expert discussion and 20 organisations were shortlisted. All 20 organisations were invited to participate in the *NextSkills* Studies, 17 responded positively and were included in the interview panel. The interviews took place between December 2016 and June 2017.

A 1.3.2 Step 2: Qualitative Interview Study

For the interview study, guiding questions were developed, which were used for orientation within the framework of an open, unstructured, problem-deepening interview and focusing on the following aspects:

8 The competition was organised in cooperation with the Baden-Wuerttemberg Cooperative State University, the Ministry of Science, Research and the Arts Baden-Wuerttemberg and the employers' association Südwestmetall and was advertised as the "Dual Partner Award".

- Question 1: Please tell me about your view how learning will take place in organisations in the future and which role self-directed and self-organised, autonomously initiated, self-responsible learning and self-efficacy will play.
- Question 2: Please tell me your view on learning and the way it is (really) happening according to your experience.
- Question 3: Please tell me what measures you take in order to support employees in this.
- Question 4: Which measures, methods and learning models are suitable?
- Question 5: Please tell us what you expect from a higher education institution as a partner in the (preparatory) development and support of the competences of staff?

Participants in the interviews were the organisations' human resource managers and in some cases some of their dual students. A total of 17 in-depth interviews were conducted, in which 20 persons took part and which led to about 700 minutes of qualitative interview material. The interviews were transcribed literally and independently coded by two researchers using the inductive coding technique (Mayring 1996; Thomas 2006) and the MaxQDA software (VERBI Software 2017). Passages that had not been uniformly coded were discussed in a second step in order to establish solid interrater-reliability. The aim was to extract constructs from the interview data enabling to reconstruct conditions, contexts, values as well as processes and dependencies for *Future Skills* prospectively considered important for individuals. In addition, constructs were analysed that provided information about the changing working and learning conditions in current and future working and learning contexts. This approach made it possible to determine dimensions of important future abilities, to determine their internal relationship and to compile *Future Skill Profiles* on the basis of their substantial proximity to one another. In the same way, the analysis process allowed the reconstruction of conditions predicted by the respondents for future changes in organisational processes, as well as the location of organisational reactions in order to balance the resulting tensions. At last, expectations and expressed demands on academic qualification systems, such as university partnerships, i.e. cooperative and dual studies, could be gathered and compiled. This provided insights into the different dimensions of change within organisations triggered by digital and networked global collaboration processes and outlined a number of potential scenarios for future higher education. A small sample of a total of three further interviews was used to qualitatively validate the constructs obtained and the main statements as well as the *Future Skills* determined.

A 1.3.3 Step 3: International Delphi Study

In order to further refine and validate the qualitatively acquired results, a Delphi Study was conducted with an international expert panel. The Delphi Study (for Delphi methodology, see Dalkey & Helmer 1963) entitled “*Future Skills – Future Learning and Future higher education*” (Ehlers & Kellermann 2019) comprised two inquiry rounds (see Figure 4). 53 international experts from various organisations and institutions were invited to participate in the study. They worked in universities, as researchers in the field of pedagogy, in networks dealing with topics related to learning, digitisation of higher education teaching and skills development or in non-governmental organisations (NGOs) (ibid.). Particular attention was paid to taking both perspectives – those of the higher education institutions and those of world of work and practice – into account in the selection of experts. In addition, it was paid attention to including experts within these two sub-samples who occupy different positions within their organisations. This was done in order to ensure that maximum differentiation and plurality prevailed with regard to different opinions on the topics – the future of learning, skills and higher education – in order to reflect the full range of experiences and opinions and to avoid *blind spots* to the extent possible. A total of 49 experts took part in the first round and 40 in the second round, from a total of seventeen countries (Australia, Austria, Belgium, Canada, France, Germany, China, Italy, Lithuania, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom).

The Delphi Study was conducted in two consecutive rounds, with the second round being conducted four weeks after the first round. In the first round, the focus was on consensually sharpening concepts, definitions and terminology on the basis of the sample’s assessments and clarifying their importance. In the second round, experts should then assess how quickly the components specified in the first round would become relevant in the higher education context.

Figure 4 shows the structure and logic of the questionnaire, the different thematic components of the individual survey waves and how they build on one another. It was central in both waves to inquire about the participants’ views on capacities, processes, strategies, skills and competences which future employees need in order to be able to deal with the constantly and ever faster changing organisational realities of the future in a productive manner. The sample’s qualitative comments as well as the assessments of the relevance were analysed and entered the second survey wave of the Delphi in the form of improved and reformulated, sharpened statements (round 2).

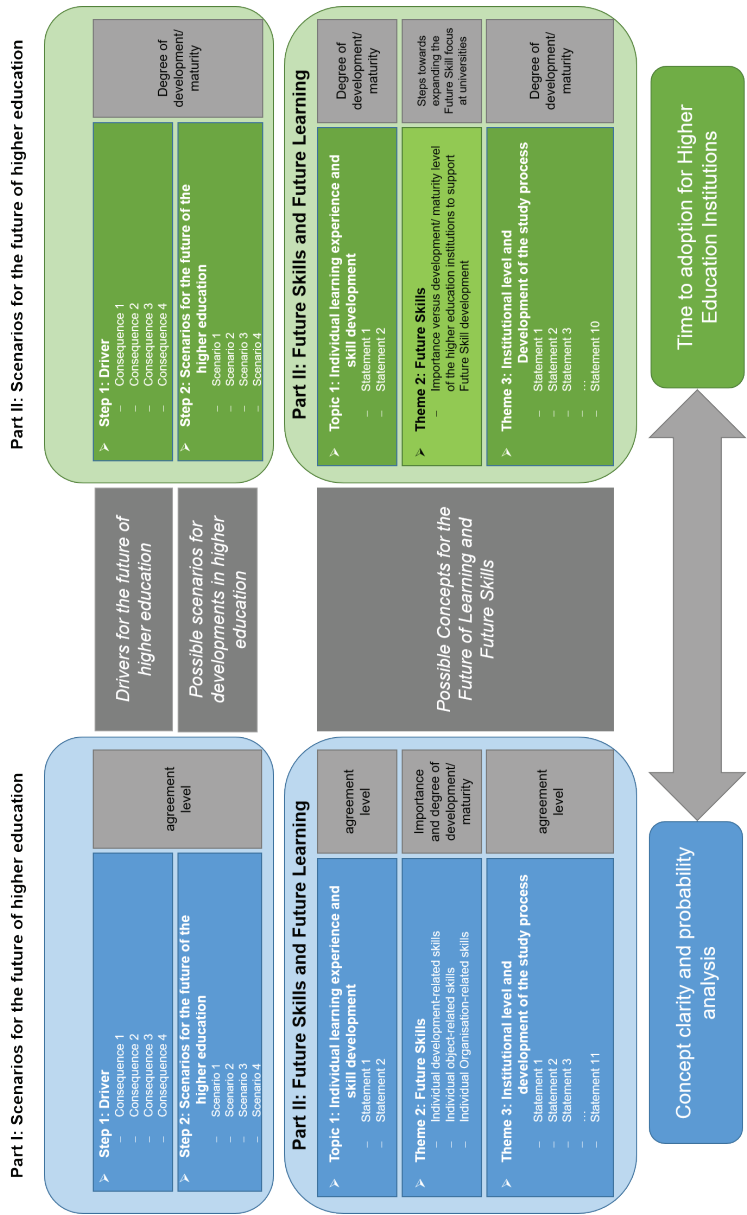


Fig. 4 Design of the Delphi Study I + II (Source: Ehlers & Kellermann 2019)

For the exploration, definition and validation of *Future Skills* qualitative and quantitative methods and studies have been included into a triangulation of different methods, theories and data sources in order to allow the richest possible reconstructions of *Future Skills* and the conditions they create. The main aim was to discover the genuinely new of what makes *Future Skills* emerge.

In addition to identifying individual *Future Skills*, the data analysis also made it possible to identify the factors underlying the *Future Skills*. Moreover, the data show the absolute necessity of continuous learning in order to master the constant adjustment process with which employees become and remain capable of acting in highly emergent contexts of *future organisations*. These are precisely such organisations which already have a well-developed and explicitly formulated understanding for the promotion of the capacity to act. The results allow conclusions to be drawn about the individual abilities and skills which form the capacity to act in present and future challenges of society and the working world alike.

In addition, the data also allow a model-like reconstruction of the conditions in which *Future Skills* emerge. The aim was to identify systematic changes and correlations that have a fundamental and systemic effect in organisations and lead to those new requirements that we call *Future Skills* here. Due to its three-pole structure, we call the resulting model the “*Future Skills Triple Helix-Model* of Capacity to Act in Emergent Practical Contexts”.

A 2.1 The *Future Skills Triple Helix-Model*: Capacity to Act in Emergent Contexts

First, it must be noted that *Skill* and competence is a term that always expresses a relationship. Skills gain meaning by relating something. *Communication*, for example, initially consists only in the production of sounds that often represent language, but which in themselves do not designate *communication skills*. Only the very speech act, that is, entering into a relation to a situation or other person by means of language, makes a form of expression necessary, which we can then perceive or describe as appropriate or capable. *Communication skills* are therefore not meaningful from their pure course of action at first. A person's ability to communicate in a *skillfull* way in relation to something or someone only gains meaning through the context in which they act. Moreover, to follow this example, the direction of communication is not always towards another person, such as a dialogue partner. Communication can also express a relationship to oneself and one's own position or to a certain object – such as a discourse about a certain subject matter area.

Three such relations can be reconstructed in the empirical data of the *Future Skills Study*: An actor can develop *Future Skills* in relation to her/himself, can develop them in relation to dealing with a task, a topic or an object s/he is working on, or in relation to an organisational environment, i.e. the social system. In the reconstruction of the data and with recourse to the epistemological position of the subject-object split and the distinction of the object-, material world into a representational and a social world, we attribute to it a subject-, object- and world (social/organisational) reference. The result is a tripartite division, a threefold relation, with each of its three parts (or dimensions) being in relation to the other. In highly emergent contexts all three dimensions and their inter-relations are determining the performance of individuals. Due to the close interrelated integration of all three dimensions, we refer to this concept as the *Triple Helix-Model* of *Future Skills* or the *Future Skills Triple Helix-Model*, alluding to the biological concept of DNA, and its helix structure. The concept allows the formal description of actions in highly emergent contexts. An individual's capacity to act therefore depends on his/her inner subjective constitution in relation to their action; it also depends on the perceived individual concept of his/ her ability to act regarding a task/ the object of action; and it depends, thirdly, on the relation of the acting individual to the social dimension regarding the context of his/ her action. All three relations are related to each other. This means that performance in a context in which *Future Skills* come into play is the result of an interplay of the described tripartite structure.

This structure allows to identify an internal composition within the *Future Skill* constructs. It allows a classification of *Future Skills* with regards to the dimension to which it refers. In answer to the question of whether it is rather a subjective, self-related skill (e.g. self-directed learning, self-competence), a skill related to an object or a task, or a skill related to the social, organisational environment, the *Future Skill* profiles which have been found through the studies can be divided into three areas and differentiated within them. For this, the direction of the relation – whether it is related to a subject (individual to himself), object (individual to a certain object, for example a task) or the environment (individual to social environment) – serves as the classification criterion (see Figure 5):

1. Relation of an individual to her/himself in the present, past or future (subject or time dimension),⁹
2. Relation of an individual to a specific object (object dimension) or
3. Relation of an individual to a person or a group in the world (social dimension).

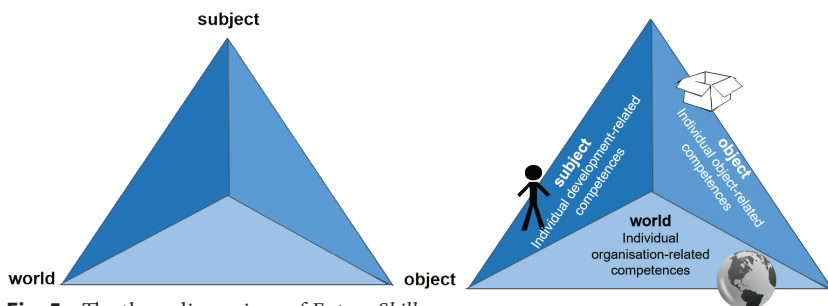


Fig. 5 The three dimensions of *Future Skills*

⁹ The term “time dimension” goes back to the fact that subjects can only perceive themselves in time, i.e. in relation to something past, something just passing, or something imagined for the future.

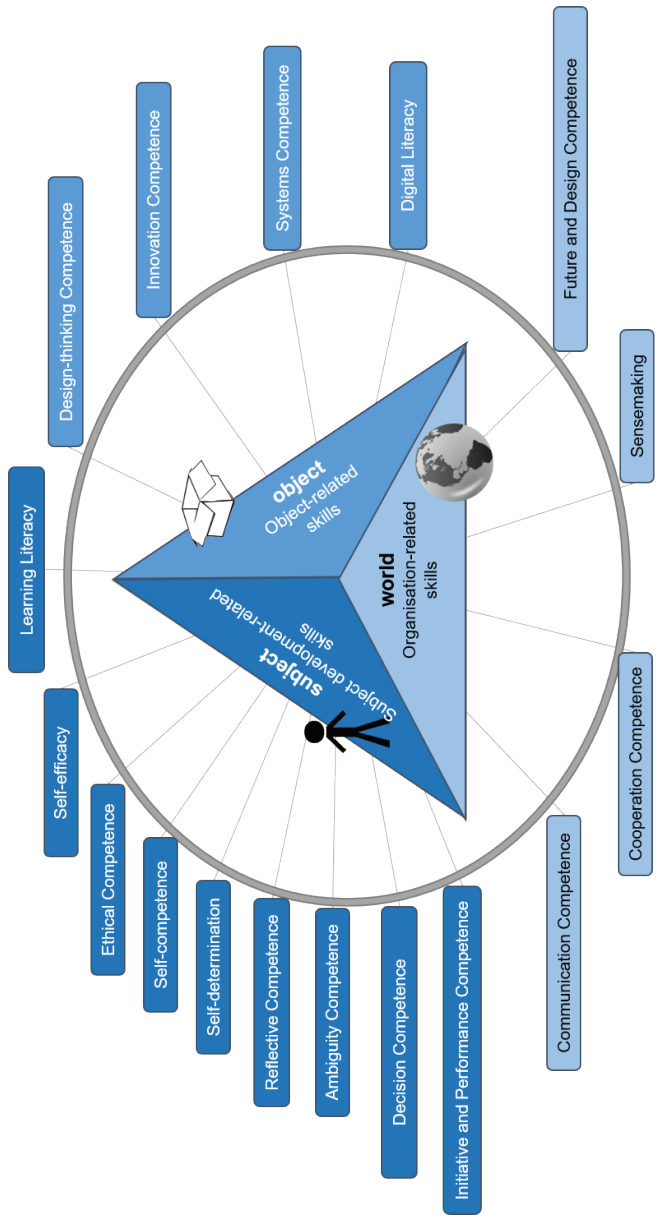


Fig. 6 *Future Skills* overview – allocation to three dimensions

This tripartite division is deeply anchored in the philosophy of the educational sciences (e.g. Dewey and Bentley in his essay “Knowing the Known”, Dewey & Bentley 1949), but its topicality can be traced back to Meder (2007, also Roth (1971)), who establishes a fundamental, constitutive structure for *education* as a structural tripartite relationship. For the *Future Skills* concept, this tripartite structure proves valuable. The structure can be elaborated as follows: *Future Skills* refer either (1) according to the time or subject dimension, either to individual development-related aspects of the acting subject (e.g. the ability to self-reflect on something experienced in the past or ethical competence), or (2) to the handling of an object, e.g. a topic, a task (e.g. Design Thinking Skills) or (3) to the social environment or the social context of the acting subject, e.g. the organisation in which the individual acts (e.g. cooperation or communication skills). Subject, object or world/organisational reference thus span the fields of competence in which *Future Skills* can be located. Figure 6 shows the breakdown of *Future Skills* into the various competence fields.

All three dimensions are in turn interconnected and influence each other. For example, self-reflection competence affects not only the subjective development of an acting individual, but also the ability to communicate and cooperate (social or organisational dimension) and, in turn, the system competence of an individual (object dimension). In this respect, different *Future Skills* are involved in each action (see Figure 7). The three dimensions thus form the *Future Skills Triple Helix-DNA* in which the three skill dimensions interact in concrete actions. This conceptual framework allows a better understanding of the factors that determine future capacity to act.

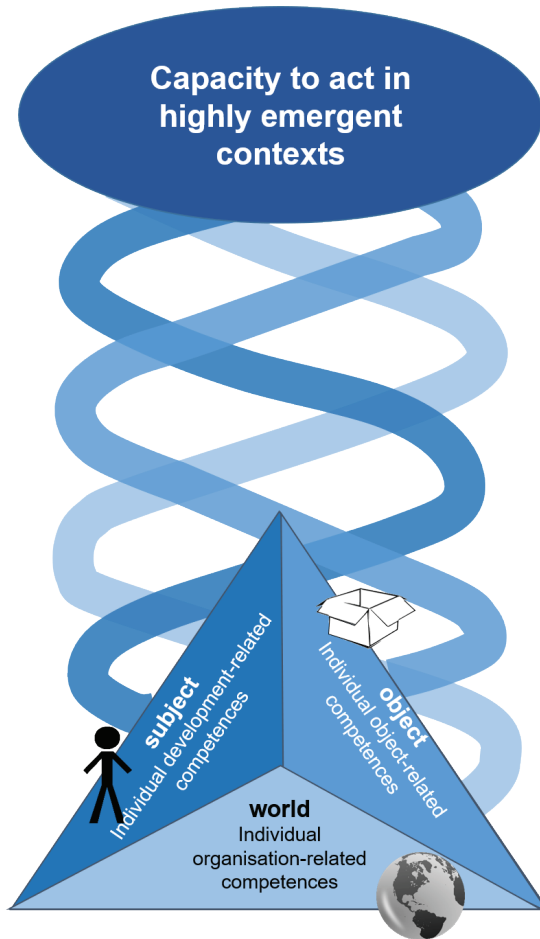


Fig. 7 The Triple Helix-Model of Future Skills

To focus on the three constitutive dimensions of *Future Skills* allows to elucidate the causes that make *Future Skills* so important. The empirical analyses of the interview data show that change processes and shifts take place in each of the three described dimensions. With these changes ongoing it becomes obvious that a change is emerging with regard to the nature of those abilities that are important for individuals and their ability to act in future work and life contexts. *Future Skill*

requirements can thus be clearly distinguished from those of the past and also partly from those of the present.

A2.2 Shift 1: From Standardisation to Self-Organisation

The concept of Voß and Pongratz (1998) on what they call “labour entrepreneurs”, of Hitzler and Honer about “assembled biographies” (1994) and of Ulrich Beck (1986) on the risk society suggests an ever-decreasing standardisation of employment biographies. This results in a stronger self-control of the individual with regard to his/her employment biography. This self-monitoring of navigation from one job to the next, but also from one position within a profession to the next, or from one profession to the next, is also reflected in the *Future Skills* data on a micro level.¹⁰ At this level, skills can be reconstructed for the internal requirements within work processes, which suggest that there is a change that requires less predetermined work structures and more self-organisation. This emphasis on self-competence is expressed in the reconstruction of the data, in which respondents stress that contexts of action in organisations are changing ever faster, both structurally (in the organisation) and in terms of content (in the area of responsibility) and socially (in the environment). It becomes clear that individuals will have to make ever stronger individual adaptations to new contexts of action. These are often the result of emergent processes and are difficult to plan or predict. The necessary skills, which are required by the respondents as *Future Skills*, have the task of making this adaptation performance possible. It becomes clear that a productive-anticipatory approach to changing contexts of action is becoming increasingly important, so that compensatory measures are not in the foreground, which aim to restore the

10 Nachtwey (2016) describes change in the labor market as follows: For employees, the normal employment relationship was associated with predictability of their life course and relative social security. At the beginning of the 1970s, only around 10% of employees worked part-time. Whereas in the 1970s the secure normal employment relationship dominated the economic scene, in Germany in 2011 only 28% of West German employees were employed in private companies with sectoral collective agreements (Gundert & Hohendanner 2011). In 1998 the figure was 39% (ibid.). In addition, in some sectors the subcontracting and temporary employment relationship has changed from the exception to the rule. In the food industry, only every tenth employee in Germany currently has a regular employment contract (ibid.). However, the deregulation spiral is also turning in the higher-skilled segment, with consequences for employees. Especially for IT specialists, the number of service contracts is increasing and the practice of crowdworking in the software and automotive industries is increasingly displacing defined activities (ibid.).

capacity to act, for example in the event of a loss of capacity to act due to changing contexts of action. Rather, the aim is to enable actors to participate productively in shaping new contexts for action in the course of change processes. *Future Skills* have the objective of empowering actors to act in a self-organised way. So-called self-competences such as self-efficacy, self-determination, self-competence, reflection competence and self-directed learning enable individuals to productively perform the necessary adaptation processes in highly emergent contexts.

A 2.3 Shift 2: From Knowledge to Competence

A second shift resulting from the interview data is the change from the originally high importance of knowledge expertise to a more generically described capacity to act. Following Erpenbeck (2012), we define competence as the capacity to act understanding it basically as the disposition to purposefully act in complex and unknown (future) problem situations. Chapter B 1.2.3 Self-Organisation deals in more detail with the special significance of competence as a concept.

Following Baacke's et al. (1991) competence dimensions which he in turn develops from the concept of communicative competence in accordance with Chomsky (1981) and which he implements for the field of media competence, four competence dimensions can be differentiated which we use here to illustrate the shift described above. As described Baacke (ibid.) originally develops his concept for the field of media competence (based on Baacke, cited from Vollbrecht 2001: 56), however, his four dimensions can be used in a more generic sense to describe the ability to act in emergent contexts (see Figure 8):

- The knowledge dimension with an informative and an instrumental qualification dimension,
- the dimension of usage with a more receptive and a more interactive component,
- the design of something new with an innovative and a creative component, and
- the ability to criticise a knowledge base with an analytical, a reflexive (here self-referential) and an ethical component.

Over and above the realization that *Future Skills* comprise the capacity to act rather than specialist knowledge, the model allows a much more precise specification of those dimensions of competence that are pronounced in the *Future Skills* Model. In the interviews, it is clearly pointed out that *Future Skills* above all require the development of the design and critical dimensions component of the model, as

illustrated in Figure 8. In the past, individuals could confine themselves often to applying knowledge, methods and tools, but in the future, it will become increasingly important to develop new knowledge, methods and tools in an original and creative way.



Fig. 8 Shifting focus of object-related competences

A 2.4 Shift 3: From Hierarchical to Networked Organisations

A third major change relates to a generally changing organisational environment from hierarchical structure-oriented organisations to networked and more agile organisations. This change can clearly be found in the interview data: While organisations in the past were organised in clear structures and management processes, the organisations of the future will be organised in more fluid structures that are subject to faster and more fundamental changes. Figure 9 illustrates that competing poles are confronted with each other, in which the previous structures and processes of clearly defined management structures will be replaced in the future by agile processes and an enabling management.

In contrast, the traditional structure-oriented organisation will more and more be characterized by networked structures in which processes are subject to change more frequently and organisational charts and responsibilities will change more rapidly. Relationship management is becoming an increasingly important factor. The whole area of informal self-initiative is an important component of organisational success and an essential *Future Skill* without which the management of organisations will become inefficient in the future. The interviewees expressed that in *future organisations* central control approaches in organisations are less and less effective and instead participation-oriented strategy defining processes are becoming more and more important.

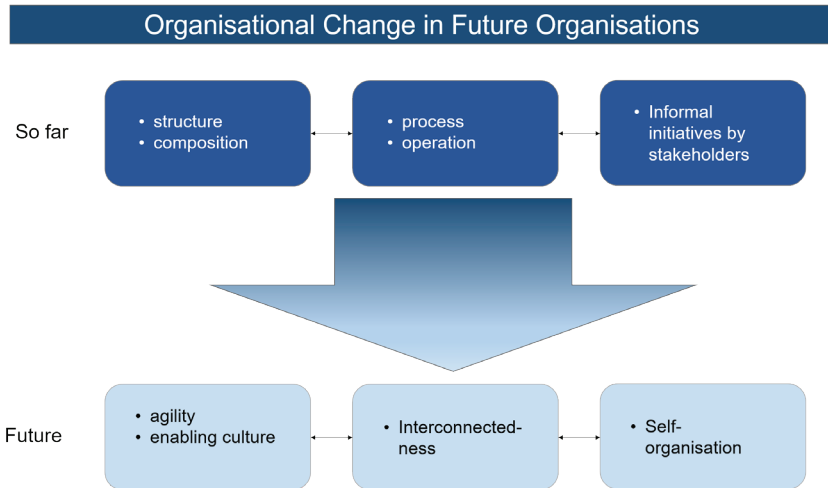


Fig. 9 Organisational change in *Future Organisations*

A 2.5 Summary and Conclusion

Figure 10 shows the three *shifts* described in a summarizing graph on the three dimensions of the *Triple Helix-Model*. All three dimensions interact with each other and are not mere expressions of isolated skill areas. Subjective aspects influence both the perspective on objective aspects and on social aspects, which in turn affect subjective and objective aspects. The *Future Skills* model presented here thus goes beyond a static model that merely defines and enumerates *Future Skills* as single items on a list.

Furthermore, although the model is based on the assumption that digital literacies will undoubtedly be an important ingredient in the future, it does by far not consider these skills to be sufficient. The real value of *Future Skills* is therefore above all in the development of personal dispositions that can enable the individual to self-organise action in a defined domain.

The *Future Skill* concept presented here is based on the following three distinct moments of theoretical reflection:

1. Skills are understood as *relational concepts*, which can be described by means of the three-dimensional structure analogous to the tripartite structural concept of education.

2. Skills are understood as *competences* in the sense of Erpenbeck (2010) and it is emphasised that competences represent dispositions to be able to act in complex, unknown future contexts.
3. *Future Skills* are understood in relation to shifts within the different components of the theoretical framework and can be described using the 17 identified *Future Skills* Profiles.

This theoretical framing anchors the *Future Skill* concept in the field of educational sciences. Instead of putting together individual *Future Skills* in list form in an additive fashion, the approach chosen here provides a uniform and precise direction for the skill terminology and allows to define exactly what is meant by *Future Skills*.

In summary, it can be stated that the *Future Skill* Model has the explanatory power to map a series of *Future Skills* using a clearly structured and describable set of dimensions:

The first *Future Skill* dimension represents the subjective (or time) dimension of the *Future Skills* Profile. This refers to the subjective, personal abilities of an individual to adapt and develop in such a way that it can productively participate in and actively shape tomorrow's world of work, life and organise itself into communities in order to deal effectively with future challenges. This dimension includes nine *Future Skills* Profiles.

1. The second *Future Skill* dimension refers to the ability of individuals to act in a self-organised way in relation to an object, task or theme. This dimension continues to conceive knowledge as central, but advocates taking it to the next level in thought and thinking it along with motivation, values and intentions. Knowledge is thus charged with a new facet, which emphasises the importance of self-organised action in diverse fields of knowledge. It is no longer just the quantity of knowledge that counts, but rather the question of how this knowledge can be used productively in order to achieve professionalism instead of expertise. This dimension combines four *Future Skills* Profiles.
2. The third *Future Skill* dimension refers to the ability of an individual to act in a self-organised way in relation to his/her social and organisational environment and society. It is emphasised that individuals have a double role to play: on the one hand, they are curators of their social member portfolios in different organisational and social spheres, while on the other hand, and at the same time, they create organisational and social spaces themselves and redesign organisational and social structures in order to make them sustainable for the future. Four *Future Skill* Profiles are grouped under this dimension.

The changed basic conditions of work and learning lead to a shift in the ingredients necessary for the ability to act successfully. In the concept of *Future Skills*, three components are regarded as essential points of reference that can be routed in a relational, structural understanding of education. The process of acquiring *Future Skills* has a threefold effect:

1. Education and learning as a process of individual development and self-education (formation of a relationship to oneself)
2. Education as a process of appropriation of a certain object, subject area or body of knowledge (formation of a relationship to an object)
3. Education as a process of development of one's own position in a community (formation of a relationship to the world).

In principle, all three elements of this educational concept are interconnected. Thus, one's own self-image, the developed self-esteem also influences one's own reference to an object or to the world and vice versa.

A shift can now be observed in future work contexts, where *Future Skills* are becoming more and more relevant: Under conditions of greater self-organisation, the meaning and goals of the three dimensions of the *Future Skills* triangle change (see Figure 10). The process of subjective development in the sense of the formation of a relationship to oneself takes on a new significance. It requires a new focus on such subjective abilities that can be described as self-organisation, self-esteem, self-competence, etc. This dimension is the pivotal issue for our understanding of *Future Skills*. The object-related dimension, on the other hand, changes its meaning to the effect that it will also be necessary in future learning and working environments to acquire knowledge about learning objects, that the appropriation of new knowledge is, however, more important. It is not so much a matter of accumulating knowledge, but rather of being able to find knowledge, to assess it, to judge it critically and to reflect again and again on the relation to one's own current state and position. From this point of view, training, further education and courses must change radically by becoming reflection laboratories (in the sense of Donald Schön, 1983), in which the focus is not on memorizing and accumulating knowledge, but rather on developing one's own (action) strategies for complex situations and the ability to reflect, evaluate and redefine subjective strategies for action.

The formation of a relationship to the organisation, as the third dimension, represents the objective that the acting subject should be able to relate to the community, the group, the social structure, the organisation and the department. Our research shows that this is a two-way process: On the one hand it challenges the acting and learning individual in new ways, since organisational structures change quickly;

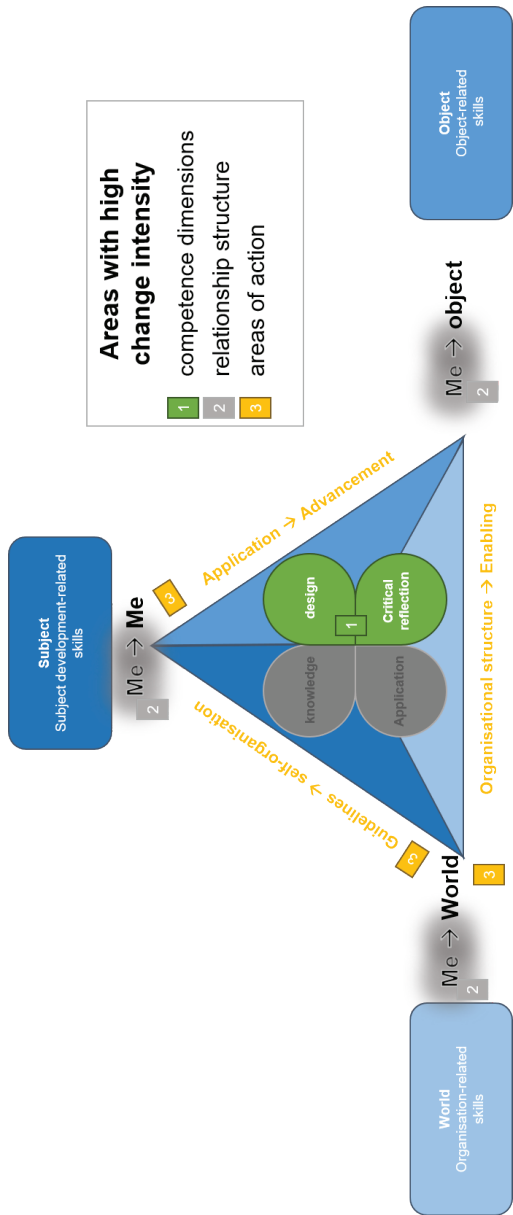


Fig. 10 Areas of change

on the other hand the organisation is under pressure to change with regard to new organisational and leadership concepts, since the understanding of organisation no longer consists of long-lasting, fixed structures which are set up in line hierarchies, but are now much more dynamic and complex based on the fact that flexible, agile individuals act in them and constantly further develop them.

Future Skills in a nutshell

The term “*Future Skills*” is defined as the ‘ability to act successful on a complex problem in a future unknown context of action’. It refers to an individuals’ *disposition* to act in a self-organized way, visible to the outside as performance.

The *Future Skills* model divides *Future Skills* into three interrelated dimensions: The first *Future Skill* dimension is the *subjective dimension* of futures skills profiles. It is relating to an individuals’ subjective, personal abilities to learn, adapt and develop in order to improve their opportunities to productively participate in the workforce of tomorrow, actively shape the future working environment and involve themselves into forming societies to cope with future challenges. It contains seven *Future Skills* profiles.

The second *Future Skill* dimension is relating to an individual’s ability to act self-organized in relation to an object (*object dimension*), a task or a certain subject matter related issue. It is emphasizing a new approach which is rooted into the current understanding of knowledge but is suggesting to take knowledge several steps up the ladder, connect it to motivation, values and purpose and impregnate it with the disposition to act self-organized in the knowledge domain in question. It is not just a quest for more knowledge but for dealing with knowledge in a different way which is resulting into professionalism and not into knowledge expertise.

The third *Future Skill* dimension is relating to an individual’s ability to act self-organized in relation to its social environment (social-dimension), the society and organizational environment. It is emphasizing the individual’s dual role as the curator of its social portfolio of membership in several organizational spheres and at the same time having the role of rethinking organizational spaces and creating organizational structures anew to make it future proof. It contains an array of five skill profiles.

Higher education of the future must be oriented towards the teaching of *Future Skills*. This is shown by the results of the *NextSkills* Studies. Based on in-depth interviews of the experts involved worldwide and their evaluation, 17 skill profiles were constructed that are of significance for future university graduates. Each skill profile consists of a bundle of individual competences – so-called reference competences – and is described in this chapter as a *profile*. Skill profiles are, as it were, clusters of future-relevant skills. In line with the three skill dimensions introduced above they are divided into three fields of competence.

At the same time, the study is the empirical basis on which the *Triple Helix-Model of the capacity to act in emergent practice contexts* was constructed (see Chapter A 2 *The Future Skills Triple Helix-Model*). *Future Skills* are part of the *Future Skill Turn*, which the higher education institutions of the future necessarily have to take. They mark a *turn* towards higher education that no longer focuses on the function of *preparation through knowledge transfer*, but supports students in the development of *Future Skills*, i.e. *disposition and willingness to act* for dealing with complex, unknown problem situations through reflection, values and attitudes (see Figure 11). *Future Skills* are defined as follows:

- **Definition:** *Future Skills* are competences that allow individuals to solve complex problems in highly emergent contexts of action in a self-organised way and enable them to act (successfully). They are based on cognitive, motivational, volitional and social resources, are value-based and can be acquired in a learning process.

If *Future Skills* are formulated in terms of competence theory, it becomes clear that *Future Skills* are competence constructs with special content profiles (see Figure 11). These are profiled in such a way that they enable individuals to act in highly emergent contexts. From the perspective of competence theory, the *capacity to act* (fed by knowledge and further developed into skills) interacts with the *willingness*

and disposition to act, which is mainly fed by values, motivational and habitual factors, which represent personality traits.

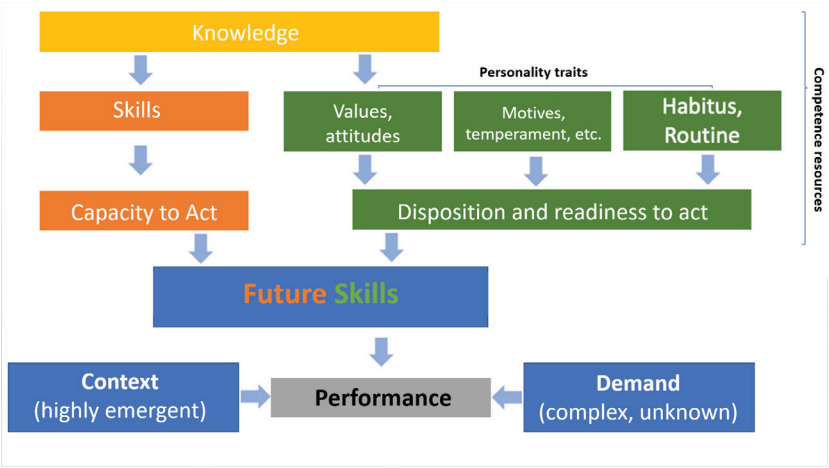


Fig. 11 The *Future Skills* concept from a competence perspective (own illustration)

Regarding terminology and concept, *Future Skills* can be distinguished from competences that are not particularly future-oriented. As a distinguishing factor the concept of emergence applies: In particular, contexts of action that show highly emergent developments in life, work, organisation and business processes demand *Future Skills* in order to cope with the requirements. Emergence thus defines the dividing line that separates previous or traditional work areas from future work areas. Since this boundary is not clearly schematic, but fluid, and many organisations are in transformation processes in which low emergent practice contexts evolve to highly emergent, the need for *Future Skills* is also an evolving area, and not a binary state of either-or.

Emergence vs. submergence is thus an important basic distinction to explain the significance of *Future Skills* and is therefore part of a separate chapter – B 2.4 Emergence and Self-Organisation. The *NextSkills* Studies show that low-emergent (stable) professional action contexts often change quickly and intensely into high-emergent action contexts. It is the *drift-to-self organisation* we are talking about and we will describe this phenomenon in Chapter B 2.1 The “Drift to Self-Organisation”: Self-organisation as a social guiding principle. This corresponds to a change in the system of organisations. It is triggered by changes in macro-, meso- and microsystems,¹¹ and reinforced by their interdependent relatedness. In the evolving new state, the system elements cannot be traced back causally or linearly to the previous state. The system condition of *irreducibility* and *unpredictability* applies.

The *Future Skill* Profiles reconstructed in the *NextSkills* Studies on the basis of in-depth interviews are summarized in Table 1 and Figure 14. They represent bundles of individual, related so-called reference competencies. A total of 17 such competence profiles can be reconstructed from the qualitative data, which are presented and described below. They are divided into the three competence fields of the *Triple Helix-Model* and shown in Figure 12 of the Skill Map.

11 On ecosystem theory and the relationship between micro-, meso- and macro-systems, see also Chapter B 2.6 Co-Evolution and Self-Organisation: Ecosystemic and Socio-Ecological Approaches



Fig. 12 Future Skills map – Overview of 17 skills profiles from three competence fields

The division into three competence fields, which are shown in the picture as three *Metro* lines, follows the systematics of the *Triple Helix-Model for Future Skills*. It is based on the recognition that the skills necessary to cope with the demands of action can be identified on the basis of three dimensions which interact and which in the *Triple Helix-Model* are referred to by specific terms:

1. Subject development-related *Future Skills*, which relate to the development capability of one’s own person, referred to here as individual- or subject-development-related competences,
2. Such *Future Skills* that relate to the handling of certain objects, work tasks and problems, here called object-related skills, and
3. Such *Future Skills* which relate to dealing with the social, organisational and institutional environment, referred to as organisation-related skills.

Within this three-dimensional space of action, the individual *Future Skills* named by the respondents can be conceptually located (see Figure 13).

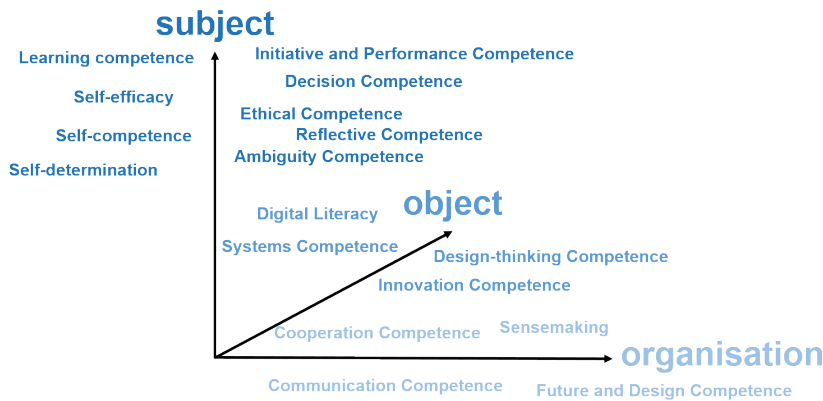


Fig. 13 *Future Skills* space of action

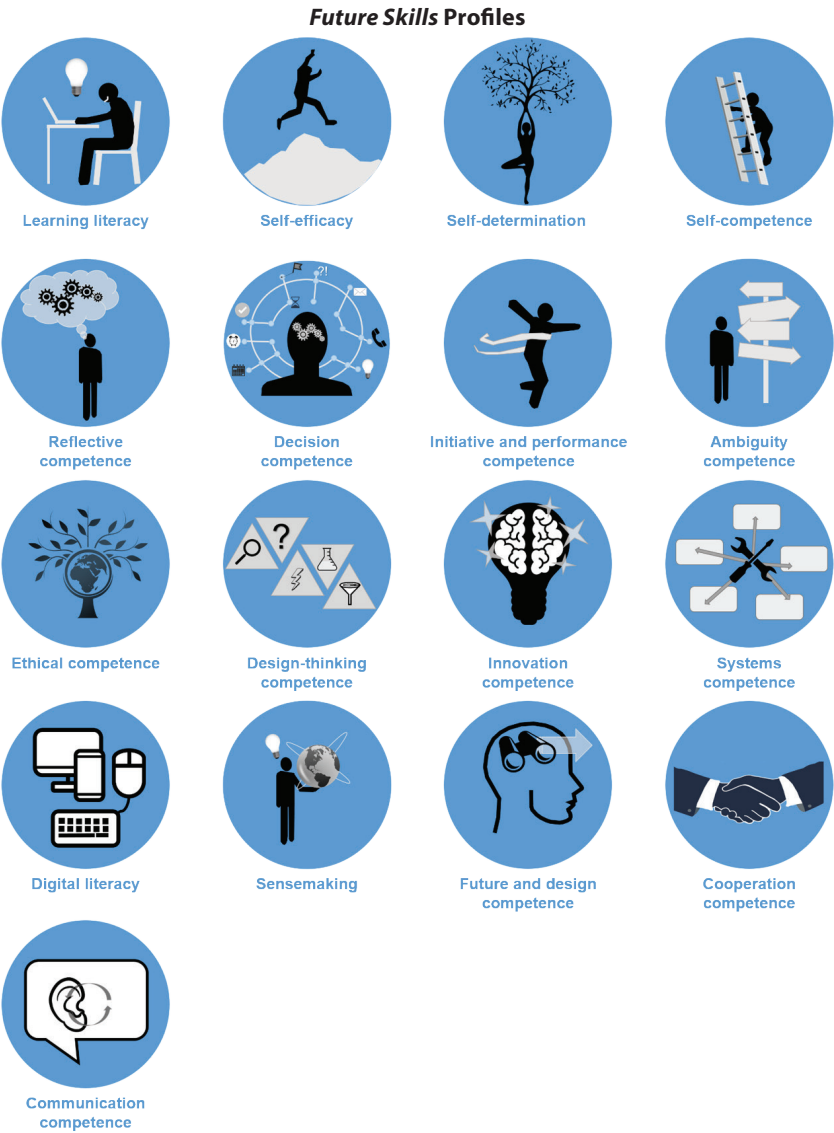


Fig. 14 Overview of *Future Skills* profiles

A 3.1 Competence Cluster I: Subject development-related competences

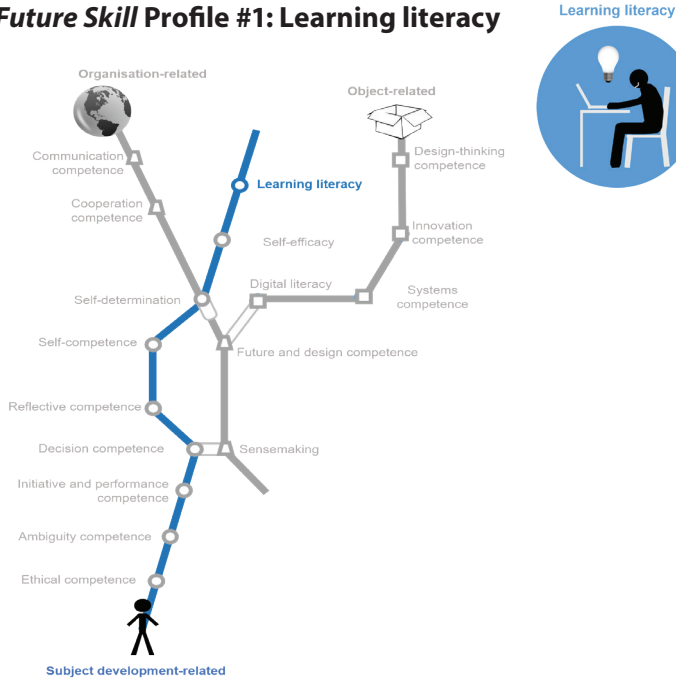
Competence cluster I contains nine competence profiles¹². It concerns skills that were identified by respondents in *Future Organisations* as particularly relevant to the future way of working and living and that relate to the acting subject itself. All nine *Future Skills* Profiles of this cluster include additional so-called *reference competences*. This particular first cluster reflects the special significance of the individual-subjective relationship of the competence formulations. It refers to the abilities of an individual to adapt and develop in such a way that s/he can participate productively in the world of work and life of tomorrow and actively shape it as well as organise her-/himself as part of communities in order to be able to deal effectively with future challenges.

It is about subject development-oriented abilities and dispositions that have to do with reflection of one's own behaviour, with development and learning abilities, with convictions, values, with the ability to distinguish, to differentiate, to act self-determined, self-confidently and autonomously and to reflect on one's own performance motive as well as dealing with ambiguity and uncertain contexts, but also cover the area of ethical competence.

It should be noted that each of the 17 *Future Skills* Profiles cannot be exclusively assigned to one of the three areas of the *Triple Helix-Model*, as if a particular action could be assembled from a three-box construction kit. Instead, we find interdependent areas and interrelated capabilities within the three areas of the *Triple Helix-Model*. They all aim to make a contribution to the capacity to act in highly emergent contexts, each having different anchor or starting points, but successful action as a common goal.

12 *Future Skills* Profiles consist of individual competences that belong together. A total of 17 such competence profiles can be reconstructed from the qualitative data, which are presented and described here. They are divided into the three competence fields of the *Triple Helix-Model* developed in the previous chapter.

A 3.1.1 Future Skill Profile #1: Learning literacy



Definition: Learning literacy is the ability and willingness to learn in a self-directed and self-initiated fashion. It entails metacognitive skills as well. (*mean value: 4.5 of 5, standard deviation: 0.68*)¹³

Reference competences: self-directed learning, metacognitive skills

Significance: Learning literacy as a *Future Skill* enables individuals in highly emergent contexts to make the necessary adaptations through learning, to anticipate them and to shape them if they are necessary, e.g. in working or living environments or task areas that are subject to strong change.

Description: Learning literacy is defined as the ability and willingness to self-directed learning and to self-learning competence. That includes a kind of learning

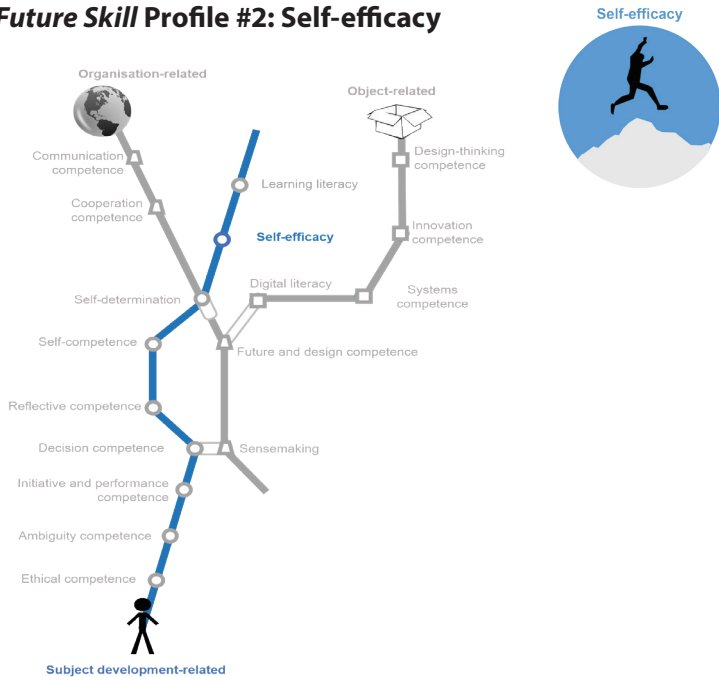
¹³ In the following, the mean value (M) and the standard deviation (SD) from the Delphi Survey are given for each *Future Skills Profile*, with which the experts assessed the relevance of the respective *Future Skills Profile*.

in which learners essentially control their learning process themselves. Learners must have a range of competences or learning strategies that enable them to use the existing leeway for their own learning. The learning process is specifically influenced through the deliberate use of learning strategies. This includes amongst others four learning strategies (Kilius 2002):

- Cognitive learning strategies – have a direct impact on the information to be acquired and processed.
- Metacognitive learning strategies – serve to plan, monitor and regulate the learning process.
- Motivational learning strategies – to ensure the success of cognitive and metacognitive learning strategies, students must be able to motivate themselves optimally.
- Resource-based learning strategies – i.e. scheduling, working with learning partners or using media and other tools.

Learning literacy as a *Future Skill* Profile enables the acting person to analyse the necessary learning needs in highly emergent practice contexts. The participants of the *NextSkills* Studies often stated that an essential aspect of current and future personnel development is to promote the self-directed learning skills of the organisation's members. The concepts and tools used for this are oriented towards promoting the ability for self-directed learning, the ability for lifelong learning and the readiness for learning in communities. Reference can be made here to instruments for organisational development, such as the Competence Workshop in Chapter II.3.1 Building a Networked Organisation, which focuses on these skills.

A 3.1.2 Future Skill Profile #2: Self-efficacy



Definition: Self-efficacy as a *Future Skill Profile* refers to the belief and one's (self-) confidence to be able to master the tasks at hand relying on one's own abilities and taking over responsibility for one's decisions.¹⁴ (mean value: 4.4 of 5, standard deviation: 0.69)

Reference competence: Self-confidence

Significance: Self-efficacy as a *Future Skill* enables an individual to act in highly emergent contexts with the conviction to be successful in awareness of her/his own abilities and needs.

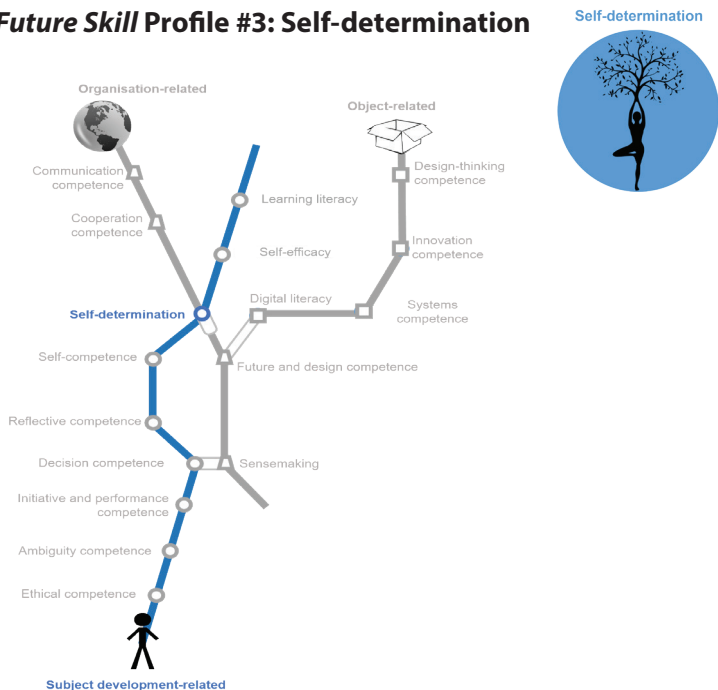
14 Definition according to Bandura (1989) "people's beliefs about their capabilities to exercise control over events that control their lives" (Bandura 1989, S. 1175). Bandura (1982 in Frayne 1987) defines self-efficacy as follows: "Perceived self-efficacy refers to the strength of one's belief that he or she can successfully execute the behaviours required" (Bandura 1982) (in Frayne & Latham 1987).

Description: Self-efficacy represents the conviction of being able to implement the tasks to be mastered with one's own abilities, taking responsibility and making decisions. Self-confidence is an additional competence in this competence profile. Self-confidence is a term used in several disciplines. It was first defined in philosophy, but also plays an important role in sociology, psychology or history. Self-confidence is essentially the experience of the peculiarity and unity of one's own person, the consciousness of one's own existence in contrast to the outside world, to the world of objects of knowledge and experience. In psychology, the term *self-confidence* is understood primarily as *self-esteem*, i.e. as awareness of the significance and value of one's own personality, whereby it represents primarily an emotional assessment of one's own value (Stangl 2019). Self-confidence arises through observation and reflection of the self, or in other words: one's own self, one's own personality. The self-observer is both object and subject at the same time. In this view the division of subject and object introduced by Karl Jaspers (1953) is suspended. Immanuel Kant (1964) expresses this as follows: "I am an object of contemplation and thought myself' is a synthetic sentence a priori and the principle of transcendental philosophy". (Kant 1964: 449)

Self-efficacy has been an established concept of learning psychology since the early nineties, which is well defined and can be observed empirically stable (Bandura 1989). Self-efficacy in psychology means the personal belief of a person that he or she can successfully cope with difficult situations and challenges on his or her own (ibid.). The concept of the general expectation of self-efficacy asks for the personal assessment of one's own competences, generally to cope with difficulties and barriers in daily life. This conviction about one's own abilities determines how people feel, think, motivate and act in a concrete situation. It therefore influences perception and performance in a variety of ways. Self-efficacy thus refers to the belief that one is capable of learning something or performing a particular task. Studies show that people who believe in their own strength are more persistent in accomplishing tasks and also develop a lower risk of anxiety disorders (Stangl 2019).

Examples from the *Future Skills* Study demonstrate that organisations work, for example, with theatre workshops or coaching methods in order to promote self-efficacy and self-confidence (see, for example, Chapter II.3 Conversations with Practitioners: Gaining Insights into the Practice of Supporting *Future Skills* Development).

A 3.1.3 Future Skill Profile #3: Self-determination



Definition: Self-determination as a *Future Skill* describes an individual's ability to act productively within the field of tension between external structure and self-organisation, and to create room for self-development and autonomy, so that they can meet their own needs in freedom and self-organisation. (*mean value: 4.5 of 5, standard deviation: 0.61*)

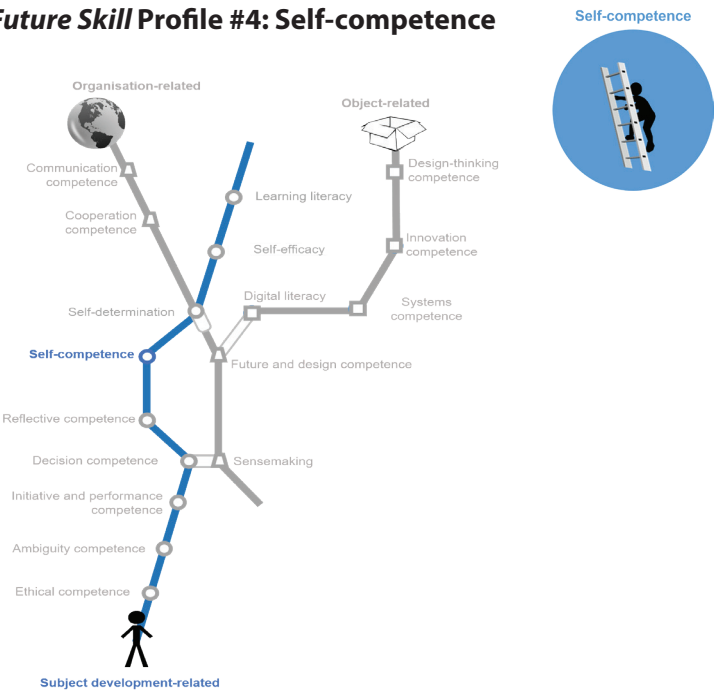
Reference competence: Autonomy

Significance: Self-determination as a *Future Skill* is particularly important for learning and development projects, since in highly emergent organisational and action contexts the appropriate and individually correct learning concept can less and less be externally specified. Autonomy and self-determination therefore play an increasingly important role in learning processes and performance situations.

Description: Self-determination comprises the ability of an individual to create learning contexts for himself in which important reference persons take part, in which the satisfaction of psychological needs is made possible (e.g. involvement,

success), in which an individual’s striving for autonomy are being supported and in which they have the opportunity to experience their individual competences. The subcompetence autonomy belongs to the competence profile self-determination. Autonomy and self-determination are of particular importance for learning and development processes, since in highly emergent organisational and action contexts the appropriate and individually correct learning concept can less and less be specified and therefore autonomy and self-determination play an increasingly important role for learning processes and action processes. It is not only a matter of successfully implementing the learning and appropriation process, i.e. one’s own development, for oneself, but also of selecting the important and perhaps necessary persons and group contexts suitable for this and of being aware and express one’s own needs for development. Only through the knowledge and the ability to act or develop independently can actions be successfully carried out in highly emergent systems – because the conditions are unpredictable, and actions must be carried out under conditions of uncertainty.

A 3.1.4 Future Skill Profile #4: Self-competence



Definition: Self-competence as a *Future Skill* is the ability to develop one's own personal and professional capabilities largely independently of external influences (see also KMK 2015). This includes other skills such as independent self-motivation and planning. But also the ability to set goals, time management, organization, learning aptitude and success control through feedback. In addition, cognitive load management and a high degree of personal responsibility. (*mean value: 4.5 of 5, standard deviation: 0.82*)

Reference competences: self-management, self-organisation competence, self-regulation, Cognitive Load Management, self-responsibility

Significance: Self-competence occupies a special position within the framework of *Future Skills*. Since it refers to the capacity for self-organisation, Cognitive Load Management and self-regulation, it is important for a productive-balanced and sustainable handling of requirements in the field of tension between one's own abilities and needs, and the professional as well as the organisational requirements.

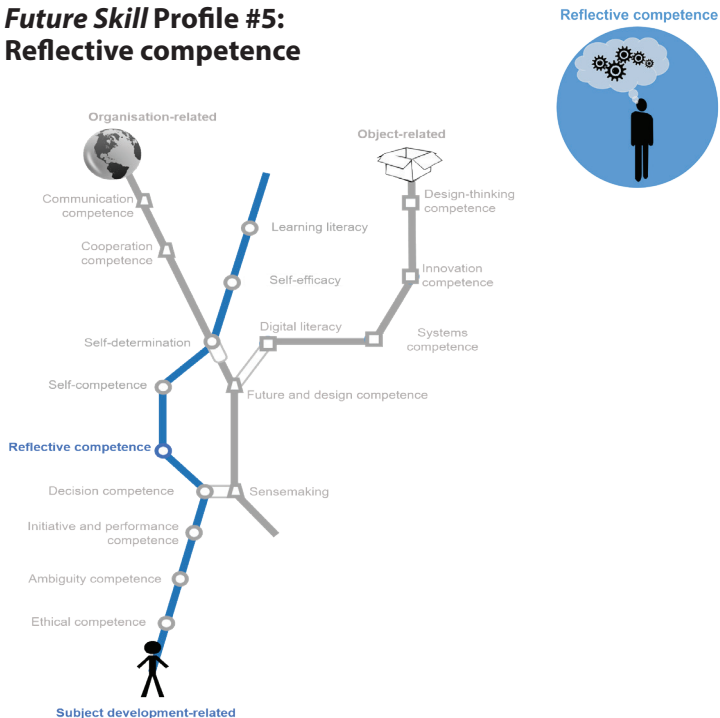
Description: The *Future Skill* self-competence consists of the competences self-management, self-organisation competence, self-regulation, Cognitive Load management and self-responsibility.

- *Self-competence* is the ability to shape one's own personal and professional development largely independently of external influences. This means that self-competence focuses on which actions and conditions can be shaped and controlled by personal influence. The corresponding competences such as self-management, self-organisation competence, self-regulation, but also Cognitive Load Management and self-responsibility are necessary for this.
- *Self-management* is defined as the ability to independently motivate, set goals, plan and manage time in relation to existing activities.
- *Self-organisation competence* is defined as the ability to independently understand structures, as well as maintain and develop models, patterns of order and structures.
- *Self-regulation* can be defined in various ways. In the most basic sense, it involves controlling one's behaviour, emotions, and thoughts in the pursuit of long-term goals. It includes, among other things, the mental handling of one's own feelings and moods and the ability to realise one's intentions through purposeful and realistic action. This also includes the ability to subordinate urgent short-term needs to longer-term goals (postponement of rewards). A high expectation of

self-efficacy can have a supporting effect (cf. also *Future Skill* #2, and Baumeister, Vohs 2004).

- *Cognitive Load Management* is defined as the ability of an individual to deal with cognitive requirements and stress in the sense of sustainable and productive personal development, taking into account his/her own needs (Plass et al. 2010).
- *Self-responsibility* is the attitude of overlooking, understanding and taking responsibility for one's own actions.

A 3.1.5 *Future Skill* Profile #5: Reflective competence



Definition: Reflective competence as a *Future Skill* includes the willingness and ability to reflect, i.e. the ability to question oneself and others for the purpose of constructive further development, as well as to recognise underlying systems of behaviour, thought and values and to assess their consequences for actions and decisions holistically. (*mean value: 4.5 of 5, standard deviation: 0.65*)

Reference competences: critical thinking, self-reflection competence

Significance: Reflective competence as a *Future Skill* is an important prerequisite for successful action in highly emergent action contexts. It enables individuals to see developments questioningly and in relation to their own canon of values and thus to perceive congruence or divergence between inner need and outer situation. It promotes both the *distancing from* one's own person (self-reflection competence) and the questioning and taking of another critical perspective in relation to existing identified facts.

Description: Reflective competence encompasses the ability and willingness to reflection. This includes the ability to communicate with oneself and with others for the purpose of being able to question structural further development and to recognise underlying systems of behaviour, thinking and values as well as their consequences; furthermore, to be able to evaluate negotiating situations and decisions holistically, i.e. in their entirety. This field of competence includes *critical thinking* and *self-reflection competence*.

Critical thinking and self-reflection competence make it possible to change perspectives. On the one hand, they make it possible to *distance* one's own consciousness from one's own person (self-reflection competence) and, on the other hand, they make it possible to question and change perspectives in relation to existing identified facts. In the organisations that took part in the *NextSkills* Studies, critical thinking, the questioning of given concepts and organisational processes as well as self-reflection skills are promoted.

A 3.1.6 *Future Skill* Profile #6: Decision competence



Definition: Decision competence as a *Future Skill* is the ability to seize decisions and to evaluate different alternatives against each other, as well as making a final decision and taking over the responsibility for it. (*mean value: 4.5 of 5, standard deviation: 0.71*)

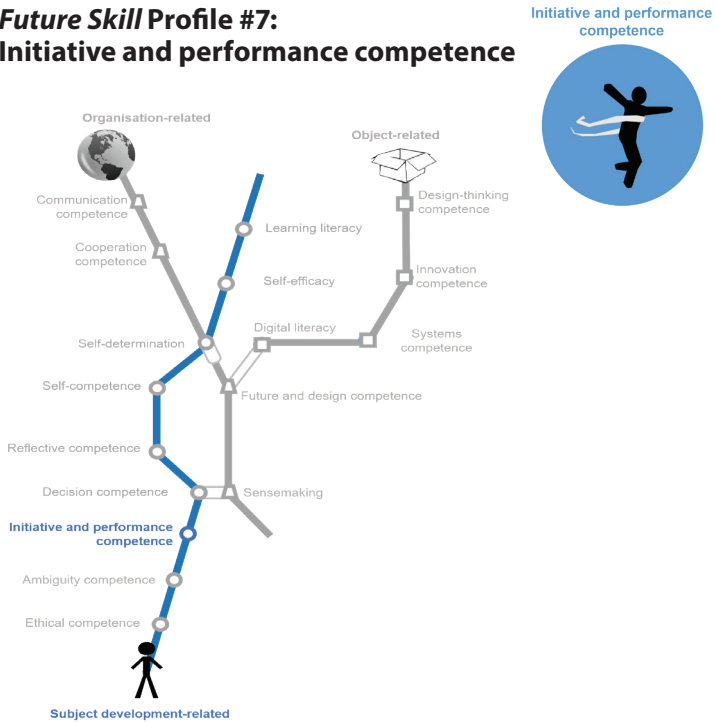
Reference competence: Responsibility-taking

Significance: The development from centrally managed to decentralised and networked organisational structures necessitates a decentralisation of decision-making powers and processes as well. This increases the importance of the ability to make decisions and take responsibility within the decentral spheres of an organisation. Decision competence as a *Future Skill* in highly emergent contexts enables an organisational change from hierarchical organisations to more network-based organisations with more decentralised control.

Description: Decision competence is the ability to perceive decision-making needs and to weigh possible alternative decisions against each other, to make a decision and to take responsibility for it. This field of competence also includes the competence to take responsibility. Making decisions and assuming responsibility are understood by the interviewees as two interdependent actions or competencies. Making decisions requires the ability to reflect critically on one's own decision bases and to rethink and communicate the action parameters that guide decisions in a given situation. Taking on responsibility also means being able to justify the decision taken in view of existing constellations of values and standards in the respective organisational situation, both personally and organisationally as well as socially.

With regard to taking responsibility, decision competence is the ability to explicitly justify a decision through dialogue. This understanding of responsibility is based on a purposeful or reinforced dialogical principle of answering via the prefix *re*, from which the ability to communicate can be derived as the first condition of responsibility. In this sense, every responsibility represents an act of communication. In order to be able to speak and answer for something, the actor in question must be able to communicate. Within the discourse of responsibility language plays an important role as a prerequisite for responsibility (cf. Piepmeier 1995: 86; Schwartländer 1974: 1580). Since the objects of a responsibility represent actions and consequences of actions, the subject in question must be able to act in order to bear responsibility. The process of justification is expressed in form of actions, it represents a way of acting. And yet action is to be distinguished from mere behaviour as actions always emphasise intentions. In this respect, actions are understood as target-oriented, purposeful activities, and thus as a special type of behaviour. The possibility of attributing responsibility begins with the description of behaviour as action.

A 3.1.7 *Future Skill* Profile #7: Initiative and performance competence



Definition: The *Future Skill* initiative and performance competence refers to an individual's ability to motivate him-/herself as well as to his/her wish of contributing to achievement. Persistence and goal-orientation form the motivational basis for performance. A positive self-concept also plays an important role as it serves to attribute success and failure in such a way that the performance motivation does not decrease. (*mean value: 4.1 of 5, standard deviation: 0.91*)

Reference Competences: (intrinsic) motivation, self-motivation, motivation capability, initiative-taking, need/motivation for achievement, engagement, persistence, goal-orientation

Significance: Initiative and performance competence act like a motor for *Future Skills*. The participants of the *Future Skills* Studies stated that initiative and performance competence should include the ability to always reflect on the goal of actions in practice and to check whether the original goal of action is still sustainable or

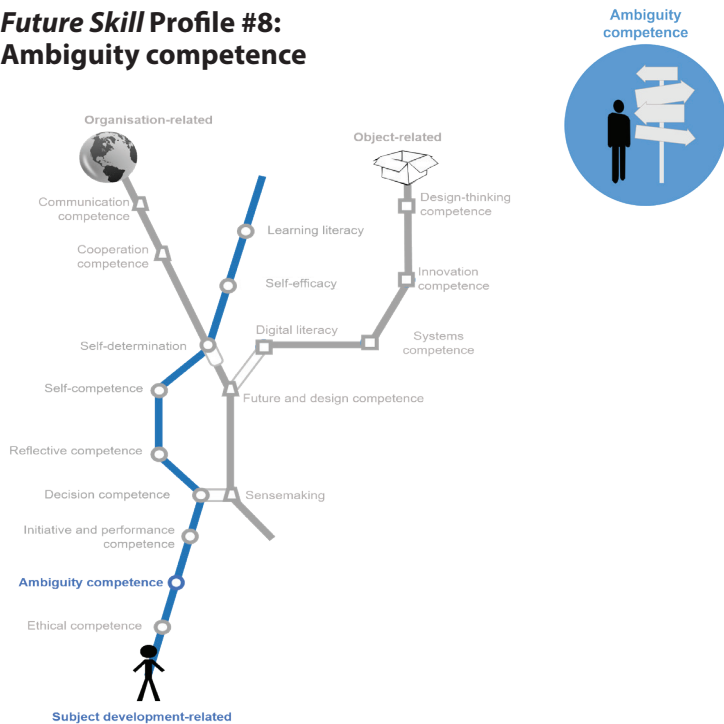
whether it can be redirected. In this way, high and intrinsic motivation, initiative and willingness to perform can continue to prevail in highly emergent contexts of action, even with newly formulated objectives.

Description: Initiative and performance competence is the ability to motivate oneself and the desire to contribute. It is also about perseverance, goal orientation and performance motivation as well as a positive self-concept. Motivation is understood as the totality of all motivations that lead to willingness to act. The striving for action is based on the principle of homeostasis, in an effort to balance the existing needs of the individual and the environment (on homeostasis, see also Chapter B 3 The Principles of *Future Skills* Development). The conversion of motives into actions is called volition or implementation competence, or activity competence.

Waldemar Pelz (2017) conducted an empirical study with 13,302 participants on the operationalisation and validation of activity and implementation competence (Volition). The goal was to operationalize the phenomenon of implementation competence as a human ability and to make it measurable so that it can be used and trained practically. The resulting *Giessen inventory of implementation competence* has large overlapping areas with the *Future Skill* initiative and performance competence presented here. Pelz proposes five partial competences (ibid.) which are also suitable for describing initiative and performance competence:

1. Attention control and focusing: Can the person concentrate fully on the essentials, even if influences occur that impair motivation and attention? Can it set clear priorities?
2. Emotion and mood management to increase personal energy: Is the person able to put himself or herself and others in a positive emotional position? Can she anticipate her own and other people's behaviour aptly and thus control it better?
3. Self-confidence and assertiveness: Is the person convinced of their own abilities and successes on the basis of their experience and can they achieve their goals constructively and prudently?
4. Foresighted planning and creative problem solving: Is action fundamentally proactive (instead of reactive) and future-oriented? Is the person well prepared for risks and problems?
5. Goal-oriented self-discipline by recognising the deeper meaning of the task: Does the person have a pronounced stamina until results are available? Does she recognise the deeper meaning in her activity? Can it constructively deal with the negative expectations of others?

A 3.1.8 *Future Skill* Profile #8: Ambiguity competence



Definition: Ambiguity competence as a *Future Skill* refers to an individual's ability to recognise, understand, and finally productively handle ambiguity, heterogeneity, and uncertainty, as well as to act in different roles. (*mean value: 4.3 of 5, standard deviation: 0.92*)

Reference Competences: dealing with uncertainty, dealing with heterogeneity, ability to act in different roles

Significance: In highly emergent contexts, the ability to deal with vagueness and uncertainty or to reinterpret contradictory information and signals productively plays an important role.

Description: Ambiguity competence includes dealing with uncertainty and heterogeneity, i.e. different parts in a field of action and the ability to act in different

roles. It is also about recognising ambiguity, heterogeneity and uncertainty, understanding them and being able to deal with them productively.

A 3.1.9 Future Skill Profile #9: Ethical competence

Ethical competence



Definition: Ethical competence¹⁵ as a *Future Skill Profile* comprises the ability to perceive a situation or situation as ethically relevant, including its conceptual, empirical and contextual consideration (perceive), the ability to formulate relevant prescriptive premises together with the evaluation of their relevance, their weight, their justification, their binding nature and their conditions of application (evaluate) and the ability to form judgements and check their logical consistency, their conditions of use and their alternatives (judge).

¹⁵ Ethical Competence as a Future Skill Profile was resulting from the interview studies, but has not been included in the Delphi Survey.

Reference competence: ---

Significance: Every action is value-based. A consideration of values in specific action situations therefore requires the ability of an individual to understand and develop ethical standards and to make them usable for her/himself in her/his own constellations of action. This is all the more important if there are no or only a few reference actions, standards and models, as is the case in highly emergent contexts.

Description: Ethical competence refers to the ability to perceive an issue or situation as ethically relevant. Furthermore, ethical competence means developing ethical positions (*what is to be done?*) by weighing values, interests and consequences for a given context of action. Ethical competence also includes the communication of ethical positions and the ability to formulate premises together with the examination of their relevance, weight, justification, binding force and conditions of use (evaluation), as well as the ability to form judgements and the examination of their logical consistency, conditions of use and alternatives (judgement).

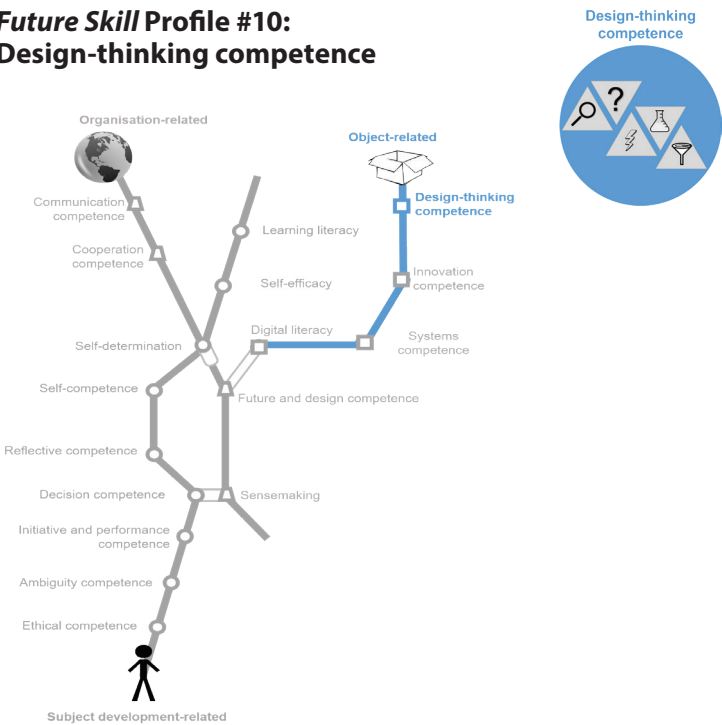
A 3.2 Competence Cluster II: Object-related competences

In the *NextSkills* Studies, respondents indicated that the way organisations handle products, processes and procedures is changing overall. Stability and market position therefore result from agility, the ability to organise rapid innovation cycles and openness, also for new and often international cooperation partners and alliances. This also results in new demands on employees and on how they deal with topics, objects, tasks and their view of processes, procedures and workflows. Those responsible in *Future Organisations* state that, in addition to new and creative methods, an open attitude and an innovative approach are particularly important in order to create the necessary sustainable innovation ecosystems.

The second competence cluster includes in particular object-related competences. These are skills which refer to acting creatively, agilely, analytically and with a high level of system understanding in relation to certain objects, topics and tasks and to acting successfully even under highly uncertain unknown conditions. This field of competence comprises four competence profiles that deal with creative and innovative ways of handling the respective topics of the context of action. These are design-thinking competence, innovation competence, systems competence and digital literacy.

Here, too, it should be noted that each of the 17 *Future Skill* Profiles cannot be clearly assigned to one of the three areas of the *Triple Helix-Model*, as if a particular action could be assembled from a three-box construction kit. Instead, we find interdependent areas and interrelated capabilities within the three areas of the *Triple Helix-Model*. They all aim to make a contribution to the capacity to act in highly emergent contexts, each having different anchor or starting points, but successful action as a common goal.

**A 3.2.1 *Future Skill* Profile #10:
Design-thinking competence**



Definition: The *Future Skill* Profile design-thinking competence comprises the ability to use concrete methods to carry out creative development processes open-endedly

with regard to given problems and topics and to involve all stakeholders in a joint problem and solution design process.¹⁶

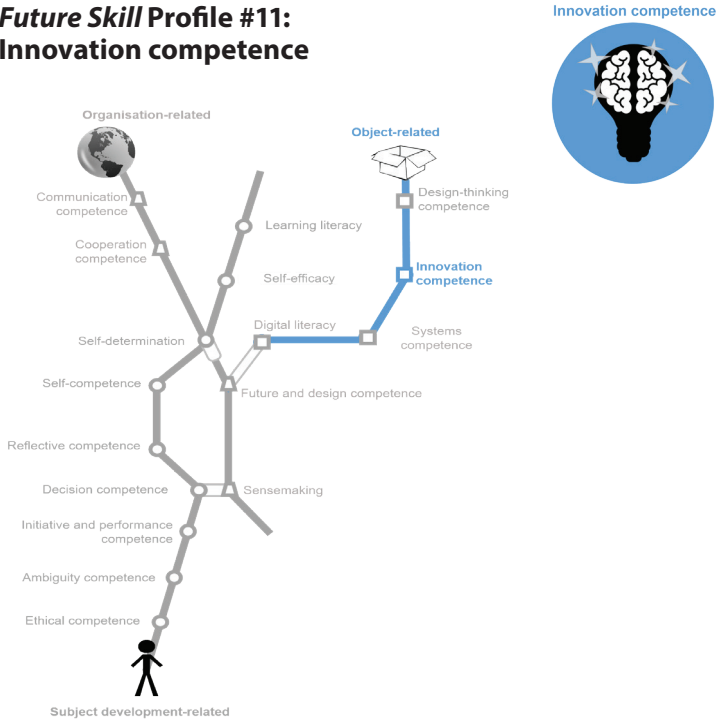
Reference Competences: flexibility and openness, versatility, ability to shift perspectives, interdisciplinarity

Significance: As innovation ecosystems, *Future Organisations* are dependent on being able to use concrete methodological skills that incorporate the given social stakeholder constellations into concrete problem definition and solution designs, as represented in the *Future Skill* Profile design-thinking competence.

Description: As a concrete methodological competence profile, the *Future Skill* design-thinking competence refers to the ability to develop concrete and creative solutions for organisations, processes or products that integrate stakeholders in the process and take their needs into account in a special way. In particular, this class of creative and innovation methods are summarised in the design-thinking profile. In addition to the concrete methodological skills, this *Future Skill* Profile is also concerned with promoting and shaping the organisational culture in *Future Organisations* in such a way that open-ended methods for core processes in the development and internal management of *Future Organisations* can be applied without leading to credibility crises.

¹⁶ Design Thinking Competence was not included in the Delphi Survey.

A 3.2.2 Future Skill Profile #11: Innovation competence



Definition: Innovation competence as a *Future Skill* profile includes the willingness to promote innovation as an integral part of any organizational object, topic and process and the ability to contribute to the organization as an innovation ecosystem. (mean: 4.3 of 5, standard deviation: 0.75)

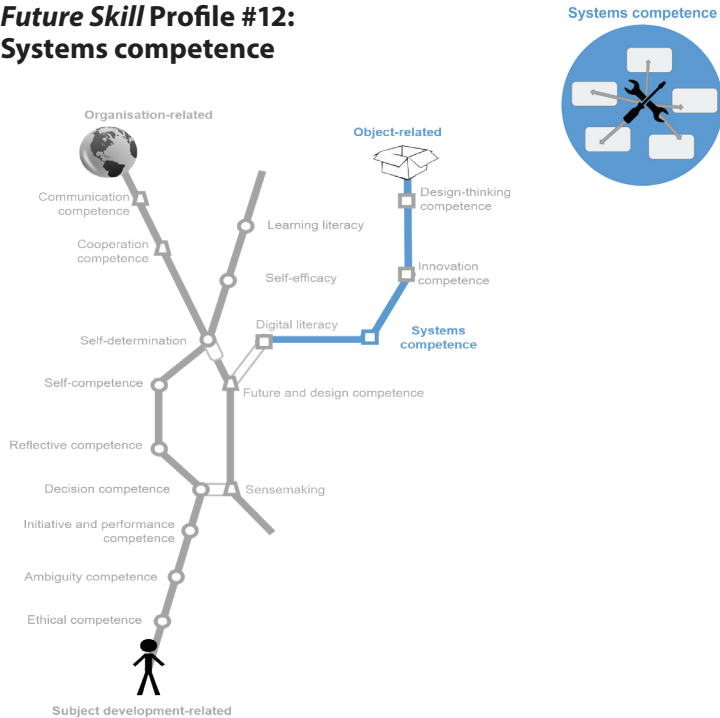
Reference Competences: creativity, innovative thinking, willingness to experiment

Significance: In *Future Organisations*, the disposition to an *experimental mindset*, *fail forward* and *error tolerance* is indispensable. Furthermore, it is important to understand *Future Organisations* as innovation ecosystems and to be able to promote innovation processes.

Description: *Future Organisations* are innovation ecosystems. Innovation helps to maintain and develop them. First and foremost, innovation competence means developing a comprehensive understanding of this and being open to the pro-

motion of innovation cultures. This profile comprises the ability to translate the contribution of innovation or innovation itself into sustainable value creation for the respective organisational context rather than methodological or operational competences to promote innovation.

A 3.2.3 *Future Skill* Profile #12: Systems competence



Definition: Systems competence as a *Future Skill* is the ability to recognise and understand complex personal-psychological, social and technical (organisational) systems as well as their mutual influences and to be able to design and/or accompany coordinated planning and implementation processes for new initiatives in the system. (*mean value: 4.3 of 5, standard deviation: 0.73*)

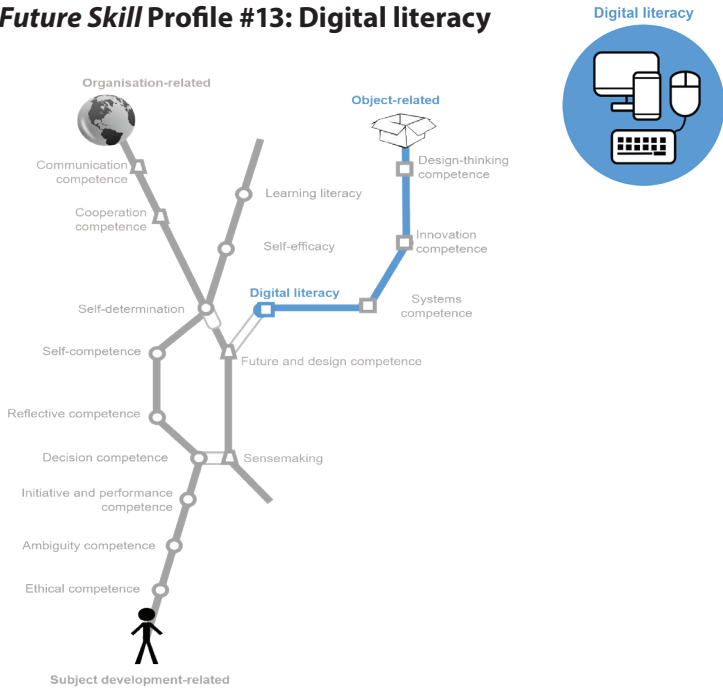
Reference competences: systems-thinking, knowledge about knowledge structures, navigation competence within knowledge structures, networked thinking, analytical competence, synergy creation, application competence, problem-solving, adaptability

Significance: For the work in *Future Organisations*, systems competence enables an understanding of the multipolar dependencies of personal-psychological, social and technical systems and is thus a prerequisite for the ability to shape *Future Organisations*.

Description: Themes, objects and processes of everyday work in *Future Organisations* are increasingly systemically interwoven with each other. Globalized, intercultural contexts, the increasing integration of technical and social systems, such as artificial intelligence, decision or performance support systems in professional and increasingly private contexts, require us to know the mutual dependencies of personal-psychological, social and technical systems, to understand them and to perceive them as designable. Systems competence also means recognising system boundaries and subsystems. Systems competence as a *Future Skill* entails the development of the understanding that systems are networked and integrated with each other, i.e. are connected with each other and influence each other to varying degrees (positively or negatively),

1. can only be recognised through a holistic approach, the focus having to be on the structure of the overall system while individual sub-areas are becoming blurred,
2. are becoming increasingly emergent and non-linear, with often only minor cause-and-effect relationships, and that deep comprehension and self-organisation skills become crucial.

A 3.2.4 Future Skill Profile #13: Digital literacy



Definition: Digital literacy is the ability and disposition to use digital media, to develop them in a productive and creative way, the capacity to critically reflect on its usage and the impact media have on society and work, both for private and professional contexts, as well as the understanding of the potentials and limits of digital media and their effects. (*mean value: 4.5 of 5, standard deviation: 0.80*)

Reference Competences: media literacy, information literacy

Significance: Digital literacy cannot be overestimated in terms of its importance as a *Future Skill*. Especially the critical-reflective aspect but also usage and creative design competences are of essential importance as *Future Skills*.

Description: Digital literacy includes media and information literacy. As a *Future Skill*, it refers above all to a) the knowledge of digital media and their (also social) modes of action, b) application competence, c) the competence to shape communication and cooperation with the help of digital media, and d) a critical attitude

towards one's own use, design, social significance, information quality of media, and e) their significance for one's own life and that of society as a whole, as well as f) the social mechanisms of action and power that digital media bring about.¹⁷

A 3.3 Competence Cluster III: Organisation-related competences

Respondents to the *NextSkills* Studies largely agree that the way organisations are organised in both the private and public spheres will be subject to radical and disruptive changes in the future. The drivers, symptoms and effects of this change have been described in other chapters in detail (see for example Chapter B 4 *Future Skills* for Future Organisations: An Analysis). One of the most far-reaching consequences of this development is a change from primarily hierarchical organisational forms to primarily flexible network structures (in working contexts but also in society, see e.g. the work of Manuel Castells on the networked society.) This change is often already largely developed in *Future Organisations*. There are completely new demands on the employees, which are described in the four following *Future Skills* Profiles contained in this third competence cluster.

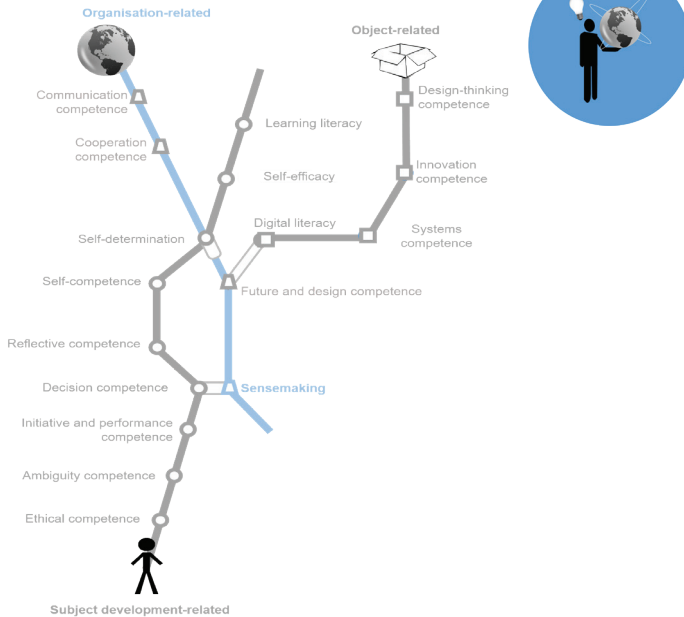
Competence Cluster III thus encompasses *Future Skills* Profiles that relate to dealing with the social, organisational and institutional environment. This includes skills such as creating meaning and value, the ability to shape the future, to cooperate with others and to be able to communicate, criticise and reach a consensus, also in intercultural contexts. In the interviews, the respondents particularly emphasised the unpredictability and uncertainty of conditions for action and thus the need to support sensemaking and build connections and meaning. The learning and development approaches necessary and practiced are primarily coming from the field of coaching and mentoring. In addition, the development of internal networks within organisations is being promoted.

Here, too, it should be noted that each of the 17 *Future Skill* Profiles cannot be clearly assigned to one of the three areas of the *Triple Helix-Model*, as if a particular action could be assembled from a three-box construction kit. Instead, we find interdependent areas and interrelated capabilities within the three areas of the *Triple Helix-Model*. They all aim to make a contribution to the capacity to act in highly

¹⁷ A comprehensive definition of digital literacy is presented in the framework concept “DigiComp”, which is the current concept at European Commission level (Carretero et al. 2017).

emergent contexts, each having different anchor or starting points, but successful action as a common goal.

A 3.3.1 Future Skill Profile #14: Sensemaking



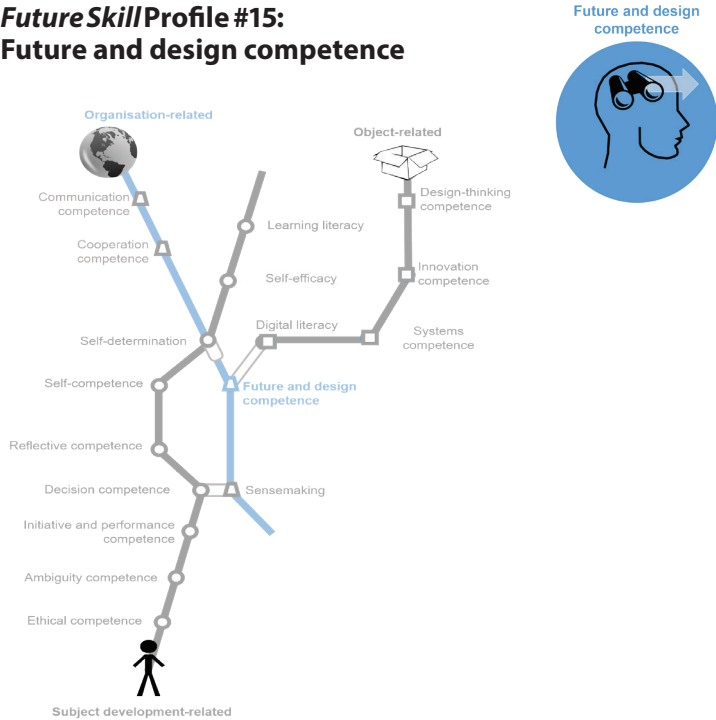
Definition: The Future Skill Profile Sensemaking comprises the willingness and ability to construct meaning and understanding from the rapidly changing structures of meaning within future work and life contexts, to further develop existing structures of meaning or to promote the creation of new ones where they have been lost. (*mean value: 4.0 of 5, standard deviation: 0.90*)

Reference competences: meaning creation, value orientation

Significance: Sensemaking is important in highly emergent action contexts, as it enables individuals to orient themselves when structures of meaning change rapidly and evolve.

Description: Sensemaking encompasses the creation of meaning and values. Every action and every decision is value-based – also in future agile, networked and unpredictable action contexts. The ability of individuals to realise sensemaking from within themselves is of greater importance in that the action situations diversify and no longer result in lasting constellations of meaning guaranteed from outside by the organisation. The value-bound nature of actions, decisions and interactions must therefore increasingly be assumed by employees in the respective organisational units. Sensemaking describes the process by which people classify the stream of experiences, which is absorbed inarticulately into meaningful units by the senses. Depending on the classification of the experience, a different sense and thus a different explanation for the recorded experiences can result. Sensemaking means especially the ability to recognise structures and values in different organisational contexts on the one hand and to structure experiences and perceptions productively and positively into meaningful meanings on the other hand.

A3.3.2 *FutureSkillProfile* #15: Future and design competence



Definition: Future and design competence is the ability to master the current situation with courage for the new, willingness to change and forward thinking. To develop situations into other, new and previously unknown visions of the future and to approach these creatively. (*mean value: 4.3 of 5, standard deviation: 0.81*)

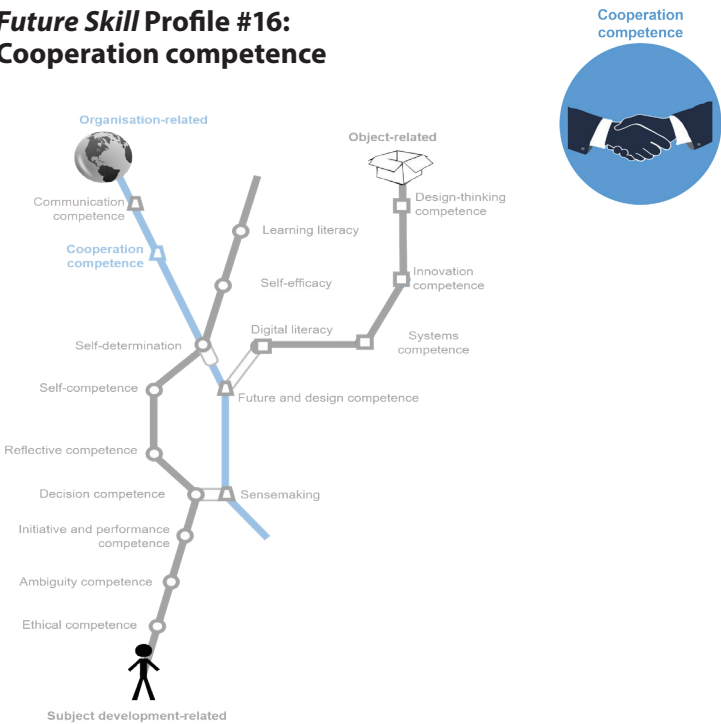
Reference Competences: willingness to change, ability to continuously improve, future mindset, courage for the unknown, readiness for development, ability to challenge oneself

Significance: Future and design competence is important in highly emergent contexts of action, as it allows individuals not only to react to changes, but to exert a proactive and formative influence, to understand changes as challenges and to approach them productively with the courage to embrace the new.

Description: Future and design competence means that individuals can envision alternative perspectives on the future, formulate them and take the first steps towards

their realisation/ creation, if desired. In particular, the competence to create enables to carry out a change of perspective and to move from a perspective of reaction into a perspective of action. The *Future Skill Profile* #15 contains competences such as willingness to change, ability to continuously improve, future mindset, courage for the unknown, readiness for development, ability to challenge oneself.

**A 3.3.3 Future Skill Profile #16:
Cooperation competence**



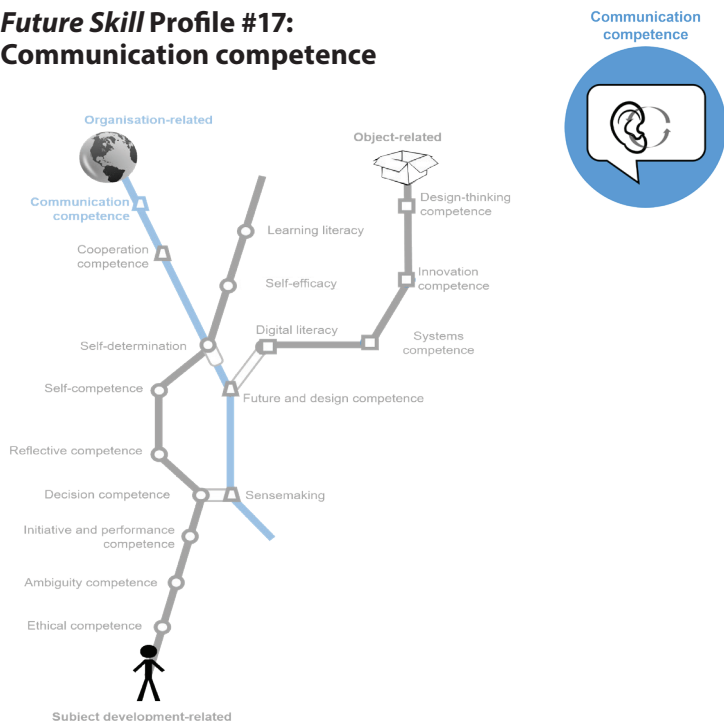
Definition: Cooperation competence as *Future Skills* relates to the is the ability and disposition to cooperate and collaborate in (intercultural) teams either in face-to-face or digitally-supported interactions within or between organisations with the purpose of transforming differences into commonalities. Social intelligence, team-working competences and consultation competence play a key role for this competence. (*mean value: 4.6 of 5, standard deviation: 0.67*)

Reference competences: social intelligence, team-working ability, leader as a coach, intercultural competence (organisational culture), consulting expertise

Significance: In networked, digital, global and highly emergent contexts of action, the ability to successfully collaborate with others within and outside one's own organisation, to build new networks as a *social artist* and to openly invite others to collaborate, both digitally and in physical presence, is essential.

Description: Cooperation competence includes competences such as social and emotional intelligence, team-working ability, the ability of leaders to act as coaches, intercultural competences which also include the different organisational cultures and consulting expertise. Thus, cooperation competence in the comprehensive sense is the ability to work together in teams, also interculturally (as well as inter-organisational-culturally) in direct interaction or by using media within or between organisations, to shape cooperation in such a way that existing differences can be transformed into commonalities. Social intelligence, team-working ability and consulting expertise play an important role in this.

A 3.3.4 Future Skill Profile #17: Communication competence



Definition: Communication competence as a *Future Skill* entails not only language skills, but also discourse, dialogue, and strategic communication aspects, which – taken together – serve the individual to communicate successfully and in accordance with the respective situation and context, in view and empathy of her/his own and others needs. (mean value: 4.6 of 5, standard deviation: 0.68)

Reference competences: language proficiency, presentation competence, capacity for dialogue, communication readiness, consensus orientation, openness towards criticism

Significance: In all interviews in the *NextSkills* Studies, experts from *Future Organisations* have repeatedly emphasised that the change from hierarchical to networked and from predefined to self-organised structures only works if organisational members are able to communicate in a needs-oriented, distinct and empathic way.

Description: Communication competence comprises competences such as language proficiency, presentation competence, capacity for dialogue, communication readiness, consensus orientation and openness towards criticism. In addition to language skills, communication competence also includes discursive and dialogic abilities, requiring the adoption of different positions in communicative cooperation while promoting acceptance and further development. The focus is on information purposes as well as strategic communication skills in order to be able to communicate successfully and appropriately in different contexts and situations. An important role also play self-reflection competences and empathy because a needs-oriented communication demands an awareness of one’s own position and needs and the competence to be empathic for others needs and feelings in communication situations.

Table 1 summarises the *Future Skills* Profiles, the corresponding reference competences and the descriptions of the competence clusters.

Table 1 *Future Skills: Competence clusters and profiles*

ID	Competence cluster/ <i>Future Skill</i> profile/ reference competences	Definition
A	Subject development-related competences	Subject development-related competences entail the ability to be able to act from within oneself, engage in self-directed learning and development activities within a professional context. Autonomy, self-competence, self-efficacy as well as performance competence play an important role in this context.
A1	Learning literacy	Learning literacy is the ability and willingness to learn in a self-directed and self-initiated fashion. It entails metacognitive skills as well.
A1a	Self-directed learning	Self-efficacy as a <i>Future Skills</i> Profile refers to the belief and one's (self-)confidence to be able to master the tasks at hand relying on one's own abilities and taking over responsibility for one's decisions.
A1b	Metacognitive skills	
A2	Self-efficacy	
A2a	Self-confidence	Self-determination as a <i>Future Skill</i> describes an individual's ability to act productively within the field of tension between external structure and self-organisation, and to create room for self-development and autonomy, so that they can meet their own needs in freedom and self-organisation.
A3	Self-determination	
A3a	Autonomy	Self-competence as a <i>Future Skill</i> is the ability to develop one's own personal and professional capabilities largely independently of external influences. This includes other skills such as independent self-motivation and planning. But also, the ability to set goals, time management, organization, learning aptitude and success control through feedback. In addition, cognitive load management and a high degree of personal responsibility.
A4	Self-competence	
A4a	Self-management	Self-organisation competence
A4b	Self-organisation competence	

ID	Competence cluster/ <i>Future Skill</i> profile/ reference competences	Definition
A4c	Self-regulation	Reflective competence as a <i>Future Skill</i> includes the willingness and ability to reflect, i.e. the ability to question oneself and others for the purpose of constructive further development, as well as to recognise underlying systems of behaviour, thought and values and to assess their consequences for actions and decisions holistically.
A4d	Cognitive Load Management	
A4e	Self-responsibility	
A5	Reflective competence	
A5a	Critical Thinking	Decision competence is the ability to seize decisions and to evaluate different alternatives against each other, as well as making a final decision and taking over the responsibility for it.
A5b	Self-reflection competence	
A6	Decision competence	Initiative and performance competence refers to an individual's ability to motivate him-/herself as well as to his/her wish of contributing to achievement. Persistence and goal-orientation form the motivational basis for performance. A positive self-concept also plays an important role as it serves to attribute success and failure in such a way that the performance motivation does not decrease.
A6a	Responsibility-taking	
A7	Initiative and performance competence	
A7a	(intrinsic) motivation	
A7b	Self-motivation	
A7c	Motivation capability	
A7d	Initiative-taking	
A7e	Need/motivation for achievement	
A7f	Engagement	
A7g	Persistence	
A7h	Goal-orientation	

ID	Competence cluster/ <i>Future Skill</i> profile/ reference competences	Definition
A8	Ambiguity competence	Ambiguity competence refers to an individual's ability to recognize, understand, and finally productively handle ambiguity, heterogeneity, and uncertainty, as well as to act in different roles.
A8a	Dealing with uncertainty	
A8b	Dealing with heterogeneity	
A8c	Ability to act in different roles	
A9	Ethical competence	Ethical competence comprises the ability to perceive a situation or situation as ethically relevant, including its conceptual, empirical and contextual consideration (perceive), the ability to formulate relevant prescriptive premises together with the evaluation of their relevance, their weight, their justification, their binding nature and their conditions of application (evaluate) and the ability to form judgements and check their logical consistency, their conditions of use and their alternatives (judge).
B	Object-related competences	Individual object-related competences group together competences that refer to interacting with certain objects, topics, and tasks in a creative, agile, analytic fashion, and with a high degree of understanding of the system – also in highly uncertain and/or unknown environments.
B1	Design-thinking competence	The <i>Future Skill</i> Profile Design Thinking competence comprises the ability to use concrete methods to carry out creative development processes open-endedly with regard to given problems and topics and to involve all stakeholders in a joint problem and solution design process.
B1a	Flexibility and openness	
B1b	Versatility	
B1c	Ability to shift perspectives	
B1d	Interdisciplinarity	

ID	Competence cluster/ profile/ reference competences	Definition
B2	Innovation competence	Innovation competence as a <i>Future Skill</i> Profile includes the willingness to promote innovation as an integral part of any organizational object, topic and process and the ability to contribute to the organization as an innovation ecosystem.
B2a	Creativity	
B2b	Innovative thinking	
B2c	Willingness to experiment	
B3	Systems competence	Systems competence as a <i>Future Skill</i> is the ability to recognise and understand complex personal-psychological, social and technical (organisational) systems as well as their mutual influences and to be able to design and/or accompany coordinated planning and implementation processes for new initiatives in the system.
B3a	Systems-thinking	
B3b	Knowledge about knowledge structures	
B3c	Navigation competence within knowledge structures	
B3d	Networked thinking	
B3e	Analytical competence	
B3f	Synergy creation	
B3g	Application competence	
B3h	Problem-solving	
B3i	Adaptability	
B4	Digital literacy	Digital literacy is the ability and disposition to use digital media, to develop them in a productive and creative way, the capacity to critically reflect on its usage and the impact media have on society and work, both for private and professional contexts, as well as the understanding of the potentials and limits of digital media and their effects.
B4a	Media literacy	
B4b	Information literacy	

ID	Competence cluster/ <i>Future Skill</i> profile/ reference competences	Definition
C	Organisation-related competences	A third group of <i>Future Skills</i> Profiles entails all those competences that refer to interaction of an individual with his/her social, organisational and institutional environment. Amongst them are sensemaking and value-orientation, the ability to actively design future environments, collaborate and cooperate with others, to be able to communicate in a certain way, be open to criticism as well as to finding consensus.
C1	Sensemaking	'The <i>Future Skill</i> Profile Sensemaking comprises the willingness and ability to construct meaning and understanding from the rapidly changing structures of meaning within future work and life contexts, to further develop existing structures of meaning or to promote the creation of new ones where they have been lost.
C1a	Meaning creation	
C1b	Value orientation	
C2	Future and design competence	Future and design competence is the ability to master the current situation with courage for the new, willingness to change and forward thinking. To develop situations into other, new and previously unknown visions of the future and to approach these creatively.
C2a	Willingness to change	
C2b	Ability to continuously improve	
C2c	Future mindset	
C2d	Courage for the unknown	
C2e	Readiness for development	
C2f	Ability to challenge oneself	
C3	Cooperation competence	Cooperation competence is the ability to cooperate and collaborate in (intercultural) teams either in face-to-face or digitally-aided interactions within or between organisations with the purpose of transforming differences into commonalities. Social intelligence, openness, and advisory skills play a key role for this competence.
C3a	Social intelligence	
C3b	Team-working ability	

ID	Competence cluster/ <i>Future Skill</i> profile/ reference competences	Definition
C3c	Leader as a coach	
C3d	Intercultural competence (organisational culture)	
C3e	Counselling competence	
C4	Communication competence	Communication competence as a <i>Future Skill</i> entails not only language skills, but also discourse, dialogue, and strategic communication aspects, which – taken together – serve the individual to communicate successfully and in accordance with the respective situation and context, in view and empathy of her/his own and others needs.
C4a	Language proficiency	
C4b	Presentation competence	
C4c	Capacity for dialogue	
C4d	Communication readiness	
C4e	Consensus orientation	
C4f	Openness towards criticism	

How well do higher education institutions currently manage to support their students in the development of *Future Skills*? In the *NextSkills* Studies, experts were asked how capable higher education institutions are in the field of *Future Skills*. The *Delphi* respondents received a list of all *Future Skills* including their descriptions and were asked to assess their importance for future higher education. They were asked to indicate to what extent higher education institutions are currently able to promote these skills among their students. Both variables were each collected on a 5-step Likert scale, which ranged from 5 = “very important” to 1 = “not important” to measure the importance of the skills and from 5 = “very good” to 1 = “very low” for the current ability of the higher education institutions to promote these skills. In order to obtain an overview of the possible discrepancies between the importance of a skill and the degree of maturity of its current promotion by universities, the delta of the two mean values of these variables was calculated.

A4.1 Adoption of Individual Development-Related Competences

Individual development-related competences are those skills which enable an individual to react to circumstances which have to do with him or herself – such as reflection, autonomy, self-efficacy, etc. All individual development-related competences were rated as important by the respondents’ sample, with autonomy (Self-determination Competence) and the ability to reflect (Reflection Competence) even being considered very important ($M_{Autonomy} = 4.53$, $SD_{Autonomy} = 0.62$; $M_{Ability\ to\ reflect} = 4.50$, $SD_{Ability\ to\ reflect} = 0.67$). In addition, the data showed that Reflection Competence, together with Self-efficacy and willingness to perform (Initiative and Performance Competence) – compared to the other individual development-related

competences – currently represent the *Future Skills* best promoted by the higher education institutions. The *Future Skill* Profiles Learning Competence ($M = 4.48$, $SD = 0.69$) and Decision Competence ($M = 4.46$, $SD = 0.72$) came second and third in the ranking of importance. This contrasts, however, to a large extent with the assessment of the degree of maturity of higher education institutions to promote these skills among their students: The delta calculated for this (see Figure 15 and Figure 16) shows the highest discrepancy between importance and the current level of promotion for Learning Competence ($\Delta = 1.83$) and Self-determination Competence ($\Delta = 1.81$) – two of the skills that were rated as among the most important. In contrast to this, Initiative and Performance Competence was rated as important ($M = 4.13$, $SD = 0.89$) and, according to the experts, their promotion was supported to an acceptable degree by the higher education institutions ($M = 3.07$, $SD = 0.93$).

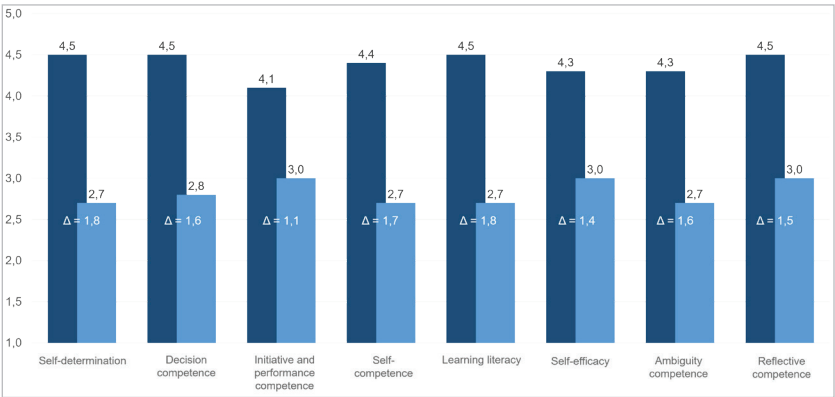


Fig. 15 Subject development-related skills: Importance versus higher education institutions' readiness to promote *Future Skills* development (N = 46)¹⁸

¹⁸ The Ethical Competence, which also belongs to the individual development-related competences, was not included in the Delphi Study.

A look at the discrepancies – shown in Figure 16 – indicates the degree of urgency with which concepts must be developed in order to drive competence development forward. The circles showing the highest deltas also show the degree of highest urgency (Figure 16, left), whereas the smaller deltas (Figure 16, right) indicate less urgent aspects.

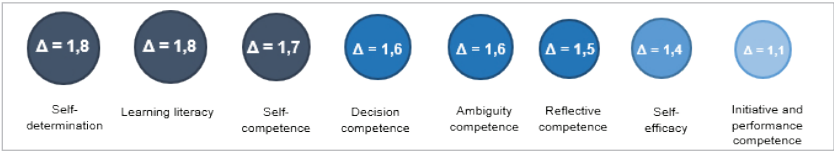


Fig. 16 Discrepancy values for subject development-related skills between skill importance and higher education institutions' readiness (N = 46)

A4.2 Adoption of Individual Object-Related Competences

Individual object-related competences are those skills that are based on the individual's ability to act in unknown future contexts, but in which the individual is not the point of reference, but a particular object to which the action relates – a particular task, for example.

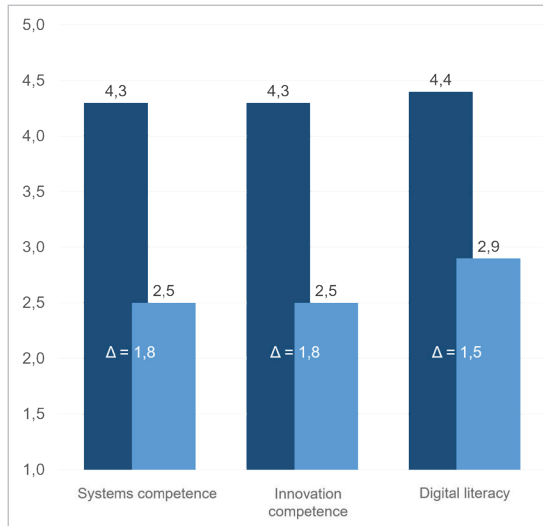


Fig. 17 Object-related skills: Importance versus higher education institutions' readiness to promote *Future Skills* development ¹⁹

The expert sample rated all skills in this category as important. As can be seen from Figure 17, the experts believe that agility (System Competence) ($M = 2.53$, $SD = 0.87$) and creativity (Innovation Competence) ($M = 2.52$, $SD = 0.85$) are the least promoted by higher education institutions. For both competences, this is reflected in the highest discrepancy between their importance on the one hand and the promotion of these skills by higher education institutions on the other (see Figure 18).

The Delphi respondents rated digital literacy as being promoted to an acceptable degree ($M = 2.93$, $SD = 1.03$). With regard to the frequency distributions, however, it can be seen that as many as 40 percent of the experts rated the degree of maturity of higher education institutions as low or even very low. In contrast, 37.8 percent consider the ability of higher education institutions in this respect to be (very) good.

¹⁹ The Ethical Competence, which also belongs to the individual development-related competences, was not included in the Delphi Study.



Fig. 18 Discrepancy values for object-related skills between skill importance and higher education institutions’ readiness ($N_{\text{Importance}} = 44$, $N_{\text{Support}} = 45$)

A 4.3 Adoption of Individual Organisation-Related Competences

Individual organisation-related competences comprise those skills that are needed to act successfully in organisational and social environments.

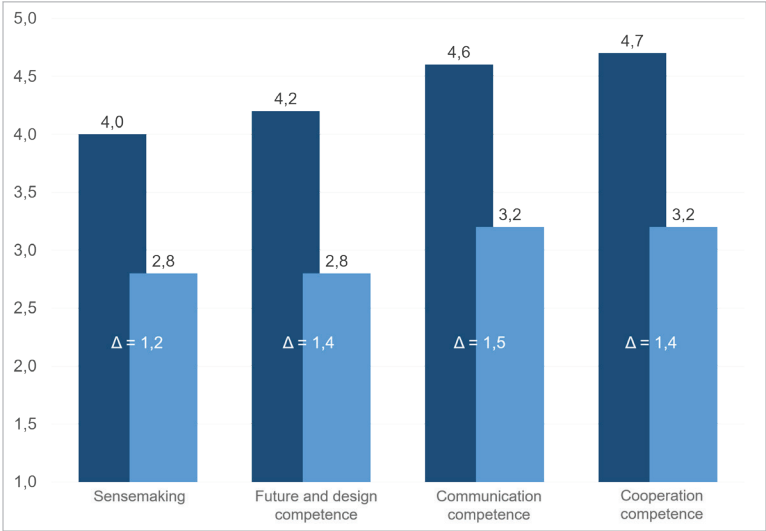


Fig. 19 Organisation-related skills: Importance (dark blue bars) versus higher education institutions’ readiness to promote *Future Skills* development (light blue bars) ($N = 45$)

In this section, too, the international expert sample rated all skills as important at a high level, with the Cooperation Competence with an average value of 4.59 ($SD = 0.67$) and the Communication Competence with an average value of 4.67 ($SD = 0.67$) even being rated as very important (see Figure 19). In addition, the experts assessed all the skills in this category as being supported to an acceptable degree by higher education institutions, with the two skills considered most important – Cooperation and Communication Competence – also being regarded as the *Future Skills* best promoted altogether.



Fig. 20 Discrepancy values for organisation-related skills between skills importance and higher education institutions' readiness (N = 45)

The experts emphasised that the degree to which *Future Skills* are promoted differs between higher education institutions, between different types of higher education institutions, also depending on study programs and teaching styles. And it is also students who, depending on age, personality and attitude, are not equally prepared to develop *Future Skills*. In a study commissioned by the Stifterverband on the subject of *Future Skills*, potential for developing strategy profiles within higher education institutions is highlighted in order to counterbalance the deficits in the integration of *Future Skills* in higher education teaching (Meyer-Guckel et al. 2019):

- According to this, higher education institutions face the challenge of preparing all their students for a digitised working environment. This requires new educational strategies from higher education institutions and opens up a range of strategic potentials for them. Currently, there is primarily a lack of educational opportunities promoting *Future Skills*.
- Higher education institutions are becoming increasingly important for companies when it comes to promoting *Future Skills*: According to the Stifterverband, one in four companies is currently already collaborating with higher education institutions in order to meet its skills requirements – with upward tendency.

- Higher education institutions need innovation and more resources in very different areas. These comprise the conception of new study programs, the ongoing development of existing curricula, the teaching of *Future Skills*, the creation of new learning environments and agile innovation spaces as well as the positioning of higher education institutions as training providers for lifelong learning processes.

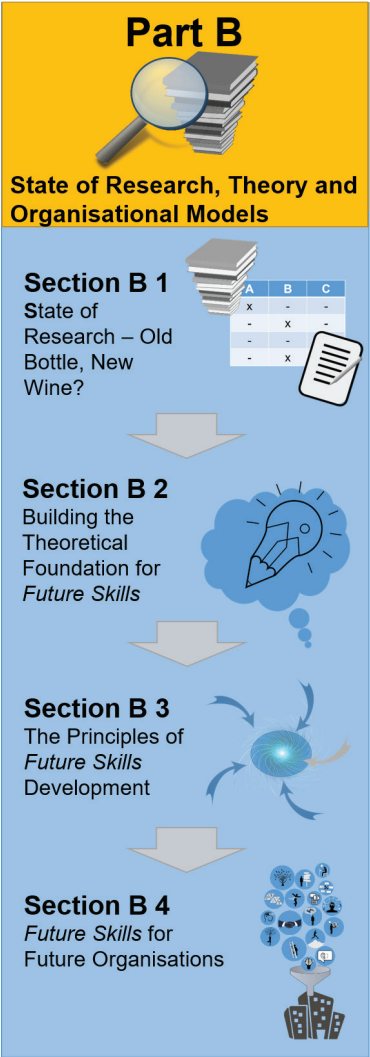
Part B

Future Skills: Research, Theory and Organisational Practice

#in-a-nutshell

Part B of the book is dedicated to the task of reviewing the state-of-the-art literature in *Future Skills* research and related fields. Up to today there is no systematic compilation, review or literature research on this subject available in either German-speaking or English-speaking countries. Chapter B 1 State of Research – Old Bottle, New Wine? gathers research from the past 30 years on different concepts and puts them in perspective, starting with research in the field of graduate attributes. In Chapter B 2 Foundations of the *Future Skills* Revolution: The Theory of *Future Skills* the main theoretical reference framework for *Future Skills* research is then constructed and described. An important concept in this regard will be the so-named “drift-to-self organisation”. For the first time, a systematic review is conducted, a related terminology established and an interdisciplinary architecture integrating different reference theories from a broad interdisciplinary spectrum is built in order to provide a theoretical reference framework for *Future Skills*. For this purpose, theoretical contributions from systems theory, organisational theory, organisational sociology, management theory, physics and education theory are considered and linked. In Chapter B 3 The Principles of *Future Skills* Development, the basic principles underlying the construction of *Future Skills* will be pointed out. Finally, in Chapter B 4 *Future Skills* for Future Organisations: An Analysis

organisational structures, management concepts and models that represent the “drift-to-self organisation” will be analysed, and their relevance for the concept of *Future Skills* will be worked out further.



State of Research – Old Bottle, New Wine?

In this chapter different definitions and approaches of the *Future Skills* will be discussed and the current state of research on *Future Skills* and important terms and concepts will be described. In this chapter it will be discussed how *Future Skills* are defined, what existing *Future Skills* approaches include, and what the state of research on *Future Skills* and on important terms and concepts comprise. Are *Future Skills* something new or just new wine in old bottles? “Old bottle, new wine” is the title of a jazz album by composer, arranger and pianist Gil Evans from 1958, in which he and his band reinterpret famous jazz pieces such as “Bird Feathers” by Charlie Parker. The title plays with the idea of rearranging the familiar in a new appearance. This question also comes with the *Future Skills* concept: What is actually the point of this new, popular term? What is the real content of the concept and what is new about it?

B 1.1 Definition and Concept of *Future Skills*

Future Skills are defined as competences that allow individuals to be (successfully) self-organised capable of acting in highly emergent organisational and practical contexts. Thus, *Future Skills* are competencies in the true sense of the word. They are embedded in the discourse around the goal of higher education and employability as the goal of any educational process that aims at vocational aspiration of any kind. Basically, there are two emerging understandings and usual applications of the term *Future Skills*: First, there is an additive-enrichment-oriented comprehension that understands *Future Skills* as additional components for educational processes that would enrich actual knowledge transfer processes in order to qualify students for future fields of activity. This perspective emphasises the importance of

digital competences or so-called soft skills such as communication or presentation skills. In the discussion about the importance of these skills as additional skills in existing curricula, many centres and programmes for key qualifications were formed at higher education institutions in the 1990s. Representatives of this view of *Future Skills* in Germany are, for example, the “Stifterverband der Deutschen Wissenschaft” with its “*Future Skills-Initiative*”.²⁰

In the last ten years, another understanding gained in importance, which has been competing with the first. In this second view, *Future Skills* are understood in a more integrative way that focusses on the educational process as a whole. Following this approach, the concept of *Future Skills* targets on the reorganisation of educational processes as an integrative concept comprising both, knowledge transfer and development of Skills. In this view, educational processes should lead to higher education programmes that foster the development of competences not only the dissemination of knowledge. Representatives of this view of *Future Skills* are the University of Toronto with a Canadian *Future Skills Initiative*²¹, the World Economic Forum (WEF) with an initiative on “Skills for the Future”²² or the Organisation for Economic Co-operation and Development (OECD) with the initiative Future of Education and Skills 2030²³. A distinction is often made between domain-specific competences and generic or cross-domain competences (cf. Villa Sánchez & Poblete Ruiz 2008). The focus of this view on *Future Skills* is the action of an individual or a future professional. Action as a point of reference always integrates portfolio of knowledge, motivation, willingness, attitude and values into a complex framework of dispositions, which can find expression in action as performance.

NextSkills is based on the latter understanding of *Future Skills*. Hence, *Future Skills* are understood as behavioural dispositions that will manifest in complex and unknown future action situations as (successful) behaviour. Irrespective of the point of view, the concept of *Future Skills* has gained relevance in higher education Institutions as, in addition to the factors described above, vocational training became increasingly academic all over the world. Therefore, higher education studies are more and more required to impart employability and skills for a creative and constructive use of knowledge in an increasingly complex environment.

20 <https://www.stifterverband.org/future-skills>

21 <https://futureskillscanada.com>

22 <https://www.weforum.org/focus/skills-for-your-future>

23 <https://www.oecd.org/education/2030-project/>

B 1.2 Terminological Environment of the *Future Skills* Concept

The term *Future Skills* is a new artificial concept that – from a terminological or conceptual point of view – is not anchored in educational science or organisational sociology, nor does it appear in research on learning psychology or in management theory. In the following sections we are going to constitute the term and anchor it through the concepts education, learning, competence and self-organisation.

B 1.2.1 Education and Learning Theory of *Future Skills*

Education and learning play a constitutive role in the *Future Skills* concept. Learning here is understood as a self-active process that takes place in social-ecological spaces and is equally facilitated and limited by them. Furthermore, learning is considered to being linked to the concept of action and as an activity that serves to overcome subjectively perceived barriers through learning activities (Holzkamp 1993). Externally organised learning (e.g. through given curricula that are not directly subjectively relevant) can also lead to learning, which must rather be perceived as *defensive* learning following Holzkamp's (ibid.) subjective learning theory.

Klaus Holzkamp's subject-scientific foundation of learning (1993) is based on an analysis of previous theories of learning psychology and concludes that the subject is not sufficiently represented as a self-directed individual in previous approaches. It analyses the previous (psychological) approaches to the concept of learning as "equating with externally controlled" learning – and refers to behaviourist and cognitivist learning theories. Thus, according to Holzkamp, the idea that the subject might have a vital interest in learning cannot be found in the learning theories he has analysed. According to Holzkamp, the underlying problem is "[...] the fact that learning as a problem does not occur in traditional learning theories from the analytical point of view of the learning subject" (Holzkamp 1993: 14). It stands to reason that that this is one explanation why learning subject-centred theories on pedagogical quality are lacking.

Based on this analysis, Holzkamp explores learning starting from the subject: According to this people exploring the world perspectively and through intentional reference; reality is interpreted by the subject within the context of his own experiences and intentions (cf. Holzkamp 1993: 21). The subject thus has to be considered as a "centre of intentionality", "that experiences other people as centres of intentionality with their respective perspective/intentionality from its own point of view" (ibid.). The world is perceived as meaningful from the individual's point of

view. These meanings become behavioural premises of human beings and by this the basis for reasonable individual behaviour (cf. Holzkamp 1993: 26). Learning is presented as that kind of activity that aims for expanding one's own means of disposal and in this respect differs from other actions.

Learning is an important and constitutive process for education, which can support the educational process. Learning is not understood as learning in higher education Institutions in the sense of a given curriculum, but as an activity of a subject educating her/himself, which can also be understood in the sense of socialisation or development. Both processes can also be described as learning, which promotes the educational progression. Education in a holistic sense is understood as the effort to form a threefold relationship to oneself, to an object and to the social environment. This means, that through educating myself, I form a relationship to myself and therefore step into a critical distance to myself. Secondly, in relation to an object, theme or task, I develop a relationship, for instance by acquiring it, informing myself, picking up knowledge about it, qualifying myself. Thirdly, it is about the formation of a relationship between me and the environment, which often also presents itself as the narrow environment, this includes people and social systems in which I am involved. This also implies for the wider environment, my workplace, the organisation I work for or our society. Any of these poles can stand alone or can be considered separately, because in turn my capacity to act in my environment is shaped by my abilities in terms of a knowledge base or certain skills, and also by how I recognise myself, for example my self-concept. In consequence the three poles relate with each other. The concept of education such understood provides a structure of three dimensions that are related to each other. However, this structure does not release us from looking at the dimensions, the object, the self/personality, and the environment/ society. Although they all influence each other in the understanding of education and in educational processes, it is helpful to take a closer look at the three dimensions and their developments.

Within the *NextSkills* Studies on *Future Skills* and regarding the question of what knowledge and competence levels employees will need for future working environments, for all three dimensions of the concept of education transformation tendencies are schematically sketched out, which are to be taken up here. With regard to the subjective dimension, it is emphasised that self-development, autonomy and reflection become more important than ever before. Within the object dimension, it is emphasised that there is a change from objective knowledge to a rapidly changing knowledge bias. In conclusion a relatively high deterioration – virtually inflationary – can be observed regarding the importance of this dimension on successful solutions. With regard to the environmental/social dimension, it can be noted that organisations are undergoing a broad transformation of internal organisation and

structure formation triggered by environmental megatrends such as demographic change, digitisation, globalisation, networking.

Regarding the question which future competences will gain in importance, it must first be noted that the structure of the outlined concept of education will not change, but rather the content-related structure of the interaction of the three dimensions. Thus, the importance of coping-competences for future tasks result from the of the changes. Beyond that, the factor of self-organisation which has significance as a basic requirement and determinant for competent acting has to be added.

B 1.2.2 *Future Skills as Competence*

What role does competence play for *Future Skills*? What is the purpose of higher education studies? Education through science or development of professional competences? Or both? Competence orientation has become the magic word for teaching and testing and therefore for the design of study programmes. Education cannot be reduced to verifiable competences. Higher education must offer both: Opportunities to acquire subject-specific and interdisciplinary competences, which as such can be verified, and opportunities for education through science, which as a whole are largely beyond control (Reinmann 2014).

Future Skills are a specific profile of existing concepts of competence. In doing so, we assume that *Future Skills* contain competencies that are important for future action situations. The impact on an individuals' abilities is depending on the personal emotional value-related constitution, on the respective state of knowledge and the extend of introducing this to one's environment or how the environment can enrich one's actions (see also Figure 11). The concept of competence as defined by Erpenbeck et al. (2007) comprises exactly this understanding, focussing on action, more precisely on performance. Competence as a concept refers to the capacity to act not only in relation to knowledge, but also in relation to individual personal values, attitudes, opinions and emotions. And moreover, to the system of action in which a certain activity takes place, namely the operating context in which an action is to be carried out, thus the performance environment. Competence is not context-neutral, but always refers to a specific context. For example, the competence to communicate is context-specific, as it differs in the context of a business environment from a private environment. With regard to competence, another dimension has to be added, that of self-organisation.

B 1.2.3 Self-Organisation

Self-organisation is an anchor concept for *Future Skills*. Self-organisation as a concept was first scientifically and systematically defined by Heinrich Haken. As a physicist, he refers to the ability of particle systems to independently form orders and structures. Erpenbeck has consistently developed and transferred this concept to the field of competence development where he has highlighted self-organisation as one of the central characteristics of competence. To a certain extent, self-organisation is thus an indispensable meta-dimension to the three dimensions mentioned. Only self-organisation as a meta-category is able to harness the concept of education as a concept of competence.

Self-organisation is, so to speak, the fourth dimension in the threefold structural relationship of the concept of education mentioned above. The factor of self-organisation influences the respective dimensions of the educational concept and thereby, as a requirement, changes the content of the educational process. Self-organisation in this sense can not only be understood as a structural condition of every future educational process, but also as an important normative element in the educational process, which recharges the various components with new content.

In relation to organisations, environmental social systems, self-organisation leads to a diminishing influence of hierarchically, given system dimensions. With regard to the dimensions of objects of educational effort, self-organisation as normative orientation is to be understood to provide less given canonical objects of education, and with regard to the subjective dimension of the structural concept of education, self-organisation translates into self-determination and autonomy and less fixed subjective behavioural and life patterns.

The range of competences that will enable people to act in their working, private and social lives are determined by the structural conditions.

Form and substance of what needs to be learned has always been a bone of contention. Indisputable is however the concept of an education for self-determination. Self-determination has always been an important goal of any education in a human, democratic society. If one acknowledges that one of the general goals of a human and democratic education – under the conditions of our historical epoch – needs to be the ability of young people to determine themselves to the greatest possible degree, in short, the ability of self-determination, one must acknowledge self-action as a necessary pedagogical principle (Klafki 2003). It should be emphasised that self-determination must not be interpreted subjectivistic, but always from the angle of a responsible relationship of the individual to his fellow human beings, to culture, society and politics (ibid.).

B 1.3 Future Skills Research: Literature Review

What are the main results of previous research on *Future Skills*? Research on *Future Skills* is divided into two different areas: On the one hand in research work – development of framework concepts or empirical analyses of requirements as well as analyses of academic curricula – on the subject of graduate attributes with a peak in the 1990s. On the other hand – especially in recent times, emerging since the 2000s – on the topic of *Future Skills* or 21st Century Skills.²⁴ Another related research area is the area of employability research, which has been booming internationally since the 2010s. Our analysis of the current state of research includes the most frequently cited research publications on *Future Skills* and Graduate Attributes from the years 2010-2019. In addition, we have analysed more than 40 existing *Future Skills* concepts, and examined and compared their range of content and the categories used (see Chapter B 1.4 Critical Analysis of Existing Future Skills Concepts). The research work of the last 20 years on both topics can be broadly summarized as follows:

1. Research in the area of Graduate Attributes concentrates on determining which competences – as attributes of graduates – are of particular relevance to their subsequent success on the labour market. Apart from this, research is being carried out into which teaching-learning strategies are particularly suitable for the development of such attributes, both of a didactic and curricular nature. After reviewing the literature Trevleavan and Voola (2008), present eleven different terms for Graduate Attributes: key skills, key competencies, transferable skills, graduate attributes, employability skills (Curtis & McKenzie 2001), soft skills (BIHECC 2007; Freeman et al. 2008), graduate capabilities (Bowden et al. 2000); generic graduate attributes (Barrie & Ginns 2004, Bowden et al. 2000), professional skills, personal transferable skills (Drummond et al. 1998), generic competencies (Tuning Report 2008). Rigby et al (2009) summarise these synonymous terms under the umbrella term “graduate skills”. They thus refer to skills that are not only relevant for professional development, but also and above all

24 A search in the Web of Science for the term “21st century competences” and “21st century skills” led to the following result: Three academic publications for the years 2000-2003, one for the years 2004-2007 and 19 for the years 2008-2010, 158 for the years 2011-2014 and 299 for the years 2015-2019, 39 publications in 2019 alone. Publications in the Education Resource Center (ERIC) show a similar result: 77 publications for the year, 143 publications since 2018, 309 publications since 2015, 468 publications since 2010 and 511 publications since 2000.

focus on personal development and the holistic education of the individual to become a committed member of society (ibid.: 4).

2. Employability, in the sense of a lifelong employability, can be scientifically defined and empirically investigated. Competences and skills that are relevant for employability can be determined. Research shows that Graduate Attributes are important for employability.
 - a. In a comparative literature analysis of the years 2006 to 2014, including 39 studies, Osmani and colleagues (2015), collected a comprehensive set of 53 Graduate Attributes.
 - b. The Australian Chamber of Commerce and Industry, in cooperation with the Business Council of Australia, has identified a set of competencies and personal attributes that workers assessed to correlate with higher work performance (2000).
 - c. The NCVER Report (2003) relates Graduate Attributes to Employability and concludes that graduates with Graduate Attributes have a competitive advantage over those with weak or low levels of competence in terms of graduate attributes.
3. Those competencies or skills that are particularly relevant to employability are often transferable and referred to as interdisciplinary competencies, generic competencies, key competencies or soft skills.
 - a. The labour market is undergoing change (Jackson 2014; James et al. 2004), which should be reflected in university curricula. Rigby et al (2009) identify a necessary shift from pure content knowledge towards process knowledge in curricula. This change also has an effect on a changed pedagogy: The knowledge transfer paradigm has to be enriched by constructivist teaching/learning models (Rigby et al. 2009: 5), which, according to Tenenbaum et al. (2001), is not necessarily reflected in practice despite its anchoring in existing curricula. The main reason for this may often be the uncertainty of the teaching staff: Who should teach Graduate Attributes and how and which methods can be used for evaluation? (Freeman et al. 2008).
 - b. As research shows, graduates must not only develop Graduate Attributes in the sense of skills, but also the readiness and willingness to apply them in practice (Trevleavan & Voola 2008; Hoban et al. 2004; Kember & Leung 2005).
 - c. According to Rigby et al. (2009), the core problem for anchoring graduate attributes in higher education curricula is that there have been two opposing opinions in the literature on how graduate attributes can best be conveyed: 1) Train Graduate Attributes along with subject-specific course content, whereby the graduate attributes to be trained should be relevant in the respective disciplinary context (Barrie & Ginns 2004; Sin & Reid 2005; Thompson et al.

- 2008; Bowden et al. 2000; Star & Hammer 2007; Drummond et al. 1998; Bath et al. 2004). 2) Graduate Attributes Disciplines – teaching independently in separate course formats (Cranmer 2006). While the first approach is based on the assumption that forms of teaching must adapt to changing market demands (Biggs 2003), the latter seeks to retrofit skill deficits of individual students by a *modular principle* without focusing on the necessity of changing teaching concepts. Osmani et al (2015) propose a “double approach”, that anchors graduate attributes in the curriculum on the one hand (1) and offering additional employability programmes and workshops on the other.
4. It can be stated that there is a general deficit of the curricula of higher education Institutions in promoting competences that are particularly relevant to employability.
 - a. In their study, Finch, Hamilton, Baldwin and Zehner (2013) identified factors that have an impact on the employability of graduates, showing that employers attached the greatest importance to soft skills; academic reputation was rated as the least important. Similar findings can also be found in the studies of Daud et al. (2011) or Finch et al. (2013).
 - b. In the report on employers’ satisfaction with the level of the Graduate Attributes among their employees, Hager et al. (2002) have shown that the performance of employees was only evaluated as “appropriate”. This is to be understood as a hint for higher education Institutions, which have so far failed to adequately train their graduates in the skills that are critical for the market.
 - c. In this context, Rigby et al. also speak of an “implementation gap” (2009: 8), Osmani et al. (2015) call it a “broad mismatch” (see *ibid.* 367).
 - d. According to Tran (2015), graduates of higher education Institutions are poorly prepared for the labour market and its demands, as curricula are often outdated or irrelevant.
 - e. Study results by Gibbs et al (2011) and Stone, Lightbody and Whait (2013) suggest that cooperation and dialogue between stakeholders (higher education Institutions, employers, students, ...) is the key to adequately exploring and reconciling skill needs and training opportunities. Daud et al. (2011) come to the same conclusion. In their study they revealed a gap between the Graduate Attributes of graduates of business and management studies demanded by employers and the performance of these graduates after their studies. The authors therefore conclude that curriculum design should always take into account the employee’s perspective and consider which competencies future graduates will need in their future field of work.
 - f. Dewey and colleagues (2008) analysed the expectation gap between competences postgraduates exhibit after accomplishing their graduate studies

- and those considered essential by employers. It turned out that there were discrepancies between the expectations of the employees and the competences imparted in the educational programme.
- g. In US literature, the gap between the skills demanded by industry and those taught at higher education institutions is documented by a number of empirical studies (e.g. Aasheim, Williams & Butler (2009); Cox et al. (2013); Koppi et al. (2009); Koppi et al. (2009)). I.e. Koppi and colleagues (2009) examined, how the curriculum of US bachelor students could be better adapted to the requirements of the labour market. It turned out that it was not the division of business and technology courses that needed adjustment, but that the curriculum should instead be aligned at focusing on communication and teamwork skills.
 5. 21st Century or *Future Skills* are a recently emerging research topic by the World Economic Forum, UNESCO, the European Commission or the OECD, which deals with the question which graduate attributes are particularly relevant in order to act in an increasingly globalised and digitised world in a socially creative, responsible, sustainable way and in accordance with the Millennium and Sustainable Development Goals (Osmani et al. 2015; Rigby et al. 2009). Despite many years of discussion and research the embedding and integration of effective skill development is still considered “difficult to operationalize effectively” (Drummond, Nixon, & Wilkshire (1998: 21).
 6. The approaches to 21st century skills from the last 10 years and to *Future Skills* from the past 5 years, are often oriented towards the design of policy framework recommendations and are not always empirically based or based solely on sectoral data collection. Therefore, the present study is particularly relevant for closing this gap by empirically operationalising *Future Skills*.
 7. The existing approaches generally consist of lists of more or less important skills but are not based on sound competence theory approaches (Barrie 2004; Clanchy & Ballard 1995; Sin & Reid 2005). There has been no modelling so far that makes it possible to critically classify the models with regard to their substance and scope.
 8. In most of the existing approaches, it becomes apparent that they go far beyond listing what graduates should know (knowledge) and be able to do (competences) and besides relate to a wide range of personal characteristics (Rigby et al. 2009). Therefore, they not only subsume individual skill components under Graduate Attributes, but also the attitudes, values, dispositions, abilities and competences of individuals.

9. An interesting approach is to understand attributes and skills for employability not as lists of characteristics and abilities, but in a broader sense as part of the identity that is to be developed holistically within the framework of academic studies. These approaches mainly refer to Bourdieu (e.g. 1986 1990) and include habitus (internalization of cultural norms) and capital (social, cultural and economic capital) as components. These approaches do not focus on the acquisition of a set of individual skills, but rather on supporting students in their transformation into their professional role in working life. These more holistic approaches appear promising, but still are rare. Osmani and colleagues (2015) therefore recommend including graduate attributes in higher education curricula in order to meet the demands of tomorrow's world of work at best.

B 1.4 Critical Analysis of Existing *Future Skills* Concepts

What *Future Skills* models and concepts are currently available and how are they structured? A research on the currently available *Future Skills* approaches, models and concepts can only remain incomplete. This field is too dynamic and the understanding of what belongs to *Future Skills* is too diverse, what maybe is called *21st Century*, but actually means *Future Skills*, or what relates to certain educational sectors – such as schools, teacher training, higher education Institutions, individual university disciplines, such as engineering (i.e. *The Engineer 4.0*) or economics (i.e. *Leadership Skills for Managers*) – or content domains, such as MINT/ STEM Skills.²⁵ Due to this heterogeneity a contentwise analytical comparison of the approaches is not useful. However, the approaches can be presented side by side using uniform criteria of skills in order to get an impression of the scope and coverage of the respective approaches. In order to ascertain these criteria, a metanalysis has been carried out.

25 STEM comes from English and means Science, Technology, Engineering and Mathematics. Comparable to STEM is the German acronym MINT, which refers to mathematics, computer science, natural science and technology.

Table 2 Comparative analysis of existing *Future Skills* models (sources see list of references)

Consolidated Skill Inventory	Nr. of matches	The OECD Future Skill Framework	PISA Key Competence Framework	European Commission Future Learning Model	OECD Key Competencies	OECD Global Competencies	WEF 21st Century Skills	P21 Partnership for 21st century learning	Tuning Transversal Skill Model	AEGEE Transversal Skills and Competencies Policy Paper	21st century stem model	National Research Council Model: Skills for Work and Life	21st skills envision experiences	Harvard Global Citizenship education	Graduate Employability 2.0	Social and Emotional Learning Methodology	The future of Skills. Employment in 2030	Future Skills Model NextSkills
Subject oriented skills																		
Analytical and critical thinking	10					1	1	1	1		1	1	1			1	1	1
Creativity	11	1	1	1			1	1	1				1		1	1	1	1
Learning skills	6								1	1	1	1					1	1
Action & Initiative	6	1		1				1		1						1		1
Health Literacy	4					1	1									1		1
Intercultural knowledge and understanding	9	1			1		1	1	1	1			1			1		1
Taking Responsibility	5	1		1		1	1											1
Persistence/grit	4					1	1									1		1
Ability to reflect	3	1								1								1
Curiosity	3						1									1		1
Entrepreneurship Skills	5				1				1	1		1					1	
Flexibility	3					1	1						1					
Global-mindedness	2				1	1												
Anticipation	2	1								1								
Deal w. ambiguity and uncertainty	2			1														1
Empathy	2			1		1												
Form & conduct life plans, personal projects	2		1							1								
Resilience	2								1									
Compassion	1			1														
Falling Forward	1			1														
Reconciling Tensions & Dilemmas	1	1																
Risk Taking	1			1														
Object related skills																		
Digital & Data Literacy	9	1				1	1	1	1			1	1			1		1
STEM skills, complex problem solving	7					1	1	1				1	1	1			1	
Financial Literacy	5						1	1	1		1					1		
Organisation related skills																		
Communication skills (language, symbols, texts)	14		1		1	1	1	1	1	1	1	1	1	1	1		1	1
teamwork	8		1	1	1				1					1	1		1	1
Context awareness and adaptability	5					1	1	1					1			1		
Leadership skills	8					1	1		1			1	1		1	1		
Co-operation skills	9	1					1		1			1	1	1	1		1	1
Networking skills	7		1	1	1					1					1	1	1	
Interact respectfully, appropriately and effectively	5					1				1	1	1	1					
Civic Competence	4				1					1						1		1
Co-constructing, shared cognition	2			1														1
Act within the big picture	1		1															
Defend and assert rights, interests, limits and needs	1		1															
Organizational Skills	4				1	1						1	1					
Tot		7	9	13	10	13	13	11	10	12	8	10	11	5	4	14	7	17

This was done as follows: With the help of the keywords “*Future Skills*”, “21st Century Skill”, “Future Learning”, “Future higher education”, it was possible to identify 41 models, approaches, political position papers and concepts that were published between 2012 and 2019. Only explicit and concrete concepts containing skill descriptions and lists of competences were included in the analysis. Concepts of only theoretical nature were not considered in this analysis. They are the subject of the analysis in Chapter B 1.3 *Future Skills* Research: Literature Review.

The next step was to create a *longlist* containing all skill items of all 41 skill approaches. It resulted in a total of 199 items. These were harmonized by means of a content analytical procedure by paraphrasing as well as determination and standardisation of double entries. As a result, the 199 items were reduced to 33 items, that were suitable to function as category grids or comparison criteria for the previously determined overall list of 199 items regarding their depth of formulation and concept scope. In a further step, the 33 comparison criteria were divided into three categories constructed in the *Triple Helix-Model for Future Skills* – such as skills that refer to subjective individual competences, i.e. the ability to reflect, those that refer to items, objects or content-related areas of expertise, i.e. STEM competences (object-related competences), and those that refer to competences in dealing with the social environment, namely organisational competences (see Table 2).

In the next analysis step, 17 of the 41 skill approaches were selected for being included in the comparative presentation. From the previously used skill concepts, approaches and models those approaches were included that explicitly contained *Future Skills* Lists. Afterward, those were compared on the basis of the 33 criteria. The result is shown in Table 2. The *Future Skills*, which are most often seen in the compared approaches, are – with more than 5 entries each – the following skills:

- Creativity
- Analytical and critical thinking
- Intercultural knowledge and understanding
- Learning skills
- Action & Initiative
- Taking Responsibility
- Digital & Data Literacy
- STEM skills, complex problem solving
- Communication skills (language, symbols, texts)
- Co-operation skills
- Teamwork
- Leadership skills
- Networking skills

- Context awareness and adaptability
- Ability to interact appropriately and effectively

Foundations of the *Future Skills* Revolution: The Theory of *Future Skills*

B 2

The increasing importance of *Future Skills* as the capacity to act in emergent contexts can be explained by a multitude of theoretical references from different scientific disciplines. The interaction of complex systems leads to self-organisation and system change. We call this development a “drift to self-organisation. These system changes are characterized by the fact that they cannot be traced back linearly to the previous state and do not emerge deterministically, so that predictions can’t be made. Networking through digital media, global interaction and the abundance of information through digitalization lead to faster changes at the level of social organisations, which reinforce and accelerate themselves at all levels of the macro, meso and micro levels. The correlation amongst the different ecosystem levels leads to an acceleration of self-organised change.

Future Skills is a dazzling term that is currently in great demand, due to its programmatic effect rather than to its conceptual power. In this respect, it is certainly comparable with terms such as lifelong learning, e-learning, competence or digitisation. These are all concepts that stand for broad developments and combine entire bundles of theoretical-conceptual components.

Looking at the current research on *Future Skills*, it becomes clear that there is a very similar discourse to the concept of lifelong learning behind it. Programmatically speaking, this requires the development of (key) competences in order to maintain or develop the innovativeness of work processes. Such terms occur as landmarks in the public debate and are characterized less by clear conceptual sharpness than by their orientation effect. Therefore, in this chapter we present the current state of research on important theories and groundwork about *Future Skills*. We will process the concepts of competence, self-organisation and related terms. The terms emergence and emerging order in self-organised systems will also be thematised.

B 2.1 The “Drift to Self-Organisation”

Self-organisation is a principle that underlies many social developments and is used as an explanatory model in many theoretical approaches. As it develops into a pervasive concept, we described the evolution towards self-organisation as a guiding principle using the term “drift to self-organisation”. Now, the following question arises: How can coherence, synergy and joint action develop in organisations despite or maybe through self-organisation? Is that not inconsistent? Is the emphasis on the self not opposed to a collective order?

B 2.1.1 Self-Organisation and Structure

Self-organisation is a cross-disciplinary research direction that deals with systems that generate order without external intervention.

“Intuitively, self-organization refers to the effect that a systems structure or organization appears without explicit control or constraints from outside the system. In other words, the organization is intrinsic to the self-organizing system and results from internal constraints and mechanisms, due to local interactions between its components.” (Serugendo et al. 2004:2).

Order formation is the subject of diverse scientific fields as laser physics, thermodynamics, evolutionary biology, meteorology, computer science, economics and sociology. As the basic assumptions and concepts of self-organisation differ fundamentally from those of externally structured, externally influenced systems of order Paslack (2013) speaks of a paradigm shift:

“The answers that were found to these and similar questions certainly went beyond the specific question interest and established a completely new view of nature.” (Paslack 2013)

The research direction of self-organising systems establish itself in the sixties. This actually quite late breakthrough of the self-organisation concept in science is not least due to the success of the mechanistic world view in combination with the mathematically manageable theory of linear systems, which is closely connected to the differential calculus. This success led to problems being classified as linear for as long as possible, which impeded the awareness for nonlinear phenomena. Due to the emerging conception of self-management in organisations, the digital networking on micro-, meso- and macro-level and a movement towards highly

emergent systemic phase shifts of social systems, linear models lost more and more explanatory power.

Self-organisation is the principle underlying many social developments. It is developing into such a pervasive concept that we have described the development towards self-organisation in society as a whole, but also in specific areas of society, such as private or public organisations, by the term “drift to self-organisation”.

The trick of the approach to consider systems as self-organised entities lies in the phenomenon of dynamics. Dynamic systems are inevitably unstable systems. However, structure on the one hand side and flexibility of these systems on the other do not occur despite, but precisely because of their dynamics. *It can be concluded: only adaptable systems are stable and only unstable systems are adaptable.* In self-organisation processes, elements in a system interact in a certain but unpredictable way. This process, the emergence of new characteristics or structures of a system as a result of the interaction of its elements, is what we call emergence (Stephan 2006; Stephan 2005).

Erpenbeck and Heyse (1999) point out that in practice corporate management can be described as an interaction of deterministic approaches and the creation of a framework that enables employees and groups of employees to make decisions and take actions within this framework of implicit and explicit knowledge. Thus, the task of any kind of *organisier* in human social systems is to create and renew conditions that increase the degree of freedom or choice and thus increase the potential for self-organisation and innovation for all participants (Probst 1987:113).

B 2.1.2 Self-Organisation as a Social Trend

The *principle of self-organisation* is the basic principle of the *Next Organisations* – the new working and living reality of people in ever-increasing parts of society – the *Next Societies*²⁶. As a principle, it underlies many social developments. It develops into such a pervasive concept that we refer to this development as “Drift to Self-Organisation”.

Apart from institutional actors and political guidelines and in combination with a higher degree of self-responsibility it seems to be increasing. As a result, the first phenomena of a “progressive we”, emerge as Kruse (2009) calls them, describing them as a continuation of the new social movements of the nineties. Other and new forms of community and solidarity emerge. Depending on one’s

26 For the term see also <https://next-society.de>

perspective, self-organisation as the central concept of *Future Skills* and the future world of work can quickly be understood as neoliberal action – especially if it is provided without a protective net. The economist and sociologist Oliver Nachtwey, for example, describes the transition to the newly designed German welfare state in the “regressive modern age” beyond the “paternalistic principle of leadership care” and identifies self-organisation and personal responsibility as the increasingly dominant concepts (Nachtwey 2016). It is important that any vision of the future that focuses on self-organisation and self-responsibility does not lose sight of these political, social and societal contexts.

Klaus Schwab, head of the World Economic Forum, examines in his book “The Fourth Industrial Revolution” its potential impact on companies, states, countries, society and individuals. He emphasises that self-organisation is the most serious effect of digital transformation: “One of the most far-reaching changes in all these areas will be due to a single force: empowerment” (Schwab 2016). Empowerment to self-determination changes everything: the relationship between the state and its citizens, between companies and their employees, between shareholders and customers, between superpowers and smaller countries. This adds a new quality to the solely systemic considerations of Bronfenbrenner’s ecosystem theory (1981), which emphasizes systemic interrelations between the different levels (the micro-level, the meso-level, and the macro-level). The quality is that the actors acting at the different levels produce a new unpredictability and uncertainty through a new orientation of self-organisation and personal responsibility. The disruptive effect of what Schwab calls “The Fourth Industrial Revolution” (2016) will make it necessary for actors to see themselves as parts of a widespread system that can only be successful with cooperative forms of interaction. In their study “Next Germany” Brühl et al. put it this way:

“By their very nature, these systems are no longer limited to local or regional contexts but are at various levels communicatively and processual interwoven organizations or social systems that influence each other in their digital processes in an accelerating way.” (Brühl, Koppel, Schomburg & Schuldt 2017)

Self-organisation as a principle, self-responsibility as an impulse from within and active intervention as an expression of growing impatience – this is how Handelsblatt editor Gabor Steingart describes in his book “Weltbeben. Leben im Zeitalter der Überforderung” (Steingart 2016) (“Earthquake. Living in an age of Overload”, translated) the zeitgeist of the Next Society. In the chapter on democracy, subtitled “Citizens’ Uprising,” it says:

“The coming uprising will be one that will change the Western more than any election in the past decades. The centre of this change is not a party or a religion, a leader or a guru, but a self-confident bourgeoisie that wants the overthrow depending on respective circumstances that are perceived as unfavourable”. (Steingart 2016)

Due to the demonstrations of the pupils and students against the climate catastrophe, which are currently taking place every Friday since 2019, this diagnosis appears correct and in a new light.²⁷ Steingart reports that the aim is to fundamentally change the procedures for gaining and exercising power: He emphasizes transparency, participation, communication and co-determination as the guiding principles of this silent revolution. This time the disenchantment will not turn in the idle run of the individual sensitivities but will become effective as change energy. All in all, a new awareness has now become evident in a historically unique way: Self-organisation and personal responsibility are the new basic principles for the functioning of social systems and organisations. Until now there have often been poles of social and organisational development that have been perceived as contradictory or thematized, either the expansive new development (“everything is designed independently bottom-up”) or the restrictive counter-movement (“it is important that someone has been top-down, taking things in hand from above”), these seemingly contradictory poles dissolve further and further in the direction of synergetic forms.

Today’s organisations find themselves in this area of tension. On the one hand, stable structures, departments and outlasting objectives are important for continuous development, on the other hand, there is the necessity to allow and promote more and more governance through agile, rapidly changing decentralized organisational units. Paying attention to both poles at the same time and to maintain the resulting tension without simply dissolving it is the new balancing act that organisations and societies have to perform. Depending on the point of view, either powerlessness or belief in hierarchy are in the foreground – or the departure into a new exciting togetherness.

B 2.1.3 Self-Organisation Strategies in Organisations

Self-organisation strategies are adequate, suitable means for our time. In his book “Acceleration” the sociologist Hartmut Rosa uses the term “drift” as a possible “reaction of late modern subjects to the complex roaring world” (Rosa 2005: 379ff).

27 <https://fridaysforfuture.de>

The *Drifter* lets itself carry by the flow of life, does not want to control or to plan, but instead to develop a situational self. This raises the question what effect and what extent self-organised individuals with a high degree of self-responsibility can have. What about the duration and commitment of such approaches for long-term development and what significance do they actually have for practice?

A closer look at the current state of modern management literature reveals that new forms of organisation and management are being tried out under the principle of self-organisation and that we are situated in a field of a worldwide experimentation. Most observers who write about new forms of organisation, self-management, self-organisation and self-responsibility, such as *Holacracy*²⁸, *democratic organisation*, *sociocratic management* or about other types of self-organised organisations, are judging very pointed and adopt extreme points of view. Either the flat hierarchies and work environments *without leaders* are praised for their flexibility and commitment, or they are condemned as naïve social experiments that ignore how things really have to be done.

As so often, the truth lies in between, at the centre of the management of the field of tension. In order to adopt more accurate, balanced perspectives, it is important to look behind the buzzwords that describe these new structures – *post-bureaucratic*, *post-structuralist*, *digital*, *organic*, etc. There is a need to examine which new forms have formed and on what basis they function. Both in the efforts of the lowlands and trenches of operative organisations as well as on the level of organisation-wide strategy formation and policy development.

In the general debate about new forms of organisation, repeatedly extreme positions are adopted, evangelists take one side or the other. However, in a first step rather basic positions and resulting structuring concepts should be examined neutrally – how they work and how appropriate they are for the different organisational requirements. The discussion centres around two opposing pairs that form the poles of the field of tension to which today's organisations are exposed: Reliability on the one hand and adaptability on the other. Reliability as a principle means generating a multitude of things such as predictable profits for shareholders, adhering to rules, being compliant, having stable employee requirements and employee numbers and last but not least meeting customer requirements and the requirements of clients and stakeholders in the public sector. Adaptability on the

28 Holacracy – also Holacracy – is a composite of *holos* (ancient Greek for complete, whole) and *kratía* (ancient Greek for dominion) and is a decision-making system attributed to the entrepreneur Brian Robertson of Philadelphia (USA) in his company Ternary Software Corporation. It's about equipping all organisational levels with the greatest possible transparency and opportunities for participation.

other hand means being able to act situatively in situations, beyond structural principles and rules, being flexible, being able to make small adjustments in the production or manufacturing process and services to meet local requirements, but also being able to make major strategic changes and structural adjustments. Organisations are always caught between stability and adaptability, but most often they are seen as opposing pairs in an *either-or* quandary rather than poles referring to a field of organisation-cultural tension, a tense togetherness.

However, the *NextSkills* Studies indicate, that in the perception of the participants one often excludes the other. Uncertainty exists if too much emphasis on adaptability will generate fragmentation and lead to the loss of the benefits associated with focus and scaling. And although managerial hierarchies often fail in different directions, they are strong proponents of rather stable, hierarchical organisations. Employees are just as dependent on stability and reliability as they are on flexibility and adaptability. In order to do their work effectively, they need a stable environment, access to critical resources and clear objectives and responsibilities. But they also need a space in which they can adapt to changing conditions and take ad hoc decisions, as managerial hierarchies often fail to provide the necessary flexibility. Under the keyword “adhocracy”, Friedrich Lindenberg has been addressing this fact in the latest development since 2016.²⁹ As a manager it is not easy to find the right balance between reliability and adaptability. Therefore, approaches of self-management, decentralized organisation, networked organisation with flat hierarchies or further approaches under the keyword Holacracy, sociocracy, democratic organisation or adhocracy have been developing recently as a new large field of experimentation of dynamic organisations in rapidly changing environments.

B 2.1.4 Self-Organisation and Self-Management

Self-organisation as a form of organisation has existed for quite a while. Not until industrialisation the initial holistic work process was divided into sub-steps and through industrialisation processes then subdivided into the smallest production and value-creation units. In fact, the era of self-organisation goes back a long time ago: 65 years ago, Eric Trist³⁰ – a member of the British Tavistock Institute – observed

29 Friedrich Lindenberg has developed an open source software called Liquid Democracy for online participation for organisations and institutions within the scope of his Bachelor thesis.

30 Eric Lansdown Trist was a leading British social psychologist on the field of organisational development. He was co-founder of the Tavistock Institute of Human Relations in

that teams working according to self-management principles could substantially increase their productivity in coal mining (Trist & Bamforth 1951). At that time, the unquestioned standard procedure was to carry out coal mining as a small-step process. Each team only worked on one small step and the steps were carried out one after the other. The model was based on Frederic Taylor's management approach and Henry Ford's assembly line concept. One team had to finish the shift before the next could start. But the miners in South Yorkshire, England, began to reorganise their work spontaneously and self-organised. Autonomous working groups were formed, equipped with comprehensive skills, performing changing roles and shifts with minimal guidance and supervision were created, able to mine coal 24 hours a day without waiting for the results of the previous shift. As a result, so-called "Self-Managed Teams" (SMT) gained popularity. In the seventies and eighties of the last century more and more attempts were undertaken to introduce this form of management. In Europe, participative management was born (Sexton 1994). Furthermore, the concept of so-called "industrial democracy" was introduced (Korsch 1968).³¹ In Japan, these concepts developed into quality circles and continuous improvement concepts (CIP). In the US, out of these concepts the organisational principles for so-called Innovation Task Forces arose.

The development towards "Self-Managed Teams" helped many organisations and companies to achieve breakthroughs in manufacturing and service practice. The Volvo factory in Kalmar, Sweden, was able to reduce its production defects

London. In 1949 Trist published a well-known article "Some Social and Psychological Consequences of the Longwall Method of Coal Getting" (Trist, Bamforth 1951) about his work on organisational theory in an English coal mine in Yorkshire. The Tavistock approach and the socio-technical research methods emerged from these investigations. In the socio-technical system, the technical and psychosocial systems were linked. Together with Fred Emery, Trist developed the socio-technical approach to "work design" – an application of organisational development in favour of the so-called humanization of work (improvement of job satisfaction, efficiency, quality, absenteeism, etc.): Internally managed, self-regulating working groups would be more productive and motivating for workers than the previous conventional hierarchy.

- 31 The German Marxist Karl Korsch, after a longer stay at the Fabian Society in London (1912/13), translated the term Industrial Democracy, which goes back to Sidney and Beatrice Webb, into German for the first time (The Fabian Society, founded in January 1884, is a British socialist intellectual movement, which became known for its groundbreaking work in the late 19th century until the First World War.) In his paper "Labour Law for Works Councils" (1922) he not only used the term "industrial democracy", but also expanded its content. While the Fabians mainly thought of self-administration/co-determination/participation of the workers in the company and enterprises, Korsch also included the inter-company level, e.g. in the form of economic and social councils at sectoral and overall economic level.

by 90 percent in 1987. FedEx was able to reduce service errors by 13 percent in 1989. In the late eighties and early nineties C&S Wholesale Grocers developed an innovative warehouse concept with self-managed teams that offered 60 percent cost advantages over competitors. General Mills increased productivity of their factories that deployed self-managed teams by 40 percent. The method became more well-known in the 1990s. The concept promised benefits in terms of higher productivity, especially in complex and dynamic fields of work.

In the organisations in which they were introduced, only a fractional amount of the employees were involved in the conception of self-management. Mostly in areas where adaptability was more important than stability and reliability. Over time, these work environments evolved into work ecosystems where employees could easily check their own performance and iteratively improve it. Over time, the question arose why self-management should only be introduced at team level? After all, it seemed as if the strongly transforming organisational structures, partly structured as a matrix, partly very hierarchical and complex with comprehensive reporting schemes, were hindering the development of such self-managed organisational units. C&S Managing Director Rick Cohen reports that when working with self-managed teams, the greatest difficulty is to keep the managers outside and enable the teams do what is necessary (DeLong et al. 2003). Thus, the question arose why entire organisations were not based on the principles of self-management.

B 2.1.5 Self-Organisation as Management Paradigm

And indeed, organisations have begun to go in that direction. Management pioneers such as Warren Bennis and Henry Mintzberg, who in his famous article in the Harvard Business Review in 1981 posed the question “Organization Design: Fashion or Fit?” noticed already in the 1980s a change towards new structures called adhocracy: flexible informal management structures. A decade later, the Internet itself became the model for the conception of the so-called “networked firm”, the virtual company. The Free Software / “Open Source” movement in 1983, the emergence of agile work and planning methods, such as “Scrum”³² in

32 Scrum is a process model of project and product management especially in the field of software development. It was originally developed in software technology but is independent from it and now being used in many other areas. It is a Lean Management usage for project management.

1986³³ and Sharing Economy platforms and business models such as Uber, originally founded as a limousine service by Gerrett Camp and Travis Kalanick in 2009, or Airbnb, the accommodation platform founded in San Francisco in 2008 by Brian Chesky, Joe Gebbia and Nathan Blecharczyk, have led to the emergence of participatory and responsive organisational structures in many areas. Holacracy, Podularity (a concept by Dave Gray from 2013 rooted in agile software development, published in Gray, Vander Wal (2014)) and many related organisation-specific variations of self-organisation were added. These new forms oppose hierarchical management constructs and principles. But in a certain way, and contrary to public perception, they resemble the construct of bureaucracy as Max Weber defined it in the early 20th century (Weber 1921). According to him bureaucracy authority is not located in status, class or wealth but within depersonalized rules and roles. Weber's idea was to define bureaucracy as a concept in which individuals were exempt from the dictatorial right of bad leaders. Self-management systems share the same objective, with less rigidity. To some extent, they could be understood as bureaucracy 2.0.

B2.2 Self-Organisation and Competence in the Post-Knowledge Era

This chapter describes the importance of competence as a basis for self-organised action. We are entering an era in which the value of knowledge in comparison to agency, and the capacity to act is changing. However, it is not vanishing – the post knowledge era is characterised by the need to enhance knowledge with additional component which lead to competence and professionalism. The post-knowledge era asks for knowledge plus – where the plus is defined as motivation, value impregnated, emotionally anchored knowledge, expressing through capacity to perform actions in unknown, complex problem situations. From learning to education, from knowledge to competence. The concept of competence has long been anchored in educational science and psychology. In educational science he was introduced by Heinrich Roth (1971), in psychology he goes back to Franz Weinert (2001). Its different definitions are united by a common core: At first, all definitions provide different sections of competences – which we call competence fields – such as social competence, personal competence, technical and methodological competence. These, in turn, contain further competences. Second, all concepts of competence

33 Scrum was first mentioned as a term in the Harvard Business Review in 1986, in an article by Nonaka and Takeuchi (1986) on The New Product Development Game.

include a number of factors that link them to actions, such as cognitive factors – that is, knowledge relevant to action, volition – thus, the will to act, motivation – as extrinsic and intrinsic motives for an action, social factors of an action, and value-related factors in an action situation. Thirdly, all competence concepts assume that competences can be acquired through learning. And fourth, beyond the mere reproduction of processes they describe a person's ability to solve unknown problems in unpredictable, complex problem situations. According to Erpenbeck we define competence as follows:

“Competences are the ability to act self-organised and creatively in open problem and decision situations. Competences are self-organisation dispositions.” (Erpenbeck in Faix et al. 2012)

Compared to the previously described characteristics this definition emphasises the important role of competence for *Future Skills*. It is geared at future unknown actions and also refers to action disposition – not to a fixed, predefined ability. From the point of view of educational science and learning psychology this disposition to a self-organised action makes the concept so fruitful for the concept of *Future Skills*. *Future Skills* therefore represent specific competencies described above. In the concept of *Future Skills*, the concept of competence is applied to a certain extent and related to the area of emergent action contexts. These are precisely those contexts in which unforeseen, newly emerging connections have to be grasped and unforeseeable problems to be overcome. The concept of unpredictability also includes self-organisation. The *NextSkills* Studies indicate that future organisations will demand self-organisation dispositions over prepared approaches to solutions.

The understanding of a self-organised ability to act, as it is covered in the *Future Skills* approach, aims at the abilities of people to act successfully in future, uncertain, previously unknown contexts.

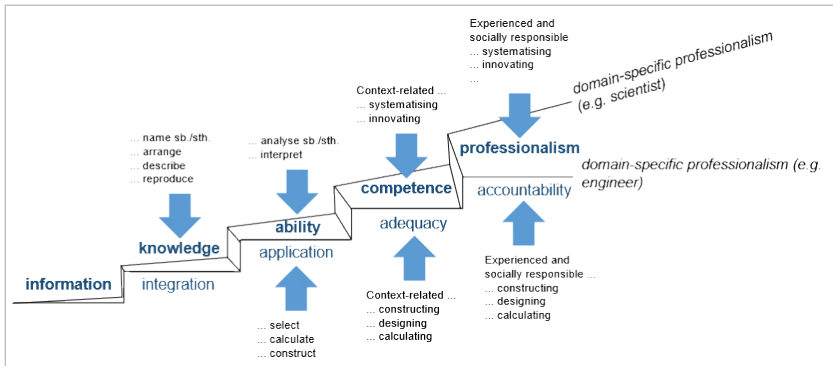


Fig. 21 Stage model of professional competence (Source: Wildt 2006)

It is important to understand that knowledge and competence, action and professionalism are not mutually exclusive or alternative concepts. Rather, they are integrated into the concept of competence. For example, Figure 21 shows that knowledge is located at a lower level than competence and professionalism but represents a necessary step on the path to competence and professionalism.

Finally, according to Erpenbeck (2007), we propose to regard self-organisation as an independent competence that has the quality to combine other competences, i.e. to serve for interaction and combination of competences. This conception understands the different fields of competence in a certain relation to each other. Competences for handling organisational requirements, competences for cooperation and communication, as well as competences for setting priorities and coordination have “medium character” (also Erpenbeck & Heyse 1999). They serve for attainment of the objectives of value creation actions, handling of disruptions, for quality work and the handling of physical environmental conditions – i.e. the ability to make better use of other competences. Based on these considerations and on studies by Erpenbeck and Heyse (1999), we conclude that self-organisation competence and its development manifest themselves as follows:

- self-organisation as a particular quality of competence that exists among other competences (e.g. technical, methodological, social or personal competence) and/or
- self-organisation as a level of competence; i.e. as a degree of expertise that can be found in all fields of competence (e.g. technical, methodological, etc.) and/or

- self-organisation as a competence that describes the development from one level of competence to the next, and/or
- self-organisation as a special form of interaction and combination (interaction and combination action) between different areas of competence.

On a Note... Myths and Misunderstandings About Competence in Higher Education

The discussion about competence in higher education is often characterised by misleading myths, misunderstandings and incomprehension. Such as the common reservation that (1) competence could not be the goal of learning at school or university, rather it had to be focused on knowledge, otherwise learners would not learn anything substantial. And: if at all competence is suitable for higher semesters in higher education, when knowledge is already conveyed, competences can then be developed in addition. A (2) second myth is certainly that competence can best be acquired in a separate specific seminar, e.g. on key competences, and not linked to the actual study of the subjects. By introducing additional competence or key competence courses many higher education Institutions have managed to restructure their programmes towards a competence-orientation, without, however, any changes within the actual courses. A (3) third misunderstanding is that the area of competence is anyway very unclear and esoteric, and the term competence cannot be clearly defined, let alone operationalised for teaching.

Still, in many discussions it becomes evident that the concept of competence deeply permeated the perception of those responsible for education and is currently in a design phase in which sorting, discarding and replanning are taking place. Competence orientation actually requires a complete rethinking of the teaching approaches, which has so far been rather strongly based on an underlying metaphor of transfer.

B2.3 Anchoring *Future Skills* in Educational Theory

Education is the process that should lead to the development of *Future Skills*. But how is that to be understood? In what particular way can the concept of *Future Skills* also be understood in terms of education theory?

First of all, it is obvious that the actors involved in the pedagogical process – such as learners, professionals, management/organisation and state/society – have different perspectives and criteria with regard to the quality of educational outcomes, i.e. how *Future Skills* should be structured. The different perspectives are unlikely to generate *Future Skills* automatically through education. Basically, we argue within the framework of a medium-purpose relationship, thus according to the idea that educational resources can be designed to develop *Future Skills*. Consequently, the development of *Future Skills* is a question of means and methods by which educational processes are stimulated and *Future Skills* are acquired among the users of educational services (hereinafter referred to as learners) by specific (pedagogical) forms of teaching in the broadest sense.

In addition to the question of the relation between purpose and means, there is another question, namely whether it makes sense in normative terms to impart *Future Skills*. With regard to this question, it is assumed that the social and educational services provided in a democratically legitimized state should guarantee material, social and intellectual participation in social developments. Such participation enables citizens to live a largely self-determined and self-responsible life. Participation and attendance in social processes is a constitutive characteristic of this. In this respect, *participation* can be understood as securing opportunities for shaping society. If participation in the social democratic process is endangered by external, material, financial or social problems, politically initiated support takes place. In the field of education, pedagogical services are used where the subjective abilities and competences of citizens are either (newly) developed, exist in a form that is in deficit or at risk, or have partly been lost.

Pedagogical contexts of action that are intended to trigger educational processes always contain components of (1) enabling, (2) preserving and (3) restoring skills and competences that establish opportunities for participation. However, these components are significantly different within the different areas of pedagogy: measures to introduce the next generation into social life are primarily aimed at enabling (e.g. vocational training), measures to prevent dissociation, primarily aim at maintenance, and measures fostering rehabilitation, primarily aim at restoring subjective participation competences. Action contexts that are geared for the development or maintenance of participation competences in their three variants can also be described as *pedagogical action contexts*. Their arrangement,

realisation and cultivation are socially entrusted to the field of education and its instance of reflection, educational science. In this sense, the promotion of *Future Skills* through education is aimed at developing and securing the participation of individuals in the social system.

Education in such a sense is structurally understood as a threefold relationship of the individual to the material world, to society and to himself (Meder 2007: 199ff; Meder 2000: 36f; in detail also 1999: 25ff). This concept of education demonstrates that education as an object of research is not a substrate or a substance, but a correlation – thus a relationship. This tripartite structure has been adopted in the present *Future Skills* Concept, that contains competence fields for all three areas. What can be recognised in the individual results from the relation, that can be described as behaviour (Meder 2007). Education functions as a process of formation of the aforementioned relations. However, the structural perception of this concept of education only provides the perspective of a pedagogical analysis, but not a decision criterion for intervention, i.e. whether there is a case on hand for implementing a pedagogical arrangement of action towards a specific goal. Criteria, standards and/or values are needed to make this decision. Therefore, the concept of education as a concept of the triple relationship must be normatively charged, so that it is clear what the *right* relationship to the world, to society and to oneself looks like. This is the only way to decide whether professional intervention is needed.

In addition, further normative orientation is required. If, for example, it has been professionally diagnosed that the existing relationship to oneself does not permit participation and that intervention on the part of the education and training system is therefore necessary, there is still no orientation what needs to be done in order to transform the undesirable actual state into a socially and individually reasonable target state. Hence, there is no standard for implementation that defines a qualitatively meaningful professional action in the pedagogical field. Such knowledge of action is, in addition to hermeneutic and everyday knowledge, a basic condition for any kind of professionalism. In this sense, the *Future Skills* concept is a normative design of the goal of *securing participation*, in the sense of a pedagogical transfer of participation competencies.

B 2.4 Emergence and Self-Organisation

Emergence is like the stage on which the development of organisations, processes and social coexistence in modern societies takes place. It is, so to speak, the key to understanding systems and their properties. Emergence provides information

on whether and on which rules self-organisation is based in social systems. If processes are no longer predetermined or rule-based, the question arises whether there are other than the acknowledged regularities that make it possible to foresee and understand developments. Emergence as a concept provides the basis for this.

The point is that emergent properties of a system cannot – or at least not obviously – be traced back to the isolated properties of the individual elements of the system. For example, in the field of brain research and in the philosophy of the mind, some scientists hold the opinion that consciousness is an emergent characteristic of the brain (Stephan 2016).

Stephan (ibid.) explains that emergent phenomena are described in physics, chemistry, biology, mathematics, psychology or sociology. Thus, emergence theorists would clearly deny that a full description of the world is possible solely on the basis of knowledge of the elementary particles and general physical laws. However, the recognition of emergent phenomena does not have to lead to a renunciation of scientific explanation. On the contrary, the developments in synergetics, systems theory and chaos research show that emergent-related phenomena such as self-organisation and their formation conditions are accessible to systematic and objectively comprehensible explanations (see also Greve & Schnabel 2011). However, due to a hierarchical derivation from universal laws, the unity of science is replaced by a transdisciplinary dialogue whose aim is to compare analogous structures of complex systems on different emergence levels. In most cases, emergence occurs on the basis of spontaneous self-organisation. The term Emergence describes the appearance of system states that cannot be explained by the properties of the system elements involved. In a sense, at higher levels, newly emerging qualities derive from previous conditions. It should be noted that the newly emerging qualities should not to already exist but have to occur for the first time. It is commonly expressed as follows: *The whole is more than the sum of its parts*. The concept of emergence stands for this *more* and its genesis.

The phenomenon of emergence can be illustrated by the example of temperature. If you look at a single chemical molecule, such as the water molecule, then you cannot determine a temperature for that molecule. However, if you have a large amount of these single molecules, then it is possible to determine a temperature. Temperature only occurs when many molecules collide, so temperature can be seen as an emergent property of many molecules. Thus, the temperature of the water is an emergent property of the water molecules.

According to Stephan (ibid., also Stein 2004), emergence describes a specific transformation process between two system states in systemic terms. If a system has the current system state A and this system is transferred to a new system state B, a transformation from system state A to system state B takes place. The trans-

formation is the result of a transformation process. The transformation process is called emergent if the system state B does not result directly from system state A and its particles or subsystems (Stein 2004). This consideration of emergence in the context of a transformation process also contributes to the scientific clarification of the concept. It can now be asked which transformation rules actually work. If no transformation rules are recognisable or known, one would no longer speak of emergence. During the transformation process, new qualities emerge which cannot be attributed to the summation of the individual properties.

This raises the question of whether the emergence phenomenon can be reduced to simple transformation rules at all. Emergence focuses on two principles:

- Principle 1 – Irreducibility: the new state of a system cannot be (historically) linearly reduced back to the old state but represents a qualitatively new state.
- Principle 2 – Unpredictability: neither in terms of time nor content the transformation of the new system can be predicted.

In the following, the transformation process will be discussed further. How does it take place – which explanatory models for the transformation exist, which rules work and are there systematics recognisable? We will address these questions in detail below. The centre of the transformation process is the phenomenon of self-organisation, which plays the essential role in explaining the emergence phenomenon.

Modern self-organisation theories come from physics and biology and increasingly permeate scientific thinking. They form the basis for the emergence of new needs in the labour market, which we call *Future Skills* in this book. We won't fully introduce the large areas of emergence, self-organisation, synergetics and more or less radical constructivism. Instead, we will concentrate on a few limited examples from the fields of synergetics, the ecosystem approach, media theory and autopoiesis.

B 2.5 Synergetics and Self-Organisation

The scientific discipline of synergetics is described as the first explanatory model. Synergetics is the science of interaction (Haken 1991: 17). It was developed in the sixties by Hermann Haken, a Stuttgart physicist. It was at this time that he discovered laser technology. It was of interest to find out why the different light waves emitted at a diffuse light source bundle to form a single light wave, thereby forming the laser beam. The question arose why different light waves result in a self-organisation process in which a single light wave occurs. This question also

addresses the definition of the term self-organisation. According to Stein (2004) self-organisation is defined as system state caused solely by the system elements and the relations between them, *without the* influence of the environment. Synergetics recognises itself as an interdisciplinary scientific discipline, similar to mathematics and statistics (ibid.). Haken (1991) stresses that synergetics cannot only be applied to the natural sciences, but to social sciences such as sociology. Synergetics can be understood as a doctrine of interaction and as a concept to explain order formation in systems with many interacting units. Haken uses synergetics to investigate how a large number of individual elements organise themselves into higher structures. John Erpenbeck and Volker Heyse (1999) cite the following example based on the physicist Hermann Haken:

“Let us think of a swimming pool where the swimmers are to swim in one direction to the other edge and back. If the swimming pool is very full, as it is the case on hot summer days, many swimmers are on the move and hinder each other when swimming back and forth. That’s why some pool attendants come up with the idea of requesting the swimmers to swim around in circles. The mutual obstruction is much smaller. A collective movement has been prescribed to the swimmers by the personnel. But even without a pool attendant, swimmers can come up with the idea of swimming in a circle. At first there may be only a few, but more and more are joining them, as the circular path is also more comfortable for them. In the end, a collective movement emerges, without an external regulation, that is what is called self-organized.” (Hook & Portugali 1995)

Thus, a self-organised state of order or briefly regulation establishes. Nobody stands outside at the edge and calls to order, standardising: “Now let’s all swim in a circle, left or right! In the tangle of swimmers some might swim rather coincidentally in one direction, to the left or to the right. This instability quickly, almost abruptly, forces all those who are still moving unorganised onto the circular path. The circle forms a regulation. This regulation, here, the circular movement and its enslaved parts, the swimmers, are mutually dependent regarding their movement patterns.

“The collective movement of the parts creates the regulation. The regulation, in turn, “enslaves” the parts by forcing them into the state of order.” (Hook & Portugali 1995)

Haken describes a phase transition that is formed by the “enslavement” of the individuals through the regulation. During the phase transition, properties of both phases, the old and the new, are already visible. However, there is no causality between the phases. It cannot be predicted which new state will be caused by the regulation. Another example:

“A staircase with pedestrian traffic in Germany. It is very likely but not inevitable that “right-hand traffic” will occur. Just a few English tourists on a staircase are enough to perhaps create a regulation for “left-hand traffic”. (Hook & Portugali 1995)

Haken (1991) understands “nonlinearity” that smallest changes in the system structure may have a huge impact on the system state. The complexity is reduced by the regulations. It is not necessary to know the exact behaviour of the individual; it is sufficient to know which regulations are decisive for the individuals (Haken 1991: 23). Haken cites the genetic material DNA (deoxyribonucleic acid) of living organisms as an example. Despite the enormous size of the DNA, it does not contain the information for every single body cell. Rather, the DNA only contains information for the different cell types as well as information for the formation of regulations that structure the cells. During self-organisation it can happen that several states are equally probable after the phase transition. In this situation, coincidence decides which state results after the phase transition. Consequently, predictability is not possible. The system tends towards non-determinism (Erpenbeck & Heyse 1999).

In order for a phase transition to occur, energy must be supplied to the system. In social systems, information takes the place of energy. Before having a closer look at the special significance of information as inducing factor for phase change of social systems and at digitisation, let us discuss the basic principles of self-organisation in Haken’s theory.

According to Mainzer (1992), self-organised systems cannot be completely directed and controlled from the outside in principle. They are subject to inner conditionality and determination. Their structures are therefore primarily determined by internal factors. Their future is real, open. Erpenbeck (2018) describes the transfer of Haken’s self-organisation theory to the process of human actions and evaluations and names important principles for self-organised systems that form an important background for the development of *Future Skills*:

1. He explains that, firstly, in all such systems, the already described principle of the order parameter applies. Hence, usually there are special movements that coordinate, consensualise and sometimes enslave all sub-movements. In the figurative sense, this also applies to spiritual and symbolic action, which is coordinated by superordinate order parameters, namely values and norms. The emergence of such regulations is hardly predictable and difficult to administer.
2. Secondly, he states that all self-organised systems cannot be well predicted. In principle, their developments cannot be predicted for the very long term, sometimes not even for the short term. Rather, the principle of historicity applies.

Structures and processes created by development and evolution can only be understood in the context of their concrete history.

3. Thirdly, the principle of complexity is important for social, self-organised systems. Due to their complexity, most systems can only be described incompletely. Inner states influence themselves. The system behaviour can be derived neither from inputs nor from internal states. The complexity cannot be reduced.
4. Fourthly, the principle of redundancy applies. Information is distributed throughout the system. There is no exclusive principle of hierarchy. The system can be designed and controlled from subsystems. Different values with analogue functions, but also analogue values with different functions can arise, exist peacefully coexist but also fight each other heavily.
5. Fifth, the principle of self-referentiality of self-organised systems has to be considered. Their system behaviour is the product of an inner connection. Every action has an effect on the system itself and is the starting point for further action.
6. Sixth, the principle of autonomy. Although the self-organised system is not informationally independent, it is self-determined with respect to the environment in the sense of self-design, self-direction and self-development.
7. Seventh and last, Erpenbeck points out that social systems are always self-organised and creative; always value- and will-driven, meaning- and purpose- oriented, based on communication, symbols and learning.

The importance of information for the change of the phase composition of social systems, its influence and the significance of digitisation was examined by Dirk Bäcker (2018), Professor of Sociology at the University of Witten Herdecke and is described in more detail in Chapter B 2.7 Digitisation and Self-Organisation.

B2.6 Co-Evolution and Self-Organisation

In 1978 Urie Bronfenbrenner founded an ecological socialization research, which, similar to qualitative social research, was interested in natural everyday situations of humans and their subjective meanings. André Epp (2018) interprets this as a critique of the prevailing psychological laboratory experiments of the seventies and the deterministic theories associated with them. He published the ecosystemic development model in which he incorporated both the original social and biological meaning of the term *ecology* (Bronfenbrenner 1976). The first meaning is derived from the Greek word *oikos* (Greek for *household* or *house community*) and refers to the way in which the household is composed, the family is organised and how it

relates to other people. Their importance is based on biological ecosystems. These consist of biotic communities of interrelated organisms share the same habitat. It has to be considered that ecosystems have different sizes and can overlap each other (Epp 2018). However, human ecosystems do not only include biological but also cultural living conditions.

Bronfenbrenner (1981) refers with his model to the fact that development must be regarded as a reciprocal interactionist process between the individual and his social environment. The interactions are nested in each other and the various elements of the system influence each other. The modification of one element can result in the modification of another (Oerter 1995: 88), so that a network of interaction and relationship is formed. Thus, the ecological transition is always a consequence as well as an impulse of development processes, which can be both positive and negative.

Today, the term ecosystem is increasingly used in connection with organisations and economic networks. In 1989, Robert A. Frosch and Nicholas E. Gallopoulos (1989) initially transferred the concept to the field of industrial ecosystems. One year later, Michael Rothschild described the entire (capitalist) economy as a “living ecosystem” (later published in Rothschild 2004). The scientific breakthrough happened in 1993 when James F. Moore published the concept of *business ecosystems* in the Harvard Business Review and refined the content in his book *The Death of Competition* (Moore 1996). Moore speaks of the co-evolution of various organisms of the *business ecosystem*, which are developing over time and which are increasingly oriented towards the guidelines of the leading parties in the *ecosystem*:

“An economic community supported by a foundation of interacting organizations and individuals – the organisms of the business world. The economic community produces goods and services of value to customers, who are themselves members of the ecosystem. The member organisms also include suppliers, lead producers, competitors, and other stakeholders. Over time, they coevolve their capabilities and roles, and tend to align themselves with the directions set by one or more central companies. Those companies holding leadership roles may change over time, but the function of ecosystem leader is valued by the community because it enables members to move toward shared visions, to align their investments, and to find mutually supportive roles.” (Moore 1996)

The ecological transition can also be described as a phase transition of systems in the process of emergence as outlined above. Changes therefore affect not only the individual level, but the ecological system as a whole. Ecology refers to the totality of the potential and received environmental conditions of an individual, as well as the transaction, i.e. the activity and dynamics in the entire system between the individual and his environment (Epp 2018). Consequently, not only the interactions within the immediate habitat are taken into account, but also contexts that initially

appear more distant, such as structural or normative conditions of the social system, come into focus, since people are influenced by them and in turn influence these conditions (Seifert 2011: 114 in Epp 2018). Bronfenbrenner describes these structures as micro-, meso-, exo- and macro-systems, each of which is larger and more comprehensive than the previous one (Oerter 1995: 88).

- The microsystem comprises all factors attributed to the individual within his actions by another individual; i.e. certain external characteristics, abilities, etc. These are personal influencing variables that are located within the individual.
- Epp explains that the mesosystem involves the interaction between the areas of life in which the developing person actively participates, such as a child's relationship between home, school and friends, or for an adult the relationship between family, work and circle of acquaintances (Bronfenbrenner 1981: 41). Accordingly, the mesosystem includes the various life contexts of individual, which also includes organisations.
- Those areas in which the developed person does not participate himself, but in which events take place that influence what happens in his area of life, are called the exo-system (Bronfenbrenner 1981: 42). This includes formal and informal structures, to which the developing individual as an acting person does not belong directly, thus is absent. Instead, these structures influence the individual indirectly. On the other hand, the individual also impacts these structures obliquely. In summary, exo-systems can be described as sources of effects from distant environmental regions. This includes larger institutions of society and how they develop at the concrete local level.
- It is interesting to note that the concept of the macro system does not focus on specific contexts such as the life of the individual, but rather on superordinate institutional patterns, structures and activities. According to Bronfenbrenner Epp (2018) states that the macrosystem refers to the basic formal and substantive similarity within the lower order systems that exist or may exist in the subculture or in the whole culture, including the underlying worldview and ideologies. Examples are the political system, the social, legal system and global supranational organisations and institutions.

Epp (ibid.) further defines the basic principle as a multiple intertwined construction of the different system levels which can be understood as a structure enclosing the next structure. Accordingly, the macro-level does not affect the micro-level directly, but the interaction of the individual levels and the systems contained must be considered. Since changes in the ecosystem development model are basically understood as a conglomerate of interacting and communicating systems and factors, parallels

to symbolic interactionism become apparent. Bronfenbrenner implicitly shares his scientific-theoretical assumptions. By means of the ecosystem development model, the relevance structures and levels of reality can be reconstructed and analysed with reference to the extent people in different attribute significance to social contexts (micro-, meso-, exo- and macro-systems) and their role for their construction of reality (Epp 2018). Since reality is not regarded as predetermined, but continuously constructed by subjects, social systems receive their meaning only through the interpretive powers of the agents.

Dieter Baacke's (1980) socio-ecological approach is also based on these assumptions. Social-ecological approaches examine the interrelations between the social environment and social behaviour of humans (Ehlers 2011). Socialisation is understood as the consequence of active processes of engagement between the symbolic, social and material environment as well as oneself. According to Bronfenbrenner, Dieter Baacke has introduced the socio-ecological approach to the description and explanation of the behaviour of young people into educational youth research in Germany (Baacke 1980; Bronfenbrenner 1974, 1976). In the following years, Dieter Baacke's working group first implemented this approach within the area of youth research (Sander & Vollbrecht 1985), and later empirically as a media socialization approach (Baacke 1988; Baacke, Sander & Vollbrecht 1988; Baacke, Frank & Radde 1991). The project *Medienwelten Jugendlicher* (Baacke, Sander & Vollbrecht 1990a und 1990b), with numerous publications in various authorships (Baacke, Sander & Vollbrecht 1988; Vollbrecht 1988; Vollbrecht 1990; Treumann et al. 2002), proved to be particularly fruitful.

According to Bennewitz the following can be formulated: The social world is understood as a world constructed through interactive action, which is structured with purpose for the individual but also for group collectives. Social reality thus presents itself as the result of socially meaningful interaction processes (Bennewitz 2010: 45). Thus, ecosystem theory offers an explanatory approach that shows how social systems and individuals interact at different levels, from the individual to the global social structure. Dirk Bäcker's media analysis shows how media influence and bring together these different levels and how excess of meaning and information leads to mutually influencing self-organisation processes in the respective subsystems. How these self-organisation processes work is explained by Herrmann Haken's theory within Synergetics.

With the approach of autopoiesis, self-organisation processes can also be explained and conceptualised. The concept of autopoiesis is a subset of the universal ontological concept of emergent self-organisation. In biology, the concept of autopoiesis represents an attempt to define the characteristic organisational feature of living beings or living systems by means of systems theory. The term, coined by

the Chilean neurobiologist Humberto Maturana (1987), was broadened, modified and made fruitful for various other areas of scientific creation in the course of his publications. In the following it will be discussed in the context of self-organisation.

B 2.7 Digitisation and Self-Organisation

In social systems, the emergence of regulations leads to the formation of internal structures, which can be described as phase transitions. This phase transition can be triggered under the condition of energy supply in natural systems and information supply in social systems. Digitisation functions as a medium that represents an information surplus for all social systems (Bäcker 2018). This is revealed by the analysis of social development on the basis of the so-called archaeology of the media epochs by Dirk Bäcker, a sociologist at the University of Witten-Herdecke. He hypothesises that man-machine interface electronic media provide society with an overflow, or as he calls it a “surplus sense” (Bäcker 2018), that previous forms of society are structurally and culturally unprepared for handling. Thus, by providing an excess of sense, information and meaning through electronic media, movements of adaptation and compensation are triggered in social systems whose direction of design and structuring is unpredictable and leads to self-organised processes in the sense of emergence.

The idea of the concept of “surplus sense” follows a suggestion by Niklas Luhmann (1997: 405) to observe different forms of society from the angle of the respective dominant dissemination media of communication and in this sense to distinguish between the tribal, the ancient, the modern and the next society. First a) the language, then b) the writing, then c) the book printing and finally the electronic media are dominant. In the evolution of society every newly emerging dissemination medium carries and develops new possibilities of communication, that connects previously unrelated actors in new ways. According to Bäcker, reaching and understanding new target groups threatens the existing structure and culture, brings them into instability and imbalance and destabilises the existing institutions, conventions and routines, which are adjusted to the modalities of the older (distribution) media. Exactly this instability causes the self-organisation of novelties in social systems and organisations.

Bäcker (2018) further explains that language produces an surplus sense that goes beyond the perception of bodies, gestures, movements and at best some warning and comfort sounds and confronts humanity with the *drama* of the requirement to distinguish between word and thing in order to be able to handle a language

(including its possibility of lying). The tribal society owes its origins to overcoming the reference problem of language (Deacon 1997), including the introduction of morality and mystery to control the question “who may talk to whom about what” and to mark what may not be talked about (Luhmann 1997: 230 according to Bäcker 2018). Bäcker continues by saying that humanity is entering another media epoch at the moment when first writing and then alphabetical writing produce a new surplus sense by *exploding* society’s time horizons. The font enables controllable access to a differentiable past and correctable access to a still open future. For this reason, written societies are historical societies and “hot societies” (Lévi-Strauss 1962) because of their reflexive, i.e. constantly reviewed handling of myths. The terms *hot and cold societies and cultures* go back to the work “Das wilde Denken” (“Wild Thinking”) by the French ethnologist Claude Lévi-Strauss from 1962. In this he distinguishes cultures according to their ideological attitude to cultural change. The *colder* a society is on the scale, the more pronounced its efforts are to preserve its traditional cultural characteristics as unchanged as possible – a culture, on the other hand, is classified as all the *hotter* the greater its drive for far-reaching and rapid modernisation of society is. As linear and open perspectives, the script opens up a past and a future that had previously been circularly closed in the eternal return of the memory of the ancestors. The complexity of society contained in a variable memory and in variable plans is absorbed by stratification, which makes it possible to allocate the orientation to different time horizons to different social strata.

Each of these media epochs is characterised by a surplus sense that threatens the previous order and can only be caught in a new order. Otherwise, society would have to find ways and means of rejecting the respective new dissemination medium of communication. In fact, the attempt at rejection accompanies the introduction of any new medium of dissemination. Since the introduction of writing, there have been plenty of examples of this. The fact that communication *disembodies* not only apply since the introduction and implementation of the new electronic communication media or book printing, but since the introduction of writing and already language, even though the reaction of society to language is not documented for obvious reasons. According to Bäcker (2018), the rejection of the newly emerging media is a topos that is still being repeated today in terms of media and cultural criticism. What is decisive, however, is that the rejection of newly emerging media is in turn a form of observation of their possible consequences and thus a form of discovery of possible benefits – even if this can only be achieved by overcoming rejection and violating the structures of society. The media evolution of society takes place in the medium of the rejection of media innovations.

Each medium is therefore to be evaluated as disruptive at the time of its occurrence. The reduction in transaction costs then demonstrated by economists

always convinces only the one and threatens the other, whose surplus depend on the exploitation of transaction costs. It depends on technical – as well as social – resourceful innovations whether it is possible to anchor the use of a new medium in areas of society that are initially possibly marginal and then increasingly central. This applies and also applied to the modern book printing society, which violates every authority that the written society had laboriously built up into an impressively closed cosmology by dealing with the sources and hierarchies. The fact that one was involved in this devil's work of movable letters and the mass production of texts could only be justified at first by pretending to want to reproduce only the Bible in masses and to *water* the earth with it in a way that God could not have wished for better (Giesecke 1991).

The printing press was regarded as a machine of communication – and this initially meant the dissemination of the Bible and other God-fearing literature. And no one suspected that the religious offer would not be sufficient to ensure enough supplies for the printing presses that had been put into operation with considerable capital expenditure. Humanism, the Enlightenment and the idea of an education for all, including the necessary literacy, came just at the right time to supply the missing content and make it receptive (Bäcker 2018).

Dirk Bäcker impressively analyses the surplus sense produced by digital media. In each case, “surplus sense” means that a medium of communication provides more possibilities for communication than can ever be perceived currently. Every new media epoch must first adjust to this sense of surplus and the adjustment does not mean that the surplus sense disappears, but rather that forms are available, a structure and a culture of society in which it can be taken up and reduced without making it disappear as such. These forms are forms of new social cultures, new social contexts that emerge in the sense of an evolution in order to be able to deal with surplus sense and surplus information.

This occurrence is an emergent process in the best sense of the word, in which self-organisation becomes effective as a principle in the sense of Haken. Through intensive networking via the Internet, information is provided in surplus. This allows systems to network with each other and new systems to emerge. In addition, existing systems change their phase states and enter into self-organisation processes. If we talk here about society and social challenges, Luhmann (1991) always states that sociology understands society as a communication system in terms of system theory. That is, we are talking about global societies. The interdependence of the different levels, the different social subsystems, on both a global and a local level, which are interconnected by new media, are also explained in their interdependence by Bronfenbrenner's ecosystem theory.

Bronfenbrenner (1981b) uses his ecosystem-theoretical model to develop a model that views development as a reciprocal, interactionist process between the individual and his social environment. One development step leads to the other, the interactions are nested in each other and the different elements of the system influence each other. The different system levels are therefore interconnected. The ecosystem-theoretical approach is thus a further explanatory approach that shows how systems can relate to each other and communicate with each other. This communication and relationship are reinforced by digitisation and there is a connection between the systems at the global macro level and the local individual micro level. The use of Twitter to transmit political communication is one example of this: announcements often directly trigger a chain of influences that can be felt first politically, then economically, and then individually. The resulting connection leads to a self-accelerating, self-acting and undirected, unpredictable, highly energetic further development in sub-areas of social systems.

B 2.8 Autopoiesis and Self-Organisation

The autopoiesis according to Maturana (1987) attempts to transfer the cybernetics that emerged after the Second World War to biology. Maturana's intention here is to clarify how man can reach knowledge. According to Maturana, living systems are always autopoietic. The term *autopoiesis* (Ancient Greek *autos*, English *self* and *poiein*, English *create, build*) means as much as *self-doing* or *self-creation*. Accordingly, only systems that generate their system elements themselves, i.e. act self-organised, may be described as autopoietic. All system elements must originate from the existing system elements. In this context one speaks of circularity. No system elements from the environment are transferred into the system.

Autopoiesis is also a key term in Niklas Luhmann's sociological systems theory, who transferred the term *autopoiesis* to the observation of social systems (Luhmann 1984). He refers to the work of Maturana and Varela as well as Milan Zeleny's expanding discussion on the application of the concept to organisations (Zeleny 1981). Social systems consist according to his central hypothesis, exclusively of communication (systems) and operate in autopoiesis. This means that the systems create themselves out of themselves in a constant, non-targeted autocatalytic process. The systems therefore produce and reproduce themselves (ibid.).

Autopoietic systems must be closed to the environment. This means that a structural change can only arise from the system, i.e. systems are self-referential. This does not mean an energetic or informational isolation from the environment.

This is because system disturbances that trigger structural changes can be caused by environmental influences. The system selects the extent and type of contact with the environment by defining the system boundary. This property is called structural coupling and means that there is an environmental coupling between the inner system and the outer system that defines the system scope. Due to this system boundary, the system is not able to perceive changes in the state of the environment. On the other hand, an external observer cannot make any statements about the internal organisation of the autopoietic system. This is referred to as operative unity (*ibid.*). From the outside, only a view can be taken.

Due to the operative unity and self-referentiality of autopoietic systems, a targeted influence on the system is impossible. Since the environment cannot recognise the state of the autopoietic system, the environment cannot judge how the system reacts to an environmental impact, a disturbance. The influence in an organisational system or a team from the outside through information overflow, through digital media, can lead to changes in the system after autopoietic analysis, but these changes are self-referential and self-organised and therefore cannot be determined in the result.

In autopoiesis one speaks of self-organisation, since the autopoietic system can spontaneously adapt its own state to boundary conditions of the structural coupling (*ibid.*). Autopoiesis has established the idea of self-organisation in the field of biology and sociology. A variety of management practices have been inspired by autopoiesis. The reference to emergence arises when one considers that in an autopoietic system, through self-generation and self-reference, a multitude of system elements are organised and, in the process, produce higher or new characteristics in their totality (in the emergent sense). In the theory of autopoiesis it is emphasised that in an autopoietic system there is a system-specific organisation beside the system elements. It is assumed that individual system elements are interchangeable as long as the specific organisation remains intact. This shows that the system behaviour is not due to the behaviour of the individual elements, but that a specific organisation is created alongside the system elements, which is just as decisive for the system behaviour. It can therefore be assumed that autopoietic systems exhibit emergent properties.

B 2.9 Summary and Conclusion

In conclusion, it becomes clear that the interaction of complex systems leads to self-organisation and system change. These system changes are characterized by

the fact that they are not linear to the previous state and do not come about deterministically, i.e. no predictions can be made. Networking through digital media, global interaction and the surplus of information through digitalization lead to faster changes at the level of social organisations, which at all levels of the macro, meso and micro levels once again reinforce and accelerate themselves. The relationship between ecosystem levels thus leads to an acceleration of self-organised change.

Self-organisation is therefore the principle underlying many social developments. It is developing into such a penetrating concept that we have described the development towards self-organisation in society as a whole, but also in the individual areas of society, such as private or public organisations, with the term drift to self-organisation.

In the next section we will look at how self-organisation works in companies and organisations.

The Principles of *Future Skills* Development

B 3

Listening to HR managers of organisations that have largely dealt with the new forms of work and governance, it becomes clear that the concept of networked and agile organisations is currently on the rise. With quite different speeds and characteristics, but with similar results. What are the characteristics that are common to all? Which fundamental effects cause the changes? And what can we learn from this to be better prepared for the future?

It is apparent that all vignettes and episodes reported so far are based on the same development: Organisations have set out to shift the boundary between structure and dynamics further in the direction of dynamics. For many organisations, this is still largely unknown territory. The interviews point out that we are dealing with a future area of development where experiments are carried out and measures are tested.

Regarding the question of what future employees need in order to be able to act successfully in these changing fields of work: Technical knowledge that can be retrieved is no longer sufficient to shape this development, but rather *Future Skills* that are based on aspects of self-confidence, self-competence, self-esteem, autonomy and commitment. To meet the demand for subject- and method-related competences, traditional methodological knowledge, such as business analysis or specialist knowledge in a specific field is less useful, but competences such as flexibility and openness, versatility, ability to change perspectives, interdisciplinarity, innovation competences such as creativity, innovative thinking, willingness to experiment, system competences, systems thinking, knowledge of knowledge structures, networked thinking, analytical competence or digital competences.

When this list of competences is presented to HR managers in *Future Organisations* (for the definition of *Future Organisations* see Chapter A 1.3.1 Step 1: Identification of Future Organisations), they ask for the underlying principles and structures of *Future Skills* in addition of an additive enumeration, and to develop a model of skills under conditions of ever higher self-organisation in the future.

This is a central objective of the *Future Skills* Studies. The first thing to be noted in this regard is that *Future Skills* shift the focus away from work as a predetermined, externally structured activity that follows an already pre-structured action plan towards an employment agenda that employees co-design through their own participation. With high identification, great motivation and the possibility of structuring work autonomously. An essential and constituting element of the *Future Skills* named above is the ability of self-management, that refers to the special significance of the subject as creator. For organisations which – by definition – consist of binding structures, this means to experience conflict and tension. The more they find themselves exposed to agile and unpredictable areas of work – like all those organisations that participated in the *Future Skills* Studies – the more they need to mediate, moderate and manage these areas of tension. The challenge consists of using communication and participation processes to establish structures in which the members of the organisation can simultaneously question, negotiate and determine the structures in which they work, without losing overall commitment and coherence, expectability and calculability.

We also call this tension the *structure innovation paradox*. The paradox is that organisations in their innermost part are defined through structures which also constitute the inner commitment and expectability for their members. Paradoxically, the future viability of organisations increasingly depends on questioning exactly these structures and rebuilding appropriate, new and innovative structures. Today's leaders operate within this paradoxical field of tension. They are confronted with the challenge to fostering the capacity to dealing with this area of tension and to practising them themselves. This development finds an expression in more value and less rule orientation, more communication and less structural orientation. It is about building and developing organisational cultures that develop dynamically.

Organisations not only need specific structures, but also a special understanding of how learning and development work within organisations when beginning to orient themselves in this way. Because learning and development becomes a basic constituent of such organisations that determines the ability of the members of the organisation and thus of the organisation as a whole to adapt to future requirements in an appropriate way.

The *NextSkills* Studies show in an impressive way that all participants were able to explicitly identify and elaborate on all four of the following areas:

1. the most important *Future Skills* from their point of view,
2. the necessary leadership competences for managing the described tension, and
3. the organisational learning approaches. And – everyone has
4. specific requirements arising from how higher education must be structured.

The buzzword is: Enabling self-organisation. Hereby we are returning to the keyword that frames this chapter and with which it began. From previous analyses and reports of the participants in the *NextSkills* Studies, nine different principles can be derived which are important for the concept of *Future Skills* and are explained below.

Principle 1: Organisations form part of networked, systemic environment

Organisations, their actors and the environment are interconnected as networked, mutually influencing subsystems. The changes in the global environment, the organisations and the acting subjects are systemically linked to each other so that they form a common ecosystem: Megatrends of demographic change, globalisation and digitisation are leading to more complex, networked environmental contexts, that increase the pressure to develop networked and complex structures within organisations. According to the cybernetic law of Ashby (1974), organisations can deal with complex environmental changes especially if they can enable complex structures for action in their internal structure (see Chapter II.2 The *Future Skills* Turn). The situation is also changing for the acting subjects, because they must remain capable of acting within these structures, i.e. they must face new qualification requirements.

Principle 2: Organisations strive into a state of homeostatic balance

The concept of homeostasis was described by Claude Bernard around 1860. Later Walter Cannon and Karl Ludwig von Bertalanffy revived the term and refined it in 1929 and 1932 (quoted from Flechtner 1972). It describes maintaining an equilibrium state of an open dynamic system through an internal regulating process. Homeostasis can therefore be understood as a special case of self-regulation of systems.

A system that controls another can compensate for more disturbances in the control process, the greater its variety of action: the greater the variety of a system, the more it can reduce the variety of its environment through control (see Ashby's Law 1974). Consequently, the variety of the control system must at least have the same extent as the variety of the malfunctions that occur to execute control. In particular: Whenever it comes to dealing successfully with highly complex and dynamic situations, the acting system must have at least the same complexity and dynamics as the (environmental) system in which action is taken. As market are increasingly networked, there is an increasing need to allow and promote free networking within organisations.

Principle 3: Self-organisation as a prerequisite for the capacity to act

Self-organisation becomes a key category for the ability to act under constantly changing conditions. Organisations can only remain agile and capable of acting if employees are able to develop their own organisational patterns for their respective contexts. Self-organisation in this sense is understood as a competence that has to be learned. At the same time, it forms a central principle as a metaconcept for understanding the emergence, maintenance and development of patterns of order. (see Chapter B 2.1 The “Drift to Self-Organisation”)

Principle 4: Enabling organisational structures

In connection with the importance of self-organisation competence, organisational see themselves confronted with having to designed, enable and develop such structures internally. In order to do so, it becomes increasingly central within organisations to move from rigid structures to flexible and framework conditions, i.e. to create an ecology in which solutions for problems *grow*, in which new products emerge within a research and development ecology, as non-deterministically controllable processes (see Chapter B 4 *Future Skills for Future Organisations: An Analysis*).

Principle 5: From (specialist) knowledge to decision-making competence

It is about competence not knowledge! In other words, it is about the capacity to act, which goes beyond mere knowledge or insight. Things have to be decided, implemented, promoted.

Principle 6: Individualisation and personalisation of learning and development

Learning paths become more individualised and personalised: what, when, where and how learning takes place is determined on the basis of individual learning needs resulting from an individual pressure to act.

Principle 7: Dealing with ambiguity and uncertainty as core competence

It is about the capacity to act in basically open situations, i.e. in situations of uncertainty or ambiguity.

Principle 8: Learning formats for Future Skills

The focus is on forms of learning and support that aim at active accompaniment rather than instruction or teaching. The focus is shifting from further education and training in the classical sense, towards a direct support for practice that supports individual employees within their professional context. Learning is no longer promoted by classical instruction, but by new formats, which rather include mentoring, coaching, reflection support, networking or the formation of learning communities. Learning has no educational function in the sense of acquiring pre-determined curricula, but rather the function of continuous further development on the basis of concrete problem situations based on reflections and the formation of new individual action strategies.

Principle 9: Tension between organisational structure and self-organisation

Organisational structures, rules and regulations of the organisations and the principle of self-organisation of actors within organisations are always subject to a creative-constructive tension. This must be taken up productively in human resource development and organisational design.

Future Skills for Future Organisations: An Analysis

B 4

The “Drift to Self-Organisation” described in the previous chapter, which is reflected in all areas of life and expressed in new life, learning and work models, leads to new demands on individuals in society as a whole and in organisations. In this chapter we show examples and approaches from the field of self-management and organisational theory, in which self-organisation forms the basis and *Future Skills* play a special role.

Looking at organisations and analysing the extent to which they are geared for self-organisation, it becomes apparent that between the poles “reliability” and “adaptability” there is often a belief that reliability has to be emphasised and developed more strongly than adaptability. However, the *Future Skills* Studies show that this way of thinking is increasingly being questioned, especially in *future organisations*. On the other hand, more and more empirical findings show the importance of the psychological component of identification with employees’ action for job satisfaction and productivity.

The German management consultancy Gallup Deutschland, a research-based consultancy and specialist for the interface between economics and psychology, records its annual findings in the so-called “Engagement Index”. For 2016, the study shows that German employees are satisfied with their lives and value their economic situation positive, they hardly fear for their jobs and show a positive attitude toward work (Nink 2014). Seventy-seven (77) percent would continue to work even if they would not depend on money (Nink 2014), seven percentage points higher than in 2010. Nevertheless, the majority of employees are hardly emotionally attached to their employer. This has a direct impact on key competitive factors such as absenteeism, productivity, profitability, quality and customer loyalty. Employees who do not feel emotionally involved with their employer show less initiative, motivation and conscientiousness, and they are less likely to address undesirable developments. According to the current “Engagement Index”, every third employee hid at least once in the last 12 months serious concerns from his or her supervisor. Without

emotional commitment almost every second employee has been silent. These topics, such as emotional involvement, the feeling of unjustified hierarchies, leading to insufficiently educated decisions in complex problem situations, are currently intensively discussed by organisations and companies of all sizes.

The NextSkills Studies also show that the topic of emotional commitment of employees to their organisation is one of the most important management topics, that determines the motivation of employees to get involved. Within the data of the interviews two development areas play an important role: value management and new leadership concepts. Value management refers to the appreciation of diversity and different talents, skills and competences, as well as interests, in order to create “shared cognition”³⁴ in teams and to increase team performance. In addition, the focus is on identification, motivation, culture fit and the transfer of the core values of the organisation. These play the role of a “social glue”, that the mere organisational affiliation could no longer adequately ensure, since the commitment and temporal duration of the organisational affiliation is consistently challenged and in normal biographies ever-faster negotiated episodically. Management concepts for *future organisations* are primarily concerned with communication, feedback, hierarchy reduction and decentralized, individual assumption of responsibility. The *Future Skills* Study shows that instruments such as coaching, mentoring, the initiation of peer communication networks and the moderation of self-supporting structures in organisations are becoming increasingly important. Executives are confronted with new challenges that have not been so much in the foreground so far. New qualification requirements are emerging. Mindful leadership, systemic consulting and coaching approaches, non-violent communication and communicative moderation as well as peer consulting are becoming more important than hierarchical delegation and assignment-control approaches. Two case studies illustrate these instruments and organisational forms.

Inspiring Practice: Daimler

The extent to which the topic of hierarchy and alternative approaches is currently occupying well-known large companies is reflected, for example, by the contribution of Daimler-Benz CEO Zetsche. A start-up culture should bring a new spirit into the company in order to promote grassroots democracy. The Leadership 2020 program is about a new leadership culture. The impetus come from 150 employees from 24 nations, from all areas and ranks, from clerks to foremen from up to managers. In eight teams, ideas and visions of future leadership at Daimler are developed.

34 The concept of shared cognition refers to the concept of situated learning and peer learning (Brown, Collins & Duguid 1989; Lave & Wenger 1991).

Hierarchy structure, meeting culture, performance evaluation are all questioned and there is only one guideline – that there is no guideline.

Good Practice: Spotify (Open Access for Music)³⁵

An example of self-organisation in organisations is the music streaming service Spotify. At Spotify, agile corporate structures are the order of the day. From Spotify's perspective, in 70 percent of all cases good employees take the same decisions as their supervisors. In 20 percent s/he makes better decisions because s/he knows better. Only 10 percent s/he is off the mark. These management principles were shaped by Daniel Ek. He is the founder and CEO of Spotify.

Spotify Story in a nutshell: Daniel Ek's stepfather, an electrical engineer, introduced the boy to the world of computers at an early age. Already as a primary school student he wrote his first programs on a Commodore C64, founded his first company at the age of 14 and created a company websites cooler than the commercial web agencies in the Swedish capital. The company grew. At 19, Ek sold the web service provider. Ramge (2015) reports that he began studying computer science, but quickly dropped out and finally became head of the software company uTorrent, whose programs were used to illegally exchange music and film files worldwide. During this time, he came up with the idea for Spotify. He found investors and 12 million euros of venture capital; no other music streaming platform grew as fast as Spotify. Ramge (2015) analyses that this also has a lot to do with Ek's special leadership model, through which good programmers come to Spotify and stay there. Only they are able to create the comfort for which Internet listeners are willing to pay for in the age of free culture. Ek knew that if you want to attract the best of this guild, you have to provide them with leeway. He himself was one of them. Giving more leeway was no problem for him. He is rarely in one place for long periods of time, which is comprehensible in a global company with two headquarters and five development sites.

Ramge (ibid.) explains that there are 60 so-called agile coaches at Spotify. Moderators support the teams without internal hierarchies in making the right decisions and organising themselves that each team is productive and each team member happy. At Spotify 1200, technical developers in Stockholm, Gothenburg, New York, Boston and San Francisco can do well without any supervisor. At Spotify, the number of employees doubles every 12 months. The challenge is to preserve the culture with a lot of freedom of choice and team spirit in small units, without the product and the business falling apart. Talking to Spotifyers, shows that blurringness is part of the system (Ramge 2015).

35 Presentation of the case study from Brandeins magazine based on Ramge (2015).

B 4.1 Self-Organisation as a Management Principle

Spotify is organised according to agile, holacratic principles, which have been illustrated in Figure 22. The topic of leadership relates thereby to the programming method SCRUM³⁶ and their approach to improve of software programs: A goal is defined without any planning but a cautious approach, step by step. On a trial and error basis ideas are tested. If it works, it is followed up; if it does not catch on, it is dropped. Another important principle is the *no blame culture*, this means working without accusation.

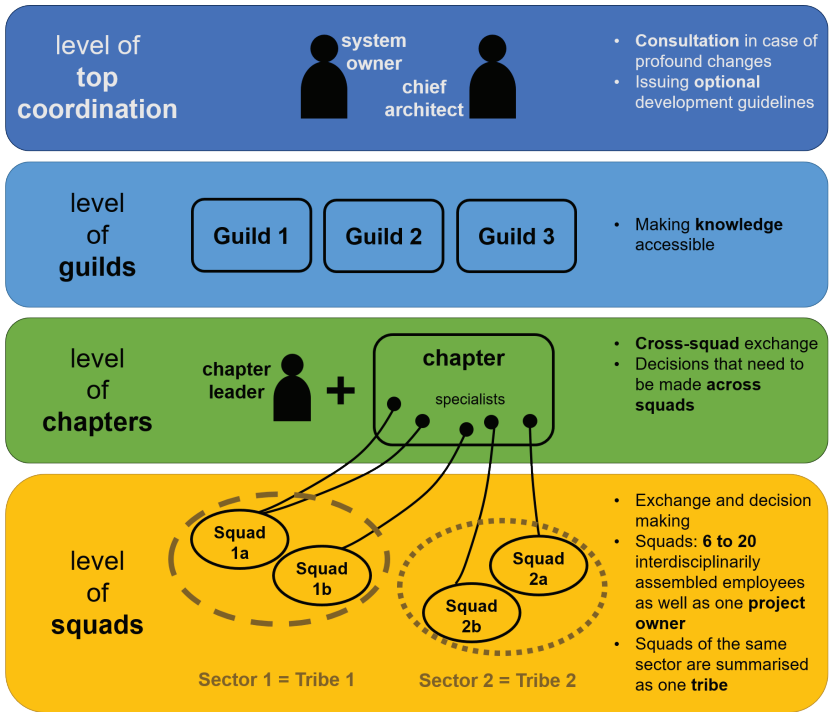


Fig. 22 Agile, holacratic structures in self-managed organisations

36 Scrum is a process model for project and product management, especially for agile software development. It was originally developed for software engineering but is independent of it.

Teams are not called teams, but squads. One of these units comprises between six and 20 employees (see Figure 22: Agile, holacratic structures in self-managed organisations). It is always an interdisciplinary team composed of classic developers, experts for user experience and tests as well as designers. There is no leader but a so-called product owner who sets the topics and organises the many joint conferences and the sometimes very emotional sessions on Friday afternoons, on which the week is reviewed.

An agile coach ensures compliance with the rules. Each member can bring about decisions by convincing her/his colleagues of her/his idea. Squads working in the same field belong to the same “Tribe”. One tribe should contain no more than 150 members, that it does not become too confusing (see Figure 22).

Ramge (2015) describes that the members of a tribe meet regularly to exchange information and make decisions that affect everyone. The specialists also discuss topics on which consensus must be reached for technical reasons. These specialists also belong to a cross squad chapter with one “Chapter Leader”. But s/he is only given authority in formal matters such as holiday applications, apart from that s/he only has an advisory function. The level above the tribes is occupied by “guilds”. Their task is to provide access to knowledge throughout the company. The highest co-ordination is assigned to two persons: a so-called *system owner* and a *chief architect*. Major changes in the system require their consent. But there are no fixed rules. Sometimes the top coordinators set development targets, sometimes self-confident squads impose their ideas. Or the founder or the chief designer breaks all rules or put his foot down (Ramge 2015).

Inspiring Practice: Deutsche Telekom

In Deutsche Telekom’s AI Blog (Bäumler 2017), Michael Kaselow, agile coach at Deutsche Telekom, reports on his experience with Holacracy within the company: “We have adapted the Spotify model for ourselves. The challenge is that the structure has not grown organically as in the case with Spotify. Rather, it has been set up and we as agile coaches have to make sure that it works out. Since there is little information about this type of organisation, we foster an atmosphere of learning by doing and adapt everything to our requirements. When working on new topics or products, we have to redesign squads or tribes or even chapters.” In the eLIZA project there are currently about 15 squads divided in four tribes.³⁷ There are also

37 eLIZA is the name of an innovation project of Deutsche Telekom with the task to develop an Artificial Intelligence (AI). The name eLIZA was taken over from a computer program developed by Joseph Weizenbaum in 1966. It should show the possibilities of communication between a human being and a computer via natural language.

so-called chapters, which are recruited from the people who work in the squads and tribes and who have the same profession. These are, for example, developers, user experience experts, designers or testers. They exchange ideas beyond the borders of the squad and develop common methods.

Kaselov says: “Not every development squad has to set up its own test environment. Many things can be shared or built up together – the chapters are responsible for that.” The so-called Campus, an event at which the individual squads present milestones and occasionally external experts speak on specific topics, provide for regular exchange opportunities. In addition to internal training, the focus is on informal exchange – recognising it is only together that the various team units, i.e. squads, tribes and chapters, can meet the challenges (ibid.).

Management concepts based on self-organisation are fundamental fields of experimentation for organisations. The *NextSkills* Studies show that self-organisation as a management principle is already widespread, without introducing more progressive types of organisation such as Holacracy.

It should be noted that these are often introduced organically in start-ups and small companies, while there is little or no knowledge about success factors for the transformation of larger and traditional organisations. Sociocracy, democracy and Holacracy are currently on everyone’s lips. According to Frederic Laloux, these three concepts can be seen as the next form of corporate evolution, as presented in his book *Reinventing Organizations: A Guide to the Design of Meaningful Forms of Collaboration* (2015). According to this, Holacracy seems to be the perfect answer to an increasingly fast-moving and complex world of work. It enables companies to react flexibly to external (or internal) changes and at the same time increases the innovative strength of the organisation. The employees are more independent, enjoy personal freedom and a high degree of personal responsibility. In the long term, they become happier, highly motivated, healthier and more productive. Freedom and self-responsibility – these are important keywords for current employer branding concepts.

However, it is not clear whether and, if so, which future organisational type will prevail – especially in large, traditionally structured organisations. The advantages and disadvantages of the three models are explained below.

B 4.1.1 Sociocracy in Organisations

Sociocracy assumes that all parties involved are equal when it comes to governance of decisions within the company. A decision has been taken if there is no serious counter-argument. The method requires self-motivation and a cooperative attitude

in cooperation as well as self-responsibility. According to the management principle Y (McGregor 1960), it also aims to ensure that employees feel comfortable and therefore strive for self-realization within the company. On the other hand, according to Management theory X (ibid.), humans have a fundamental reluctance to work, thus a manager is needed to force them to work. In comparison to management theory X, management theory Y states that work has a high value among employees and represents an important source of self-satisfaction.

B 4.1.2 Holacracy – Agility and Responsibility

The concept of Robertson (2015) is currently quite popular within the new work scene. It regulates the management of organisations through transparency that enables everyone to participate at all levels and in all processes. It focuses on the purpose of the organisation and not on profit. Robertson impressively shows how managers in a Holacracy do not assume the position and status of a manager, but their role and responsibility. At the heart of Holacracy is a steering committee that controls all activities and problems. Anyone who wants to get involved in the company is allowed to take part in it and plays a certain role there. Various other roles have been set up around the executive committee, e.g. *Business Developer* or *Consultant*. These roles can consist of one or more persons and change constantly. When an external request, i.e. from a customer, comes up the respective committee reacts to it and decides autonomously and independently. For example, a customer wants to place a new order and the person involved in the request changes from the Consultant role to the Sales role. When required, the respective person can be supported by the management circle, i.e. in searching for a suitable employee. As soon as this situation has been clarified, the person takes on the role of IT Consultant again. However, a new circle has now formed, which consists of two persons, person X and the new consultant and is unambiguously assigned to the respective customer. Consequently, we have different committees in the company that deal with a certain topic. The entire organisation is also to be understood as a committee. Beyond these committees there are many different roles. As an employee, I can be located in several committees and constantly contribute to the purpose of the organisation. Thus, the company is managed dynamically and primarily oriented to the purpose of the organisation. Roles replace status and hierarchy. In addition, above rigid organigrams there is a vivid structure.

In an analogy to biology, Holacracy consists of different circles, so-called holons, which enclose other things. A holon contains several molecules (roles) and a molecule contains several atoms (ibid.). Although the atoms and molecules in a

holon do not change, they can develop new properties through recombination. In nature this has been successful for millions of years. Agility and Holacracy have much in common.

B 4.1.3 The Democratic Organisation

The approach of democracy in companies first of all represents the following questions “Who leads me?”, “Who represents me?” and “How am I involved in the company?” Within this approach it is experimented with time as a factor in leadership. The second topic is self-determination: “Where do I work, when and with whom?” (Sattelberger 2015). Thus, it is about greater say for the employees as well as equity of opportunity. According to the authors of the book “Demokratische Unternehmen”, Sattelberger et al. (2015), the focus is on responding to the desire of the employees for participation in the strategic development of their company by allowing them deciding on their own work situation. It therefore prioritises group decisions. According to the author, the aim is not the achievement of a majority decision, but to change the position of the group members that their voices unite to form the critical mass of one option. Many companies are considering how such a democracy could look like. One abandoned thesis within various references is that digital technologies facilitate co-determination.

Will the future look as follows? Employees elect managers, vote on new products, decide on working hours and customers. Currently, this topic is still highly controversial and offers great scope for further research. However, it is evident that many employees have little interest in external control. Digital technologies have simplified coordination processes. The CEO of Microsoft Germany said: “We used to look for employees who do what they are told, now we look for employees who do what we do not tell” (ibid.).

B 4.2 State of the Art of Self-Management and Agile Management Practice

In their contribution to Holacracy in the *Harvard Business Review*, Bernstein et al. (2016) stretch an orientation framework in which they show a tension between stability and reliability on the one hand and adaptability on the other. They argue that holacratic forms of organisation are no panacea and that their implementation

should depend on how the general conditions in companies or sub-organisations develop:

- If the requirements for stability and reliability are high, large long-term investments are needed. for example, if a machine park needs overall control via long-term strategic planning, then holacratic forms of organisation are not necessarily effective.
- Does the company/suborganisation operate in an unsafe environment with changing requirements? Is the product service portfolio broad and diversified? Are few guidelines sufficient for an overall control? Then holacratic forms of organisation might be appropriate. But even in this case, some unanswered questions remain: How is overall coordination of the individual subunits/circles ensured? Who assumes the external overall responsibility? Which remuneration models are suitable for such a changed organisation and the new mechanisms of task allocation?

Overall, the agility barometer of a study by Haufe and Promerit (Anderson et al. 2017) shows that agility has not yet established as a dominant management principle in German companies. 90 percent of employees and 70 percent of managers state that they never use agile methods. Virtually no changes can be detected compared to the survey results from the previous year. *Scrum swarming* or Holacracy are unknown to 80 percent of employees. It looks somewhat better in terms of Design Thinking (57%) and fluid structures (61%). We have already learned about the characteristics of holacratically organised organisations from the Spotify case study.

What else is characteristic of Self-Managed Organisations (SMOs)? Self-Managed Organisations work by Self-Managed Teams: the responsibilities for the work are divided between the members of the teams. The members share the responsibility regarding the attainment, the use of resources and the ownership of information and knowledge related to the tasks. Variations in self-management can be recognised in organisations and companies that have dared to take the leap into agility and self-organisation. These include companies such as *Morning Star*, a manufacturer of tomato products, *Valve*, a developer of video games and gaming platforms, *W. L. Gore*, a highly diversified manufacturer, and the aforementioned *Zappos*. The variations of the different degrees and forms of self-organisation are an expression of the specific management and organisational contexts. The best-known and best specified system for Self-Managed Organisations and Self-Managed Teams is the Holacracy system already described (see Chapter B 4.1.2 Holacracy – Agility and Responsibility). Self-Managed Models (SOM), typically have three characteristics:

1. Teams are the structure: in Holacracy they are called “circles”. Podularity” refers to “pods”, *Valve* to “cabals” and in many other companies simply to teams. But whatever they are called, teams are the basic components of the overall organisation – not individuals, not departments or divisions. The roles are developed and defined collectively in the teams and assigned to the individual work tasks. As in traditional forms of organisation, Self-Managed Organisations also have different teams for different projects, functions (e.g. finance, technical development, sales or different segments (customers, products, services)). At *Zappos*, the 150 departmental units were converted into about 500 circles according to this model. The resulting modularity is much more flexible than hierarchically structured organisations. According to current organisational needs ad hoc teams can be built or removed.
2. Teams develop and lead themselves: Although Self-Managed Organisations avoid traditional hierarchy structures, teams are still embedded in larger structures that they can co-determine. Holacratic organisations adopt a constitution, an organisational charter, that usually represents a “living document” in which rules on how circles are built, developed, changed and dissolved are recorded. Thus, circles do not only manage themselves, but there are overall rules how they are “designed” and managed. However, the constitutions and charters do not determine how employees have to fulfil their tasks. They merely provide a framework for how circles emerge, are formed and work together, how they identify and assign roles, their boundaries and how they can interact with each other. At *Morning Star*, employees write so-called CLOUS (colleague letters of understanding) in teams. These define the responsibilities, activities and objectives to be pursued in the teams, as well as criteria and measurement procedures for evaluating performance measurement. Hence, CLOUs are agreements between the Circles.
3. Leadership is highly contextualized: In Self-Managed Organisations, leadership is allocated among different roles, not individuals. Actors usually perform many multiplayer roles in different teams. When work contexts change, management responsibilities also change. Technology plays an important role in providing transparent information. Amongst others, Software tools such as *GlassFrog* or *holaSpirit* are used to communicate and compare the goals and responsibilities, but also the progress and decisions of the respective circles. Due to the grouped nature of the actors’ collaboration, an equal level of information is indispensable in Self-Managed Organisations. At *Morning Star*, for example, the Clous are stored on an internal server that employees can transparently retrieve information about responsibilities. If someone does not succeed in a role, it is assigned to someone else. Of course, assigning roles is work in itself. In a Holacracy there is also a role

related to this task, the so-called “lead link”, responsible for connecting circles with each other. In more flexible, loose forms of self-management, such as the concept of podularity, roles are assigned flexibly by the internal organisation. For example, at *Zappos*, there are twice as many lead link roles than managers were previously employed. The crucial distinction is that management responsibility now is part of the respective role and no longer of the individual actor. Thus authority, power and leadership responsibility continue to exist, but are highly contextualized.

Overall, it is apparent that for large organisations and companies forms of self-organisation provide the opportunity to partly or completely introduce agile structures. The concepts to be used for this purpose are new, not yet fully tested and their effects still unknown. However, each of the approaches offers the possibility of questioning existing traditional structures, breaking them up and satisfying the abilities, needs and requirements of both employees and customers. In the field of tension between stability and reliability on the one hand and flexibility and mobility on the other, it is now a matter of detecting the right mix. Concepts such as Holacracy, podularity, Sociocracy and democratic organisation are important to form the gravitational centres of new, modern, self-organised corporate and organisational structures. The various approaches though very different aim at the same purpose: the try enhance the adaptability and flexibility of the individual abilities of members of the organisation with the roles, structures and responsibilities in the organisation as well as with the objectives of the organisation, and to point out potentials where flexible change is possible and vital. Thus, a high degree of flexibility, adaptability, competence and self-reflection is required from the individual actors. It is obvious that *Future Skills* are an indispensable prerequisite for self-organised companies. Furthermore, the advantage of structuring organisations as flexible entities is that leadership roles can change contextually over time. This almost playful approach fulfills the requirements of competence on the one hand and the abilities of the employees on the other. It is important to stay focused and transparent, and to concentrate on the common purpose within the different circles, pods and various action formats. Furthermore, Self-Managed Organisations are challenged by the topics recruiting and remuneration. When members determine their own personal role portfolios, it is difficult to define clear benchmarks or market salary rates. The development of roles also complicates the recruitment of new employees. From October to December 2015 approximately 1,500 employees at *Zappos* performed 17,624 rolls. This corresponds to around eleven roles per employee and 195 different roles per day. Thus, a completely new approach is required to manage, explain,

and monitor the diversity, multitude and variety of these roles, and beyond that to recruit, introduce or “onboard” new employees.

Traditionally, leaders are said to steer organisations and parts of organisations in the right direction guided by their vision. On the other hand, it is repeatedly shown that the attempt to change organisations with a top-down concept do not succeed. Rosabeth Moss Kanter reports in her well-known article “Transforming Giants” in *Harvard Business Review* on the question “What enables a big business to be agile?” (2008) that the success of change processes in companies highly depends on the so-called “Guidance System” or the navigation systems of large organisations. While employees initially acted mainly according to rules and decisions, they are now encouraged to play a holistic role and to contribute to the development of a shared understanding and vision. Action, identification with the work, and alignment with the living environment, partners and the extended family is of utmost importance. Authority and leadership are maintained, and activities coordinated in these new “Guidance Systems”. Above all, it is about shared values and standards and coherent organisational cultures. According to Kanter (2008), this change to new guidance systems has been discussed and prepared for a long time and is now taking place with astonishing speed. An expression of this new organisational philosophy can be found in the entire area of Self-Managed Organisations. Having a look at such highly developed organisational forms as *Valve*, the self-organisation becomes obvious for many company histories. For example, by the decision to expand the corporate market to the hardware sector by producing PC games. At *Valve*, over 400 employees focus all their time on projects that they believe are important for their customers. They collaborate in self-organised cabals and reorganise every single project by rearranging chairs and desks, sometimes several times a day. (Of course, it is also possible maintain customer focus. Steve Jobs once famously commented that even the market does not always know what it wants.)

Ethan Bernstein, John Bunch, Nico Connor and Michael Lee (2016) state in their overview article in the *Harvard Business Review*, that most killer arguments for or against self-managed organisations or Holacracy and other new forms of organisation usually ignore a very important point: Most organisations, especially large ones, should implement these new organisational structures and working techniques rather partly than in their entirety. They note:

“[W]e’d be surprised more than 20 percent of the Global 1000 looked ‘teal’ in 2030, to use Frederic Laloux’s term for ‘whole’, evolutionary, self-managing organizations. But we’d also be surprised if more than twenty percent didn’t significantly draw on some of the techniques within their corporate frameworks.” (Bernstein, Bunch, Connor & Lee 2016).

In large and small organisations, both private and public, numerous experiments with agility and self-organisation are already performed. *Procter & Gamble* have implemented a very complex matrix structure in order to integrate their different products and brands geographically. In addition to this, there is a very large, extensive “Open Innovation Program” in which external teams develop tailor-made solutions for *Procter & Gamble*. *Google* and *3M* are similar examples: For a long time, employees were encouraged to spend a certain percentage of their working time on their own projects (self-directed work). To determine how self-management and self-organisation should be introduced in companies and other organisations and to what extent it is reasonable serve the following three questions:

1. How much stability is needed? Which parts of the organisation need stability?
2. Where adjustments are required and necessary?
3. Which organisational forms provide the right balance?

Therefore, it is reasonable to apply self-management principles to entire organisations when the ideal level of adaptability is particularly high. This is the case, when the organisation operates in a rapidly changing environment where the benefits of rapid flexible adaptation exceed the costs of its adjustment effort, the consequences of possible misconduct and misadaptation would not have disastrous consequences, and there would be no need for explicit control. This is the reason why startups rank among the “early adopters” in this field. As *Valve* discovered, industries such as software development or game development are also prototypical for this category. Unlike, in industries characterised by a high degree of reliability – such as the financial sector or defence and military organisations – hierarchical structures remain, although in some niches self-management would provide fruitful approaches for promising reorganisation.

B 4.3 Conclusion on Self-Organisation as a Basic Principle

We have shown that self-organisation is a fundamental principle of modern organisational ecosystems. This affects both the organisational structures (see agile organisational and management concepts) and the individual actors as well. Furthermore, it has an impact on the required set of skills and also larger global structural contexts, which in turn interact. Self-organisation can be traced back to processes in the physical-scientific field in which energy input to a system leads to non-deterministic phase transitions. If this is applied to modern societies, according

to Dirk Becker's (2018) analysis of the media society, an excess of information has the same effect on social systems, i.e. it leads to non-deterministic phase transitions, namely self-organisation processes. In an environment where self-organisation processes on markets, in political systems and organisations prevail and are enabled, they become prerequisites in combination with the ability to act self-organised and self-responsible. Self-organisation thus becomes a basic structural principle for the development of *Future Skills*.

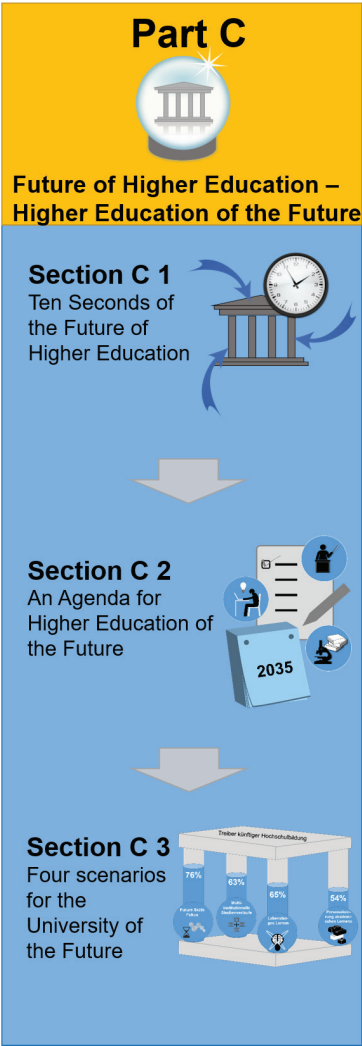
Part C

Future of Higher Education – Higher Education of the Future

#in-a-nutshell

The University of the future will have to change its organisational structure and procedures. Drivers and pressures will result in a new profile of higher education in a society in which academic education is the normal biographical experience for the majority of an age cohort. The *NextSkills* Studies make a point to view future higher education from a students' perspective and envisioned future learning experiences. The megatrend towards an educational society ("Bildungsgesellschaft") is accelerated by a second megatrend for society as a whole, that of digitisation. We have identified a total of ten key drivers that will lead to changes in the design, programme and strategies of higher education institutions and thus determine the future of the University (Chapter C 1 Ten Seconds of the Future of Higher Education). Building on this, we describe how learning and teaching can be shaped in the University of the future (in Chapter C 2 Rethinking Learning, Teaching and Research: An Agenda for Higher Education). The *NextSkills* Studies resulted into hallmark indications on the shift from academic education and teaching to active learning of choice and autonomy. Higher education institutions in the future will provide a learning experience which is fundamentally different than the model of today. Timeframe for the time of adoption vary but for many aspects a close or mid-term timeframe has been estimated through in our studies. The dimensions of future learning in higher education will comprise (1) structural aspects, i.e. academic learning as episodic process between biographical phases professional and private episodes throughout life, learning as institutional patchwork instead of the current

widest-spread one-institution-model of today, supported through more elaborated credit transfer structures, micro-qualifications and microcredentials, as well as aspect of (2) pedagogical design of academic learning, i.e. changing practices of assessment, also peer- validation, learning communities, focus on *Future Skills* with knowledge playing an enabling role in interactive socio-constructive learning environments. In general experts estimate structure changes to become relevant much later than changes related to academic learning design. Chapter C 3 Four Scenarios for the University of the Future concludes by formulating four scenarios for the university of the future as gravitation centres of future organizational development: (1) the *Future Skill* university scenario, (2) the networked multi-institutional study scenario, (3) the my-university scenario, (4) the lifelong higher learning scenario.



Ten Seconds of the Future of Higher Education

C1

Seconds, also called semitone or a half step or a half tone, is the smallest musical interval commonly used in Western tonal music. When sounded harmonically it is considered the most dissonant. Something obviously is tense, wants to dissolve, strives for another state. Dissonances in music have a dynamic force, they appear as an unstable state, are not a calm anchor. Not a moment of dwelling – they want to move on. They seem to necessitate one further step, pointing music in one direction. And yet they are the smallest unity of great pieces of music, of all pieces of music. The University of the Future is confronted with the question of whether it can understand the dissonances currently emerging as moments of development from which it can compose a new architecture, understanding them as development potentials.

What are those seconds – those developments which on the one hand present problems, difficulties, challenges, lead to dissonance and on the other hand simultaneously provoke and enable developments? Making them necessary? What are the ten seconds that determine the future of higher education? ³⁸

The future of higher education stretches out like a horizon. Luhmann (1976) describes that in all social systems expectations are shaped that are decisive for how the system, including higher education, orients itself in its operations towards the future. It is therefore important for the future of the University to also take into account its internal situation and the expectations of its different stakeholders. Niklas Luhmann (ibid.) hereby distinguishes two aspects, namely *present futures* – i.e. projections, for instance in the form of utopias – and *future presents* in the form

38 Throughout our text we used the term *higher education* and refer to its institution as *higher education institution*. However, for this chapter on its future we have decided to synonymously use *University* as a term and refer to the *University of the Future*. The main reason is to be comparable with other foresight studies and scenarios which often use the term *University of the Future* rather than *higher education institution of the future*.

of technological orientations, causal or stochastic connections of future events. The present work is intended as a contribution to the *future presents* of higher education.

It is a multitude of different developments of a social, economic, political and technological nature that lead both to a transformation climate and a need for transformation. Some aspects stand out like landmarks visible from afar and form occasions for smaller and larger crises and thus new developments. Ten points are chosen and analysed below with the aim of mapping out to what extent they exert transformation pressure on higher education institutions.

C.1.1 First Second: Digitisation – Higher Education in a Digital World

Digitisation is such a powerful development – also for higher education institutions – that it would certainly be worth devoting an entire book to the influence of digitisation on higher education. Various publications bear witness to this. However, the current discussion about higher education strategies shows that digital transformation is not an aim in itself. It is becoming apparent that fewer and fewer institutions are adopting a *digital* strategy while and more and more are moving towards understanding digitisation as a means of strategically rethinking or sharpening their own profile. Schünemann and Budde (2018) pointed out that the result is often a strategy for *higher education in a digital world*, but not a strategy for digitisation.

At the same time, digital education is the *burning issue* of the current debate about the University of the future. It is the subject of countless conversations, discussions, concept papers and scientific studies. Both in educational policy and in the current debate on higher education, as well as in educational research efforts and many other discussion contexts. The discussion about digital education has seen a boom, also critically examines terminologies and, more recently, focuses more on the educational process as such. One refers less and less to digital education, but rather to education in the future society, education in a digital society or under conditions of digitisation. In higher education institutions, the question arises: How do we deal with the new possibilities? These are offered in different dimensions. Thus, digitisation leads to processes of dissolution of boundaries in academic education and its organisation, influencing all areas of higher education.

The knowledge required for academic studies is becoming increasingly freely available in digital form and can also be accessed decoupled from a specific academic institution and its actors. The bond of knowledge access and institutional affiliation is dissolving increasingly. For example, *patchwork studies* with different academic

courses at different institutions are theoretically conceivable and are increasingly being implemented.

- Processes of knowledge transfer lose their spatial and temporal ties and studies can be organised regardless of seminar rooms and face-to-face classes.
- Today, the generating of new knowledge through research processes is no longer conceivable without digital media and processes supported by them. Digital media are also increasingly being used for the interaction between teachers and learners, both in teaching and in the organisation of studies.
- Researchers, lecturers and students are increasingly entering a global exchange via digital media and studies, teaching and research are internationalising.

The points mentioned here are only a small selection of aspects that will be influenced by digitisation in the University of the future. The fact that more and more institutions of higher education are incorporating concepts for digitisation into their strategy development processes takes this development into account and is at the same time an expression of it (Hochschulforum Digitalisierung 2016).

The increasing individualisation of academic educational processes and the diversity of demands, goals and methods of studying is only just made possible through the support of digital teaching and study tools. Digitisation acts as a facilitator for the demands fuelled by increased participation in education.

To understand the digitisation of higher education as *technisation or technologisation* would be abridged and wrong. At its core are aspects such as free access to knowledge, knowledge resources, unlimited communication possibilities and networking. The question now increasingly arises as to what educational processes must look like if they can no longer lean on the already rehearsed hierarchical divide between teachers as knowledge bearers on the one hand and students as recipients of knowledge on the other. Rather, the old ideal of the community of students and teachers with the common aim of producing innovative approaches through discourse now seems to be able to shine out again – developing and working on problem scenarios in a mutual discourse.

C 1.1.1 Accelerated Innovation Cycles – Change as the New Normal

Digitisation being such a strong influencing factor is also due to technological innovation cycles accelerating more and more. If you consider the technical development alone and imagine that the last one thousand years have shrunk to

24 hours, the development of letterpress printing would not have happened until hour 13, shortly after noon, photography about four hours ago, telephone and radio about three hours ago, the World Wide Web only half an hour ago and services such as Facebook, Twitter, WhatsApp and the iPhone itself only ten minutes ago (see Figure 23).

At the same time, the intensity of the impact of the different technologies described continues to increase. In other words, we are facing a development in which technologies are developing faster and faster and the effects that these technologies have are becoming increasingly intense and socially noticeable. In all areas of society, the impression of a “5 minutes to 12” situation emerges. With the futurologist Peter Kruse, we can speak of a paradigm shift from a linear to a non-linear, emergent system dynamic (Kruse 2009). The ability to recognise and reflect how things interrelate hereby becomes more important than defining goals and carrying out planning processes.

The change brought about by digitisation creates a feeling of permanent change in social processes and opportunities. While updating cycles have so far led to new conditions, for example in organisations or social developments, which consecutively represented the new status quo, change, transition and transformation are increasingly becoming the new normal condition. The feeling of “5 minutes to 12” now becomes a basic social underlying feeling, an *organisational norm*. In higher education institutions, too, the agenda of the involved actors, scientists and committees is increasingly geared to change and less to consistency. There’s no more steady state. New changes result from current processes of change.

The impact of digitisation on the labour market is also important for higher education institutions, their curricula and the development of study programs: The speed of technological development and its consequences are not least becoming apparent by the discussion on how it affects the labour market and the working environment.

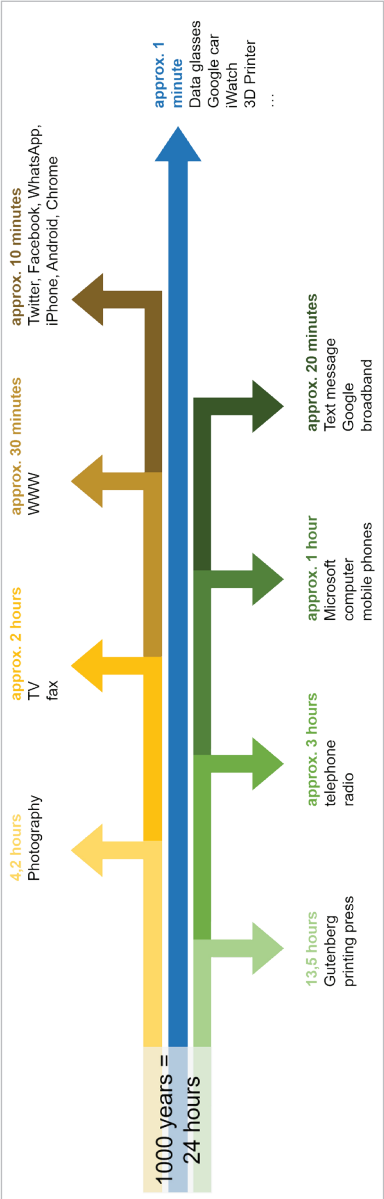


Fig. 23 Speed of digital development (inspired by Ibrahim Evsan 2015)

The message is: Technological developments consume jobs and the question no longer seems to be whether jobs will disappear, but how many. Concerning labour market effects of technologisation, robotics and artificial intelligence, it is clear that wherever manual routine activities are carried out, there is a high potential for technological transformation and wherever non-routine social skills are required, there is only a low potential for technological substitution (see Figure 24).

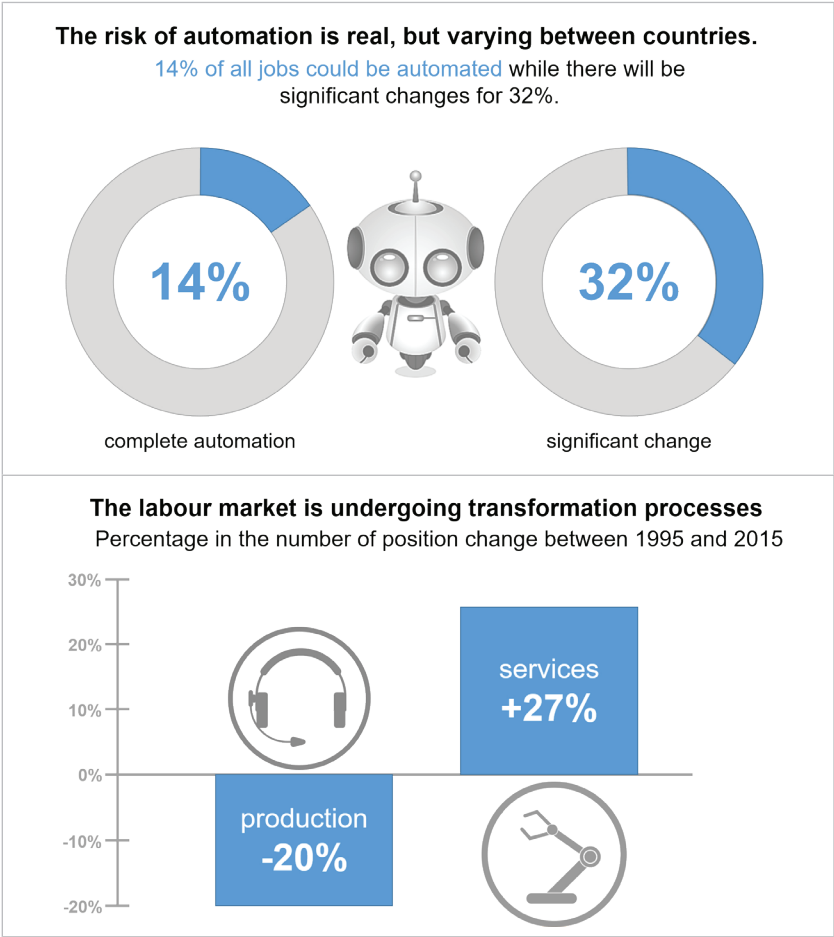


Fig. 24 Effect of digitisation on the labour market (own illustration based on data from OECD 2019)

In fact, the question of technology's substitution potential in different labour market areas is a dramatic but currently still unresolved one. If, on the one hand, clusters of activities can be substituted by computers and machine technology, on the other hand, the question arises as to when and in which stretch of time new professional profiles will emerge.

C 1.1.2 Reversing Innovation

Although digitisation implies a strong potential for disruption and causes changes in many areas of society, the implementation of digital technologies and the adaptation of processes in institutions are challenging (Hochschulforum Digitalisierung 2016). Though digital technologies have been strongly integrated in many areas by now, in many cases this has been accompanied by major upheavals. The music industry has been strongly affected by this and has developed very dynamically in recent years, almost reinventing itself. The print industry has undergone big change through the Internet. Single book chapters and individual pieces of music can today be purchased; a possibility that was previously unimaginable. However, the initial impulse for innovation in distribution or production came from outside, never from within the industries themselves – not in the printing industry nor in the music industry or in other industries. Impulses for change were always induced by technological development: It wasn't the booksellers who got together to think how they could possibly develop a new form of book distribution with granular choices at the chapter or page level and possibly even make it freely available to entirely new customer groups. But it was the Internet with its possibilities, the technology that was available that led to these developments: Innovation stimulated by external impulses.

Looking at higher education, we can ask the question which effects digitisation will ultimately have on the institutions. The processes are similar here. Only, there is only little market pressure on publicly financed higher education institutions. Nevertheless, the question is increasingly raised as to how technological possibilities and environmental changes will ultimately lead higher education institutions to further change their operating principles and reflect on the extent to which innovation will actually be possible in the institution (Schünemann & Budde 2018). And all the same it is also for higher education intuitions an external pressure to innovate which leads to the *5 to 12* feeling. Innovation in higher education via technology, for example the free provision of educational content via open online courses, the development of online courses for very large target groups (such as Massive Open Online Courses), freely available educational materials (Open Educational Resources), the modular provision of certification concepts (via so-called badges and microcredentials)

is made possible by technology and has been unconceivable in higher education until recently. All these examples of innovations have entered the institutions by external impulses. Examples are *Coursera* or *Udacity* in the USA or the MOOC platform *Future Learn*, a spin-off of the Open University UK – platforms on which open educational materials of the highest quality are offered largely free of charge and without compulsory enrolment. Students can make use of these at no charge. Interestingly, all these developments have been launched and are operated outside of higher education institutions – being the best way to guarantee the sovereignty and independence of higher education institutions. All those developments are so strongly questioning the way in which higher education has functioned to date that these platforms could not have been set up from within the universities.

Altogether, digitisation allows new distribution and information channels, new cross-platform cloud data storage that is no longer tied to institutions, new possibilities for intelligent, learning algorithms and rethinking structures and processes in higher education. In this new, often erroneously glittering world, John Nalsbitt's famous sentence "We are drowning in information but starved for knowledge" still applies – and so one may add "wisdom". Through allowing decoupling and decentralization processes, educational institutions are faced with questions how holistic educational concepts, comprising unfragmented, continuous and orienting aspects can be provided in the future, in a new and urgent way.

C 1.1.3 Digital or Traditional: What's Better for Education?

One question regularly asked when it comes to digital teaching is the one about what is better: digital or analogue higher education. There is a large number of studies and a scientific consensus on this question by now. At the core of such research has always been the question if e-learning and digital media support learning and also whether learning can be more successful or more effective with media-supported learning systems than by other means, such as conventional ones. Meta-analyses can be used to aggregate the many available studies on the effectiveness of computer use for teaching and learning. Kerres and Gorhahn (1999) refer to the following trends:

1. E-Learning is not fundamentally inferior to conventional learning. The studies mentioned could not identify any particular media system as particularly successful either.
2. The advantage of multimedia learning is not the simultaneous addressing of several sensory channels (Weidemann called this a *naive accumulation hypothesis* in 1997), but in the different coding of information in various symbol systems.

3. The learning motivation can be shortly increased through the use of learning media. However, since this effect is short-lived, it does not justify an expensive production of multimedia content.
4. Altogether, it seems that the nature of the didactic methodological learning arrangement is much more important for learning success than the media system used.
5. For people with high Learning Competence and independent learning behaviour, media systems have advantages in comparison to conventional learning methods.

One of the most important meta-analyses in this context was carried out by Kulik and Kulik (1991) as early as in the 1990s. The authors evaluated a total of 248 comparative studies. Of these, 195 had already been summarized in earlier meta-studies and 53 were added later as current studies. Of the 248 studies, 202 showed a higher learning outcome for computer-based learning and 46 a better outcome for conventional learning. However, the results were only significant in 100 cases, in 94 percent of cases in favor of computer-based learning and in 6 percent of cases in favor of conventional teaching. Comparative studies between conventional and media-based learning should not be clearly interpreted in one direction or the other. The primacy of didactics, which seems to have the greatest influence on learning success and less the influence of the digital learning system, still applies. Thomas Russel (2001) comes to the conclusion that comparing conventional and digital learning, the so-called *no significant difference phenomenon* is valid, thus a superiority of the one to the other system cannot be determined outlastingly.

However, comparative studies between conventional and media-based learning are not uncontroversial; on the one hand, they make the explicit assumption that the learning content to be conveyed is equally suitable for conventional learning and e-learning; on the other hand, they are methodologically problematic. The main question is whether the differences are really due to the media used in each case. In particular, variables relating to the characteristics of learners themselves (learning preferences, Learning Competences, motivation, etc.) seem to have an impact on learning outcomes. Empirical teaching-learning research has been trying for some time to determine who learns best with which didactic media offers. The intention is to capture all relevant influencing factors in a teaching-learning situation and to determine their effect on the learning process. From a methodological point of view, this means that media attributes such as readability of texts, film sequences, etc. as well as didactic design variables must be related to learning variables. This intention usually leads to very complex experimental research designs. The problem is not only the abundance of factors to be captured, but also their mutual influences.

Overall, it can now be said that the hope of capturing all significant influencing factors and using statistical methods to determine their impact has been abandoned as unrealistic. Recently, these attempts have been revived by trying to record as much data as possible on learning behaviour under the heading “Learning Analytics” and to draw conclusions about the way in which learning success can be observed and how they take place by data mining procedures and learning algorithms. Here, too, empirical methods are used to relate behavioural data and variables to attributes of the learning situation such as media, materials used and variables of the learners, so that in principle there is no difference to previous experiments – however, slightly different approaches can be chosen with the multitude of available data. The *Hochschulforum Digitalisierung*, a network of German higher education institutions working in the field of digitisation of higher education teaching, concludes that the question can no longer be whether digital or analogue higher education is better or worse, but how it can be designed in the future. It is not a question of digitisation per se, but of how digital media affect the learning process, how digital media can make the study process more individual and flexible and how added value can be offered from the perspective of teachers and learners. Three propositions are at the forefront of the current discussion at higher education institutions.

1. Digitisation is not *technisation or technologisation*, but didactic, curricular and organisational innovation.
2. Collaboration is the key to the successful digitisation of higher education teaching.
3. Digitisation not only creates virtual learning spaces, but also changes existing physical learning spaces.

C 1.1.4 Open Education: A New Digital Openness

Digitisation enables a new, unprecedented openness in many aspects. The new digital openness, for example of open publishing, from which new collaborative forms of work and publication emerge, has not existed in science so far. Whereas in the past the publication of scientific texts, a specific type of text that had to meet special quality requirements, was a very exclusive working approach of one or more scientists in a closed group without presenting the results to the outside world in advance, a digital collaboration on scientific analyses and texts today is often an open procedure in which peers are already included in the production process of the text.

Other aspects of openness by digital media are the opening of learning opportunities to other target groups, the provision and use of learning materials as open

educational materials, also known as Open Educational Resources (OER). Open educational resources include all types of materials, all contents and concepts that have been developed for teaching and learning purposes and that may be used, processed and passed on with little or no restrictions (cf. Butcher 2013: 6). They constitute a modern possibility to create the necessary conditions for education in terms of the exchange of ideas, experiences and knowledge. For this purpose, the material is generally made available free of charge by the copyright owners and marked with an open license that includes a legally secure, flat-rate usage approval. According to UNESCO, open educational resources can contribute directly and indirectly to facilitating access to lifelong learning: their free and unrestricted availability would enable people on lower incomes and educational institutions with limited financial resources to benefit from OER. Through the dissemination and availability of OER in digital formats, learners could be offered opportunities for further training according to their own needs, independent of time and space (cf. UNESCO 2017: 2).

It is also possible to make available and make use of data stocks and information as open data (Open Access). As a whole, digital technology is thus changing both the research process (e-science) and the possibilities for analysing data, documentation, teaching as well as the availability of teaching materials.

When it comes to digital teaching in higher education, the question arises as to what constitutes a suitable, appropriate “blend” of digital and non-digital phases and approaches. Although this question is discussed according to the particular profiles of smaller and larger higher education institutions and the respective discipline clusters and thus very variously, two models seem to prevail – at least in German higher education – at present: Blended Learning and its form called *Flipped* or *Inverted Classroom* (see Ehlers & Kellermann 2019 for details). Discussions and decisions about the design of learning and teaching scenarios at higher education institutions usually take place at program level. In higher education systems with a high degree of autonomy, each teacher is asked to make an individual design decision on the extent to which digital media and teaching in class are interwoven to form new didactic patterns. What can be noted overall is the trend to increasingly shifting knowledge transfer to media-based learning, while classroom teaching is used for knowledge deepening, the application of knowledge, further development and analysis of knowledge in specific case constellations and problem situations.

C1.1.5 The Race Between Technology and Education

Looking at digitisation and education as a megatrend from a historical perspective, Katz and Goldin (2009) point out that there is a connection between social

development, technology and educational development (see Figure 25). Whereas there were only few recognisable connections between technological development and educational development in the pre-industrial era, the advance of steam engines, the new means of production in the industrial revolution, gave rise to a great economic lead, which the public-school system, the educational resources and processes available were unable to match. Katz and Goldin speak here of an emerging area of social conflict, arising between strong technological development that massively affected production capacities and production resources as well as the workers in the factories and a lack of training and qualification. Only with the introduction of the universal, public school system there emerged the possibility of further developing the educational standards of society accordingly. Initially, there was a phase in the fifties and sixties of the last century in which educational opportunities were massively expanded, and in which social prosperity rose thanks to well-established technological production and economic mechanisms. Thus, increased education and training could lead to social advancement, prosperity and new ways of life. Here Katz and Goldin speak of the phase of prosperity.

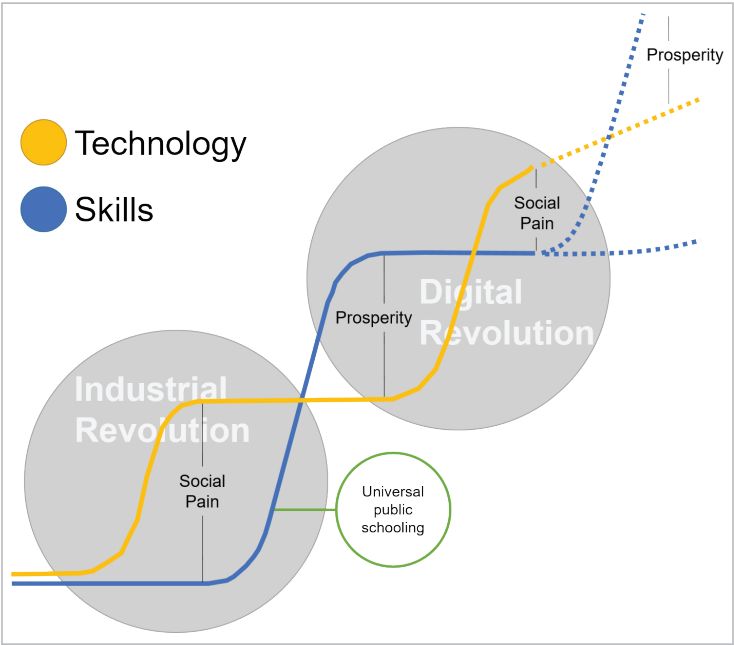


Fig. 25 Race between technology and education

With the digital revolution they once again describe a phase in which technological developments make a fast head start, without a similar educational development or educational processes and forms being discussed. This – again – is precisely where the concept of *Future Skills* comes into play and asks: What should the new education, what should the new higher education of the future actually look like in order to accompany, after the industrial revolution, the digital revolution in a way to avoid social irritation and thus to contribute to social coherence?

C 1.2 Second Second: Higher Education in a Transformative Society

From a historical perspective, media development has always led to fundamental social upheavals in all societies. Dirk Bäcker, a sociologist at the University of Witten-Herdecke, points this out in his *Media Archaeology* (2018), in which he distinguishes four media epochs. The first media epoch is the transition into oral society. Bäcker asks: Do computers complete modernity? Do they still promise freedom and participation? Or are we trapped in their web?

Dirk Bäcker sees digitisation as the most recent of four media epochs in human history, each of which has fundamentally reshaped the rules of coexistence. Digitisation means the use of electronic devices of all kinds. It is of the same profound significance for social culture as the introduction of printing, the introduction of writing and the introduction of language were before. In his book “4.0 or the gap caused through the machine” (2018, translated), the sociologist outlines how the emergence of language thirty to forty thousand years ago – in the media epoch 1.0, according to his counting – led to the emergence of social formations which, as language communities, each found their own rules for what kind of speaking was appropriate in which situation and among which actors. In the media epoch 2.0, which began with the invention of writing about eight thousand years ago, a new concept of time arose through the possibility of fixing and analysing formerly volatile speech. Bäcker on this:

“Society explodes into time horizons. Writing means being able to read what you wrote down yesterday. Writing down what you need to read tomorrow. So that suddenly terms like past, present and future became necessary after all.” Baker (2018)

With the invention of printing in the middle of the 15th century the media epoch 3.0 begins. This led to a fundamentally changed perception of the public sphere, says

Bäcker: “The modern book printing company is one in which everyone can criticize everyone at any time and you even have to endure it, because they have all read and simply “babble on”. (ibid.) This new polyphony seemed chaotic and risky to many contemporaries. The philosopher Immanuel Kant, for example, makes a suggestion in his writing “An Answer to the Question: What Is Enlightenment?” (1784). He recommends that a scholar should only speak if at least one other scholar is present who can correct him or her if necessary. Soon more or less well-read citizens began to present their own newspaper readings in salons or at regulars’ tables, to debate and criticize each other. This way, a much livelier and largely unregulated public sphere emerged, says Dirk Bäcker, which already points towards today’s.

But what is the main difference between the current digital public sphere of the media epoch 4.0 and its predecessors? The situation in which we are today is that the regulars’ table is extended into the general public sphere and one can find any arbitrary comment that crossed somebody’s mind somewhere as a posting on the platforms of the web. It is a different situation because there are no longer authorities, an accepted opinion, channels in which what has to be bundled can be bundled. Have we really become much more vulnerable to falsification and distortion of the truth than was the society in times of printing with its principles of verifiability and corresponding instances of control? In this sense, fake news is not really a new phenomenon. Scandalous false reports existed as early as in the 19th century and they caused indignation. Although it has become easier to falsify documents or images, errors can now be corrected, and fraud can be detected more quickly. According to Bäcker, the decisive factor in the development of society in response to media development is that there is a history, role models, a period of time. Furthermore, crucial is that society does not give in to digitisation passively but makes use of its freedom to design the way we want to live in a digital society – within the framework conditions algorithms have already set everywhere. This margin is the leeway that the computer leaves us.

“Not a single software,” says Bäcker, “no single algorithm can tell us how business or politics or family has to function, but rather the digital devices and electronic media have to wait for someone to have an idea about something in society, how to deal with it and what it can be used for.” (Bäcker 2018)

One question arises: How can higher education institutions prepare their students and graduates for the next society (Bäcker 2018)? For a society characterized by the developments previously described? What are the skills that people in such a changed transformation society need in order to help design the environment, society, social and economic systems as global citizens, to act proactively and non-reactively and to develop solutions for the problems of the future? Thus, the question is: What will the mindset of graduates have to look like in the future? Knowledge is certainly no longer enough. It is available in databases, computers, in technological and digital networks. Beyond this, problem-solving capacities, the innovation skills and competences, creativity must be enhanced in order to shape the diverse reality of evolving organisations. It is also about mindfulness, emotional intelligence, a design mindset and systems thinking, networked thinking, changing perspectives, taking the perspective of the other in order to advance. It is stories like these that characterize what students have to develop as competence, as capacity to act and shape the future. Stories like those where great inventions were being made.

C 1.3 Third Second: Demographic Change

Higher education has always been in demand, but never as openly accessible as it is today. Figure 26 shows that there has been a continuous increase in the number of students since the 1950s.

Due to the very considerable increase in the number of students in the 2000s and the decreasing scope of school-leaver cohorts, the area of academic education is of outstanding importance for the qualification of future generations of skilled employees. The trend towards higher education is a social reality that needs to be shaped (see Figure 26), despite all debates about the relationship between vocational and academic education and training. The higher education institutions face the challenge of finding answers to the corresponding social expectations and bringing them in line with their educational goals.

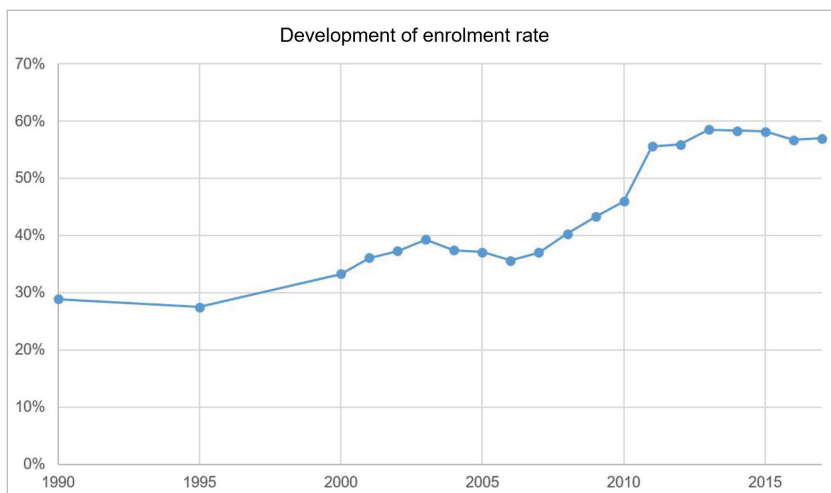


Fig. 26 Rate of first-year students 1990 to 2015 in Germany
(Source: Gehrke & Kerst 2018)

In the first part of the recommendations on “Qualification of skilled workers in the light of demographic change”, the German Council of Science and Humanities emphasised that the areas of vocational and academic education are equally indispensable for the qualification of future generations of skilled workers and must be kept in a functional balance. It should be prevented

“that young people primarily make their training decisions based on prestige, recognition or acceptance and do not consider certain attractive training options for that reason alone.” (Wissenschaftsrat 2014)

While the initial university education in Bologna in the 11th century was still very much oriented towards the social elites and highly selective in its access for only very privileged target groups, the needs of an industrial society triggered a real campaign of mass higher education. Attaining higher education is today becoming a normal part of biography and standard experience (OECD 2016). In Germany, too, more than 50% of an age cohort is now studying. In 2012, the proportion of people with higher education entrance qualifications rose to 53.5 per cent nationwide (see also Alesi & Teichler 2013 for trends in academization), the proportion of first-year students to 54.6 per cent and of graduates to 30 per cent (Dräger & Ziegele et al. 2014) (see Figure 27). Rising numbers are still being predicted, and the Bertelsmann

Stiftung expects the number of first-year students to reach a high plateau by 2050, well above the 2005 level (von Stuckrad et al. 2017).

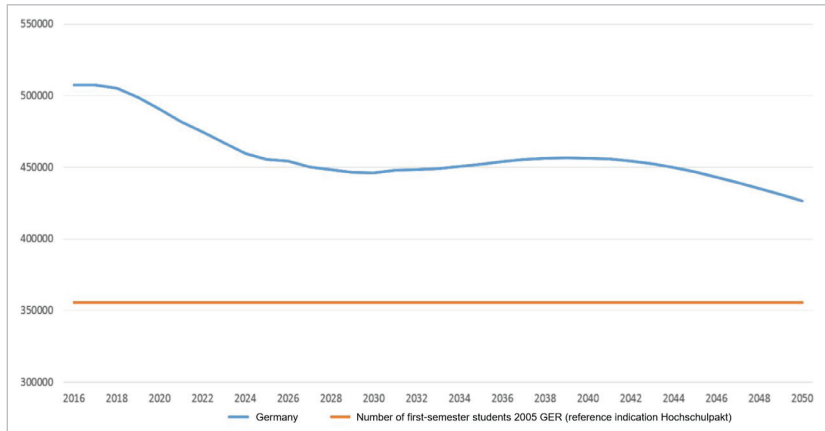


Fig. 27 Forecast of student numbers in Germany up to 2050
(Source: von Stuckrad et al. 2017)

Schofer and Meyer (2005) use statistical analyses in higher education to show that the expansion of higher education has been an accelerating process in all industrialized countries of the world ever since the middle of the 20th century but running at different speeds. Critical interventions on the “mania for academisation” (Nida-Rümelin 2016), certainly worth considering, are therefore important moments of reflection, which, however, do not and will not change the fact of the constantly increasing participation in education. A higher education participation rate well above the 50 percent mark will therefore have to be expected everywhere (see Figure 26, cf. also Teichler 2013; Baethge et al. 2015).

The proportion of employed graduates has grown disproportionately – from 13.1% in 1993 to 19.2% in 2013. In relative terms, the proportion of graduates from higher education institutions of applied sciences has risen somewhat faster than that of graduates with a university degree. The disproportionate increase in the number of academically qualified people affects all forms of employment. Between 2005 and 2012 alone, the proportion among self-employed persons and civil servants rose by 12%, in the group “Employees/Workers” even by 16% (Federal Institute for Vocational Education and Training 2013). Given the fact that academics account

for around 30% of the generations entering the labour market, this development is likely to accelerate significantly in the coming years.

The importance of participation in education as an enabling factor to participate in cultural, social and economic capital (Bourdieu 1982) continues to grow. The term educational society (Mayer 2000), which is increasingly being discussed in pedagogy and sociology, is characteristic of this. Paradoxically, it is therefore not only an important option, but increasingly represents a risk – if participation in education does not or cannot take place (Beck 1986). Option and compulsion are thus closely related.

Another major challenge facing higher education institutions today is the massification, the increasing number of students and other target groups requesting academic education. The OECD assumes that in the next 20 years the rates of academization for age cohorts with higher education entrance qualifications will rise to up to 70 per cent. Where shares are currently at just below 50 percent in Germany and somewhat higher in other countries, it can be predicted that a massive increase in student numbers will force higher education institutions to develop new models. On the one hand, the diversity of the target groups entering higher education will keep increasing. On the other hand, simply more students will come to higher education institutions than ever before.

Figure 28 shows the diversity of students in 2012 in Germany, including non-traditional target groups in addition to more traditional students. Students who come from the most different backgrounds, with different talent concepts, who enter higher education with very different requirements, demands and support needs for their studies. Institutions that are able to cope with these different abilities, starting points and target contexts of students will be the future higher education institutions with mostly successful graduates. Institutions which have difficulties in personalizing and flexibilising study experiences in terms of providing different study speeds, orders and branches, not meeting these diversified requirements, interests and needs will be overwhelmed by the demand for diversification triggered by the mass rush. When looking back, one can see that higher education has already undergone a strong development. With the establishment of the first university campus in Bologna 1088, a very exclusive study model was born in which few selected, privileged students were able to acquire a very broad academic knowledge.

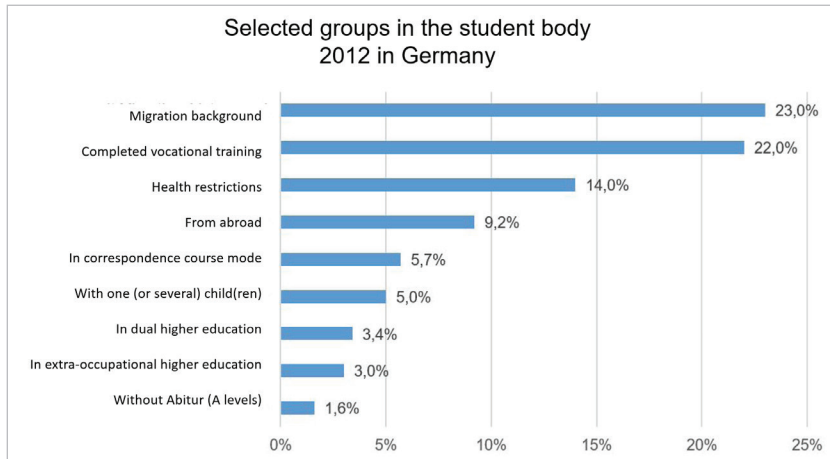


Fig. 28 Diversity of students in Germany (illustration based on Dräger 2014)

The *Studium Generale* and studying Philosophy were the predominant models at that time, due to the fact that philosophy was regarded as the mother of all sciences and that the logical way of thinking conveyed and trained there formed the basis for all other natural sciences. With the onset of industrialization and the social revolution that followed, the education system also evolved. At first, only production techniques developed, which led to a largely unskilled workforce having to carry out low-level activities in highly fragmented production processes, sometimes under very inhumane and undeserving conditions. The evolving economy and the associated prosperity led to an expansion of education, culminating in the 60s and 70s of the last century and leading to a massification of academic educational offers. The expansion of education comprised various contexts and objectives, including the promotion of previously disadvantaged target groups, such as girls. The aim was to encourage more and more young people to seek better school education and academic training. The focus here was on training qualification profiles that were suitable for jobs in an expanding industry, so that the evolving standardised occupational profiles could also be handled with standardised study programs.

We can see that with the increasing massification in academic education, further diversification is becoming apparent. In the light of a changing paradigm from a predominantly *preparatory*, up-front higher education model to an episodal *lifelong learning* model, this will lead to individualization and will demand more personalization of academic learning processes. This new demand for individual

study pathways in higher education will be expressed in new combinations of study processes: multi-campus study programs, patchwork courses with branching off ramifications, and multi-episodic phases of academic qualification permeating one's biography lifelong. Postmodern structures in higher education evolve.

On these educational voyages it will become more necessary than ever before to improve permeability of both educational pathways – vocational and academic. Here a completed vocational training should be considered as a higher education entrance qualification. In addition, the academic training should be enriched with practical elements and the vocational training with theoretical consolidation. Moreover, nationwide standard agreements for mutual recognition must be developed in order to be able to certify competences and study achievements on both sides.

C 1.4 Fourth Second: Flexibilisation of Work and Education

The modernisation of the labour market results in processes of flexibilisation, de-structuralization and decoupling. Technologization creates new jobs, existing professional profiles disappear and the development speed of requirements and change in occupational profiles increases steadily. These increases and changes are especially strong in technical professions, in finance and in globally networked fields of activity, while they are weaker in many artisanal and locally based fields of activity – but increasingly noticeable, even there. Three developments can be observed:

1. The labour market is evolving from a *professions-oriented system of work* to a *technical system of work* (Lisop 1997). This is a parting from the professions routed in qualification and suitable pedagogical approaches. The rigid occupational schemes are increasingly dissolving. The technical system of work is gaining in importance. Transformation processes within an occupational field are increasingly becoming more intense, pervasive and rapid.
2. A development from *lifetime employment* to *lifetime employability* can be observed (Beck, Giddens, Lash 1996). This means that the aim of vocational education and training in general, but above all of higher education, should be less a specific vocational competence of a certain occupational profile only but should enable individuals to lifelong employment. Here, it shows that the competences mentioned above play a central role as key points intended to ensure the capacity to act within one's own behavioural dispositions.

3. From a *profession-oriented employee* to becoming one's own labour entrepreneur within an organisation or company (Voß, Pongratz 1998). Beck (1986) also mentions a new culture of *taken-for-grantedness*.

As a consequence, an unpredictably rapid devaluation of rigid qualifications can be observed, a decoupling of work and qualification, a dissolution of boundaries between qualifications and *qualification*. Furthermore, we can observe the globalisation of learning contents, an increased *time lack* between structural changes in the labour market and respective reactions in the education system, and last but not least a differentiation in functions of continuing education in order to actually be able to react to different contexts.

In addition to this flexibilisation and modernisation of the working environment, a trend towards flexibilisation can also be observed in the field of education. There are essentially four developments:

1. A flexibilisation of degrees, paralleled by recognition of non-formal education: The European and national qualifications frameworks assume that by a better classification of qualifications along the entire education chain, seamless transitions between open education segments on this chain are enabled. The recognition of prior academic learning for further academic study plays an increasingly important role, which is guaranteed by the Bologna Process. Likewise, the recognition of informal and non-formal education will become more and more important in the future, with the importance of official certificates decreasing at the same time.
2. A flexibilisation of curricula and learning organisation through modularisation: more and more study programmes have to be specifically adapted to the needs of students, which can only be achieved through greater modularisation and greater variety of choice as well as further options within the study curricula.
3. A flexibilisation of contents: This can be achieved by focusing less on knowledge and facts and more on competences as an overarching behavioural disposition for action in any specific disciplinary and professional context and also by focussing more on key qualifications.
4. Flexibilisation on the level of didactic methodology: The emphasis on self-organised learning, self-regulated learning and research-based learning must prospectively lead to the necessary flexibilisation of study contexts and processes, thus enabling an improved learning performance, also due to self-organised learning.

When science and industry cooperate, both sides usually benefit – but it is necessary to design this cooperation carefully. Various concepts can be conceived, ranging

from loosely coupled partnerships, by which students have the opportunity to gain their first practical experience within the framework of internships, to structurally highly integrated models, such as that of the Baden-Wuerttemberg Cooperative State University (DHBW). It is important to understand the practical study experiences as an opportunity to reflect on the development of competences, as is the case, for example, with the concept for designing practical study periods at the DHBW.³⁹

But how can employability be rethought – beyond the purely additive “practical impregnation” of students, in which practical experience is simply added on top of theoretical learning? How can a comprehensive concept of employability be developed into a broad concept of reference for higher education processes, including competence enhancement, identity building as well as social and human capital, instead of deriving qualification goals from the current status quo of occupational profiles?

Study programmes usually set clearly defined and irrevocably prescribed qualification goals, which equally and simultaneously apply to all participating students and from which the contents and methods of the modules are derived during studies. Existing professional profiles are frequently used as a normative paradigm for course contents. This creates the pragmatic illusion that one can derive the prospectively relevant contents from those recently or formerly relevant. This problem is compounded by the widespread view that employability is attributable to university performance and not to the productive performance of individual graduates. In his analysis of employability concepts, Harvey (2010) criticises the common practice of employability rankings in higher education. He argues that employability in university rankings is not seen as a performance attributed to graduates, but as an indicator of the educational performance of higher education institutions. Employability is thus regarded as a quality aspect of higher education institutions, which can lead to misleading and contradictory information (Suma-nasiri et al. 2015).

The concept of employability is highly developed by now. Employability in a comprehensive sense encompasses three dimensions: Career identity, adaptability and social and human capital (Fugate et al. 2004):

- Identity (for Fugate et al. particularly related to “career identity”) comprises cognitive-affective representations with regard to expectations and goals of one’s own professional development. To this dimension, Fugate et al. (2004) also

39 More information on the DHBW at <http://www.dhbw.de>. A guideline for the design of practical study periods is also available on the DHBW website: http://www.dhbw.de/fileadmin/user_upload/Dokumente/Broschueren_Handbuch_Betriebe/DHBW_Leitlinien_Praxisphasen.pdf (in German)

assign work-related personality traits, values and norms as well as behaviour patterns and experiences of a person.

- According to Fugate et al. (2004), adaptability means the will and self-efficacy to enhance knowledge, skills and capacities in order to meet the changing demands of the labour market.
- Social and human capital includes the social network as well as individual characteristics such as education, age, gender, work experience, background, etc.

Two consequences result from the analysis of current career and employability research: For a start, there is a consensus in recent career research in understanding careers and job histories as a so-called “boundaryless career” (Arthur and Rousseau 1996), which in principle is basically perceived as flexible, permeable and versatile. Secondly, the focus of employability development is on the self-directed and self-organised individual, who is responsible for her/his own career, i.e. plays a key role in planning and shaping professional life (Greenhaus et al. 2011; Hirschi 2012). Higher education institutions play the role of an accompanying and stimulating institution here in which experiences are made and reflected upon that serve the individual’s personal development in the sense mentioned above. The aim of the academic study programmes, curricula and teaching concepts is therefore to contribute to the development of employability by taking into account aspects of identity and personality development, by developing a comprehensive understanding of competences and, last but not least, by focusing on the development of social and human capital.

Based on professional profiles, courses and programs are oriented towards further contents which promoting long-term employability: Development and reflection of individual educational goals, interests and needs, *Future Skills*, the fundamental capacity to act and overarching capacities.

Employability can be effectively promoted through active and practical forms of learning. This is demonstrated not least by the dual study programs, where drop-out rates of only seven percent are far below those of other study programmes (Kupfer 2013). This successful model should be expanded. In addition, internships should be compulsory in all degree programmes. Furthermore, higher education institutions must develop a broader understanding of employability, which should at least be supplemented by a perspective of *global citizenship*. The emphasis on conscious and responsible conduct as citizens of a globalised society who are actively involved in shaping social challenges, such as climate change, social potentials of migration, global political and finance issues, will be of particular importance for higher education in the future.

C 1.5 Fifth Second: Open Education & the Shared Knowledge Economy

Higher education institutions are expert-oriented knowledge and education organisations with the self-conception of structurally coupling knowledge production and knowledge transfer. Today this self-conception is more and more questioned by freely available digital knowledge resources. In particular, the provision of open educational resources challenges the approach taken by higher education institutions so far. While the institutions mostly see themselves as the sole producers, administrators and procurers of scientific progress, more and more new models are emerging to make knowledge, scientific results, data, publications and learning materials openly available. Based on models of the Sharing Economy such as *Uber* or *Airbnb* and the possibility to provide scaled individualised products and processes to larger target groups via digital media, the question also arises of how a Shared Knowledge Economy can look like. When the concept of open educational resources was developed by UNESCO at the 2001 Paris Conference on Education, digitisation was still at the very beginning from today's perspective. By now, both video-based and text-based materials are available for almost all topics, specifically tailored to learning in different educational segments (school, higher education, advanced training). Digitisation allows the decoupling of different teaching and learning services of higher education institutions such as

1. a function of brokerage and knowledge production: to create, select and provide teaching materials and curricula,
2. the teaching function: this includes teaching, learning and tutoring services, and
3. the quality management function, accreditation and certification of knowledge and competences.

More and more examples, especially in the private higher education sector, provide evidence that a decoupling and recombination of these different functions is conceivable and possible. A study by Earnest & Young (2018) on the future of higher education shows scenarios of rethinking higher education in which an alliance of university services is proposed between different institutions. Each institution is specialised on their services and together they compose an entire education service process. The first MOOC (Massive Open Online Course) was developed in 2011 by Sebastian Thrun, a Hamburg (Germany) native who works as a professor at Stanford. Thrun, a professor of business informatics, decided at the time to make his introductory course in business informatics, which had 28 students enrolled at Stanford, openly and freely available online for anyone interested. The very ex-

clusive, selectively chosen target group, very (also financially) privileged Stanford University students who attended Thrun's course, did not perform as well as could have been expected. A total of 160,000 participants from all over the world had enrolled in Thrun's course. Of the 160,000 participants, 23,000 decided to take the final test at the end. The final test was highly standardised using computer-based feedback. In the final ranking the best Stanford student was ranked number 412. And even more remarkable, one of the first 20 students was a little girl from Lahore, Pakistan, named Khadija Niazi, who had attended the course at the age of eleven and did better than any high-privileged Stanford student. From the point of view of educational efficiency and equity, this first MOOC prompts questions that need to be considered as part of the digital *shared knowledge economy*, especially from an ethical point of view. Should we support a situation in which less talented students are granted access to highly privileged educational opportunities but in which the most talented learners do not have that access, if digital media would allow that?

This means that in addition to the question of new models and new alliances for a shared knowledge economy, additional questions are raised by the possibility of making teaching materials, teaching services and also testing services freely available. On the one hand, the issue of educational justice by showing that existing educational system access practices are granting access to those who have a privileged access by association (kinship, relationship) or resources (social or financial capital according to Bourdieu) and not those who are most qualified for it. On the other hand, there is the question of educational efficiency when it is no longer concepts of efficiency but concepts of belonging deciding on individuals' educational opportunities in societies. At the same time, this raises the question of social justice – educational equity and educational efficiency are closely interwoven.

C 1.6 Sixth Second: In-Loops and Out-Loops in Lifelong Higher Education

The above-mentioned diversification and massification of higher education reinforce a long-term looming trend towards the necessity of lifelong learning. Learning will no longer take place in the exclusive model of qualification in the beginning of a career phase, but learning will increasingly have to be a lifelong academic activity, as career requirements develop ever faster and career phases also present themselves as lifelong evolving professional episodes, passing 10 to 15 different stations and only then ending up in retirement or pension. While lifelong learning has been postulated in education policy since the 1960s with the aim, among other things, of

obtaining well-trained employees in times of faster innovation and product cycles, the demand to create educational opportunities for lifelong academic learning is now increasingly brought to the attention of higher education institutions.

So far, higher education institutions have mainly concentrated on qualification at the beginning of one's career, between high school graduation and career entry. Also, higher education institutions do not perceive it as their prime objective to prepare individuals for the constant personal development of an episodic career biography. Rather, curricula are designed according to previously analysed bundles of activities, in the space of professional profiles for which qualifications and training are provided. All in all, the paradigm of lifelong learning forces higher education institutions to develop both their content and curricula portfolio as well as their educational structures from a preparatory model of higher education to a consequently accompanying academic educational model. Students will be graduates and graduates will be students – over and over again, and their career paths will bring them in and out of higher education again and again. A model of in-loops and out-loops will constantly be required.

C 1.7 Seventh Second: Higher Education in the VUCA World

VUCA is an acronym for the English terms *volatility*, *uncertainty*, *complexity* and *ambiguity*. In the *NextSkills* Delphi Study, almost nine out of ten (89.2%) of the respondents stated that the biggest challenge for higher education institutions to prepare their students for is to provide them with continuous learning strategies in order to successfully adapt to changing work environments ($M = 4.17$, $SD = 0.81$, $A_{Adaption(strongly\ agree)} = 37.0\%$, $A_{Adaption(agree)} = 52.2\%$)⁴⁰. The focus must shift from teaching to learning and – as a consequence thereof – from teacher-focused to student-focused approaches in which students are not seen as mere *recipients*, but rather as individual, productive learners who take responsibility for their own development.

40 In the Delphi questionnaire, experts were asked to assess the following statement: “The greatest challenge students need to be prepared for through Higher Education Institutions is the continuous need for adaption through learning in changing work environments.” To this end, respondents were asked to give their assessment on a 5-step Likert scale with values from 1 for “strongly disagree” to 5 for “strongly agree”. $A_{Adaption(strongly\ agree)}$ expresses the portion of the sample that indicates *strong* agreement with the statement, while $A_{Adaption(agree)}$ indicates the proportion that agrees.

“Indeed, and as they [the students] are increasingly actors in their own development, they will need the capacity to steer their own learning and professional experiences.” (Experts response in Delphi Study)

The study also addressed the significance of dealing with uncertainty as an educational goal and new guiding principle for higher education. Respondents assessed the handling of uncertainty and ambiguity as one of the most important skills in future work contexts.⁴¹ As can be seen from Figure 29, the expert sample also largely agreed with a corresponding statement ($M = 3.73$, $SD = 1.10$, $A_{Uncertainty(strongly\ agree)} = 26.7\%$, $A_{Uncertainty(agree)} = 40.0\%$). Experts stressed that this ability – in addition to other *Future Skills* – would become increasingly important and that supporting students in dealing with uncertainty in higher education institutions is not obvious in higher education.

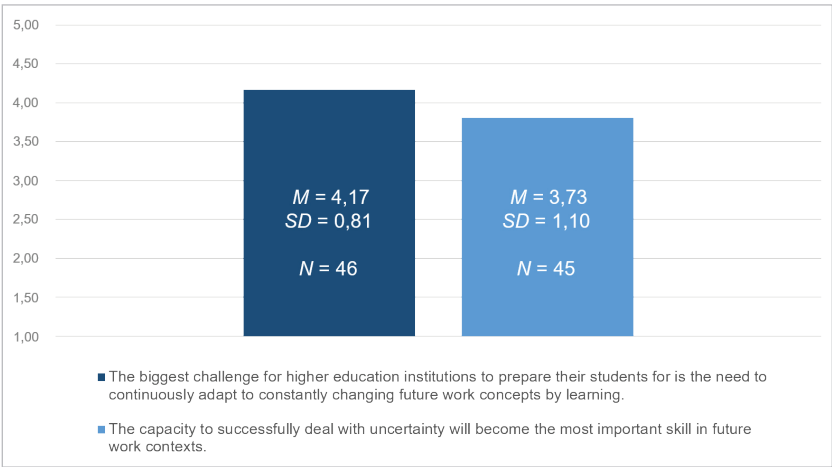


Fig. 29 Individual learning literacy and skill development

Both the ability to continuously adapt to the constantly changing environment by learning and the ability to successfully deal with uncertainties are two key

⁴¹ Respondents to the Delphi questionnaire were asked to rate the following statement: “The ability to deal with uncertainty is the most important skill in current and future work environments”.

challenges – from the perspective of the respondents both for higher education Institutions and for students.

Figure 30 shows that for the vast majority of more than nine out of ten respondents the ability to adapt continuously through learning is already highly relevant today or will even gain relevance within the next five years (see Figure 30). For a good third of respondents, this trend will become relevant at least in the short run (within the next five years).



Fig. 30 Time of adoption for *Future Skill* learning literacy (N = 46)

More than 60 percent of respondents assume that in current and future working environments the ability to deal successfully with uncertainty is already an important concern. Almost one third of respondents estimate that this ability will become more relevant over the next five years (see Figure 31).

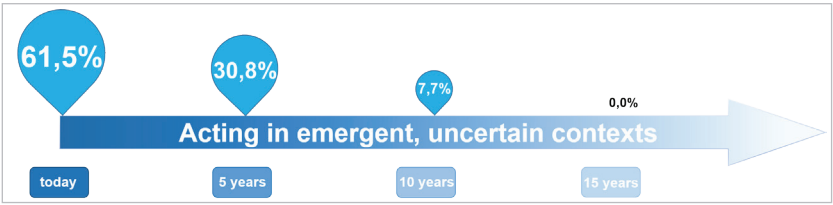


Fig. 31 Time of adoption for the capacity to act in emergent, uncertain contexts (N = 45)

The models, educational concepts and learning theories that we need in order to enhance such creative capacities are in existence for a long time. In educational science, this is usually termed as competences. Competences are described as principally unlimited dispositions to act in a self-organised and successful way in unknown complex future situations – as John Erpenbeck, a Berlin scientist, and

famous competence researcher, defines them. The point here is not to turn away from knowledge, information and data dichotomously, but to process and treat knowledge, information and data at higher level. Let us conceptualise and picture the interdependences between knowledge, capacities, actions, competences and professionalism – as done in Figure 32.

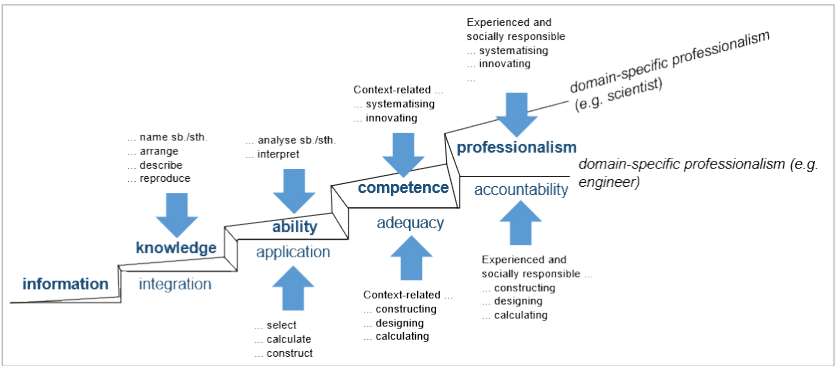


Fig. 32 Interrelation between knowledge, action and professionalism (illustration according to Wildt 2006)

Figure 32 shows that only when new *information* is connected to existing cognitive structures we can talk about emerging *knowledge*. Only when this *knowledge* is *applied*, do we speak of *capacities* and only when *volition* is added, i.e. the *capacity* to do something is linked to the *volition* (the will) and the *motivation*, only then do we speak of a *disposition to act autonomously*. And if this action is happening *adequately* to the problem context and context-specific, we speak of *competences*. If *competences* are coupled with *responsibility* in a final step, according to Johannes Wildt (2006), we can talk about *professionalism*, the highest level of one's capacity to act. The educational concepts on developing this kind of capacity to act are well-known.

One of them, an established model among many others, is the model of the reflective practitioner. In this model that Donald Schön developed with Chris Argyris in 2006, it is assumed that it is possible to *learn* reflective skills. Schön, who has worked in teacher training, found that it is not possible at all to prepare teachers for their everyday practical work situations – simply because it is basically uncertain what will happen if they cross the doorstep to their classroom. However, according to Schön, it is possible to train their capacity to develop ad-hoc action

strategies, to evaluate them, to reflect on them and to find out whether they are successful for one's own purpose. To possibly rethink them and try them out again, to evaluate them and not only to react, but to think ahead and test action strategies one more time, in order to then evaluate them ad-hoc and translate them into actions. The resulting learning is termed double loop learning effect, causing the enhancement of reflection capacities during an ongoing process. Schön calls this reflection-in-action. Starting to reflect on this process in retrospect, on the process of reflection-in-action (see Figure 33), one comes to develop her/his own individual theories of action – which is development of professional habitus par excellence.

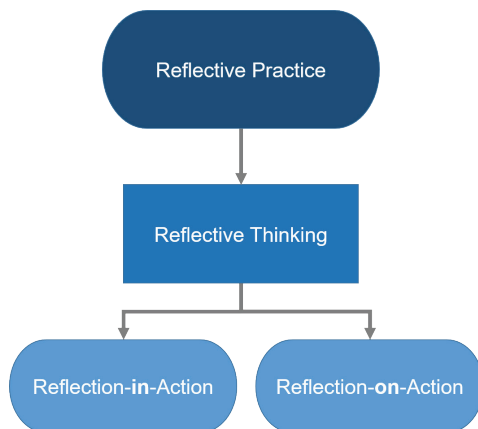


Fig. 33 The Reflective Practitioner (own illustration, based on Schön 2006)

Thus, one comes from an individual implicitly existing strategy which is assumed to be suitable all the way to an individual theory of action, via an *ad-hoc* developed strategy while acting, thereby developing professionalism, appropriateness, responsibility, volition and motivation for a professional context. It is, so to speak, a state of *perpetual beta* which Donald Schön describes, that is, a state of action in which professional action in a specific, situational context is permanently refined with an attitude of constant reflection.

C1.8 Eighth Second: From Control to Culture – Towards Empowering Learners

We know that competence-oriented teaching and learning works especially well in environments structured according to socio-constructivist principles. They are based on didactic models that go beyond pure factual knowledge and problem solving and permeate the field of creative self-developed and self-determined innovation. Learning in such an empowering way can be supported through specific teaching strategies, geared towards competence-oriented learning. Broadly speaking, it is possible to differentiate between three different teaching strategies (Baumgartner 2004) (see Figure 34).

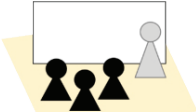


Transfer	Tutor	Coach
		
Factual knowledge („know-that“)	Procedures, methods („know-how“)	Social practices („knowing-in-action“)
Transfer	Dialogue	Interaction
Knowing, recalling	Practising, problem solving	Reflective acting, inventing
Teaching I	Teaching II	Teaching III

Fig. 34 Teaching strategies (Ehlers 2010; illustration according to Baumgartner 2004)

Mode 1 (transfer) is a mode of teaching where students are told what they need to know by teachers. It is the model of the omniscient teacher. Learning takes place in this mode as memorising and recalling. Much takes place in a process of imparting and it is mostly about factual knowledge, represented through the knowledge dimension know that. Mode 2 (tutor) goes beyond the domain of knowledge transfer into problem solving. The typical learning scenario for this is problem-based learning, in which students are presented with problem cases that they want to solve independently as case studies or problem-solving projects in dialogue with the teacher on eye level. The teacher changes her/his role from a sage on the stage to a guide by the side, to become a companion, an expert on eye-level with the student and/or a dialogue partner in a partnership. The learning activity is transformed into practicing the procedures of problem solving, of making

procedures known, of procedural knowledge, of know-how, whereby the process of teaching can in particular be described as a dialogical process. The third mode of teaching is characterised as coaching or social constructivist learning. In this model, the focus is on practicing and rehearsing social practices. Teachers here no longer have the role of imparting factual knowledge or presenting problems, but rather of guiding students to find and defined their own problems to solve and/ or generating learners' own undertakings which are then brought into a project work and solving space. It's all about realistic interaction between partners – about learners interacting with other learners, students networking, connecting with experts and other persons and resources. There is special emphasis on the social practice of growing into a certain field of professionalism, as described in the approach of the Community of Practice by Lave and Wenger (1991). The first teaching models tend to follow a control logic, whereas in the latter they tend to pursue a logic of enabling and empowerment. It refrains from the illusion that teaching directly leads to learning, that there is a direct function between teaching and teaching processes and learning and learning processes. There is also a growing attitude of respect and self-responsibility towards the learner, acting on the belief that learning is a self-determined process in which teaching can only be a supporting contextual framework condition.

C 1.9 Ninth Second: Informal Learning in Higher Education

Higher education Institutions usually concentrate on formal teaching and study scenarios when designing their teaching-learning approaches. This involves, as an example, using digital media to support knowledge transfer. The entire area of informal teaching is mostly neglected. It is an implicitly chosen strategy of institutions which neglects much of the biographical life reality of students. That neglects that informal learning is a vast area where the largest part of learning takes place. It would be an illusion to believe that studying only consists of the learning processes that are relevant according to the program regulations or curricula. Also, it is an illusion to believe that in higher education only formal learning takes place. A large part of the teaching and learning processes actually take place as self-initiated learning activity of the students outside the formal learning settings. According to the European Commission (2001), formal learning usually takes place in an educational or training institution (in terms of learning objectives, learning time or learning support), is structured and leads to certification. Formal learning is goal-oriented from the learner's point of view. Formal learning is learning that is

seemingly relevant in the course of higher education studies and leads to a certificate. However, the many occasions for informal learning that take place in everyday life, at work, in the family or during leisure time are even more often arising from students' intrinsic motivation. However, they often remain detached from what is considered officially relevant to the curricula. This kind of learning is not structured (in terms of learning objectives, learning time or learning support) and will usually not be certified. Informal learning can be purposeful, but in most cases, it is not intentional, or it is even incidental. Studies show that informal learning takes up a large part of the study process, starting with consultation with fellow students on learning and study strategies, learning and study materials, advising on personal learning projects and the selection of learning occasions, and obtaining informal learning support when needed. Digital technology is playing an increasingly important role here because it supports personalised provision of material.

A critical look reveals, however, that higher education Institutions' digital study activities are still often primarily aimed at supporting teaching and formal learning. This means that the target groups of those activities are often first and foremost the teachers, while students are only indirectly targeted. Although the framework of academic education is institutional, studies constitute a learning process that cannot be attributed solely to the influence of teaching. The students' perspective is often neglected. The processes of students' informal learning are often not sufficiently incorporated into the overall study design. Research shows that social software choices such as social networking sites are used by a large number of young people (Busemann & Gescheidle 2011) not only for private purposes, but also during their studies, as a representative survey by Hochschulinformationssystem GmbH (Kleinmann et al. 2008: 6) has demonstrated. According to the survey, almost half of German students already used social communities such as StudiVZ or Facebook in 2008 to exchange information on matters related to their studies. By 2013, 95 percent of 14 to 29-year-olds were signed up in Facebook, while VZ networks had become close to insignificant.

On the other hand, many social software application scenarios encounter competence- and acceptance difficulties among students (Schulmeister 2008; Jones et al. 2010). Likewise, higher education institutions and their staff are reluctant to include them in their e-learning programmes. A study by the German Rectors' Conference (HRK) on this topic revealed that currently there is no sign of an extensive transfer to higher education yet (HRK 2010: 35; see also Conol 2008). And all this, although the potential of social software, especially in the area of informal learning, is not contradicted and hardly debated in literature. Already two e-learning contributions in the Anglo-Saxon and German-speaking regions, published shortly after the establishment of the term *web 2.0*, referred to technical innovation in the field of

education and pointed to the fundamental role, social software can play to support learning (Downes 2005; Kerres 2006). Subsequently, corresponding approaches were continuously enhanced (Ehlers 2013). According to unanimous opinion, the greatest potential of social software is in the area of informal learning (Weigel et al. 2009). According to Stiftung Warentest, many learners are already autonomously managing their knowledge with the aid of social software (2001).

Individualised competence enhancement outside of formal learning settings can be significantly promoted by tools such as wikis, blogs, e-portfolios and social software (Himpls & Baumgartner 2009: 511). John Erpenbeck and Werner Sauter (2007) state as a main point regarding social software and competence-oriented learning that it is the power of social software tools to convey values and competences, while traditional e-learning instruments are often poorly suited for this purpose (Erpenbeck & Sauter 2007 in Ehlers 2010). In fact, studies show that although the use of social software by students is often privately motivated, the informal exchange that takes place also promotes scientific cooperation (Kumar, Liu & Black 2012).

Today it is clear that lifelong learning will contain an ever-increasing proportion of informal learning. Informal learning plays an essential role as a concept. It usually happens on the learner's own initiative, as a self-directed learning process, but also in social contexts. It is obvious that informal learning takes up an important part of the whole learning process of an individual, the largest part of it. It takes place as self-regulated learning, in which learners set their own learning goals and reflect on what they want to achieve in terms of capacity to act by learning, choose their own learning materials and learning methods and can also monitor their own learning progress. Informal learning, however, goes beyond self-regulated learning and can also be found in incidental learning, i.e. the process of initiating learning processes in the area of socialisation, of cooperation, from incidental and informing learning through to in-depth learning.

Approaches such as situated learning play an important role in informal learning concepts, for example in the concept of *Community of Practice*, as developed by Lave and Wenger in 1991. Looking at academic studies from the perspective of Communities of Practice, students are actors in a Community of Practice that is grouped thematically around a specific domain and for which a community/group develops a specific common practice, i.e. learning and studying in a specific occupational field. In 2003, Arnold transferred the model of Community of Practice to distance learning and further differentiated it mostly by defining special moments of joint development, joint learning, which are grouped around three dimensions (Arnold 2003):

- Finishing one's studies: This is about planning one's studies, attending seminars, working on tasks, passing exams, etc.
- Mutual study support: This is about asking questions, giving answers, sharing lecture notes, organising learning groups, sharing experiences, etc.
- Communication and cooperation structures: This is about using digital media in order to maintain communication.

Students today organise their studies by WhatsApp groups or common digital virtual groups, sharing learning materials, arranging learning and working settings for specific learning outputs to be prepared, and supporting each other. Students are thus keeping up with each other in a very close self-imposed, self-organised way, they have a very good subjective feeling for assigning tasks in group work, who needs what kind of support and how much time is needed in the course of studies, for which learning tasks and learning achievements. The entire area of this informal learning is currently only marginally exploited in higher education. Therefore, Köhler et al. (2016) are developing a model for this purpose which is oriented towards the life cycle of a study programme and extending to lifelong learning. By this, they show how social software can promote processes in academic education. Good practice examples from Germany:

- The project "MyPaed – the personal study environment" at TU Darmstadt on the topic "personal learning environment".
- "KISDspaces" of the "Köln International School of Design" on the topic "Blog systems".
- "CollabUni" of Hildesheim University on the topic "Social Network"
- "E³-Portfolio Platform Problem Solving Competence" of Augsburg University on the topic of "E-portfolios"
- "TUgether" of TU Braunschweig on the topic "personalised student portals".
- "Open distributed campus" of FU Berlin as a variation of a personalised student portal

These examples show how higher education Institutions can try to promote informal learning by digital media. Overall, higher education Institutions must prospectively gain a broader understanding of their role in shaping learning environments in a changing media and learning world in which open learning spaces gain in importance both in terms of temporal and social dimension. Digital media can be used to support informal learning within the framework of formal learning processes. The aim is to support studies as a section within an individual learning biography, while simultaneously taking into account specific social learning contexts (also in-

cluding formal social learning contexts). Framework conditions at higher education Institutions that sufficiently support students' self-regulated individualised and collaborative learning can only be created from this perspective. The virtual spaces created by digitisation offer sufficient potential for this, also due to their openness.

In the future, it will be important on top of this that new forms of studying and new study paths are supported by digital media. The results of the Delphi Study published here (Ehlers & Kellermann 2019) illustrate this. In the future, studies will take place as a multiepisodic process of lifelong learning. In addition, they will be organised as a process increasingly taking place at different university campuses, in which courses are not only provided and perceived as a curriculum at one but are integrated into the courses of different institutions. Studies will become highly flexible, individualised and personalised, among other things by the use of digital media, promoting individualised self-regulating learning. This will increasingly lead to learning contexts being de-formalised and enriched by informal parts. This leads to an increasing blending of informal and formal learning contexts. Higher education Institutions are requested to integrate the informal learning achievements and learning outcomes into formal studies. This will become all the more important as informal rather than formal learning plays a major role in the later occupational phase as well. The so-called "spending outcome paradox" taken up by Jay Cross (2003), which was never empirically proven but is conceptually largely accepted, shows that while 80 percent of the costs are incurred by formal learning setting, only 20 percent of learning takes place in corresponding contexts. In contrast, 80 per cent of learning takes place in informal contexts, whereas only 20 per cent of the costs are spent on it.

C 1.10 Tenth Second: Badges & Microcredentials

Microcredentials, badges, nanodegrees and MicroMasters are currently extremely fashionable and on everyone's lips. What's this about? The aim is to modularise larger study sections into smaller study units and to document students' learning experiences, knowledge or their performance in examinations and assessments, also for smaller study sections and modules. These can then be used to create an educational portfolio or competence biography in a much more granular way than a full degree and much closer to what has actually been learnt. An important ingredient in this regard is the question how higher education Institutions can design assessments for prior knowledge and competences from the academic and non-academic field in order to recognise them in a learner's study path. The underlying

idea and concept of academic education, made possible through microcredentials and microqualifications, is to enable a lifelong documentation of informal and formal (academic) education, in which informal and formal elements, modules and learning experiences are interwoven with accredited or non-accredited, certified or uncertified modules into an academic educational biography. The CEOs of big companies like *Ernst & Young*, *Google* or *Siemens* already announced in 2013 that higher education certificates such as the Bachelor's or Master's degree no longer have a predictive power in their organisations when it comes to employee selection, but that much more value is placed on the personality, the experiences and the projects that the candidates, the applicants, bring along and have made (Ehlers 2018). The aim is to document and bring on board real experiences and competences and to demonstrate evidence-based competences on the basis of actual experiences and activities. For many human resources managers in private and public organisations, these areas of experience- and evidence-based competence evidence are becoming more important than the official higher education certificates. Likewise, the study by Ehlers (2018) showed that some organisations express that degree certificates increasingly merely represent an entrance step, as they are regarded as a legal condition for entering a professional sphere, but not a rich and full information about the actual competence and performance of the respective candidates actually is.

A corresponding organisational change in organisational structures, strongly value-based and increasingly aiming at cooperation, networking and flat hierarchies in an agile environment, goes hand in hand with this and leads to personnel selection procedures increasingly relying on small granular evidence-based experience portfolios. Microcredentials as proof of performance are currently emerging in various countries in Europe and on a global level. At higher education Institutions, they increasingly emerge in order not to only certify large study sections of 180 ECTS for a Bachelor's degree or 300 ECTS for a Master's degree, but to certify more competences below this formal level. Certificates for *short courses* are becoming increasingly important. Students are collecting microcredentials in an evidence-based, validated format and can then present them to a potential employer in an application process.

Platforms for such alternative forms of certification are rapidly developing. Microcredentials, informal learning, digitisation, competence orientation and flexibilisation in the education sector as well as de-standardisation in the labour market cause challenges to higher education. Ehlers (2018) on this:

“Although alternative credentialing is just emerging, tools, platforms and concepts are already starting to emerge and develop. In technology, GitHub has become the standard platform for showcasing code to potential employers. In finance, students are using EquitySim to demonstrate trading and portfolio management skills to

investment banks. Across a wide range of dynamic sectors of the economy, students are uploading papers, presentations and problem sets to Portfolium to demonstrate capabilities. And skill passports on Viridis, or digital credentials from Credly are allowing employers to find exactly the competencies they're seeking." (Ehlers 2018)

C 1.11 Summary and Conclusion

"The future of higher education stretches like a horizon" – it is this quote from Niklas Luhmann (1976) that we have started this chapter with. Luhmann describes that in all social systems expectations are existing that are decisive for how the system, including the higher education, positions itself in its operations towards the future. The developments analysed and described in this chapter influence these expectations. They shape the situation within the institutions as well as the expectations of its stakeholders.

Looking at German higher education, everything seems to be in good order. At first glance, everything seems to be working well: Although the number of students in Germany has risen by one million to 2.8 million within just one and a half decades (Gehrke & Kerst 2018), the higher education Institutions have not collapsed. And the implementation of the Bologna Process, with Bachelor's and Master's degrees, is practically finalised. But there is a catch in the system: German higher education Institutions are lagging behind in terms of digitisation and internationalisation. And also teaching leaves much to be desired in many places, as the partly high dropout rates indicate. In some subjects, every second student drops out, the programmes often lacking practical relevance; furthermore, international mobility is at a standstill.

The megatrend of social development towards an educational society with all its manifestations is reinforced by a second megatrend for society as a whole, that of digitisation (see Figure 35). Both developments – digitisation and a drift towards an educational society – contain a number of cause-effect relationships whose effects have a strong influence on the development of the University of the Future.

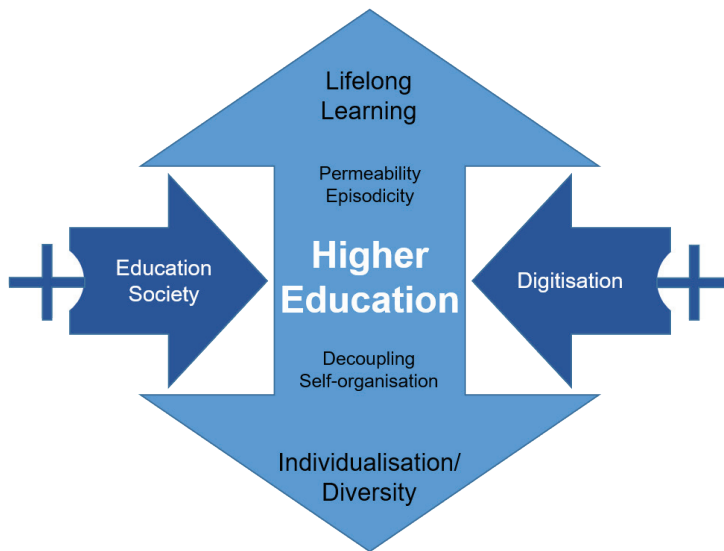


Fig. 35 Pressure factors impacting higher education institutions

Both the increased participation in academic education and the increasing digitisation of higher education have a mutually reinforcing effect on the organisation and design of studies, teaching and research. Unbundling of services and a new level of diversity are the results. They create a move towards individualisation and lifelong of higher education.

Diversity is the recent catchword of higher education. It is based on a context where academic education is becoming more and more important for social participation in society, where educational processes become more and more individual (i.e. tailored to the respective needs of the individual person and biography), and thus more diversified and adapted to the respective circumstances in form and content (i.e. less oriented to standard educational opportunities). This new diversity and heterogeneity pose the great challenge for higher education Institutions in the years ahead. The classic clientele of science- and academically oriented students will become a minority at higher education Institutions. The Bologna Process evokes that higher education is more geared to labour market professions, which is the reason for more and more students to study – to have a clear occupational profile afterwards.

Higher education Institutions will have to adapt to the new diversity, otherwise they will neither be able to meet changing societal demands, nor will they understand their students. Currently, one can get the impression that there are no major problems in higher education: the dropout rates in Germany, at around 25 percent, are rather low on OECD average on the whole. However, it is not only a question of getting as many students as possible through the well-tried study concepts, but also of asking which new skills and competences students bring into their studies and how their interests could contribute to enriching teaching.

In dealing with a higher level of diversity, it becomes important for higher education Institutions to promote students' processes of self-monitoring in order to reconcile the potentially very different objectives of a study cohort. While in one case it is still a matter of completing undergraduate studies, in other cases it is an extra-occupational or a dual study model. There might be an interest in refresher courses or in an in-depth well-founded study unit in a special subject. These different needs and interests must become combinable by intelligent and modularised study models. Students display a stronger attitude towards choice and take the opportunity to study from a wide variety of circumstances and starting points in their life career. Most drop-outs take place during the first semesters, for example, oft not resulting from performance challenges, but from the fact that students change their mind during the first phase of their studies, perhaps want to study a different subject, choose a different academic institution or want to quit studies altogether, with the option of resuming them at a later date. In order to do justify such educational pathways, the concept of academic studies must be rethought: by designing smaller academic qualification units, by linking them in intelligent ways and by simultaneously not losing sight of the big qualification threads. Certification and assessment of a large comprehensive full degree, studying at one institution only, at the same university from A to Z, will be a thing of the past soon – or at least become equally important as the new academic mobility.

A third development are emerging decoupling processes of previously tied services in higher education. On the one hand, it is becoming clear that the idea to package qualifications and competences required for a profession in clear and long-lasting valid curricula is proving to be increasingly absurd. IN the future we have to recognise the move from a vocational system which is oriented to occupational definitions to a flexible system of work in which occupational definitions no longer include rigid requirements but are constantly evolving. Lisop and Beck speak of a farewell to the “professional construct as a foundation for qualification and pedagogy “ (Lisop 1997; Beck 1986). The University of the Future can no longer conceive academic qualifications as a rigid ‘package of narrowly defined professional qualifications’. An economy and society which is highly developed and functionally

diversified in its democratic processes, production, research, development and services requires a rapid change of qualifications. As a consequence, higher education Institutions are called upon to focus more on comprehensive competences and less on precisely fitting qualifications.

In the field of study organisation, too, decoupling processes are emerging: for example, the decoupling of learning and degree certification. In the future, academic studies will not be carried out exclusively with the aim of obtaining a degree. Rather, there will be an increasing demand for advanced academic education, for academic deep learning of professionally relevant topics. Also, the motive of higher education as enjoyment and fulfilment in day-to-day life, as a means of sense-making, will become more important. In an increasingly digitised market for academic educational offers, academic qualifications will no longer be (or can be) supervised by one single institution to their full extent. Rather, students will increasingly seek and compile their own educational opportunities and institutions in accordance with their own preferences. In this way, academic study is also decoupling from a 'one-campus mentality' towards a potentially decoupled 'many-campus mentality'.

Another decoupling process is a loosening of time structures in which studies take place: In the future, academic qualification will no longer be claimed as a 'qualification in stock' directly after graduation from a secondary school, but in episodic pathways, principally unlimited throughout the entire life span. The market for academic advanced education, in which this education segment is currently located, will evolve from a niche market (today) to a standard offering of future higher education institutions.

According to Karl Valentin, prediction is a difficult issue – especially about the future. This also applies to the future of higher education. Nevertheless, it is a topic that consistently inspires conferences and workshops, mostly not so much in order to think about what will change, but what *should* change above all.

One thing becomes clear without exception, however extensive and controversial the discussions may be: higher education as an institution in society has not come to an end. We don't have to say goodbye. It is being criticised and concepts such as 'rethinking education' and digitisation play alternating roles between accompanying and driving forces. Unmistakably, the Bologna Process is criticised: a strong *school-like* nature of new study programmes is already apparent. Some critics perceive these reforms as the definitive end of the Humboldtian ideal and its understanding of education and thus the "end of a way of life" (Seibt 2007). Other aspects mentioned are the increasing separation of research and teaching and the replacement of internal control (interest in content) by external control (leading to assessment-oriented study interests under time pressure). The struggle in educational policy for the right path to reform education, schools and higher

education is also reflected in educational policy paradoxes: realising that education is becoming increasingly important leads to the conclusion that a shortened twelve-year 'Abitur' (A levels) must prospectively be sufficient and that study periods must also be shortened. The desire for more educational justice and more higher education graduates is paralleled with the introduction of tuition fees. A greater scientific expertise was expected of the higher education Institutions' orientation towards third-party funding programs. Higher education currently seems to be left alone, surrounded by reformers.

But history teaches us that progress does (should) not lead back to the old status, but that a new status, which lies in linking tradition and new possibilities, should be aspired to. What could this look like for today's and tomorrow's higher education Institutions? My proposition is that a number of key trends and developments can be identified – among them a strongly increased participation in education as well as digitisation – which will lead to profound changes in the conception of next higher education.

The University will be able to assert itself as the most important social institution in Europe (Rüegg 1993). It will have to change its organisational structure and working methods if it is to take account of the changed framework conditions of a society in which academic education is the normal biographical experience for the majority of an age cohort.

Rethinking Learning, Teaching and Research: An Agenda for Higher Education of the Future

C2

There's one thing that the university of the future will most notably have to do: it will have to be more responsive to the diversity of future target groups of students. And it will become more digital. More different in its structures and more different in the associated learning scenarios of students, teaching scenarios of professors and lecturers – and finally also in its research approaches. The self-conception of the higher education Institutions is changing – and will continue to do so! In the final chapter of the book we have identified four scenarios for profiles of the university of the future based on data from the international *NextSkills* Delphi. However, this chapter deals with the internal questions of higher education development: teaching, learning and doing research in the future and the question of how studies will evolve.

So, what does an agenda for the University of the future look like? Dealing with this topic inevitably leads to imagining new ways of teaching and learning; the way in which we will study in the future. On the one hand, the focus is on pedagogical aspects of teaching and learning, such as the advancement of examination and assessment practices, peer learning and peer validation approaches, the implementation of academic learning and teaching as a learning community, and an increased focus on *Future Skills*. In addition to these more pedagogical and study-related aspects, however, there are others.

An agenda for the university of the future must take into account the structure of the higher education Institution, its internal arrangement and the way studies are organised as well. What is changing structurally? Higher education Institutions will have to undergo fundamental changes in the way they organise their studies. More students, new target groups and an unprecedented diversity of target groups, who need to be valued and supported in personalised study settings, are approaching higher education Institutions. Furthermore, the higher education Institutions' function of social integration and the social dimension of studying in an academic educational society are becoming increasingly important. Linked to this, the con-

cept of lifelong learning is gaining in importance in higher education and brings about change in teaching and organisation as a result of a domino effect. There is, for example, the concept of microcredentials, alternative certification systems that enable learners to organise their own portfolio of qualifications and competences digitally and in a more self-determined way and call for higher education Institutions to professionalise their systems of recognition and credit. Digitisation promotes the flexibilisation of space and time structures and greater transparency in all study-related information systems over the entire study life cycle. In a digital world we are experiencing a decreasing importance of knowledge transfer and an increasing need for guidance, support and coaching in an ever more diverse world of higher education. In addition, the decoupling of processes of teaching, testing and certification of competences plays an increasingly important role. It is hereby noteworthy that the experts interviewed for the international *NextSkills* Delphi expect the organisational and structural changes to gain relevance much later than the change processes related to academic teaching and learning designs.

Based on the changed framework conditions in an educational society and the pressure for change that affects academic qualification processes, new demands on higher education Institutions for a modern, further developed higher education model arise from this. The following aspects indicate the development corridor in which higher education Institutions are currently located. The university of the future will have to adjust its profile points to this agenda.

In the following, all those concepts are described that have proven to be significant in the *NextSkills* project.⁴² They are divided into three chapters, starting with a thought experiment sketching the evolution of higher education Institutions (Chapter C 2.1 Higher Education of the Future: A Thought Experiment). This is followed by an overview of teaching and learning (Chapter C 2.2 Rethinking Learning: Future Learning Concepts), organisational and structural aspects of the university of the future (Chapter C 2.3 Rethinking Higher Education: Towards an Evolved Organisation) and a summary chapter (Chapter C 2.4 Summary: The Dawn of the Future of Higher Education).

42 The concepts described below are the summarised result of an analysis from the *NextSkills* project (www.NextSkills.org). Included are the more than 100 concepts for Curriculum 4.0 with which Higher Education Institutions applied for the “Curriculum 4.0” program. This was established in 2017 by the Carl Zeiss Foundation and the Stifterverband with the aim of honouring curricular reform projects that demonstrate new approaches to dealing with digital media.

C 2.1 Higher Education of the Future:
A Thought Experiment

If the current higher education model is transferred to a postmodern future, which structures will gain in importance? If one takes the changed framework conditions in an educational society and the pressure affecting academic qualification processes as a basis, new demands on higher education institutions for a modern, further developed higher education model arise from this. The following aspects (Table 3) are the outcome of a thought experiment and display the development corridor in which higher education institutions are currently situated. The university of the future will have to position itself to these key points.

Table 3 Projecting higher education into the future

Dimension	Current higher education model	Future higher education model (postmodern)
from... (possible development path)... to		
Degrees	The aim is to achieve a clearly defined comprehensive study degree, with the degree designations being awarded by the higher education institution on a statutory, sovereign basis.	The programme consists of small study units, which can also come from different (higher education) institutions. There will be more short courses, certification courses, refresher courses. This results in patchwork studies that can then be combined into larger final degrees or certificates, such as a final degree, and certified by a higher education institution.
Recognition of prior learning (RPL), knowledge & experience	Recognition is possible, but there is little actual recognition practice.	A lot of RPL recognition practice, higher education institutions develop professional processes for competence measurement and the recognition of previous performance and experience.
Certification	Teaching/ transfer (tutoring, courses), examinations and certification are linked within the framework of an institution.	Teaching/ transfer (tutoring, courses), examinations and certification (final examination) are decoupled and can be offered by various institutions.

Dimension	Current higher education model	Future higher education model (postmodern)
Study pathways/timing	The course of studies is clearly defined by study and examination regulations and is mostly predetermined. Studies are structured according to time units (ECTS). Clear differentiation between part-time and full-time structure.	The course of studies is flexible and determined by a wide range of electives. Studies are structured on the basis of content criteria. More flexible, individual time structure, more extra occupational and lifelong models.
Curriculum	Clearly defined qualification goals are set in the degree course, which apply equally to all students and from which the contents and methods of the modules are derived during the course of study. Professional profiles are used as a normative paradigm for course material.	The study content is increasingly oriented towards long-term employability and individual educational goals, interests and needs. The focus is on more fundamental action competences and the capacity to deal with comprehensive skills.
	Methods and contents are oriented towards faculties and disciplines in a canonic way.	The curriculum is oriented towards central issues of an area of practice. The problem orientation calls for a more interdisciplinary focus.
	Little digital import of curricula	Strong digital cooperation and digital import and export between academic institutions
Science and research structure/institution structure	Higher education institutions are structured in disciplinary units, the faculties; they are decisive in terms of content and structure of studies.	Higher education institutions are strongly organised by interdisciplinary and transdisciplinary cooperation forms. Studies are strongly organised on the basis of comprehensive issues as well as interdisciplinary and transdisciplinary work units.

Dimension	Current higher education model	Future higher education model (postmodern)
Learning model	<p>Learning principally follows the idea of a knowledge divide which needs to be compensated for. Teaching is expert-oriented. Teachers organise knowledge transfer.</p> <p>Exam-oriented learning: Learning is oriented towards examinations. Study follows the idea that it is about overcoming the obstacle of certification. Many exams for a detailed module structure.</p>	<p>Learning follows the idea of students and teachers forming a learning community (renaissance of the <i>Universitas</i> ideal)</p> <p>The learning experience is central, feeding on one's own interests and self-developed issues. Examinations take place on a larger scale on overarching topics and competences. The focus is on overarching competences from larger contexts.</p>
Examinations	Many exams are module-oriented and often designed to reproduce knowledge.	Examinations are competence-oriented, multimodal, take place at larger intervals and units, and cover larger areas.
Organisational framework	Institutional Structure: A higher education institution acts as study place and provider	Institutional diversity: Several academic institutions are involved. Students organise study frameworks and flexible study processes adapted to their needs
Reputation	The institution's reputation determines the value of the degree on the labour market.	<p>Students tend to document their skills and experience in assessments, including qualitative elements such as portfolios.</p> <p>The value of the degree is based above all on the practical relevance of the studies, the experience gained and documented and the demonstrated capacity to act.</p>
Permeability	There are clear thresholds between academic and non-academic programmes in school, vocational training and higher education. The permeability does not continuously exist.	Permeable continuum between fields of education such as school, vocational training and higher education as well as between the respective compatible levels of education of national and qualifications frameworks

C 2.2 Rethinking Learning: Future Learning Concepts

Higher education institutions will continue to evolve both organisationally as well as pedagogically and didactically in relation to the learning models of higher education. To start with, we will describe which pedagogical-didactical approaches emerge as suitable.

C 2.2.1 Digital, Networked and Informal

Studying in the future will be more digital: networked, digital and informal. It will make extensive use of the possibilities offered by digital learning environments and, in addition to formal learning opportunities, will also make use of the full range of informal learning opportunities – across institutions and fully networked. Digital learning environments consist of a whole range of developments, trends and perspectives that promote a change from teaching to learning. A new perspective on networked and open learning environments essentially links five characteristics:

1. That learning takes place all along, everywhere and in many different contexts, not only in the classroom;
2. that learners take the role of organisers;
3. that learning takes place throughout one's life, is multi-episodic and not (only) tied to educational institutions;
4. that learning takes place in *Communities of Practice* (Wenger 1998): Learners join communities, both formal and informal;
5. that learning often takes place informally and non-formally, at home, at work and in leisure time and is no longer teacher and institution-centred.

In this understanding, digitally supported learning no longer means using a digital learning platform but creating a new kind of learning platform with the help of the available social software: Not using *one* Learning Management System (LMS) as an island for material in the wide *ocean* of the net but creating a gateway to the web. The e-tutor (teacher) only intervenes as a guide and curator by providing small learning contents (microcontents) in a portal which will open the door to self-directed learning for achieving the set learning goals. These are negotiated with the learners and documented at the beginning, e.g. via blog entry or podcast. This means that the learning environment is no longer made up of a single application, but of several individually composed and interacting tools. In this context, the term *Personal Learning Environment* (PLE) was coined. In a PLE, the learner's

individual reflection takes place in weblogs or podcasts and as collaborative work in wikis. Thus, learning is no longer only transferring and consuming content and knowledge, but also (co-)producing them in an independent way.

In the long term, a *personal learning landscape* can evolve that represents an “interactive portal with all accesses to the personal digital world” (Kerres 2006) of the individual. In a constant process of knowledge production, learners as curators aggregate their learning contents according to personal interest, reflect on it and put it together anew individually, sharing it with others in the desired social context.

As early as 2006, Kerres pointed out that existing e-learning (1.0) approaches often have the disadvantage that learning programmes, but also modern learning platforms, have to be laboriously filled with content, a lot of time and money by the teachers and then often degenerate into a *data grave*, while real life “now takes place next door, on the Internet” (Kerres 2006). With the tools of Web 2.0, internet contents, continuously generated and autonomously regenerated, can be used for teaching (ibid: 5). In this model, an active and creative way of “rip, mix and learn” (Richardson 2005) replaces the editing of premade course materials. Instead of an LMS, e-portfolios could be used by learners to manage and document their learning and work processes themselves and to share them with others.

Informal learning

The concept of lifelong learning emphasises that learners cannot permanently attend courses, but that new forms of learning are needed that are self-directed, fast, flexible and problem-oriented. Informal learning, “evolving in mediate life and experience contexts outside of the formal education system” (Dohmen 2001), is once again at the centre of discussion. It comprises – as much is known today – 70 to 80 percent of all learning activities. In his latest book “Informal Learning” (2003), Jay Cross says that only 10 to 20 percent is learnt by formal learning scenarios, while 80 percent is learnt by informal learning. This calls for a formalisation of informal learning and an informalisation of formal learning. Nevertheless, formal education today is still considered far more important than informal education (Cross 2003).

Networked learning

Studying in the future will be about learners learning in a self-regulated way in social networks – digital and analogue. From the (constructivist) perspective of learning theory, the advocates of this type of learning fundamentally question the *possibility of instructing* human learning. This is justified by the fact that a self-controlled system (learner) cannot be determined by its environment but can at best be disturbed (*perturbed*) and stimulated. In addition, it is argued that

learning does not solely work by external demands being made – learning, that is the idea, cannot be planned without the learner (cf. Holzkamp 1993: 184). The concept of self-regulated learning hereby becomes enormously important. Self-regulated learning is often understood as a *generic term* for all forms of learning in which learners can determine (and/or co-decide) and take responsibility for their own learning process or tasks, methods and time investment (Deitering 1996: 45). Friedrich and Mandl (1997) illustrate the difference between *self-determination* and *self-controlling* as follows:

“Self-determined learning gives learners the opportunity to independently determine the selection modes (what is learned?) and the learning objectives (whereupon?). Self-determined learning includes the learners’ option to determine their learning paths, their regulation of learning, (how? when?) when learning content and objectives are given.” (Friedrich & Mandl 1997: 219)

The basic *media-didactic* challenge is to align the didactic learning arrangement with the parameters of the didactic field, such as the characteristics of the target group, the specification of teaching content and objectives, didactic methods, didactic transformation and structuring of learning opportunities, characteristics of the learning situation and specification of the learning management, characteristics and functions of the selected media and tools (Kerres 2001). It is important to point out the primacy of didactics and to first raise the question of educational goals and only then to choose suitable teaching/learning scenarios and methods as well as the necessary tools to implement them.

George Siemens developed a new learning theory, which was published in 2004: Connectivism. He states that his design of connectivism goes beyond the previous approaches of behaviourism, cognitivism and constructivism in its principles and takes into account the increasing tendency of learners towards informal, networked and electronically supported learning. Learning is seen as an increasingly continuous, lifelong process that permeates everyday work and even leisure activities, influencing both the individual and the organisation and their links. Siemens explains that knowledge about *where?* and *who?* is more important today than the *how?* and *why?* Although Siemens’ approach does not clearly set itself apart from existing learning theories, but rather describes a network-oriented learning philosophy, the approach is particularly valuable in that it clearly emphasises the development of networked, digital learning and social processes as the basis for the learning and interaction processes that take place.

C 2.2.2 Beyond Disciplines

How can societal issues become the pivotal element of learning causes during studies, so that students can become acquainted with different and sometimes competing different scientific disciplines and assess them for their contribution to solving the problem?

Problems do not follow any discipline – study programmes do. This describes a fundamental problem of academic differentiation. It makes sense and is even essential that the different scientific disciplines develop and maintain their own core, their own identity, their own methods, contents, research fields, knowledge and teaching traditions. The history of *Academia*, however, is a history of differentiation that frequently emphasises one's own point of view more than mutual ones and ignores the question of the contribution of other approaches, disciplines and methods to solving a social problem. As a result, higher education processes which are strongly focused on one discipline and one paradigm for solutions and which do not have a broad orientation and ability to navigate in different scientific fields are encouraged. However, this is necessary in order to solve problems, especially social problems. It is necessary in order to answer the question of what the individual scientific discipline actually contributes to the solution of a specific problem, how this contribution can be evaluated and weighted in relation to alternative contributions from other sciences and/or disciplines, and where gaps arise that raise questions to other sciences. The method of problem-oriented learning is the actual key in higher education studies to relate trans- and interdisciplinary scientific approaches to one another (see Figure 36). Because: Problems do not comply with any discipline. Inter- and transdisciplinary teaching and learning require:

- Linking and applying what has been learned to concrete and real tasks,
- Development of interdisciplinary solutions,
- collaborating on topics from society and business.

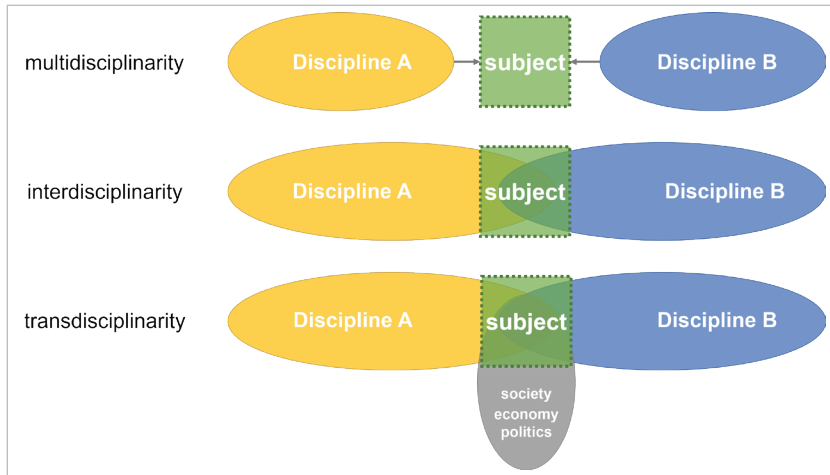


Fig. 36 Inter- and transdisciplinary learning

It is therefore essential that graduates are enabled to acquire an interdisciplinary and/or transdisciplinary basic attitude and the competence to creatively analyse problems on the basis of methodological tools of various scientific disciplines. They do not have to be experts in the respective scientific domain, but they do have to be experienced in assessing the different contributions that different sciences can make to a defined problem.

Good practice examples

- HOTSPOT (House of Transdisciplinary Studies for practice-oriented teaching and learning) at University of Pforzheim.
- Interdisciplinary Bachelor's programmes at the University of Hanover

C 2.2.3 Flexible Study Pathways

How can curricula be enriched with content from study programmes at other higher education institutes that are made available digitally, i.e. imported digitally? Another way of making study programmes more interdisciplinary and flexible, allowing more choice and strengthening students' self-organisation is the digital import of curricula from other academic institutions, recently known as *virtual*

Erasmus or virtual mobility. In this case, students attend a course, a summer school or do an internship, which is taught in the form of an online course at an academic institution (often abroad) other than the institution at which they are enrolled. The course taken this way is recognised as a full academic achievement and can be integrated into one's own studies with all acquired credit points. The digital import of teaching from other academic institutions can be facilitated if faculties give thought to the possible import possibilities, set up rules for this and include these in a virtual mobility catalogue for students beforehand.⁴³

An alternative to the above-described flexibilisation of the course of studies is a stronger interdisciplinary design of course offerings through the use of digital media. Flexible electives are defined in order to attend modules and courses outside one's subject area. Possible examples are the theologian who also wants to attend management seminars, the manager who is interested in group psychology, etc. Higher education institutions are starting to define Bachelor's and Master's programme modules as so-called 'polyvalent modules'. This has an impact on the capacity calculation and utilisation of degree programmes. Digitisation enables the presentation and accessibility of content independent of time and place, even across faculty, department, campus and even institution boundaries. One example of this is the Virtual University of Bavaria, through which many Bavarian higher education institutions now offer over 300 courses and modules in digital form.

C 2.2.4 Soft Skills as a Hard Currency

It cannot be stressed often enough that *Future Skills* are not contradicting the importance of knowledge but rather enrich it with values, attitudes and behavioural dispositions. In the agenda for future higher education teaching, *Future Skills* do not replace the transfer of knowledge, but raise knowledge to a higher stage – entirely in line with the stage model presented in Figure 32. *Future Skills* will be equally important in future higher education teaching as concepts of knowledge transfer (see Figure 37) – this is how the experts of the international *NextSkills* Delphi assess this aspect ($M = 4.16$, $SD = 0.70$, $A = 91.1\%$, $N = 45$)⁴⁴. Their significance acknowledged by both the interviewees of the *NextSkills* Studies and the panel of experts in the

43 The EU project “OER Test” has worked out and published the conceivable possibilities: <https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/Open-Learning-Recognition.pdf>

44 A denotes the agreement index as the share of those who have strongly agreed (=5) or agreed (=4) to the agreement index.

NextSkills Delphi Study begs the question whether the term *soft skills* is actually still viable for the competences described as *Future Skills*. The classification as *soft* and *hard* often suggests that they can be *transferred* and less *transferable*, or that it can be *tested well* and *less well*. In fact, there seems to be a major barrier to the widespread implementation of a higher education curricula orientation towards *Future Skills* – namely in that examination systems have so far been designed primarily for the assessment of knowledge and not for the assessment of capacities to act.

While slightly more than four out of ten respondents indicated that *Future Skills* are already on a par with pure knowledge transfer, almost half of the respondents see the implementation of *Future Skills* as a guiding orientation in a five-year period, and one in ten respondents in a ten-year period.



Fig. 37 Time of adoption for *Future Skills* equivalent to knowledge-based model (N = 38)

The respondents to the *NextSkills* Delphi Study cited the capacity to act in highly emergent action contexts – i.e. *Future Skills* – as a new key objective for future higher education teaching. The focus is on dealing with situations of insufficient information and potentially uncertain situations. The capacity to find one's way in unknown and complex future contexts becomes the main orientation in higher education and thus more important than knowledge transfer. This estimation is strongly approved by experts: $M = 3.64$, $SD = 0.99$, $A = 62.2\%$, $N = 45$. Asked about the *time of adoption*, almost five out of ten Delphi experts stated that the capacity to act in emergent contexts is already an important, decisive field for the design of higher education teaching today. This trend will intensify over the next ten years (see Figure 38).

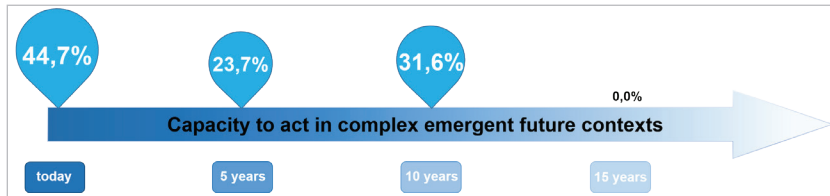


Fig. 38 Time of adoption for the increasing importance of the capacity to act in emergent, complex future contexts (N = 38)

C 2.2.5 From Defensive to Expansive Learning

How can higher education institutions abandon the illusion that learning processes can be completely planned in advance by scheduling, curricula and teaching processes? How can the vision of a participatory, student-centred way of teaching in terms of shifting from teaching to learning really be realised? The understanding of learning as an active and intentional process was developed and formulated within the framework of the critical learning theory of Klaus Holzkamp, professor from Hamburg, Germany. The term expansive learning represents learning which is done out of one's own intention and interest and serves to overcome subjectively perceived activity barriers. Holzkamp (1995) states that *intentional learning* can be divided in *expansive* and *defensive learning*. Expansive learning signifies the kind of learning that aims to improve one's own quality of life in order to overcome subjectively perceived activity barriers – not to be confused with intrinsic motivation according to the motto *want what you should*. Rather, it is about opening up the world by learning in contrast to the defensive learning effort. This stands for learning as defence against imminent threats and thus serves to avoid problems (cf. Holzkamp 1995: 190ff.).

“Holzkamp criticised the idea that learning processes could be clearly planned ahead by curricula, teaching strategies or didactic preparation as fiction. Didactics beyond the teaching-learning short must therefore give up on all illusions of preparation (...).” (Rotting Stitch 2008: 56)

For individual competence development, learning situations must be created in which self-directed, application-oriented, situational, emotional, social and communicative learning is promoted (Mandl & Krause 2001). The integration of complex and authentic problems in diffuse starting situations is an essential element in competence-oriented learning scenarios. In the future, learning designs will

increasingly turn away from presentation and knowledge transfer methods and instead focus on interactive socio-constructive approaches ($M = 3.76$, $SD = 0.76$, $A = 64.5\%$, $N = 45$) (see Figure 39).



Fig. 39 Time of adoption of interactive socio-constructive learning designs in higher education ($N = 37$)

Digital media can be used to support this: Digital learning environments can support students in digitally getting in touch with involved actors and experts and in developing a real, authentic problem scenario in addition to a theoretical body of knowledge, instead of only dealing with artificially processed questions in a seminar room. At the Hamburg Open Online University (<https://www.hoou.de>), this interlocking of academic analysis and actual problem fields is actually approached by means of many projects in which students collaborate with subject matter experts and also protagonists from civil society initiatives. Furthermore, digital media can offer possibilities to practice individual reflection skills via video take or reflexive writing, for example in weblogs, and to integrate them into higher education teaching.

In addition, collaborative learning scenarios in which learners learn together will gain in importance instead of an orientation towards knowledge transfer (lecture formats). This prediction is based on the *NextSkills* Delphi with high approval values $M = 3.71$ and $A = 60.0\%$ ($SD = 0.91$, $N = 45$). While many experts already regard these learning scenarios as significant today (39.5 %), one in three (34.2 %) considers this development to be realistic only in ten years' time (see Figure 40).

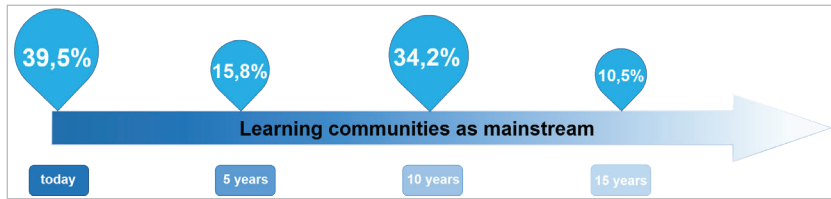


Fig. 40 Time of adoption for mainstreaming learning communities in higher education (N = 38)

C 2.2.6 The Future of Assessment

How can assessment practice, often oriented towards the reproduction of knowledge, be enhanced in favour of competence-oriented forms of assessment and peer validation models? In terms of the constructive alignment approach (Biggs & Tangs 2011), competence-oriented teaching and learning scenarios only make sense if assessment methods are also competence-oriented. It is clear that these forms of assessment will become more relevant in the future. In this context, assessments as learning (formative and peer assessment) will take the place of assessments of learning (summative assessment) (see Figure 41, $M = 3.80$, $SD = 0.86$, $A = 66.7\%$, $N = 45$).

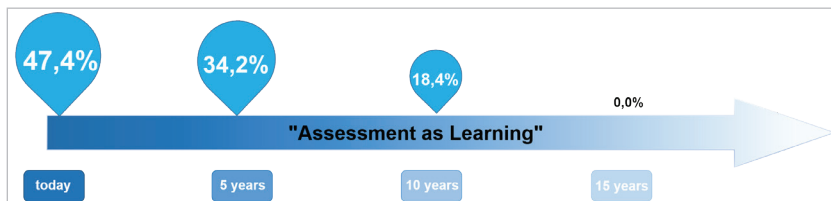


Fig. 41 Time of adoption for mainstreaming "Assessment as Learning" (N = 38)

In higher education learning design this topic is already strongly discussed while it is not yet very common in actual higher education teaching in favour of mass assessments in the sense of "memorising and reproducing", following a rather reproductive understanding. This also poses a digital challenge for higher education. In an overall view, it can be stated: Only if the assessment forms and contents are also oriented towards competences or *Future Skills* and are not being reduced to

knowledge queries, it makes sense to look at *Future Skills* as a guiding concept for higher education learning processes. For some time now, digital media have also been used for assessment and evaluation processes. The study “Digital Examination and Assessment” (Michel et al. 2015), published in 2015, provides a structured overview of the current state of affairs and the variety of (partly) digitised assessment formats that are already being used at higher education institutions.

One critical remark according to Gabi Reinmann (2014) shall be issued here: Really thinking the focus of higher education on *Future Skills* to an end would mean to only allow assessments that actually try to capture *Future Skills* and competences and meet the requirements of integrated assessments. However, modesty is called for, as competence-oriented assessment have so far remained an ideal that can only be approximated. Precise and unambiguous statements about which competence or which *Future Skills* – in the best sense of a disposition to act – someone has developed through learning can hardly be evaluated for theoretical and practical reasons. Since competences are represented in dispositions to act and are not completely self-contained, scripted and retrievable finished action sequences. Complex examination formats are needed that assess competences in a reflective manner. Both the design and the implementation of such assessments is very complex. It turns out that competence-oriented assessment is a complex project. In this case, however, digital media can also be used productively. In the sense of the ideal of *Universitas*, the focus would then no longer be on testing what has been learnt by heart, but on discussing what is new and remarkable.

The aim is to move away from the often-predominant *inquiry-response cycle* towards an exchange between students and teachers at *eye level*. In order to make this possible, the candidates can be included in the selection of topics, for example with the aid of a portfolio. A portfolio is a collection of documents that the student develops autonomously during the course(s). It thus represents the involvement and active dealing with important seminar contents. Such a portfolio is a suitable basis for an examination on the contents presented in the portfolio (Wildt, J. & Wildt, B. 2011). Students are thus involved to a much greater extent in the design of the examination by compiling the portfolio themselves and thus exerting influence on the relevant examination contents and can, as producers of the portfolio texts, also be regarded as *experts* for their contents.

In the reality of higher education institutions today, a Bachelor degree consists of about 25 to 30 modules. Each module finishes with an assessment. Often in real practice, several subjects are assessed within the scope of one module’s assessment, which in fact resembles a subdivision of the examination into several partial examinations (Pietzonka 2014). As a result, students today have to take about 50 to 60 parts of assessments within the scope of their bachelor studies – each of which

is included in the final grade (cf. e.g. Wannemacher & Kleimann 2010). Gabi Reinmann (2014) describes this as follows: The exceptional psychological situation for students in the final phase of their studies (before the Bologna reform) now extends over the entire duration of their studies (Bülow-Schramm 2008: 31). Consequently, one has moved from one extreme to the other: the one decisive examination date at the end of one's studies was traded for an all-dominant assessment period from the beginning to the end of one's studies. Huber (2008: 22) even considers competence-oriented examination forms to be utopian.

In any case, competence-based examinations will be more complex procedures, usually requiring the use of open written, oral and practical performative formats. Since this is much more complex than today's assessment practice, a correspondingly oriented study programme in which competence-oriented assessment forms are used could contain only much fewer assessments. Reinmann (2014) concludes:

"...the optimal number of these 'assessments with legal consequences' [depends] on the field of specialisation, but [should] remain in single figures [...]. This does not apply to formative performance records, which serve exclusively to provide students with feedback on their learning process and on skills already acquired. They have no influence on the final grade and are part of didactic scenarios."

The enhancement of assessment formats represents an important future component for teaching at the university of the future – respondents to the *NextSkills* Delphi Study estimate that within the next five to ten years, higher education will increasingly rely on learning by peer assessment ($M = 3.73$, $SD = 0.90$, $A = 62.2\%$, $N = 45$) (see Figure 42).



Fig. 42 Time of adoption for peer assessment instead of traditional assessment ($N = 37$)

C 2.3 Rethinking Higher Education: Towards an Evolved Organisation

C 2.3.1 The New Digital – Transformation Beyond Technisation

How can higher education institutions develop strategies for digital transformation in which digitisation is not viewed as *technisation or technologisation*, but as a call to rethink and enhance teaching, learning and studying? Digital media open up new opportunities for higher education to make teaching more personalised as well as time- and location-independent. The results of the most recent debate on *digital higher education* show that digitisation does not stand for technisation, but for enabling didactic imagination in teaching (Hochschulforum Digitalisierung 2016). It is recognisable that higher education institutions are concerned with supporting young people in the development of their ability to work independently and autonomously in heterogeneous teams and with encouraging them to enhance their capacities to act by solving complex problems. Digitisation is an enabler here, a source of impetus for the teaching of the future. Higher education institutions and their teaching staff make use of digital media in the most diverse ways and use the resulting changing framework conditions in order to productively break fresh ground. Higher education teaching is designed to attract students beyond pure monodirectional knowledge transfer concepts and mass events. Then higher education teaching becomes a Real-World Laboratory in which concepts are developed and implemented where students learn as reflective practitioners in “reflective laboratories” (Ehlers 2014), in which they collaborate and in which they are encouraged in their involvement into autonomous and self-regulated learners. Digitisation does not pursue the goal of *technisation*, but calls for didactic, curricular and organisational innovation in teaching.

C 2.3.2 From Programs to Missions

How can higher education institutions flexibilise and individualise curricula and thus realise the potentials which arise from ‘build your own curriculum’ approaches?

Today, study programmes are characterised by great internal cohesion. The aim is to integrate a self-contained system of coordinated qualification goals within six, eight (Bachelor) and/or four (Master) semesters. This is usually based on a long process of analysing an occupational field from which the relevant qualification objectives, learning and competence goals are derived. The aim is to structure a clearly defined overall degree for the study programme. The degree designations

are officially awarded by a higher education institution. However, in times where concrete qualification goals can be less and less well derived from occupational field analyses, the question arises as to whether the currently predominant academic basic unit of the *study programme* will still be adequate in the future. The international *NextSkills* Delphi Study comes to the conclusion that studying will look different in the future. It is assumed that students will switch back and forth between different higher education institutions and take courses at different institutions in multi-institutional study programmes. Changes are equally assumed for the internal structure of studies. The experts assume with high approval values ($M = 3.6$, $A = 60.0\%$) that a higher education programme no longer follows a clearly defined curriculum but takes place sequentially or in parallel at several institutions ($SD = 0.84$, $N = 45$).⁴⁵ This results in a patchwork of institutional study experience. Several academic institutions are involved, and the students organise the study framework flexibly and adapted to their needs.



Fig. 43 Time of adoption for multi-institutional & patchwork study pathways (N = 38)

The study programme then consists of small study units that can also come from different (higher education) providers. There will be more short format courses, more certification courses, refresher courses. This results in patchwork courses of study that can then be combined into larger degree certificates, such as a final degree, and certified by a higher education Institution. More than nine out of ten respondents assume that there will be major changes within a period of ten years (see Figure 43).

⁴⁵ The experts were asked to assess the following statement: “Students will study sequentially or in parallel at several Higher Education Institutions, thus their studies constituting an institutional patchwork of study experience”.

More and more higher education institutions are already offering so-called *elective curriculum options*⁴⁶. The Jacobs University in Bremen offers a so-called “3-C Model” (Choice – Core – Career), in which students can design their own curriculum with a high degree of freedom of choice. At first, a *foundation year* enables students to orient themselves towards their interests, academic disciplines, questions and methods before choosing their study programme. In higher education Institutions that offer an opportunity for students to compile their own curriculum, this usually requires them to submit a written proposal to a curriculum committee, which is then examined and discussed; for example, at the University of Maryland or Michigan in the USA.

For higher education Institutions, these *Build Your Own Curriculum* (BYOC) approaches represent new challenges. The institutions must provide appropriate advice, support and coaching. These must be professionalised services offered by both professors and learning coaches who accompany and support students in increasingly diverse learning experiences, both in terms of reflection and in the application and integration of learning content in relation to larger units of meaning, problem formulations and *Future Skills*, in the disciplinary as well as in the interdisciplinary context.

C 2.3.3 Recognition of Prior Learning

How can higher education Institutions develop more expertise and professionalism in crediting and recognising prior experience and achievements in order to make studying more flexible and permeable? Higher education Institutions in Germany are obliged to recognise competences from the academic (up to 100 per cent) and non-academic (up to 50 per cent) fields as prior knowledge in the course of study for the examination requirements to be met. However, there is no great experience with this kind of recognition practice, and this often leads to a lack of understanding on the side of teachers, since it is unclear whether the previous achievements brought in for recognition also really comprise adequate competences (Hanft et al. 2014). However, recognition and crediting are the essential key to enabling new (digital) diversity for courses of studies. Digital courses (of different faculties and

46 The collegechoice.net website lists 20 private and public higher education institutions from the USA that offer Bachelor's programs for students with particularly good grades. Students can compile their own curriculum with the help of “Academic Advisors” and “Study Coaches” (<https://www.collegechoice.net/best-bachelors-programs-design-your-own-major/>).

academic institutions) can only be fully ranged with face-to-face courses if they are also fully recognised. In many cases the recognition practice must be extended. Both individual (recognition of individually contributed achievements) and institutionalised concepts (cooperation models in which other institutions' services eligible for recognition were examined in advance) are conceivable (ibid.). In the international *NextSkills* Delphi, the experts are largely in agreement: more than 75 percent assume that within the next five years there will be a sharp increase in episodic patchwork study experiences in which previous achievements and existing competences are being recognised. ($M = 3.59$, $SD = 0.96$, $A = 59.1\%$, $N = 44$).

C 2.3.4 Microcredentials & Alternative Certification Methods

How can higher education Institutions gain experience with microcredentials and alternative certification procedures in order to make studies increasingly more compatible, permeable and flexible? While in today's higher education models teaching and examination as well as examination and certification processes are linked to each other, these processes will be increasingly untied and independent of each other in the higher education models of the future. These decoupling processes from previously largely structurally linked and related processes of transfer, testing and certification constitute both opportunities and challenges. Opportunities lie in the flexibilisation of study processes, entirely in line with the individual patchwork study pattern described above. Once academic learning is not only led towards examinations and assessment, the actual learning process becomes central. Intrinsic learning becomes more prevalent, moving beyond testable contents relevant for examinations. At the same time, one can observe an increasing importance of accompanying and reflecting on academic learning, oriented to the learners' contribution to overcoming her/his own previously perceived action barriers. Digital teaching allows the flexibilisation of space and time and therefore also promotes seizing study opportunities simultaneously at different institutions and in different modes – both in physical attendance and virtually online, officially enrolled and as a participant in an open online course. In the international Delphi Survey, the participants largely agree with the statement that study experiences certified in small, modularized units (microcredentials) will in future have the same significance as the certification of entire study programmes ($M = 3.50$, $SD = 1.10$, $A = 56.8\%$, $N = 44$). The majority of experts consider this development to be realistic in a time period of five to ten years (see Figure 44).



Fig. 44 Time of adoption for microcredentials and alternative certification systems (N = 38)

That implies another point: today, the university's reputation determines the value of the degree on the labour market. Students who have studied at a particularly prestigious university have an advantage over students who have studied at an institution with less reputation. By alternative certification methods, such as portfolios, microcredentials, badges, etc., students will be able to document various types of certification in their personal competence portfolio in the future. In many cases, the skills and experiences documented there are also available as qualitative information, thus a meaningful information basis is created. On the one hand, it contains academic achievements from various higher education Institutions and courses, as well as further qualifications and competences acquired by learning or practical experience. This will lead to the fact that the actual practical orientation of the study programme, the experiences made and documented there, and represented competences will in future constitute the value of the higher education degree. More and more so-called skill platforms are emerging online, such as the Hamburg startup Qompetent (<https://www.qompetent.com>). Job matching platforms, which are already in high number on the American market and are aimed specifically at demonstrating technological capabilities, are becoming increasingly important when it comes to recruiting tech specialists. In the case of interdisciplinary qualifications (entrepreneurial activity, adaptability, collaboration), elements of gamification can significantly improve recruitment.

Platforms such as Portfolium allow users to easily upload work samples, such as term or project papers. The inputs are then automatically analysed and linked to information about documented work experience and the competences acquired hereby. A systematic matching of these millions of user profiles with job postings results in extensive technical qualification profiles on the basis of which individual candidates can be put in touch with compatible companies. Particularly in the area of technological capacities, specialised skill platforms can facilitate and improve the identification and recruitment of experts (Ehlers 2018).

Besides, platforms that do not perform the matching described above but are nevertheless focused on demonstrating skills are also becoming more important: The Klout Score of the identically named online service (now no longer active) evaluates the reach and impact of a person's social media activities. This information enables HR departments to make an initial assessment of this person's suitability for specific jobs related to social media marketing. In the IT sector, GitHub has become a standard platform for work references (<https://github.com>).

C 2.3.5 Lifelong Academic Learning

How can higher education Institutions become an active engine of academic lifelong learning? If we follow Beck's postulate of the risk society (Beck 1986), then continuous (academic) education is an important way of risk management. In the sense of lifelong learning, continuous advanced academic training is turning from a *possibility* of avoiding life risks to a compulsion, from an option to an obligation. This is accompanied by the evolution of employability, where higher education studies are no longer aimed at being employed, i.e. preparation for a career, but rather at being employable, i.e. targeting the lifespan: From 'lifetime employment' to 'lifetime employability'. The undermining of traditional biographical patterns in the course of modernisation has become a widespread experience. Biographies are characterised by interruptions and changes, by reorientations and conversions, and they entail the permanent risk of slipping or falling (cf. Beck, Giddens, & Lash 1996). This means that qualification is never really completed. Here, too, there is pressure on higher education Institutions to increasingly conceive educational processes as episodic rather than as singular and permanently completed.

According to the expert panel, lifelong academic learning is on the rise. Nearly one third (28%) indicated that lifelong academic learning was already considered as equally important to standard academic qualifications in some higher education Institutions. Four out of ten respondents believed that this trend would only become relevant in the next five years (38%); about a quarter were of the opinion that this would only become important in a ten-year period (see Figure 45). However, since this is a systemic change, a five-year period for change operations both at institutional and legal level appears to be rather short. However, at both national and European level there are already programme-generated guidelines which could very well highlight lifelong higher learning in education systems within a five- to ten-year period. Especially under the conditions of rapid transformation of knowledge, technology acceptance rates and the dynamically changing work context, this time frame could even be shortened.

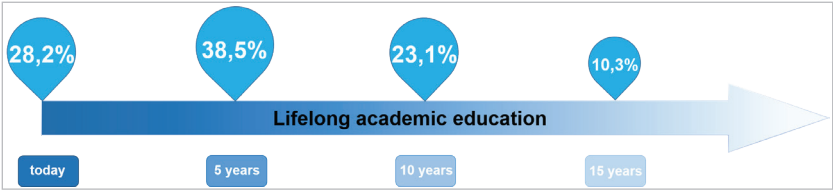


Fig. 45 Time of adoption for lifelong academic education (N = 39)

Studying in the future will have to take into account the fact that greater flexibility in the labour market entails a great need for lifelong academic education. Over 90 per cent of respondents see an increasing relevance of episodic, lifelong academic education over the next ten years, in which previous achievements and existing competences are recognised (see Figure 46, $M = 3.59$, $SD = 0.96$, $A = 59.1$ per cent, $N = 44$).



Fig. 46 Time of adoption for lifelong, episodic study experiences (N = 38)

The knowledge-based modern society implies that lifelong learning (LLL) becomes a necessity for all parts of the population. Lifelong learning (LLL) includes “all learning throughout the life-cycle that serves to improve knowledge, qualifications and competences” (European Commission 2001: 34). Demographic transition implicates that all people of working age have to pass recurrent periods of education in order to maintain the necessary high level of qualification. Against the background of international migration flows, the requirements of different cultures must also be taken into account when developing concepts for LLL. The evolution towards a knowledge-based economy also makes ever more complex demands on the workforce.

- While today’s studies are still largely structured by module and audit plans within the framework of study regulations, with little flexibility in terms of time and

content, the studies of the future will be determined by a flexible study process with a wide range of options.

- While today's studies are still strongly structured on the basis of time units (ECTS), the studies of the future will be structured more strongly according to content criteria.
- While there is a clear distinction between part-time and full-time structures for a study programme today, there will be a more flexible, individual time structure, and there will also be more extra occupational and lifelong models.

Overall, it is becoming apparent that the current lead structure of higher education studies will have to change in order to meet the requirements of lifelong learning. This will gain relevance within the next 5 to 10 years, so that the current *preparatory model* of higher education will be replaced by lifelong studies as a guiding. Many design questions remain to be answered.

From an economic-political perspective, one of the core tasks is to create adequate framework conditions so that employability is maintained or improved. But it is also about using LLL to improve the active participation of the individual in society, because equal opportunities and LLL are seen as the basis of social inclusion. Particularly important in this context is the support of socially or geographically disadvantaged groups and people with low basic qualifications. The aim is to create an inclusive society that provides equal access to learning and opportunities to participate in academic learning to all people.

Demographic developments implicate that all people of working age have to go through recurrent periods of education in order to maintain the necessary high level of skills. Against the background of international migration flows, the needs of different cultures must also be taken into account when developing LLL concepts. The development towards a knowledge-based economy also puts ever more complex demands on the workforce. In recent years, higher education Institutions have taken up this task by moderately increasing their capacities in the field of continuing scientific education. However, it is becoming apparent that this will not be enough.

The future relevance of lifelong academic education is not (only) about participation in continuing education in order to restore employability where it has been lost or merely to maintain it. Rather, it is a question of undertaking a paradigm shift in academic education, which no longer sees higher education as a preparatory model, but as a continuous activity of higher education to be designed. Both the organisational prerequisites as well as the pedagogical and capacity requirements for the design of such a new paradigm do not exist at higher education Institutions and are currently not laid down in law. Following Jochen Robes (2016), a list of

key parameters for a future university of lifelong academic education could look as follows:

1. Higher education Institutions take advantage of all the opportunities offered by digitisation in administration, teaching and research. Teaching and learning do not only take place in the lecture hall or seminar room, but make full use of the possibilities to inform, discuss, publish and collaborate that the Internet offers today.
2. The LLL University is more permeable: it is a public higher education Institution which, thanks to innovative network technologies, involves interested citizens, employers and other universities, other educational institutions and teachers in its own teaching and learning opportunities and research projects. Massive Open Online Courses (MOOCs) and Open Educational Resources (OER) are part of this development.
3. The LLL-University puts the imparting of individual knowledge management as a core competence of LLL at the heart of academic education. Individual knowledge management, this means finding, evaluating and classifying information, self-designing new content, passing on information and results and eventually networking – not only but especially in virtual space.
4. The LLL-University is not only the key point of students' interests for a limited period of time, but it continues to accompany them after the completion of their *initial study programme*: as an education partner, as a network, as an information resource.
5. The LLL University is an organisation that promotes the idea of networking actively and on every level -- from the university administration to the individual chairs and lecturers. It opens up room for students, lecturers, researchers and all interested parties to exchange ideas – and that before *Google*, *Apple* and *LinkedIn* are the only ones to set the pace.⁴⁷

47 With the acquisition of the skills analysis platform bright.com, the Internet video learning portal Lynda and the development of the so-called "StudyPath Explorer", LinkedIn has already created an opportunity for LinkedIn members to obtain lifelong and apposite qualifications for their respective goals.

C 2.3.6 Integrating Theory and Practice

How can the University of the future use digital media to allow studying at different locations, job-related learning and practice-integrated studies? Increased lifelong learning opportunities will entail an increased importance of in-service and job-related academic education. Overall, it can be assumed that job-related academic education will gain in relevance and represent an essential structural feature of future higher education opportunities.

Digital media can be used in cooperative, practice-integrated, practice-oriented or dual study programmes in order to link the two usually existing learning environments – the workplace and the higher education Institution. For instance, course formats enabling students to get back to content that they have prepared for project and research work carried out at the practical learning location, or such as reflexive writing of learning diaries for exploration and reflection tasks which students conceive on the basis of theoretical concepts during the study phase at the higher education Institutions and which are to be realised at the practical learning institution, are suitable for this.

C 2.3.7 From Isolation to Permeability

How can higher education Institutions open up even more to alternative target groups and increase compatibility and permeability with different education sectors? Higher education systems are becoming increasingly open and permeable as a result of alternative courses of study – this is what the experts interviewed in the international Delphi Survey greatly agree on ($M = 3.95$, $SD = 0.82$, $A = 81.8\%$, $N = 44$). The existing boundaries between school, vocational training and higher education will become more blurred in the future and increased permeability will be of great importance.

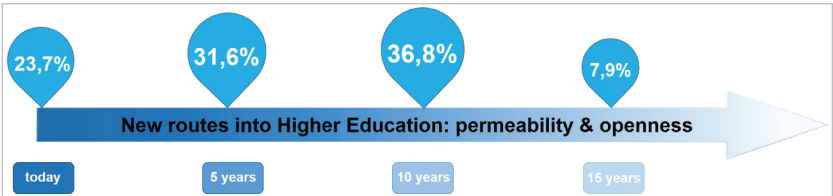


Fig. 47 Time of adoption for openness of higher education institutions for permeable access pathways ($N = 38$)

The surveyed experts estimate the period in which this development will be realised to be between five and ten years (see Figure 47). The aim will be to create a permeable continuum between the educational sectors of school, vocational training and higher education and the respective levels of education of the national and European qualification frameworks. This development will particularly be triggered by the increased need for lifelong learning. In addition to promoting individuals' willingness to learn, the aim is to break up the more or less existing segmentation of the education system in order to make individual learning biographies more flexible (Bohlinger & Heidecke 2009: 454). The demand for cross-system and permeable learning pathways is at odds with a highly segmented education system, which often requires individuals to make a final and hardly correctable decision about a vocational or academic qualification career.

The traditional isolationist mechanisms between the vocational education and the higher education system is problematic for the future, because according to relevant forecasts a shortage of academically qualified specialists is expected (Nickel & Leusing 2009: 19), which explicitly underlines the relevance of the learning environment of higher education. Since not all those who want to study in the future also have a general or subject-linked higher education entrance qualification, the issue of establishing more flexible transitional passages between vocational education and higher education, beyond formal entitlements, is right at the top of the political agenda (KMK 2009a / 2009b). Realising permeable and lifelong learning opportunities in higher education takes place at different levels – beginning with educational policy perspectives and reaching out to different target groups in connection with, in order to allow a broadening of access paths for non-traditional students by means of crediting procedures.

Opening higher education to more and more young people of the same age automatically leads to a flow of non-traditional target groups to higher education and increases the diversity of circumstances in which people turn to academic education. This poses a challenge for higher education Institutions when it comes to academic accomplishment. Especially in STEM disciplines, higher education Institutions are often confronted with mathematical entry-level qualifications for first-year students that are not sufficient to successfully come through the introductory phase (Heublein et al. 2014). More and more higher education Institutions are now experimenting with online courses which students take before their studies and which give them the opportunity to acquire the appropriate level of qualification in the necessary domains.⁴⁸

48 Within the EU project "OER Test" we have worked out and published the conceivable possibilities: <https://oerknowledgecloud.org/sites/oerknowledgecloud.org/files/Open->

A further possibility to support the opening of higher education Institutions to non-traditional target groups are so-called bridging courses, which can be coupled with equivalence tests. If, for example, professionals with long professional experience want to return to higher education, it is appropriate to support them with *onboarding courses*, propaedeutics or alike to get back to academic studies – and that without having to attend regular classroom training at University.

C2.4 Summary: The Dawn of the Future of Higher Education

Many higher education Institutions have already set out for the future. The two main influencing factors described, digitisation and the increasing importance of academic qualification as a normal biographical experience, will have the effect that academic education must evolve in terms of organisation, didactics, institutional orientation and profile. Digitisation is not a panacea for higher education institutions and their didactic design. It rather has the potential to support the transformation of higher education in terms of societal demands. More than ever, higher education institutions are currently faced with the task of sensibly integrating digital media.

Higher education institutions have become Real-World Laboratories in which courageous concepts are being developed. In these settings digitisation is experienced as didactisation and not technologisation, because with the use of new media, questions of learning organisation and learning design come into focus anew. It is actually through digital media that one can even realise that the ideal of *Universitas* is not often lived in reality of everyday university life. The *NextSkills* Studies provide concrete starting points for the design of the university of the future (see Figure 48).

Learning-Recognition.pdf In addition, more and more higher education institutions are offering their students support in organising their studies and their mathematical skills during the introductory phase: <http://www.optes.de>

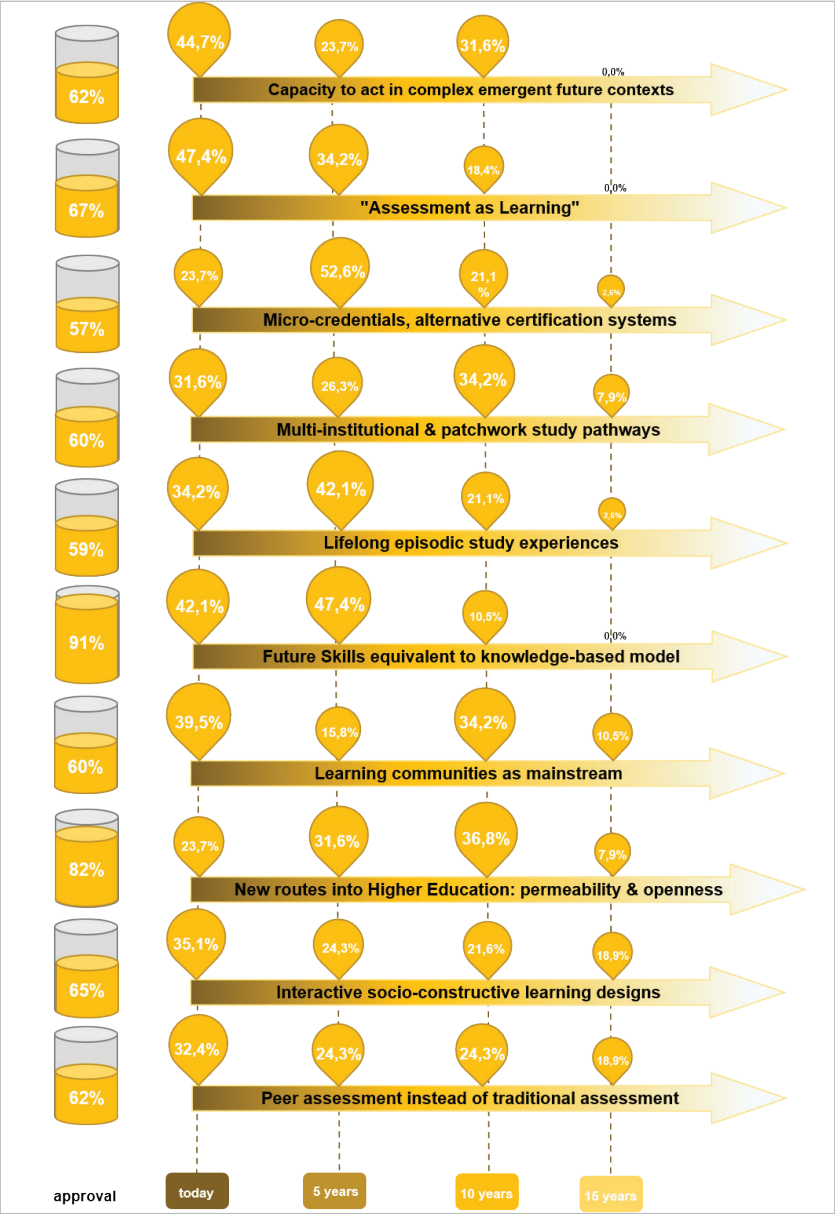


Fig. 48 Time of adoption for selected higher education developments

Overall, the international expert sample agreed on the above statements (Figure 48, all mean values ranged between 3.54 and 4.19). The statement that traditional certification procedures of university degrees would be replaced by microcredentials ($M = 3.54$, $SD = 1.10$) was the one which receiving least accepted amongst them. On the other hand, the following elements were assessed as key characteristic factors for the future of higher education: firstly, the importance of *Future Skills* ($M = 4.19$, $SD = 0.71$) and secondly, as a consequence thereof, the necessary adjustment of appropriate quality standards to ensure that students' employability would remain guaranteed ($M = 4.15$, $SD = 0.82$) and thirdly, an increased degree of diversity and permeability with regard to higher education institutions, which would pave the way for alternative pathways of studies and non-traditional student groups ($M = 4.00$, $SD = 0.84$). In order to be able to promote *Future Skills* in higher education Institutions, the respondents of the Delphi referred to the importance of qualifying teaching staff accordingly. Only if teachers are able to use the right teaching methods it is possible, according to expert opinion, to also promote students' skill enhancement. Although the experts criticised the role of quality standards as drivers of change, they generally agreed on the necessity to adapt them for students according to new requirements. The increasing openness of higher education institutions was assessed as profitable for society as a whole; however, the interviewed experts expressed concerns about the extent to which higher education institutions are already in a position to undergo such a change and whether the changes actually have the potential to compensate for or at least reduce social differences.

In addition, the experts identified five factors which they considered to be already highly relevant for the organisation of higher education.⁴⁹ These were the assessment of learning for the sake of learning (formative assessment), institutional university patchwork, peer evaluation and validation, and alternative courses of study.

According to the international expert sample, two trends in particular are expected to change the way higher education institutions will operate in the next five years: a changed understanding of higher education institutions as transfer-oriented places instead of their current focus on transfer of specialist knowledge. According to the experts, students' ability to find their way in complex, unknown future contexts as a trend-setting factor for future higher education will also become relevant in the short term (in the next five years).

The sample identified the change towards socio-constructive approaches for higher education learning and a more flexible course of study between individual institutions as becoming relevant in the medium term. The latter is facilitated by

49 "Already relevant" received the most votes for this factor and was used as the basis for assessment.

the recognition of previous academic achievements and existing competences. Although the sample mean value indicates that these last two trends will only be relevant in the next ten years, the assessment of the majority of the sample indicates that both factors are already relevant today.

Four Scenarios for the University of the Future

C3

In the previous chapter (Chapter C 1 Ten Seconds of the Future of Higher Education), we have demonstrated which factors influence higher education institutions today. It was possible to reconstruct indications within the data of the *NextSkills* Studies, that indicate four dominant development strand of future higher education institutions (Chapter C 3.1 A Framework for the University of the Future). These were submitted to the *NextSkills* Delphi experts for discursive validation. The experts were asked to do two things: On the one hand, they were asked to assess the relevance of the influencing factors formulated in each case. On the other hand, they were requested to assess the so-called *time to adoption*, i.e. the estimated period for effectively shaping and implementing the influencing factors at the universities.

Four additional future scenarios were presented to the respondents on the basis of these influencing factors. These have been constructed on the basis of a fundamental scenario (*business as usual* scenario) which was then extended in each scenario by the assumption of the realisation of one of the four influencing factors.

C3.1 A Framework for the University of the Future

The study results indicate four different influencing factors, that are referred to below as the *pillars of change in higher education*. The use of the term “pillar”, in the sense of an architectural metaphor, intends to express the setting of a space in which higher education will develop over the next ten to fifteen years (see Figure 49). The identification of these factors constitutes the first methodical step within a scenario method, in which scenarios for higher education development will be identified in Chapter C 3.2 Scenarios for the University of the Future.

Although it is not possible to precisely limit the extent, intensity and speed of change, it is possible to provide information about its character. The four pillars of change model obtained high approval (see percentages within the pillars).

As an expert oriented consensual procedure, the Delphi procedure allowed the experts to initially adapt the formulations in the first Delphi round and to add or change components and weightings of the formulations. They were able to indicate their agreement with the four factors on a five-stage Likert scale, which ranked between the two poles 1 = “strong rejection” and 5 = “strong agreement”. In case they wanted to comment on a factor – for example for the purpose of item reformulation or as specification/explanation for their response behaviour – a separate commentary field was provided. In this way about 26 notes and comments have been collected to improve the depth and range of formulation. In the second round,

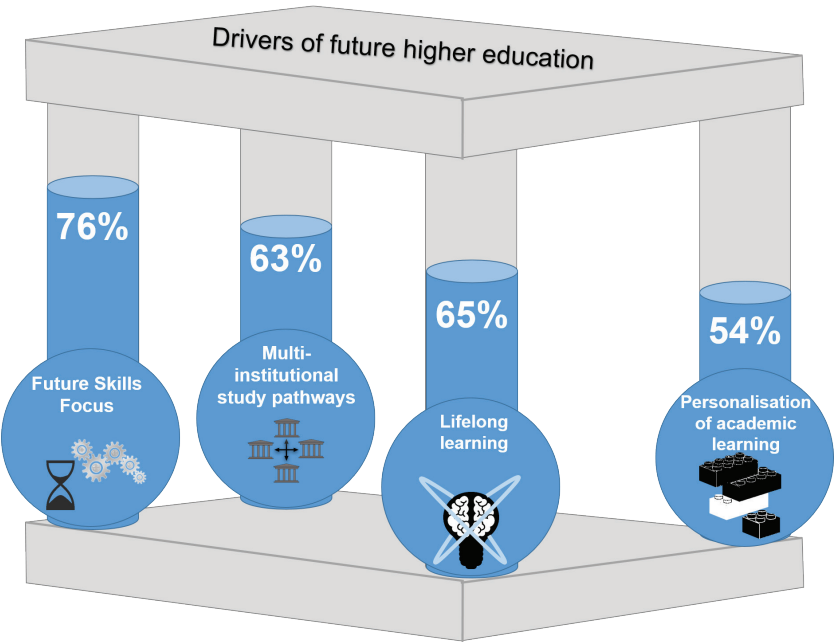


Fig. 49 The four pillars of the future development of higher education with experts’ opinion⁵⁰ (N = 46)

⁵⁰ The approval value *A* (for *Agreement index*) indicates the percentage of those who answered with 4 or 5 (approval or strong approval) on the 5-step Likert scale.

these more precise formulations were then reassessed by all participating experts with regard to the period in which these influencing factors would be implemented at the university. In the following, these are described as the supporting pillars bracing the space for the development of future higher education (see Figure 49 The four-pillar space of the Delphi for the future development of higher education with approval values of the sample).

The architectural metaphor of a development space used here refers explicitly to the fact that it is due to an interplay of all four factors that will determine the shape of the future university profiles.

What drives future higher education

Four key drivers in the higher education market can be described. Each driver has a radical change potential for higher education institutions and together they mutually influence each other and span the room in which higher education likely will develop. There are 2 content and curriculum related drivers (i.e. (1) personalized higher education and (2) *Future Skill* focus) and 2 organization-structure related drivers (i.e. (1) multi-institutional study pathways, (2) Lifelong Higher Learning)

The profile, shape and nature of higher education in the future will be most probably a certain pattern of configuration along the impact each of the four key drivers, called “pillars of change” has, and will influence the development of higher education strategies.

1. An emerging focus on *Future Skills* radically changes the current definition of graduate attributes in higher education: The focus on a “next mode” of studying (focus on *Future Skills*: autonomous learning, self-organization, applying and reflecting knowledge, creativity and innovation, etc.) gradually replaces a reduced/ narrow focus on academic and valid knowledge acquisition as a means to provide correct answers for known questions based on a curriculum which is focused on defined skills for fixed professions.
2. Higher education increasingly becomes a multi- institutional study experience: The provision of higher education increasingly moves from a ‘one- institution’ model to a ‘multi-institution’ model in which higher education is provided through alliances of several institutions.
3. Students build their own personalized curriculum: The elements of choice in academic programs enlarge. The curriculum of academic programs moves from a fully predefined and ‘up- front’ given structure to a more flexible, personalized and participatory model in which students actively cooperate

with professors/ teachers/ advisors in curriculum building of higher education programs.

4. Higher education institutions turn towards providing offerings for lifelong higher learning services: The current model of higher education, to prepare students (up front) for a future profession, is equally complimented with higher lifelong learning offerings.

C 3.1.1 Pillar 1: *Future Skills Focus*



An emerging Future Skills focus is changing the common focus of knowledge transfer in higher education in favour of a “next mode” of studying.

Factor 1 indicates that the focus in higher education will shift to *Future Skills*, leading to a radical change in the definition of graduate attributes. This change implies that the current focus in higher education on academic and valid expertise (learning is understood as a mean to provide correct answers to familiar issues) would change in favour of a next mode of study. In this next mode, learning is understood as application and reflection on knowledge and as creative development of new knowledge, which replaces memorizing knowledge. New teaching and learning methods aiming at the development of *Future Skills* would be used to support this. The international Delphi panel generally agreed with this factor ($M = 3.81$, $SD = 1.22$, $A_{Factor1} = 76.1\%$).⁵¹ Thanks to the qualitative comments of the experts, the description of the factor could be refined towards a clearer and stronger vision of *Future Skills* and learning. Among other things, it was shown that *Future Skills* and knowledge are not perceived as opposing components of higher education, but rather build on one another. Knowledge is the basis for *Future Skills* but is no longer sufficient. The expert panel used terms such as “specialized knowledge” or “knowledge mode 2” as semantic markers to point out that a concept for “next knowledge” was

⁵¹ A *Factor 1* denotes the agreement (A =Agreement) to factor 1 and indicates the percentage of those who responded with 4 or 5 (agreement or strong agreement) on the 5-step Likert scale.

indispensable. These concepts can be related to Gibbons et al. (1994), who speak of new and collaborative knowledge production in this context. The respondents also stated in some cases that a stronger focus on *Future Skills* was no longer a vision of the future but was already part of the agenda in some institutions. The statements of the experts indicate not only a focus shift towards a change of the importance of knowledge, but also of the competences referred to as *Future Skills*. While the direction and the concept of the development presented are clearly evident in the opinions of the panel of experts, it has to be noted that a *Future Skills* focus will not be equally critical for all (types of) universities, faculties, subjects and degrees (Bachelor and Master) equally critical to success.

Future Skills: Estimated duration of change

Interestingly, the data showed that the predicted change towards a stronger focus on *Future Skills* in higher education institutions (factor 1) was already taking place according to the majority opinion of the international panel (35.0 %). Autonomous Learning Competence, self-organisation competence, application of and reflection on specialist knowledge as well as creativity and innovation are already important components of academic training at many universities. For this *next mode* of study, the sample of experts assumes that it will gradually replace the reduced/narrow focus on academic knowledge acquisition (with the aim of developing a fixed curriculum for a specific occupational field). Figure 50 displays that the remaining 65 percent assume that the importance of this factor will increase in the coming years and decades.



Fig. 50 Time of adoption for the increasing importance of *Future Skills* focus for higher education (N = 40)⁵²

⁵² Note: In this and the following figures the percentages may add up to more than 100 percent due to rounding errors.

C 3.1.2 Pillar 2: Multi-Institutional Study Programmes



Higher education is increasingly moving from a 'one-institutional' to a 'multi-institutional' model, in which several institutions unite to form alliances for higher education transfer.

According to the second factor, higher education develops into a multi-institutional study experience. This means that higher education would tend to break with the current single-institution model and instead open up to cooperation with other institutions in an alliance network. The mean value of 3.72 ($SD = 1.12$, $A_{Factor2} = 63.0\%$) shows that the international panel of experts generally agrees with this concept. However, they point out that study courses that extend beyond institutional boundaries would require a consolidated experience in dealing with the recognition of previous academic credits. In such a setting, students would change higher education institutions according to their personal preferences in terms of reputation, quality and the range of courses. Smaller or larger parts of the curriculum would be divided between different institutions, which generate patchwork-like, multi-institutional study organisation.

While the aspect of credit transfer within the Bologna signatory countries is at least conceptually realised, there is still a lack of practicability at the institutional level. As it can be seen distance learning institutions can draw on a much greater wealth of experience than *traditional* institutions. For example, one Delphi participant stated that students in Canada already had the opportunity to transfer their credit points among different educational institutions, highlighting the pioneering role of the *Canadian Virtual University*. Two other respondents explained that this trend was also reflected in the voting behaviour of students with regard to the selected university: Students enrolled for a Bachelor's programme at one university, and then chose another institution for their Master's programme. *Erasmus mundus*, for example, offers a joint Master's degree and organises the academic training of students as an integrated, international study programme provided by a consortium of different universities. This programme was also mentioned by the sample of experts as an existing example of the increasing importance of multi-institutional study paths. One interviewee also supposed whether the Internet could replace a multi-institutional network of higher education institutions as an additional source of knowledge generation and provision.

While these examples demonstrate that there is already first evidence of multi-institutional approaches in higher education, three experts indicated that in their opinion this trend would only become real in the next five to ten years, but they agreed with the general trend towards this alternative form of study course.

In addition, the experts tried to identify reasons why higher education institutions should become involved in this type of network organisation, especially smaller, specialised institutions could benefit. Following a similar reasoning, one of the experts criticised the willingness of large higher education institutions (such as the US *Ivy League Colleges*) to participate in such multi-institutional arrangements. According to the argumentation, this could damage their strong brand name. In addition to the respective character of the different higher education institutions and types, regulatory and economic framework conditions were also discussed, as they could function either as enabling or limiting conditions for the formation of multi-institutional networks. Two further respondents identified the students as key influencers on which it would depend whether and to what extent this factor would be anchored in future educational scenarios.

Multi-institutional courses of studies: Estimated duration of change

According to the experts' estimation, the second factor, *multi-institutional courses of studies*, will gain in importance for higher education institutions over the next five (30.8%) to ten (30.8%) years (see Figure 51). The above-mentioned development of comprehensive rules and experience for the practice of the recognition of academic achievements are a major prerequisite. Smaller or larger parts of the curriculum would be allocated among different institutions, which would generate a patchwork-like, multi-institutional study organisation.

While the Bologna Process and European qualification frameworks have created an initial basis for multi-institutional alliances in the higher education sector, the mutual recognition of credit points acquired at other institutions has by no means become a reality – this position is also reflected in the qualitative comments of the experts. Despite the systemic nature of this factor and the fact that higher education institutions will have to develop cross-border transfer systems, portable credit points and mutually understandable and trustworthy formats of academic credentials, the experts within the sample estimate that this trend will become more prominent over the next five to ten years.



Fig. 51 Estimated time of adoption for the increasing importance of multi-institutional courses of studies (N = 39)

C 3.1.3 Pillar 3: Personalisation of Academic Learning



The curricula are developing from a completely predefined structure to a more flexible, personalised and participative model in which students cooperate with their professors, lecturers and counsellors to jointly develop curricula.

By a third factor the role of students was examined in more detail. In future, students would create their own personalised curricula in cooperation with teachers and professors. As a consequence, this would lead to a significant diversification of study programme options. In addition, a shift towards personalised curricula would lead to a departure of the predefined *up-front* structure, being replaced by a participatory, personalised model in which students and teaching staff collaborate to jointly design curricula. The agreement on this factor was similarly high as for the other factors ($M = 3.68$, $SD = 0.98$; $A_{Factor3} = 54.4\%$). Most of the critical comments, restrictions that may apply to the development of personalised curricula, were traced back to institutional resistance. Another aspect mentioned by the interviewed experts was the students' ability to act in order to be able to cope with and benefit from this increased freedom of choice. In addition, questions arose regarding academic quality concepts for this type of personalised future study modes.

With regard to the higher education institutions, the experts identified a high need for cultural change towards a more education-oriented perspective. Although the sample majority agreed that it would be desirable for students to design their own curricula and have more freedom of choice, the experts were also in favour of *safety nets* to be guaranteed by the institutions.

Thus, the degree of personalisation is linked to an increased offer of coaching and support for students to help them develop their own academic structures and develop them into autonomous learners. This role was considered necessary to help learners reflect on their progress.

Of course, the implementation of this factor requires a radical paradigm shift with which institutions and stakeholders of higher education institutions are not familiar. However, more heterogeneous target groups and the addition of students who are not students in the traditional sense seem to open up more space for personalisation possibilities, which is reflected in the high approval ratings of the experts, while at the same time concerns arise about the implementation of such personalisation possibilities.

Personalisation of academic learning: Estimated duration of change

According to the OECD, factor three can be seen as an acute development trend with regard to the increasing number of students in industrialised countries (Baethge et al. 2015; Teichler 2013; OECD 2016).

This trend would lead to a greater diversity of target groups making use of the offered courses and higher education would have to meet their demands. Personalisation, studying at different speeds and a variety of choices for students with different backgrounds and at different life stages would call for more personalised approaches to academic education in higher education. It is likely that the rising number of an increasingly heterogeneous group of students can only be coped with the help of improved target-group-oriented approaches. The structure of these approaches would have to be adapted that the heterogeneous learning requirements of learners are taken into account and otherwise aligned with the increasingly heterogeneous needs of students in the future.

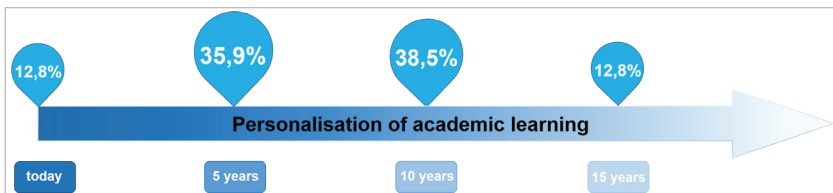


Fig. 52 Time of adoption for the increasing importance of personalised academic learning (N = 39)

As a consequence, the study programme curricula would have to be detached from completely predefined and given structures, and make use of more flexible, personalised and participatory models in which students actively cooperate with teachers, professors and consultants within the design of curricula and study programmes. Personalisation then also means being able to reassemble individual existing programs. The aim is to help students take their first steps in their academic careers, to discover their mission and their passion. And it means allowing greater freedom of choice regarding learning content and modules. All in all, it amounts to a *design your own curriculum approach*. The sample majority indicated that this factor would rather become reality in the next five (35.9%) to ten (38.5%) years (see Figure 52).

C 3.1.4 Pillar 4: Lifelong Learning



The current higher education model aims to prepare students for their future careers. This model is complemented by opportunities for lifelong learning.

The fourth pillar of change is based on the fact that lifelong learning in higher education institutions becomes just as important as the (current) *mode of preparation*. The term *preparation mode* addresses the current university model. This model is based on the assumption that academic education should follow the paradigm of learning certain knowledge assets that would later be applied to a professional context and would be needed to perform and accomplish tasks in professional life. However, the current model is under increasing pressure from ever faster changing knowledge, technology acceptance rates and changing professional contexts. To the extent that higher education institutions concentrate on imparting knowledge, but in professional action contexts *Future Skills* are needed above all, there is a gap between requirements and offers. Faster innovation cycles in the professional context are widening this gap. One way to mitigate this risk from the gap is to shift the focus to teaching *Future Skills*, which includes, but goes beyond, knowledge.

Lifelong learning – or in the higher education context *lifelong academic learning* – allows students and workers alike to continue their education and to adapt to the new challenges of their changing field of work. However, this concept should and cannot only be thought of from the perspective of an individual. Rather, it highlights the need for a paradigm shift in higher education organisation: Academic

education should no longer be seen as a phase at the beginning of working life, but as a continuum of constant biographical learning episodes.

Consequently, Bachelor's and Master's qualifications must then stand as a basic phase at the beginning of an academic career, with which one stage does not end, but which only lays the foundations for the further steps, which means repeatedly entering and leaving the academic education phases. The University of Stanford calls these phases In-Loop and Out-Loop cycles. Transfer of credit points, recognition of achievements already made (academic and professional), compatibility of different competences and flexible processes would enable individuals to shape their own individual lifelong learning paths. The *NextSkills* Delphi Survey respondents showed high levels of agreement with the development towards lifelong academic learning as equivalent to the current predominant preparatory model ($M = 3.72$, $SD = 1.33$; $A_{Factor4} = 65.2\%$) (see Figure 53).

Although most of the experts stated that a shift in focus towards lifelong academic learning was desirable, doubts were raised as to whether higher education institutions would be able to make the necessary changes on their own. They also pointed to the need for support from higher education legislation. Some experts also pointed out that lifelong higher learning does not necessarily have to be part of higher education but has to be understood as the individual's responsibility towards oneself. Finally, according to the respondents, it could be assumed that external providers would also play a more important role outside the higher education institutions in the future.

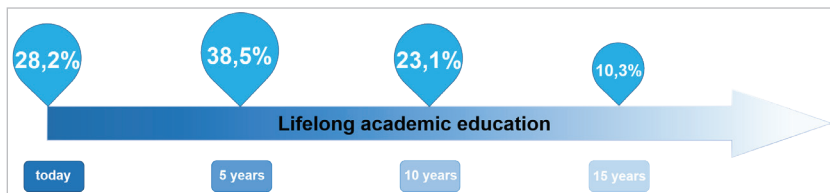


Fig. 53 Time of adoption for lifelong academic education (N = 39)

Lifelong learning in higher education: Estimated duration of change

According to the experts, lifelong higher learning is becoming increasingly relevant. Nearly one third (28.2%) indicated that lifelong higher learning was already considered as important as standard academic qualifications in some higher education institutions. Four out of ten respondents believed that this trend would only become relevant in the next five years (38.5%) and about a quarter in the next

ten years. About a quarter said that this would only become important in a ten-year period. However, since this is a systemic change, a five-year period appears short both for higher education institutions and for necessary legislative changes. However, at national and European level, there are already guidelines developed through programmes which could very well direct the focus of education systems towards lifelong higher learning within a five to ten-year period. Especially under the conditions of rapid knowledge change, high technology acceptance rates and a rapidly changing work context, this time frame could even be shortened.

As a consequence of completely predefined and given structures, the study programme curricula would have to be detached and make use of more flexible, personalised and participatory models in which students actively cooperate with teachers, professors and consultants in the design of curricula and study programmes. Personalization then also means being able to reassemble individual existing programs. The aim is to help students take their first steps in their academic careers, to discover their mission and their passion. And it means allowing greater freedom of choice in terms of learning content and modules. All in all, it amounts to a *design of your own curriculum approach*. The sample majority indicated that this factor would only become reality in the next five (35.9%) to ten (38.5%) years (see Figure 52).

C3.2 Scenarios for the University of the Future

Academic education is on the verge to become the norm. Digital transformation is allowing new learning paths. The currently predominant model of a three- to five-year study block with subsequent following lifelong employment is empirically losing relevance. It will be replaced by more flexible, often lifelong study models. Universities, policy makers and society, together with students, must create the vision and conditions for this development and work together to design a new guiding consensus for the university of the future. The expectations and requirements of students also change rapidly. Even today they are much more diverse as a group than they were before (see Chapter C 1.3 Third Second: Demographic Change). In 2016 in Germany, for example, more than one in five students had before completed their vocational training already, one in ten continued higher education despite a health impairment, and one in fifty did not have the standard university entrance qualification (Abitur).

What the university of the future will look like will certainly depend on the regional-local context conditions in which it is placed. What is certain is that the

university of the future will look different from the present one. The influencing factors (see Chapter C 1 Ten Seconds of the Future of Higher Education) are too powerful and are pushing and pulling in diverse directions. If we try to deduce which main influencing factors result from this, one arrives at the four pillars of change described in the previous chapter. They open up a space for future developments in higher education. The study experience will change depending on the respective configuration within the developments of the four pillars.

As part of the *NextSkills* Studies, experts were presented with four different scenarios based on the four factors (see Chapter C 3.1 A Framework for the University of the Future). Table 4 explains the four scenarios. They all are based on a baseline scenario in which all drivers are set to low intensity. The derived baseline scenario for today's study experience is as follows:

Baseline Scenario today: Business as usual

Higher education is generally institutionalised – students enrol – usually directly after graduating from school at an institution where they later graduate. They study along a pre-defined curriculum with predefined contents in order to achieve prescribed learning goals, which are usually derived from a specific occupational field or scientific discipline. Study programmes are located in an academic discipline or faculty/ organisational unit of the current academic system.

Based on this baseline scenario the four possible future scenarios were elaborated. They are based on a cumulative logic – the next scenario is always adding another factor into the elaboration. Table 4 shows the different configurations of the four factors and their distribution within the scenarios – each formulated from a student perspective. As can be seen from the table, the scenarios build on each other. Delphi respondents were asked to indicate their level of agreement with the proposed scenarios on a five-level Likert scale, ranging from strong agreement (=5) to strong rejection (=1) (see Figure 54). In addition, respondents were given the opportunity to provide written justification for their decision or comments for potential reformulations of the scenario description.

Table 4 Scenario Building: current and future higher education – students’ perspective

Drivers	Scenario: Today	Scenario: Future 1	Scenario: Future 2	Scenario: Future 3	Scenario: Future 4
<i>Future Skills</i>	Low intensity	High intensity	High intensity	High intensity	High intensity
Multi-institutional	Low intensity	Low intensity	High intensity	High intensity	High intensity
Personalization	Low intensity	Low intensity	Low intensity	High intensity	High intensity
Lifelong learning	Low intensity	Low intensity	Low intensity	Low intensity	High intensity

The following infographics summarize the four scenarios and show experts’ approval rates for the scenarios (Figure 55).

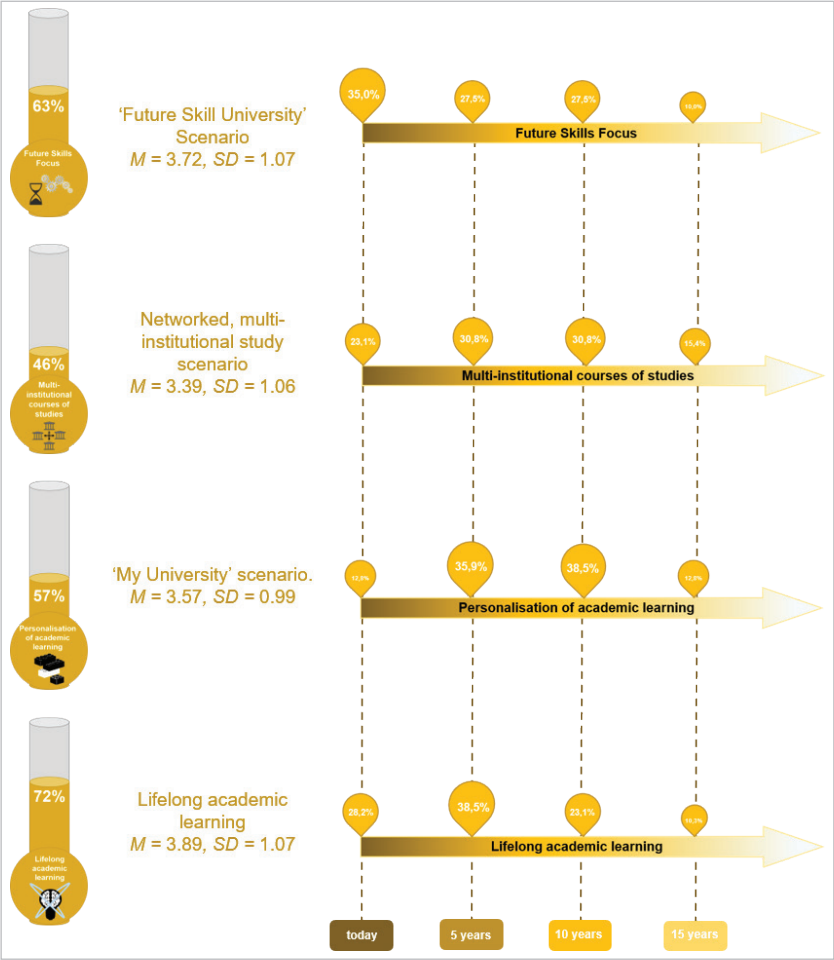


Fig. 54 Experts' evaluation of importance and time of adoption of the scenarios for higher education ($N_{\text{Runde1}} = 46, N_{\text{Runde2}} = 38$)

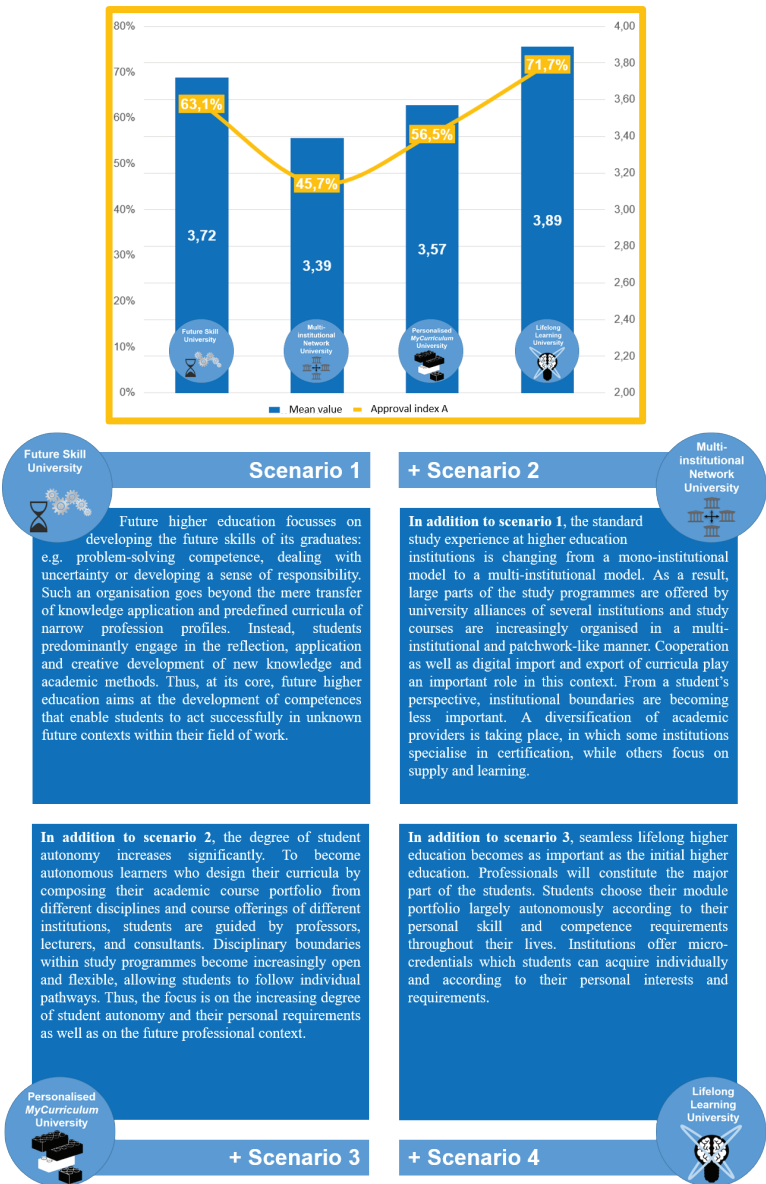


Fig. 55 Four future scenarios for the University of the Future



C 3.2.1 Scenario 1: The *Future Skill* University

Scenario number 1, the *Future Skills* scenario, assumes that higher education institutions would turn away from their current model of knowledge transfer. Instead, new study and university profiles would emerge, aimed at supporting students' development of *Future Skills*. In this scenario, higher education would be oriented towards one main objective: to enable the development of *Future Skills*, i.e. the ability to act in highly emergent contexts of a future professional field or in private life. This would not replace the acquisition of knowledge and defined curricula for fixed occupational profiles but would go far beyond them. Instead, students would focus on reflection on values and attitudes, application and creative development of new knowledge and academic methods. The main ambition within this scenario would be to prepare students to be able to act in uncertain and uncertain future contexts.

The Delphi experts expressed a high degree of approval for this scenario ($M = 3.68$, $SD = 1.07$, $AScenario1 = 63.1\%$). *Future Skills* are understood as a concept that builds on expertise but goes beyond it to enable students to access higher levels of learning (e.g. conceptualised within Bloom's taxonomy) that will be necessary for future academic education. The experts agreed that higher education institutions should offer learning opportunities aimed at developing *Future Skills*. However, it was also noted that the definition and scope of what would be considered *Future Skills* would vary within the disciplines.

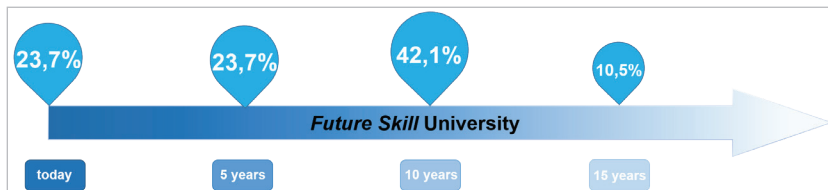
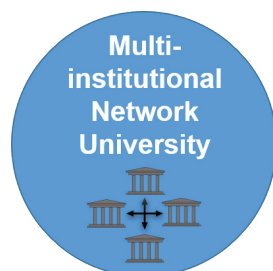


Fig. 56 Time of adoption for an increasing importance of the *Future Skill University* scenario (N = 46)

The majority of respondents (42.1%) estimate the time of adoption for this scenario to be ten years ($M = 2.39$, $SD = 0.97$) (see Figure 56). The analysis of the qualitative comments revealed that the main reason for the experts' time estimation was primarily four factors: a perceived inertia of university systems, their internal cultural resistance and the slow pace of change processes with regard to changes in legislation and financing rules. It was also stressed that, in addition to macro- and meso-level changes (state policy and institutional regulations), university staff and students would also have to adapt their mindsets accordingly.

The heterogeneity of the respective national context conditions and the different types of higher education institutions were identified as moderators of such change processes: While some respondents indicated that private colleges and business schools were already actively engaged in helping their students develop *Future Skills*, traditional higher education institutions in particular often placed a high value on knowledge transfer.

"It is already a reality that the knowledge needed for a certain profession is evolving constantly and needs a permanent update. So, having the skills for this adaptation and having skills more focused on developing capacities is much more important than just information and knowledge in a specific field." (Participant NextSkills Delphi Study)



C 3.2.2 Szenario 2: The Multi-Institutional Networked University

The second scenario assumes that, in addition to the focus on *Future Skills*, a higher education structure will be established that will enable new study experiences in a network of many higher education institutions, referred to here as *multi-institutionality*. This will shift the linchpin of previous higher education. So far, everything has rotated around the axis of the individual university, where everything from enrolment to graduation takes place, now this axis is completely rotated. The scenario envisages a mode of higher education which no longer revolves around the axis of the institution as the centre, but around the academic program. The focus is on the question of how completely new study experiences can be made possible through institutional cooperation. The linchpin for the definition of a university course of study has been completely shifted.

This requires a radical rethinking of the current model of higher education as this is based on the assumption that institutions are full-service provider and students study at a single institution, and that these institutions also represent spaces for personnel and organisational identity development that are occupied as *campus mentality* or with terms such as *alma mater*. The new concept of the multi-institutional network university is about enabling the advantages of networking while at the same time not abandoning the identity-forming space of the one-university model – also in the sense of a protected space. For this, the idea of the previous university organisation must be rethought. How can a course of study at different institutions in a network structure nevertheless be designed in such a way that the presumed coherence of the one-university model is not lost?

Previous approaches, especially in the USA, often appear to be based on a neoliberal market model and try to work out cost advantages through economies of scale (cf. Selingo 2017). In Europe, too, approaches of the networked university are being discussed in various forms, for example in the form of the so-called “European University” initiative of the European Commission. The aim is to bring

together networks of higher education institutions in Europe in completely new forms of cooperation in study and research.⁵³ Regional networks are also establishing themselves more and more, but so far mostly research focussed. One example is the “Network of medium-sized universities” in Germany, a network primarily for research cooperation.⁵⁴ However, the strongest innovation potential lies in the possibility of enabling completely new study experiences. The scenario of the multi-institutional university network would make this possible.

The scenario of a multi-institutional university network follows the idea of radically integrating the curricula of different higher education institutions into one network. For institutions, this means an increased import and export of curricular components from other higher education institutions. This integration of study programmes through digitisation will become increasingly important and simpler in the future. The increasing availability of open online courses and open educational materials suggests that study experiences will increasingly have to remain less institution-bound. However, it would be a misconception to think that digitisation automatically leads to (meaningfully) networked study programmes. For this purpose, tools for recognition must be developed and made available. Study experiences are no longer credit points administered by universities, which only lead to a degree in certain combinations regulated by higher education institutions themselves but become portable academic credentials that are the personal responsibility of students. The necessary concept of an academic qualification approach, which is *personally responsible* and *made possible by higher education institutions*, continues to be *advised by teachers and coaches*, has not yet been tested or conceived. In *NextSkills* Delphi, respondents point out that on the one hand it is becoming apparent that this development is imminent, and on the other hand there are also risks pointed out with regard to the coherence and connectivity of such study experiences.

The standard study experience at higher education institutions changes in this scenario from a *single-institutional* model to a *multi-institutional* model (see Figure 58). For students, this means that they enrol at university 1, but therefore do not necessarily graduate at this university or take all courses at this university only. Instead, the study becomes a patchwork or network experience, which depends more on the respective interests and individual preferences of the students for certain topics and profiles, the desired access to specific institutions or course profiles than

53 See the description of the initiative on the European Commission’s website: https://ec.europa.eu/education/education-in-the-eu/european-education-area/european-universities-initiative_en

54 See the network’s website: <http://www.mittelgrosse-universitaeten.de>

on the curricular possibilities and capacities of the university or its competences to offer a certain range of courses. If these are not available, students at another institution will take advantage of the corresponding offers. From the perspective of the institutions, this would mean that they would have to organise themselves in alliances and networks with other higher education providers, develop cooperation interfaces and mutually recognisable, portable credit schemes and certificates. Academic programmes in this scenario would be provided by university alliances and would enable students to create individual, patchwork-like courses of study that cross institutional boundaries. This would be made possible by cooperation and the digital import and export of curricula. From a student perspective, therefore, institutional boundaries would become less visible and there would be a diversification of providers of academic education, with some institutions specialising in certification, some in coaching and learning guidance, while others focusing more on content provision. Thinkable multi-institutional study paths that would be made possible in this way are shown in Figure 57.

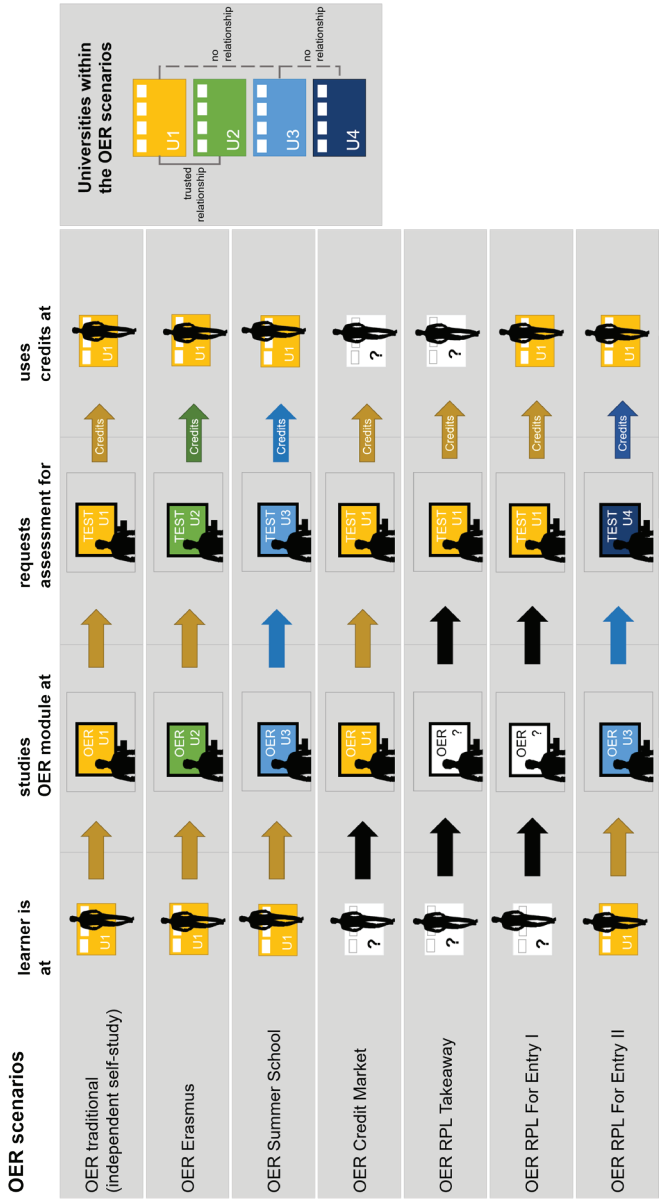


Fig. 57 Multi-institutional study paths scenarios (Source: Ehlers et al. 2011)

The participants of *NextSkills* Delphi were asked to assess the scenario in terms of their agreement and the time span of implementation. On the one hand, there is a cautious approval of the scenario with an average value of 3.43 ($SD = 1.06$) and an approval index A of 45.7 % (see Figure 58).⁵⁵ However, respondents estimate the *time of adoption* for this scenario to be slower, with four out of ten respondents who expect a ten-year period for this and every fifth who sees this development only in a fifteen-year period. Thus, more than half of the respondents assume this scenario as a long-term perspective.

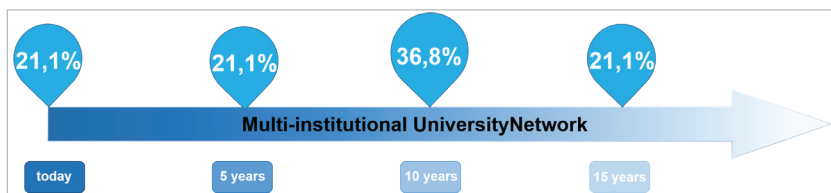


Fig. 58 Time of adoption for the Multi-institutional University Network (N = 46)

Experts stated that new business models had to be developed along the lines of a “co-opetition” paradigm.⁵⁶ They also indicated that higher education institutions would have to accept the willingness to adopt new competitive models in order to make this scenario possible. Constructive discussions would therefore be necessary in order to specify the conditions under which higher education institutions could develop towards cooperative networks without losing sight of the conditions that would lead to a weakening of their own competitive position. Business models that include instruments for recognition and credit transfer should also be developed further to motivate the emergence of such institution-wide arrangements. According to experts, student demand will drive this scenario forward:

“A rather neo-liberal ideal of a market place with infinite choice and competition but at what cost? I’m not sure this is as liberating as it sounds.” (NextSkills Delphi Study participant)

⁵⁵ The approval value A (for *Agreement index*) indicates the percentage of those who responded with 4 or 5 (approval or strong approval) on the 5-step Likert scale.

⁵⁶ Coopetition refers to the duality of competition and cooperation on markets (Bouncken et al. 2015). Coopetition is a word composed of the English terms cooperation and competition.

According to the experts' assessment, the time to adoption for the scenario will realistically within the next ten to fifteen years. However, the international experts hint to certain prerequisites for the implementation of this scenario:

- The will of higher education institutions to preserve their own identity and status while embarking on an intensive cooperation and recognition process could be seen as a risk of loss for the location of study programmes at their own institution.
- Although some respondents stressed the benefits of this scenario, others questioned the applicability and desirability of multi-institutional cross-country and cross-university arrangements.
- The concept of the transferability of academic achievements must first mature before higher education institutions can make use of it in both directions: on the one hand as self-exhibiting, on the other hand as recognising institutions.

In the scenario of the multi-institutional university network, student support plays an important role in the experience of study across institutions and higher education contexts. Coaching and supporting students to not lose sight of the red thread within their academic education becomes more important because fewer external guidelines exist. In developing this scenario, it also becomes clear that the infrastructure for coaching, mentoring and accompanying students to integrate their academic learning experiences into a larger and coherent whole would be necessary. Otherwise there would be a risk of loss of coherence.



C 3.2.3 Scenario 3: The Personalised MyCurriculum University

The *MyCurriculum* scenario focuses on increasing the involvement of students in designing their own personal curricula. More electives, more participation and more opportunities to actually compile your own course of studies – not alone,

but in cooperation with professors, coaches or specialised committees. Students can thus compile their own curricula and learning formats based on their personal interests. Therefore, in this scenario, the academic curriculum concept changes fundamentally – from a *previously designed* structure towards a personalised, more flexible and participative model in which students actively cooperate with professors, lecturers, counsellors to develop their own curriculum. In addition to sovereignty concerning curricula, there will also be greater freedom of choice and variety in teaching formats, which will enable higher education institutions to better respond to the greater diversity of students in the future (see Chapter C 1.3 Third Second: Demographic Change). This can be reflected in the different needs for assistance, the more or less marked interest in certain study contents, the different study speeds, the different preferences regarding online and face-to-face teaching as well as internationality.

As a consequence, the rigid ties of the overwhelming majority of academic programmes to an academic organisational unit (faculty, school, etc.) are loosened. The main focus is thus on the students' individual study needs and their future professional contexts in a personalised study environment. The majority of the experts stressed that this was not to be equated with a dissolution of academic-scientific disciplines. Rather, it would result in interdisciplinary cooperation for academic higher education programmes, which would make more flexible, personalised curricula possible. Initial approaches to this are already being seen in private higher education institutions, such as *Jacobs University*, a private university in northern Germany. An expert who himself attended a highly personalised course of study assesses his own experience as follows:

“The challenge was creating a balanced degree (temptation to choose ‘easy’ or familiar subjects), so some criteria should be agreed on, such as a balance between practical/theoretical, subject-related/soft skills. Future professional contexts are uncertain, so this scenario needs to be associated with sound orientation approaches, both human and machine-based.” (NextSkills Delphi Study participant)

Overall, the sample shows a high approval of the third future scenario ($M = 3.57$, $SD = 0.99$). According to respondents' perceptions, this scenario will also become relevant in the next ten years. Approximately 56.5 % expressed agreement or even strong agreement with the *MyCurriculum* model (approval index A) (see Figure 59).

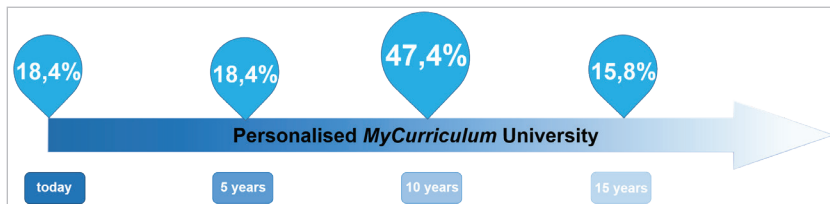


Fig. 59 Time of adoption for the increasing importance of the MyCurriculum scenario (N = 46)

The experts' discussion shows that this scenario is challenging in terms of students' ability to study and would entail an increased need for student support and coaching. On the one hand, students can focus on subjects that are of particular interest to them thanks to flexibilisation. On the other hand, it can be questioned whether students are already prepared to decide what is not only interesting, but also important to know. Higher education institutions must therefore develop entirely new coaching and mentoring formats and a new kind of expertise in this. Initial experience with the *MyCurriculum* approach shows that higher education institutions invite students to compile their proposals for studies and then submit them to an advisory curriculum committee, which together with the student(s) advises on how suitable the planned study path is.

In addition – according to the opinion of the respondents to the *NextSkills* Studies – it can be assumed that the degree of personalisation potential depends on the respective field of study, national contexts of the higher education system, traditions and the students themselves:

“I believe that there is room for personal learning paths for professionals and skilled workers, who wish to upgrade or diversify their work. However, younger students don't always have much of an idea on their personal study needs, but professionals in the field can better make these choices.” (NextSkills Delphi Study participant)

An additional challenge is the resulting increasing diversity of degrees, which would be reflected in the personalised curricula. Further mechanisms should therefore be introduced to ensure that study experiences are meaningfully documented and presented in a way that third parties can apprehend them, and that quality concepts for individualised study courses can be developed.

The realisation speed for this scenario depends on various factors: the technological infrastructure, counselling and mentoring skills of the teachers – who must be trained as mentors and tutors – as well as a high degree of autonomy and

responsibility on the part of the students. An increasing number of students as well as decreasing federal basic funding of the higher education institutions are mentioned as special challenges in the context of the *MyCurriculum* scenario. In addition, the respondents stressed the dependence of the feasibility of the scenario on the students' ability to self-regulated learning.



C 3.2.4 Scenario 4: The Lifelong Learning University

In this scenario, lifelong academic education is considered as important as initial higher education at the beginning of the career phase. In this scenario, employees make up the majority of the students, who choose their module portfolio according to their personal skill needs and competence requirements with a high degree of autonomy over their life course and independently according to their requirements. Institutions therefore also offer alternative certification procedures, such as microcredentials, which students can acquire individually according to their own interests and needs. In this scenario, the recognition of academic achievements and practical experience allows flexible switching between different providers of higher education. These enable students to document previous learning experiences in the form of more comprehensive certificates.

In the scenario, four essential dimensions are addressed which would have to be substantially further developed for its realisation:

- **Permeability:** The creation of access routes for people with vocational qualifications and the recognition of competence from academic and non-academic pre-qualification phases should be guaranteed. In Germany, state legislation and university practice are making strong progress in this respect, but lag behind the equivalence of lifelong and initial academic education formulated in the scenario.

- Study organisation: The creation of flexible in-service study formats and part-time models as well as *short courses, micro and nanodegree formats* are particularly important here. In addition, the organisation of higher education studies over the life span requires the creation of appropriate administrative processes as well as teaching organisational processes for corresponding offers.
- Study formats: Suitable flexible study formats are needed, both with regard to the sensible integration of digital media into teaching and with regard to flexible times and spatial possibilities as well as didactically with regard to the target group of working adults.
- Continuing scientific education: The creation of legal and higher education administrative framework conditions as well as strategies in which higher education teachers can design courses in the field of lifelong learning within the framework of their activities and duties as teachers.

The lifelong students represent an increasingly growing target group for universities, which in this scenario are finally added to the already existing, traditional target groups in terms of numbers. An interesting idea that has not yet been implemented in Germany is the introduction of a lifelong matriculation number that would make it easier for students, at least once in administrative terms, to take advantage of courses offered during their life course even after the official end of a first or second study cycle (Bachelor's or Master's degree). Higher education would thus move from its momentary *up-front mode* to a new form of seamless lifelong academic learning. An initial academic qualification phase corresponding to the current Bachelor's or Master's programme is not excluded. However, this would only be the prelude to the further academic path of life learning. In this scenario, students would choose their module portfolio with a high degree of autonomy and according to their personal or professional skill requirements and competence requirements of their respective life phase. Universities, on the other hand, would offer *portable* microcertificates. Depending on their own preferences, these students could then compile a cumulative or complementary final profile for an individual degree profile.

The fourth scenario received the highest approval ratings of the participants of the *NextSkills* Delphi: 71.7 % of the sample indicated a (strong) approval (approval index A) (see Figure 60). Respondents underlined that in order to succeed in today's competitive *global village*, individuals have an unprecedented need for lifelong academic learning.

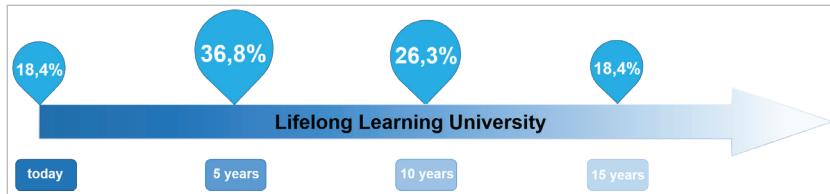


Fig. 60 Time of adoption for the Lifelong Learning University (N = 46)

With a few exceptions, the target group of lifelong academic learners has so far tended to be on the fringes of the strategic efforts of higher education institutions to expand their study programmes, which are primarily geared to the type of *normal student* (admission directly or shortly after obtaining a higher education entrance qualification without prior vocational qualification, full-time/presence studies). Above all, it was three social dynamics that fuel the fourth scenario:

1. Demographic change,
2. the demand for skilled workers forecast by many labour market experts, and
3. the demand for greater permeability between vocational and academic education and training.

With regard to the assessment of the time to adoption of the scenario, the assessment is slightly contrary to the importance of the scenario. While there is a strong consensus among the experts on the relevance of the scenario, the scenario in this clearly and pointedly formulated variant (lifelong academic learning would be regarded as just as important as the current model of higher education) is not considered immediate and already feasible today. The majority of experts assume that this scenario will become more relevant in the next five years (55.2%). However, one in four respondents estimates the *time of adoption* at around ten years and one in five at fifteen years. In terms of the scenario, respondents tend to view an *evolutionary* path of change rather than a realistic one. In their view, the first step is to open up higher education institutions more to working lifelong learners. This would also mean that higher education institutions would in future focus more strongly on maintaining intensive relationships with their alumni, who would turn to their *alma mater* again after graduation whenever they needed further academic training in their professional lives.

Challenges to the scenario arise from the need for a real paradigm shift in academic education, with implications for existing courses and higher education

structures. In addition, it must be taken into account that a change towards lifelong academic education cannot be shaped solely by higher education institutions, but also by learning individuals and their willingness to participate in education, as well as by employers. They must recognise the importance of lifelong academic learning and provide additional learning and training opportunities for their staff accordingly.

Four Scenarios for Universities of the Future

The *NextSkills* Studies take a student's perspective on the Future of the University. Four scenarios for the Future University can be described as gravitation centres of organisational development: (1) the *Future Skill* university scenario, (2) the networked multi-institutional study scenario, (3) the MyUniversity scenario, (4) the lifelong higher learning scenario. Three out of four scenarios score with a time of adoption of more than 10 years from today with the majority experts involved. Only the lifelong higher learning scenario scored for a time for adoption within the next 5 years with the majority of experts.

1. The *Future Skill* university: The *Future Skill* scenario suggests that higher education institutions would leave the current model that focusses on knowledge acquisition. Instead, new profiles would be developed that emphasise graduates' *Future Skill* development. In this scenario, higher education would mainly be organised around one key objective: to enable the development of graduates' *Future Skills*, i.e. complex problem solving, dealing with uncertainty or developing a sense of responsibility, etc. This would not replace but go beyond the current emphasis of knowledge acquisition and studying based on defined curricula for fixed professions.
2. The networked, university: This scenario views higher education as a networked study experience. It will not be down to a single institution providing a student with a certain program, but that this role would be split among multiple institutions. This means that 'digital import' and 'digital export' of parts of the curriculum would play a significant role. The standard higher education study structure and experience would shift from a "one-institution" model to a "multi-institutional" model.

3. The “MyUniversity” scenario: This scenario describes higher education institutions as spaces where the elements of choices enlarge, and students can build their own curricula based on their personal interests. The curriculum of academic programs in this scenario would move from a fully predefined and ‘up-front’ given structure to a more flexible, personalised and participatory model in which students actively cooperate with professors/ teachers/ advisors in curriculum building of higher education programs.
4. The lifelong higher learning scenario: In this scenario, seamless lifelong higher learning would be as important as initial higher education. Learners in the workplace would be the main type of student, choosing their portfolio of modules according to their personal skill needs and competence demands with high autonomy throughout their lifetime. Institutions thus would offer micro-credentials, which students assemble individually based on their own interests. Recognition of prior study achievements and practical experience would enable permeable shifting between different providers, which offer to bundle prior learning experience into larger certifications.

Part D

Final Act: Summary and Epilogue

The word epilogue comes from the Greek word *epilogos*, which means “conclusion word”. It always comes at the end of a work and is therefore the opposite of a prologue, which always comes at the beginning. As with the prologue, the epilogue originated with Greek playwrights and poets. It served both as a summary of the play’s moral lessons, as well as a wrap up of the characters’ fates. In that sense and in a manner of summarising we can clearly state that research on *Future Skills* is currently the hot topic of the day coming along with fundamental changes in the job market and in our lives in general due to a number of powerful drivers and developments.

The present publication is the first comprehensive book publication about the emerging issue of *Future Skills*.

While many studies focus on the changes brought through digital technologies, they relate *Future Skills* directly to digital skills, which – as important as they are – only represent one side of the *Future Skill* coin. The results presented from the *NextSkills* Studies are taking a broader approach and go far beyond digital skill demands. The approach elaborates on an experts’ informed vision of future higher education, describes in detail 17 *Future Skills* profiles, outlines the four pillars of change which will shape the learning revolution in higher education and – through the *Triple Helix-Model* – presents a first model of *Future Skills* for future graduates. Being part of an overarching research initiative on “*NextSkills*” (www.nextskills.org) it collates opinions from many sources and original empirical research set in

the interface between higher education and business. Participating experts were asked on the nature, the relevance, as well as the timeframe of adoption for *Future Skills*, future higher education scenarios and the driving pillars of change.

What plays out in the future depends on decisions taken today, which can critically narrow the room for manoeuvre over time. That is why it is important to factoring the long term into decision-making in higher education today. Starting point for research on *Future Skills* is an analysis of factors, which influence our lives, the way we work and live, learn and develop. On the one hand, we cannot predict what the future will look like, whereas, on the other hand we notice that changes are underway and leave us with a changed environment demanding different behaviour, and adaption to more complex situations in our live and work contexts. An analysis of such changing factors is available in a multitude of volumes, in many forms, shapes and perspectives. The nature of such descriptions, studies and analyses is – as they are dealing with the future – naturally carrying a certain degree of vagueness, while being as precise as possible in order to capture aspects, which can be taken as factors of influence for the future: future ways of living, future ways of working, future ways of learning, etc. (e.g. OECD 2019, 2018, 2017a, 2017b). Analysing the currently existing writings dealing with the question of which skills and abilities will be important for the future work life, at least two converging primary factors crystallise:

- Ever faster technological advancements and their penetration and infusion of all spheres of our lives, work and societies, leading to an excess of information and options. This can be compared to the point in time, when Gutenberg invented the printing machine for books, and for which our society is only starting to develop ways of coping with it.
- Increased global cooperation, exchange, and communication, which moves from being an option to being a necessary ingredient of every process of society, work and individual life.

Resulting from that, a number of connected changes can be observed, which we believe to be secondary effects, building on the foundations of the two prior ones:

- Resulting from the tectonic shifts in the structure of work and its development, a new demand for (higher) education study and learning pathways and qualification structures including certification and credentialing schemes will be needed. Educational institutions need to understand these forces in order to develop a changed vision of future education to inform their strategies.

- Fostered through these changes an ever-larger demand for higher educational attainment is induced evoking industrialised societies to turn into learning/educational societies in which life risks primarily can be mitigated through education.
- And lastly, a changing nature of the very essence of what learning (in school) and studying (in higher education) is aiming at can be observed, leading to a new ‘lead-orientation’ for concepts like knowledge – shifting from static knowing to knowing & reflection in action in complex and open situations.

It is important to note that no cause-effect model can be applied to these developments. In order to find reference models which are capable of capturing the intertwined and networked nature of these developments with factors mutually influencing each other, we turned to eco-systems theory and cybernetics. The dynamic nature of these approaches able to deal with and describe system dependencies provides grounds for theoretical description of reality. The eco-systemic approach is based on the assumption that changes and developments in one system are causing effects in a connected system. Building on this approach, combining it with an education science point of view, as well as with a sociological perspective, our research shows that there are ongoing changes within the structure, nature, and profile of the abilities and skills. Individuals will need these skills for their professional and personal lives in order to cope with the demands and requirements of their respective work contexts and tasks, and society will need them to stand up to the challenges it is facing. In our research we found, that these changing skill requirements can be described and analysed.

Notably, policy and especially research, pays increasing attention to analysing in-depth changes and trends for the future world of work and for future job markets (see chapter B 1 State of Research – Old Bottle, New Wine?) However, most approaches fall short of two perspectives, which we call the “iceberg phenomenon” and the “future education gap”:

- The first blind spot is the *iceberg phenomenon*: The iceberg phenomenon of *Future Skill* research refers to the fact that *Future Skill* research is often focusing on technological change (World Economic Forum 2018, Hirsch-Kreinsen 2016, CEDEFOP 2012, Deloitte 2018, PwC 2018, McKinsey & Company 2018, Balliester & Adam 2018), which is only one side of the coin. Our research shows that this is just the tip of the iceberg. Only very few studies try to elicit the changes, which go along with it and which lie underneath the surface of said iceberg: dealing with future work concepts, the tectonic shifts throughout an entire business or public organisation, the way collaboration is organised, and the impact it has on

- organisation culture, new leadership concepts, more decentralised, smaller units, and a need to organise shared creativity and shared cognition in a global setting.
- The second blind spot is the *Future Skills* education concepts gap, which refers to a lack of research with regards to the demand and shape of future higher education concepts, which meet the need for *Future Skills*. It is still unknown how higher education institutions can organise their academic programs in a way that they specifically are sensitive to supporting the development of *Future Skills* for their future graduates. Although many promising attempts and pilot trials are underway, there is no overarching forum for discussing possible future higher education and its institutions.

Both issues, the iceberg phenomenon of *Future Skill* research and the future education gap are predominant issues in *Future Skill* research today. It was exactly with this intention to overcome this shortfall that we designed a threefold long-term research project, starting in 2015, and called it “*Future Skills* – Future Learning and Future Higher Education” in order to be able to research the articulation, extent, nature and contexts of *Future Skill* – not limited to digital skills but *Future Skills* with a broader scope.⁵⁷ The research focus from the beginning was on identifying *Future Skills* in a broad and holistic sense, incorporating digital skills but going beyond them, and determining which changes are caused in work environments leading to these new skill demands. Moreover, we asked how higher education institutions would have to reorganise their academic programs in order to support development of such *Future Skills* for future graduates.

There are complex feedback loops between new technologies, job creation, education organisations’ attempts to prepare individuals for present and future jobs, and their skill development. New technologies can drive business growth, job creation, and demand for specialist skills, but they can also displace previously existing roles when certain tasks become obsolete or automated. Well-developed links between higher education institutions and labour markets in order to share and exchange information about these often short-term developments, do not exist at large scale.⁵⁸ Skill gaps – both, among workers and among the leadership of organisations – can speed up the trends towards automation in some cases but

57 Notably the first European country, which had a national higher education strategy mentioning the term “*Future Skills*” was Ireland (<http://hea.ie/assets/uploads/2017/06/National-Strategy-for-Higher-Education-2030.pdf>).

58 Good practices for frameworks of university business cooperation have been analyzed in the frame of the HAPHE Project (<http://haphe.eurashe.eu>)

can also pose barriers to the adoption of new technologies and therefore impede business growth.

Starting from the current lack of agreement on how higher education will develop in shape, nature and organisation in the future in order to meet the demands of tomorrow's future workplace and society, the *NextSkills* Studies seeks to state clearly which drivers of change in higher education will become relevant in the near and further future, how higher education institutions will develop driven through these "pillars of change", and gain clarity on the description of *Future Skills* and their nature. The intense interaction with national and international experts, stakeholders of the higher education governance community as well as private businesses and students who participated in different parts of the studies made clear that there is no unanimous consensus – and as research team we neither expected this, nor did we think that it should be possible. However, the research results show clearly that – whichever scenario for higher education institutions' development one focusses at – a radical advance will have to be made in order to arrive from the current situation of today's higher education at the position of each respective scenario. We can draw the following conclusions.

With regards to *Future Skills* we can conclude:

1. *Future Skills* can be analysed and described as a set of profiles, each containing an array of skill definitions covering *Future Skill* demands.
2. These skills can be referred to as *Future Skills* and can generally be described through two cornerstone characteristics: a strong, transversal and well-developed ability of self-organisation, which is mutually supported through a high-articulated supposition to act under conditions of uncertainty. Proficiency in any field in the future will entail these two traits.
3. *Future Skills* can be described within a model, which is structured into three dimensions: a subjective – individual development-related, an objective – task and subject matter-oriented, and a social dimension – organisational and environment-related. All three dimensions interact with each other and are not sole expressions of isolated skill domains: subjective aspects influence the outlook on objective aspects, as well as social aspects impact subjective and objective aspects.
4. The *Future Skills* approach presented here is going beyond a static model of listing a set of defined skills. It is going beyond digital or technical skills which will – no doubt – carry high importance for the future workforce but represent just one ingredient. The specific value of the presented *Future Skills* approach lies within the combination of focusing on the development of dispositions

to act in a self-organised manner in the respectively described domain with a defined array of skills.

5. The first *Future Skills* dimension is the subjective dimension of *Future Skill* profiles. It is relating to an individual's subjective, personal abilities to learn, adapt and develop in order to improve his/ her opportunities to productively participating in the workforce of tomorrow, actively shaping the future work environment, and involve him-/herself into forming societies to cope with future challenges. It contains seven *Future Skill* profiles.
6. The second *Future Skills* dimension relates to an individual's ability to act in a self-organised manner in relation to an object, a task or a certain subject matter-related issue. It emphasises a new approach, which is rooted in the current understanding of knowledge but is suggesting taking knowledge several steps up the ladder, connect it to motivation, values and purpose and impregnate it with the disposition to act in a self-organised fashion within the knowledge domain in question. It is not just a quest for more knowledge but for dealing with knowledge in a different way, which is resulting into professionalism and not merely into knowledge expertise. This dimension houses five *Future Skills* profiles.
7. The third *Future Skills* dimension is relating to an individual's ability to act in a self-organised way in relation to his/ her social and organisational environment, as well as to the society. It emphasises the individual's dual role as the curator of his/ her social portfolio of membership in several organisational spheres while at the same time taking over the role of rethinking organisational spaces and creating organisational structures anew to make them future-proof. It contains an array of four skill profiles.

With relation to future learning we can conclude:

1. Higher education institutions in the future will need to provide a learning experience which is fundamentally different from today's model. Adoption timeframes vary, but the *NextSkills* Studies conclude short or mid-term time-frame for many aspects.
2. The dimensions of future learning in higher education will comprise structural aspects, as well as pedagogical aspects related to learning design. Structural aspects comprise academic learning as episodic process between biographical phases, professional and private episodes throughout life, learning as institutional patchwork instead of the current one-institution-model and supported through more elaborated credit transfer structures, micro-qualifications and microcredentials. Pedagogical aspects related to learning design of academic learning comprise changing practices of assessment, also peer-validation, learning

communities, focus on *Future Skills* with knowledge playing an enabling role for learning in interactive socio-constructive learning environments.

3. In general, we estimate structural changes to become relevant much later than changes related to academic learning design.

Concerning the future of higher education, we can conclude:

1. Four key drivers in the higher education market can be described. Each driver has a radical change potential for higher education institutions, and together they mutually influence each other and span the room in which higher education will likely develop.
2. There are two content and curriculum related drivers (i.e. (1) personalised higher education, and (2) *Future Skill* focus), and two organisation-structure-related drivers (i.e. (1) multi-institutional study pathways, (2) Lifelong Higher Education).
3. The profile, shape and nature of higher education in the future will be most probably a certain pattern of configuration along the impact that each of the four key drivers – called “pillars of change” – has and will influence the development of higher education strategies.
4. Our studies looked from a student’s perspective and envisioned future learning experiences. Four scenarios for future higher education can be described as gravitation centres of organisational development: (1) the *Future Skill* university scenario, (2) the networked multi-institutional study scenario, (3) the MyUniversity scenario, (4) the Lifelong Higher Learning scenario.
5. The experts estimated that the adoption time for three out of four scenarios would be a bit more than ten years from today. Only the lifelong higher learning scenario was suggested to become relevant already within the next five years.

In a famous speech Nelson Mandela once expressed that the power of education extends beyond the development of skills we need for economic success. It can contribute to nation-building and reconciliation. To shaping the world, we live in. It is the most powerful tool to change the world.

With these words we wish to close this book, continue the conversation and open the debate!

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