# 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.
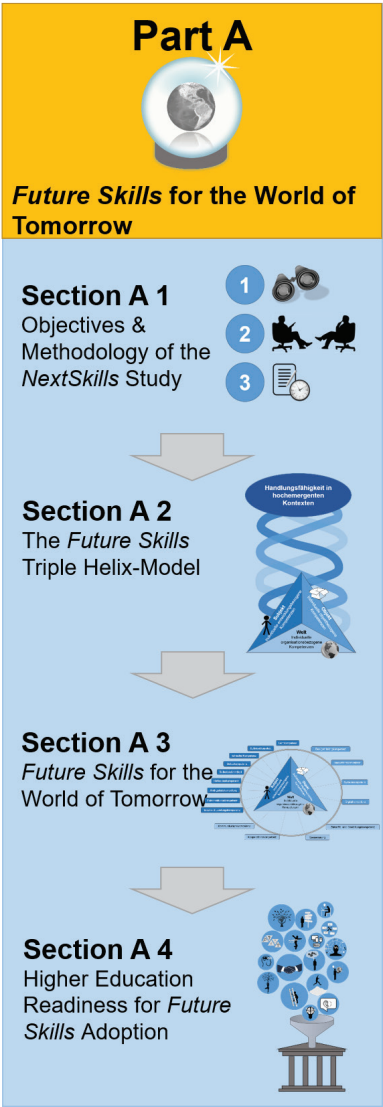
# Objectives & Methodology of the *NextSkills* Studies

# 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 employees[6]. 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?

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6   In addition to those responsible for human resources and organisation, students were also included in the interviews during their practical phase.
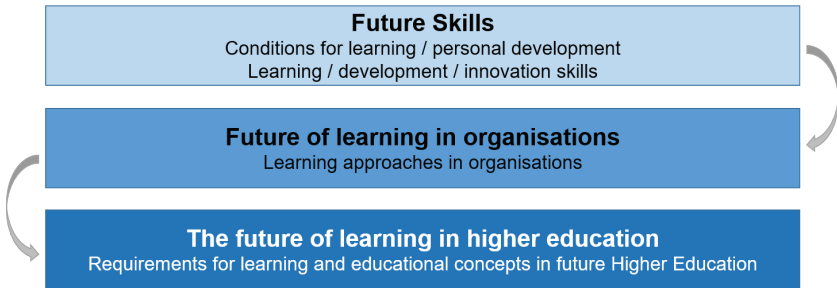
**Fig. 2**   Research questions of the *NextSkills* Studies

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

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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").
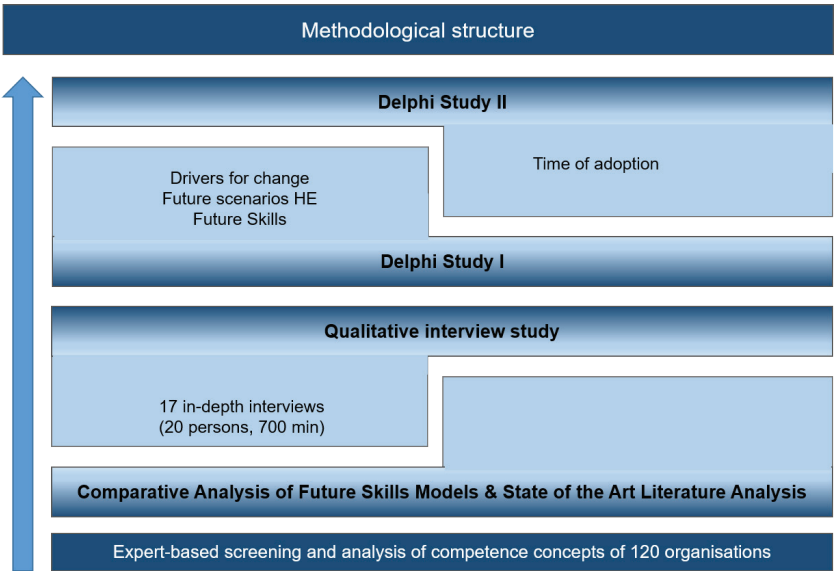


**Fig. 3**  Methodological design of the *NextSkills* Studies

## 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:

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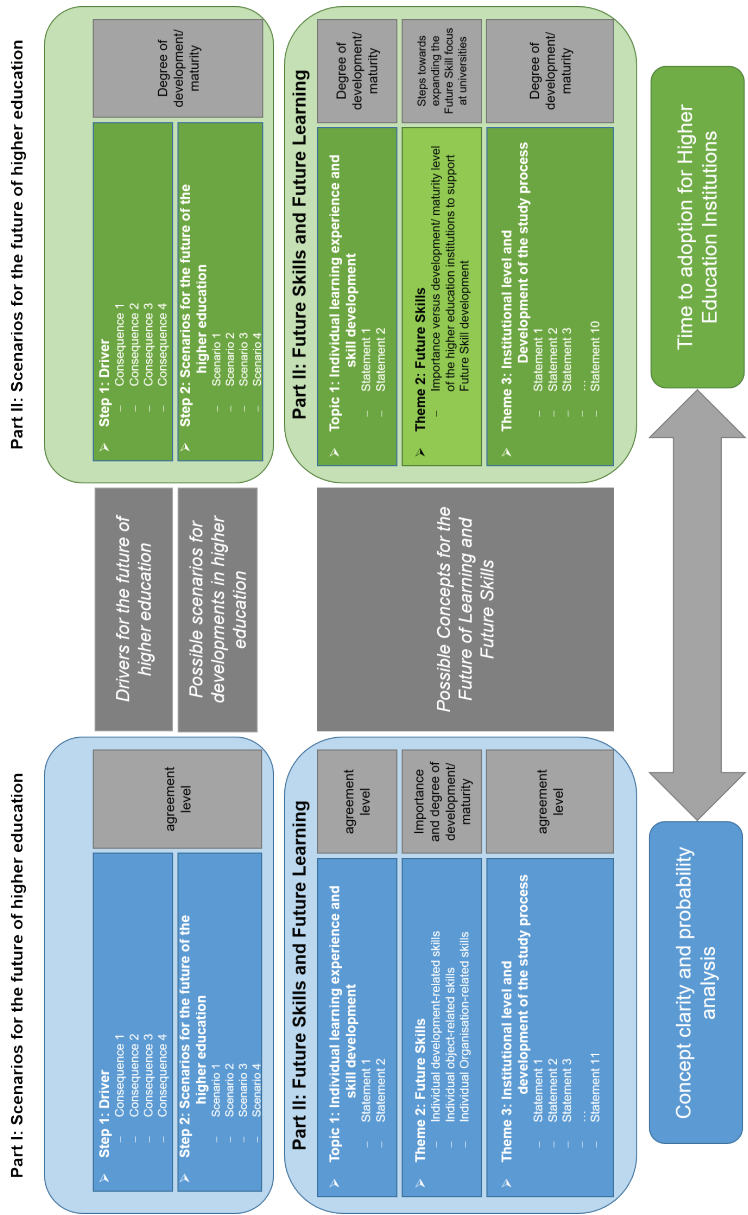
**Fig. 4**   Design of the Delphi Study I + II (Source: Ehlers & Kellermann 2019)

# The *Future Skills Triple Helix-Model* <span style="float:right">**A 2**</span>

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).
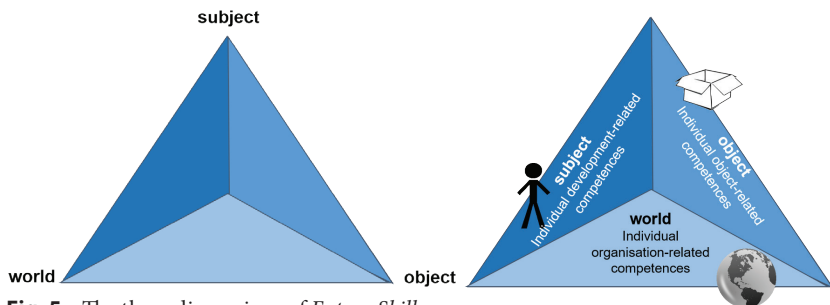


**Fig. 5** The three dimensions of *Future Skills*

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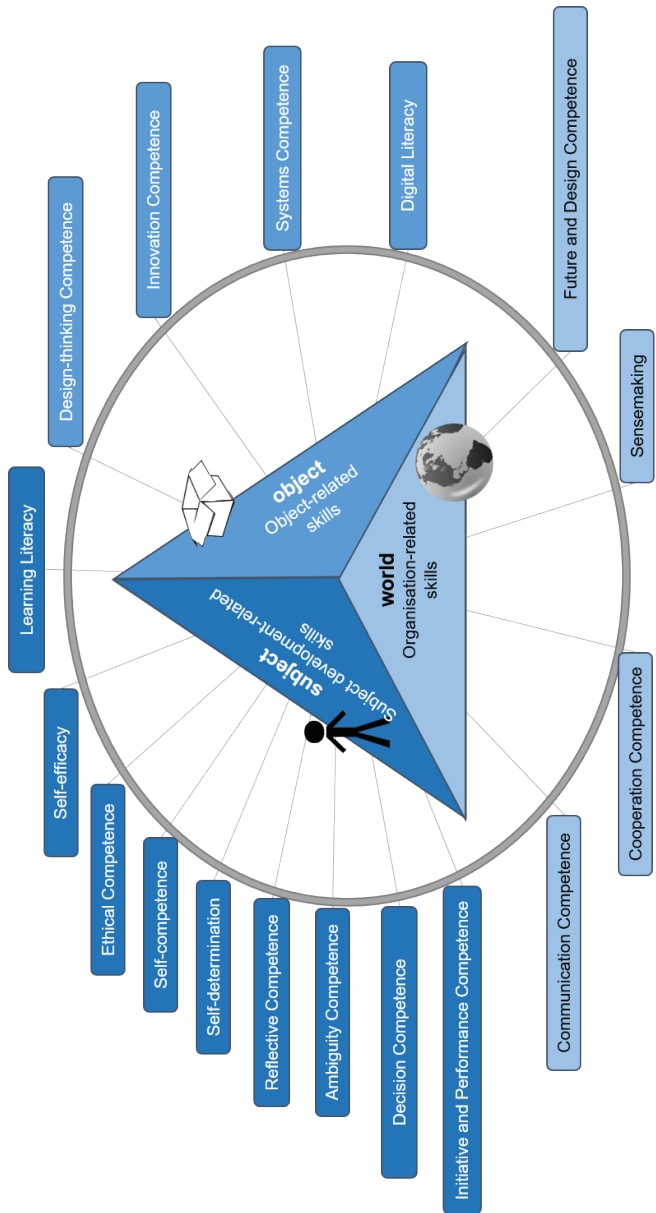
**Fig. 6**   *Future Skills* overview – allocation to three dimensions

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.
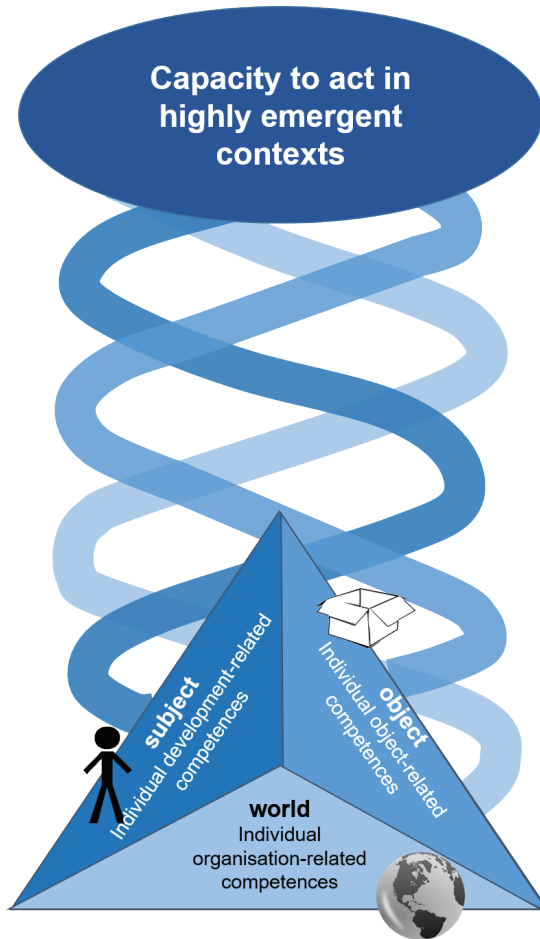
**Fig. 7**  The *Triple Helix-Model* of *Future Skills*

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.

## A 2.2   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

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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.
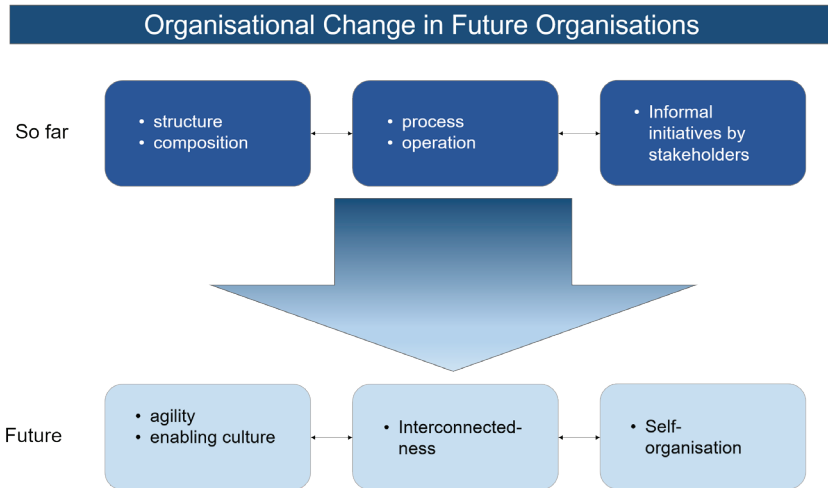
**Fig. 9**   Organisational change in *Future Organisations*

## 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 are 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;
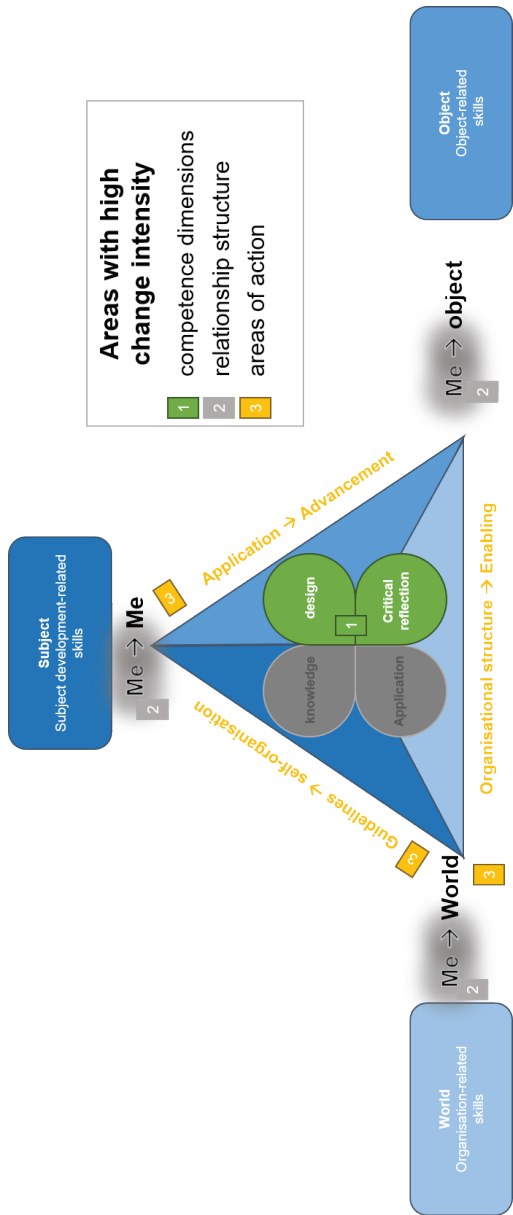
**Fig. 10** Areas of change

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.

# *Future Skills* for the World of Tomorrow

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# A 3

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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.
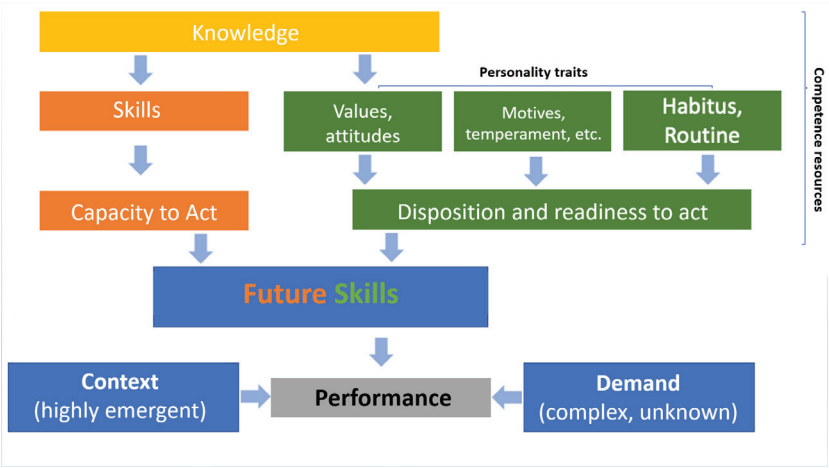


**Fig. 11** The *Future Skills* concept from a competence perspective (own illustration)

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.

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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
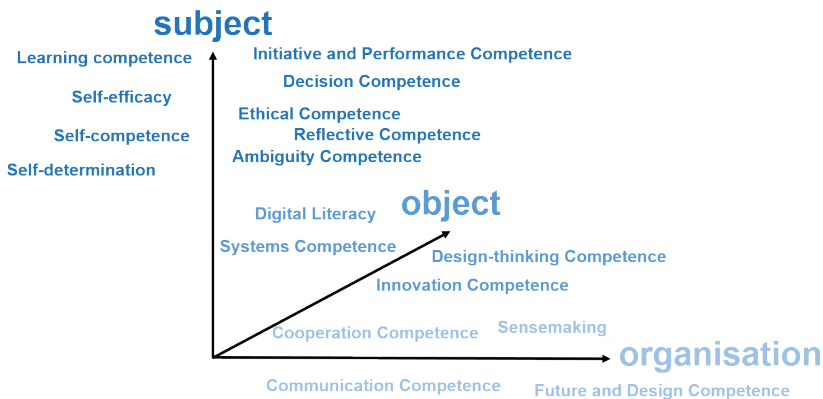
**Fig. 12** *Future Skills* map – Overview of 17 skills profiles from three competence fields
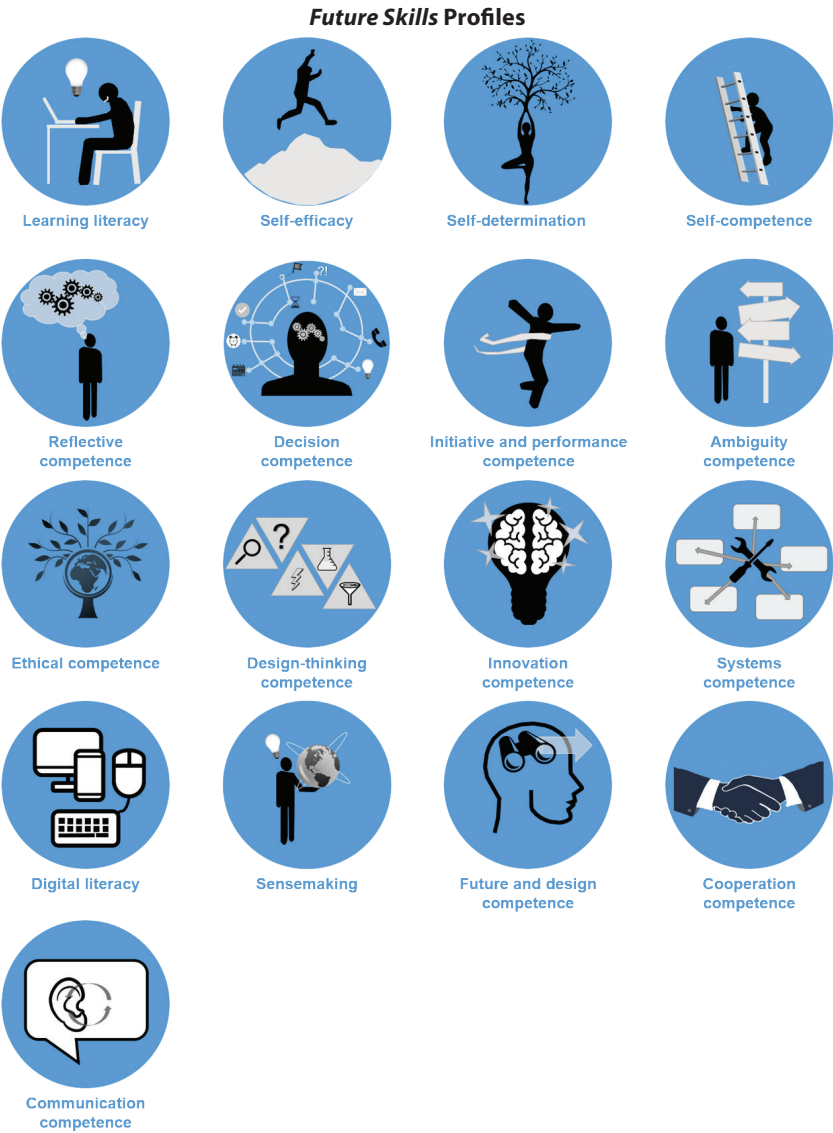
The division into three competence fields, which are shown in the picture as three *Metro lines*, follows the systematics of the *Triple Helix-Model* for *Future Skills*. It is based on the recognition that the skills necessary to cope with the demands of action can be identified on the basis of three 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

## *Future Skills* Profiles

Learning literacy

Self-efficacy

Self-determination

Self-competence

Reflective competence

Decision competence

Initiative and performance competence

Ambiguity competence

Ethical competence

Design-thinking competence

Innovation competence

Systems competence

Digital literacy

Sensemaking

Future and design competence

Cooperation competence

Communication competence

**Fig. 14** Overview of *Future Skills* profiles

## A 3.1   Competence Cluster I: Subject development-related competences

Competence cluster I contains nine competence profiles[12]. 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.

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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**
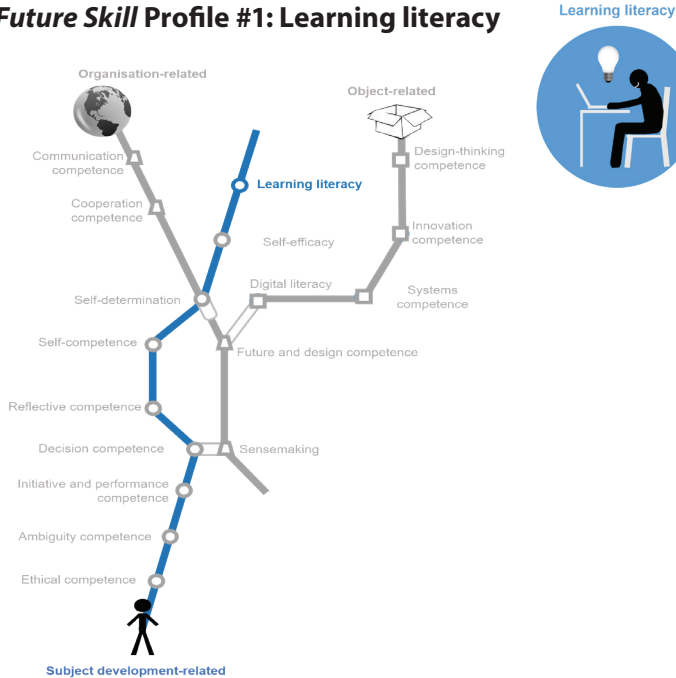


**Definition:** Learning literacy is the ability and willingness to learn in a self-directed and self-initiated fashion. It entails metacognitive skills as well. *(mean value: 4.5 of 5, standard deviation: 0.68)*[13]

**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

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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
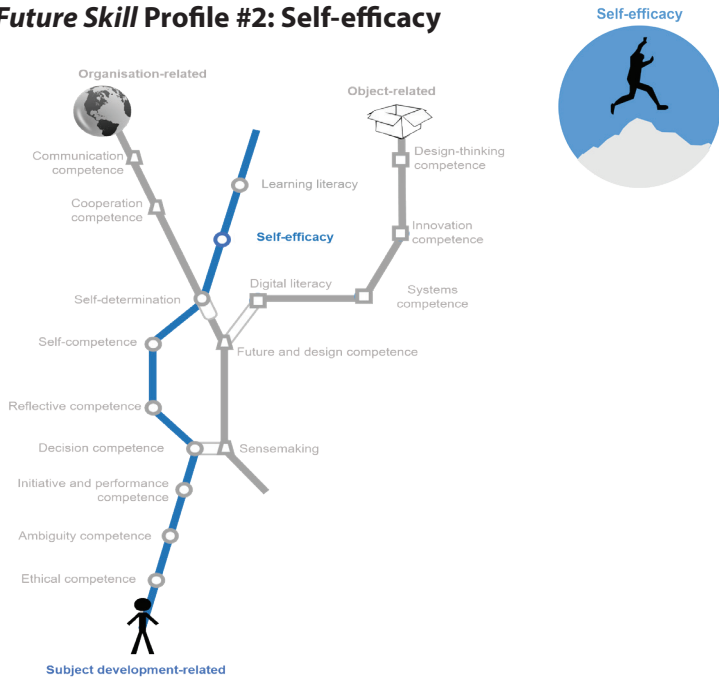


**Definition:** Self-efficacy as a *Future Skill* Profile refers to the belief and one's (self-) confidence to be able to master the tasks at hand relying on one's own abilities and taking over responsibility for one's decisions.[14] *(mean value: 4.4 of 5, standard deviation: 0.69)*

**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.

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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**
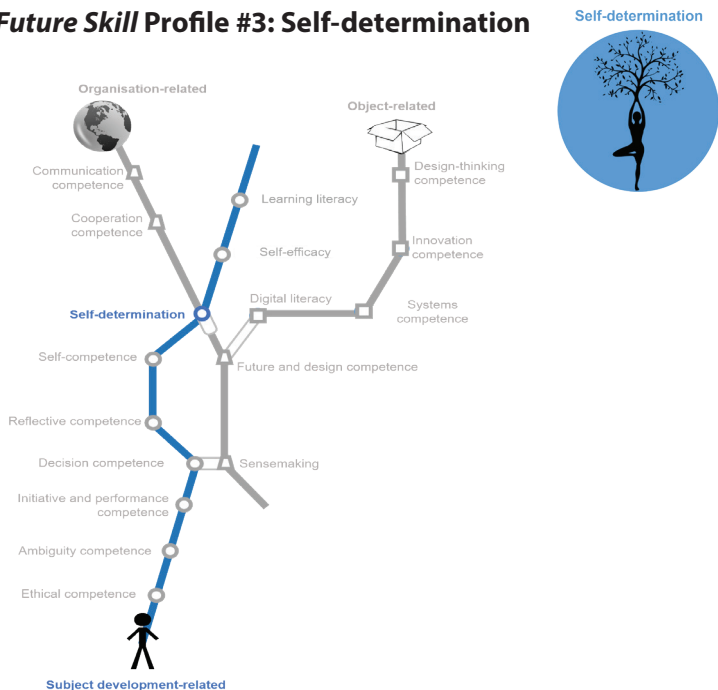


**Definition:** Self-determination as a *Future Skill* describes an individual's ability to act productively within the field of tension between external structure and self-organisation, and to create room for self-development and autonomy, so that they can meet their own needs in freedom and self-organisation. *(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
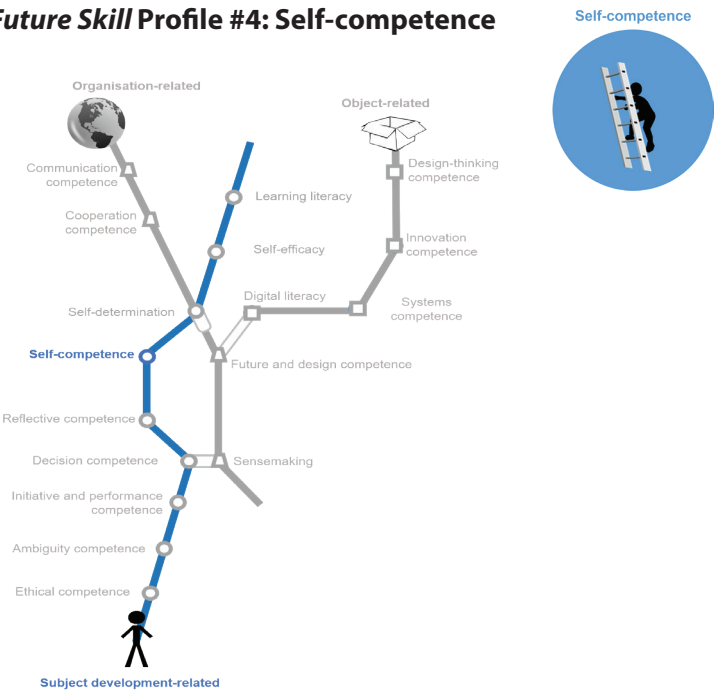
**Definition:** Self-competence as a *Future Skill* is the ability to develop one's own personal and professional capabilities largely independently of external influences (see also KMK 2015). This includes other skills such as independent self-motivation and planning. But also the ability to set goals, 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
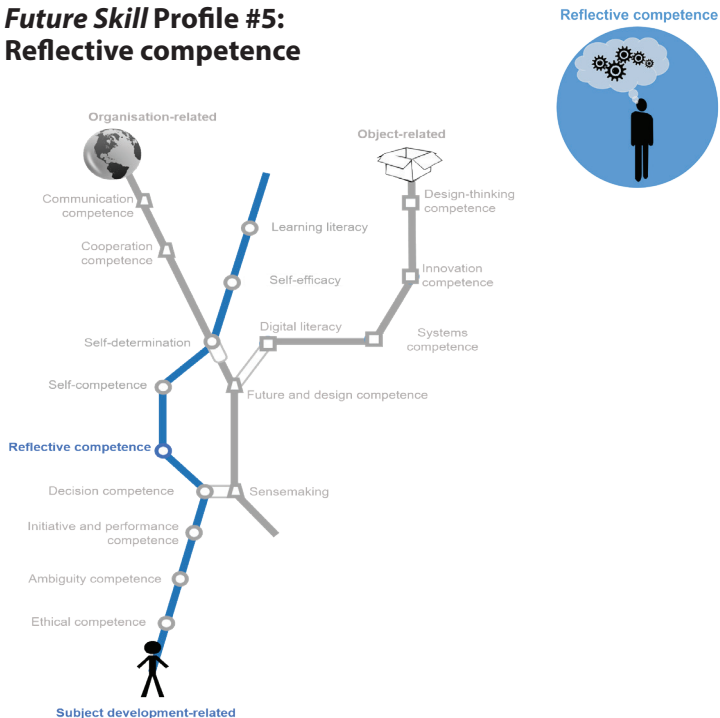


**Definition:** Reflective competence as a *Future Skill* includes the willingness and ability to reflect, i.e. the ability to question oneself and others for the purpose of constructive further development, as well as to recognise underlying systems of behaviour, thought and values and to assess their 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
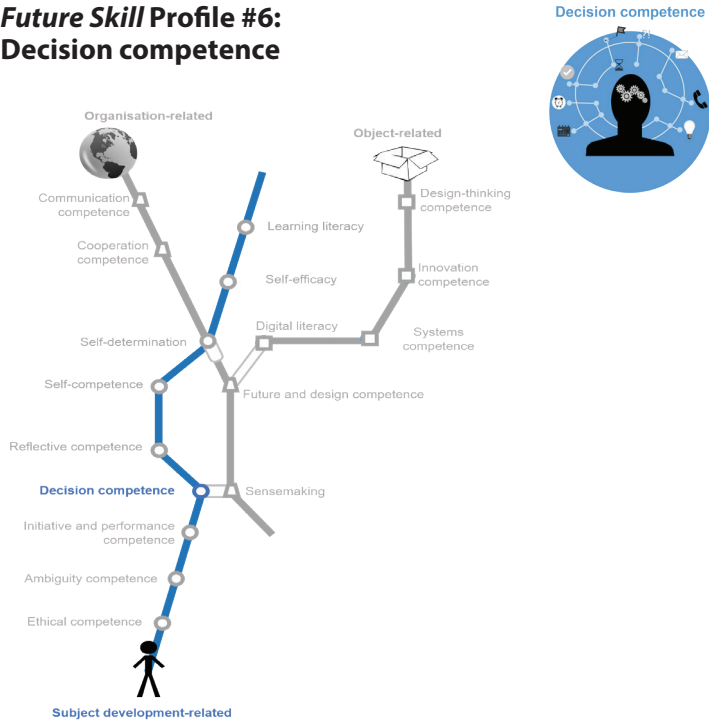


**Definition:** Decision competence as a *Future Skill* is the ability to seize decisions and to evaluate different alternatives against each other, as well as making a final decision and taking over the responsibility for it. *(mean value: 4.5 of 5, standard deviation: 0.71)*

**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
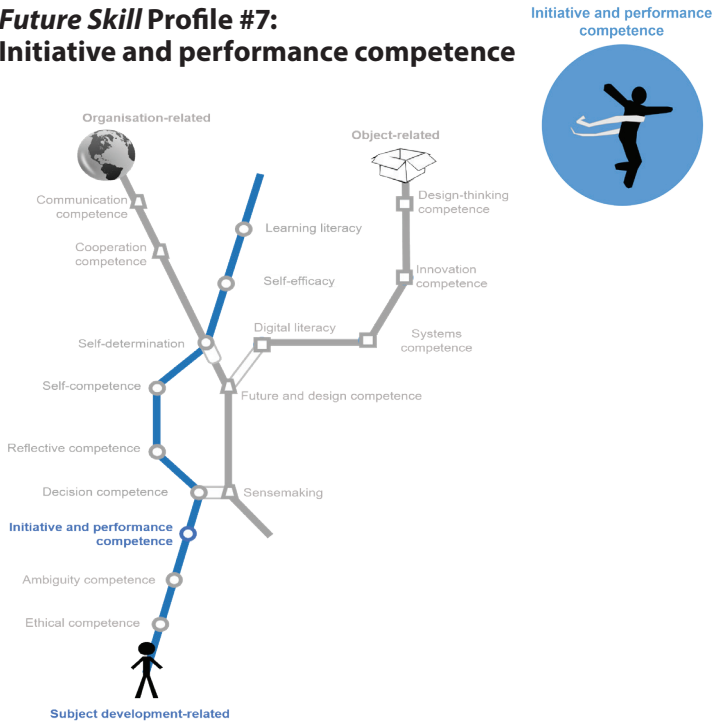


**Definition:** The *Future Skill* initiative and performance competence refers to an individual's ability to motivate him-/herself as well as to his/her wish of contributing to achievement. Persistence and goal-orientation form the motivational basis for performance. A positive self-concept also plays 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 one-self 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**
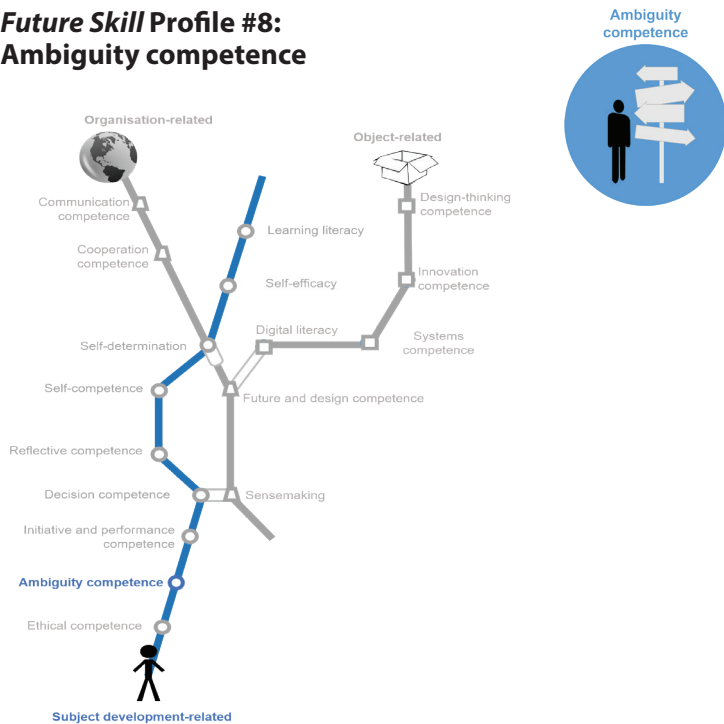


**Definition:** Ambiguity competence as a *Future Skill* refers to an individual's ability to recognise, understand, and finally productively handle ambiguity, heterogeneity, and uncertainty, as well as to act in different roles. *(mean value: 4.3 of 5, standard deviation: 0.92)*

**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**
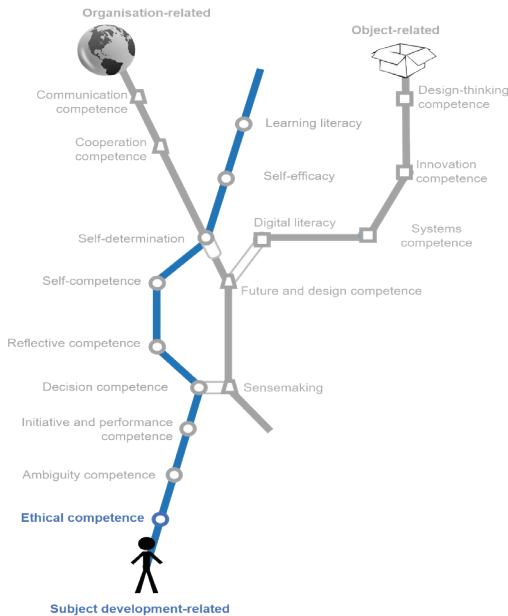


**Definition:** Ethical competence[15] as a *Future Skill* Profile comprises the ability to perceive a situation or situation as ethically relevant, including its conceptual, empirical and contextual consideration (perceive), the ability to formulate relevant prescriptive premises together with the evaluation 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).

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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
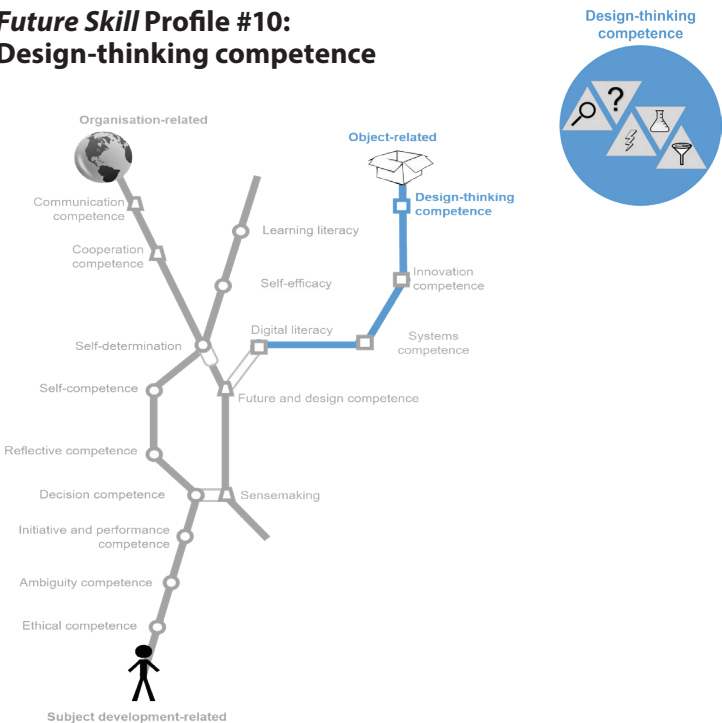


**Definition:** The *Future Skill* Profile design-thinking competence comprises the ability to use concrete methods to carry out creative development processes open-endedly

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.

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

## A 3.2.2  *Future Skill* Profile #11: Innovation competence

Innovation competence
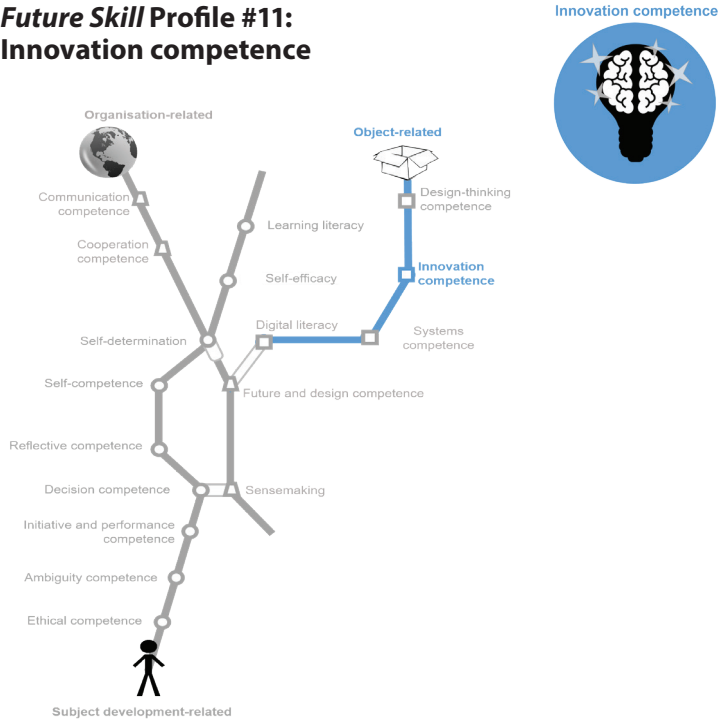


**Definition:** Innovation competence as a *Future Skill* profile includes the willingness to promote innovation as an integral part of any organizational object, topic and process and the ability to contribute to the organization as an innovation ecosystem. *(mean: 4.3 of 5, standard deviation: 0.75)*

**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
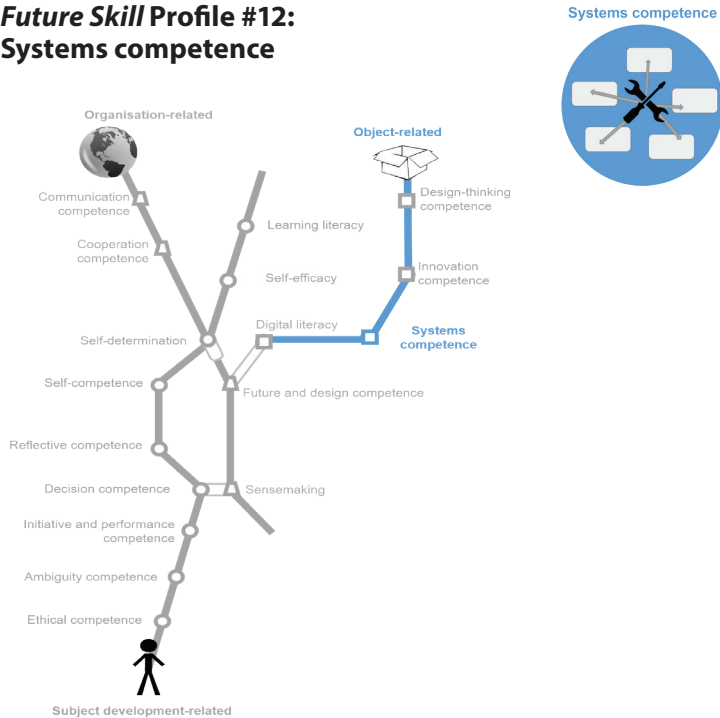


**Definition:** Systems competence as a *Future Skill* is the ability to recognise and understand complex personal-psychological, social and technical (organisational) systems as well as their mutual influences and to be able to design and/or accompany coordinated planning and implementation processes 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**
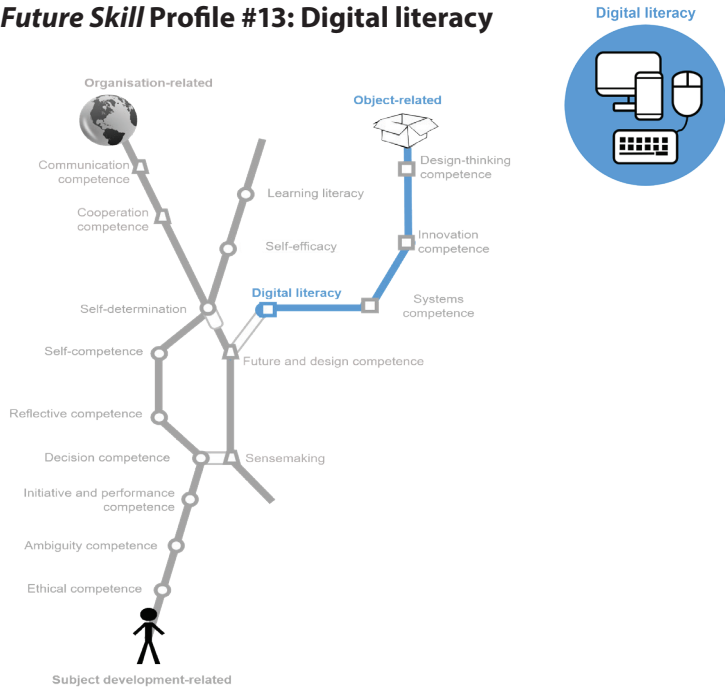


**Definition:** Digital literacy is the ability and disposition to use digital media, to develop them in a productive and creative way, the capacity to critically reflect on its usage and the impact media have on society and work, both for private and professional contexts, as well as the understanding 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
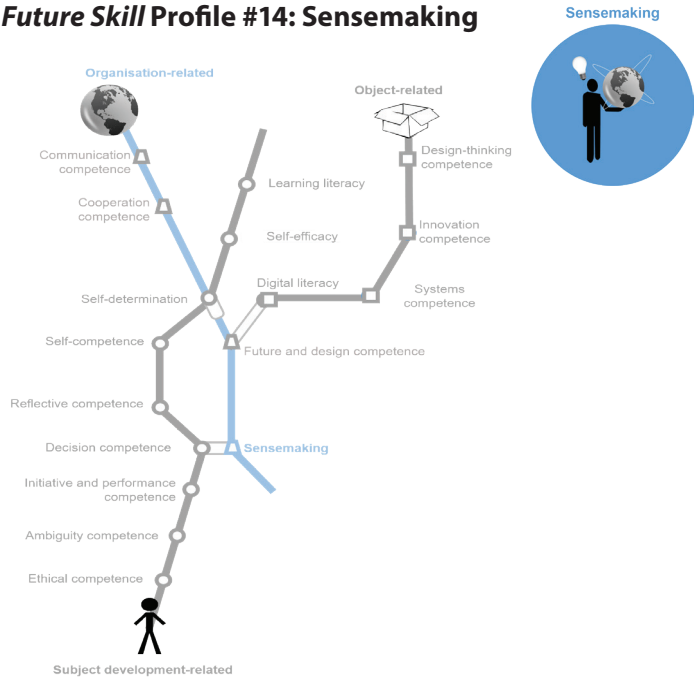
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17   A comprehensive definition of digital literacy is presented in the framework concept "DigiComp", which is the current concept at European Commission level (Carretero et al. 2017).

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.

### A 3.3.2  *Future Skill* Profile #15: Future and design competence
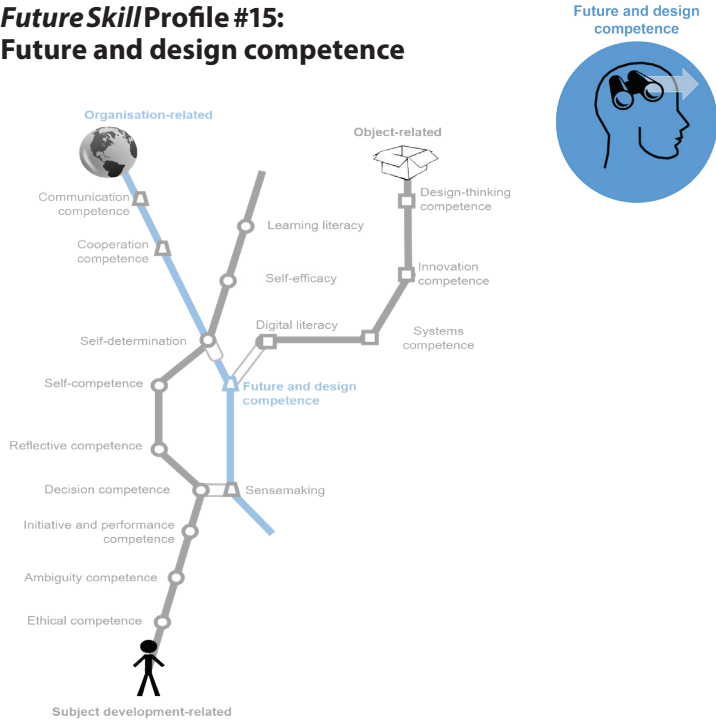


**Definition:** Future and design competence is the ability to master the current situation with courage for the new, willingness to change and forward thinking. To develop situations into other, new and previously unknown visions of the future and to approach these creatively. *(mean value: 4.3 of 5,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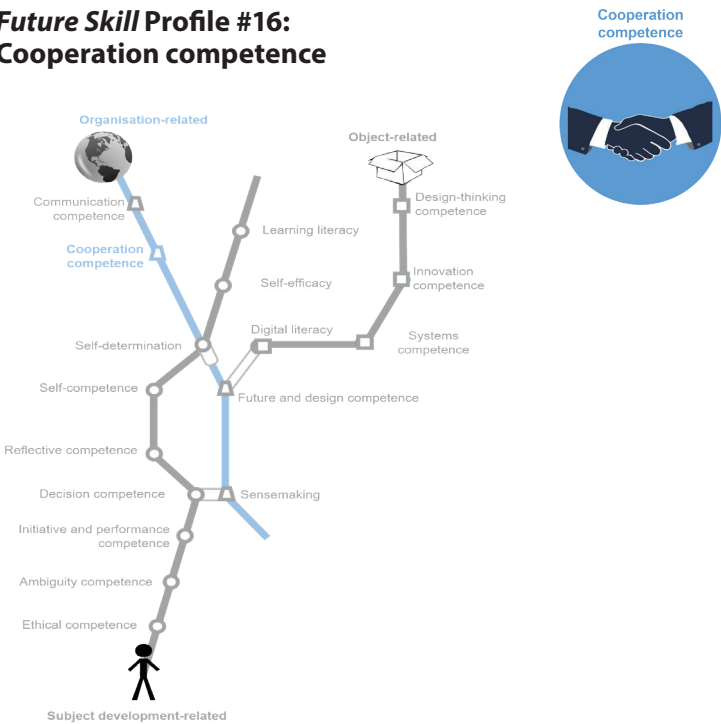


**Definition:** Cooperation competence as *Future Skills* relates to the is the ability and disposition to cooperate and collaborate in (intercultural) teams either in face-to-face or digitally-supported interactions within or between organisations with the purpose of transforming differences into commonalities. 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
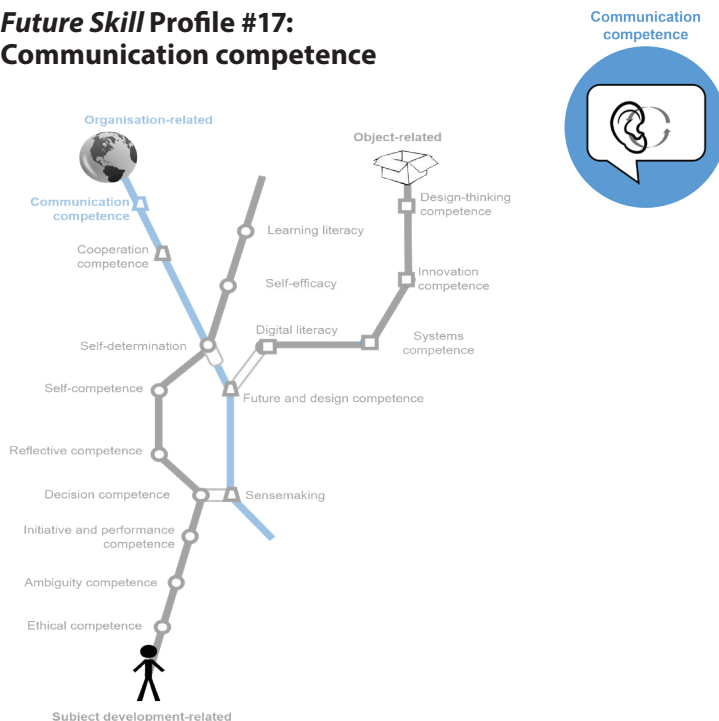


**Definition:** Communication competence as a *Future Skill* entails not only language skills, but also discourse, dialogue, and strategic communication aspects, which – taken together – serve the individual to communicate successfully and in accordance with the respective situation and context, in view 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/*Future Skill* 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 | |
| A1b | Metacognitive skills | |
| A2 | Self-efficacy | Self-efficacy as a *Future Skills* 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. |
| A2a | Self-confidence | |
| A3 | Self-determination | 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. |
| A3a | Autonomy | |
| A4 | Self-competence | Self-competence as a *Future Skill* 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. |
| A4a | Self-management | |
| A4b | Self-organisation competence | |

| ID | Competence cluster / *Future Skill* profile / reference competences | Definition |
|---|---|---|
| A4c | Self-regulation | |
| A4d | Cognitive Load Management | |
| A4e | Self-responsibility | |
| A5 | Reflective competence | 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. |
| A5a | Critical Thinking | |
| A5b | Self-reflection competence | |
| A6 | Decision competence | 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. |
| A6a | Responsibility-taking | |
| A7 | Initiative and performance 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. |
| 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/ *Future Skill* 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 *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. |
| B1a | Flexibility and openness | |
| B1b | Versatility | |
| B1c | Ability to shift perspectives | |
| B1d | Interdisciplinarity | |

| ID | Competence cluster/ *Future Skill* profile/ reference competences | Definition |
|---|---|---|
| B2 | Innovation competence | 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. |
| B2a | Creativity | |
| B2b | Innovative thinking | |
| B2c | Willingness to experiment | |
| B3 | Systems competence | 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. |
| 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/ *Future Skill* profile/ reference competences | Definition |
|---|---|---|
| C | Organisation-related competences | A third group of *Future Skills* 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 *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. |
| 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/ *Future Skill* profile/ reference competences | Definition |
|---|---|---|
| C3c | Leader as a coach | |
| C3d | Intercultural competence (organisational culture) | |
| C3e | Counselling competence | |
| C4 | Communication competence | 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. |
| C4a | Language proficiency | |
| C4b | Presentation competence | |
| C4c | Capacity for dialogue | |
| C4d | Communication readiness | |
| C4e | Consensus orientation | |
| C4f | Openness towards criticism | |

# Higher Education Readiness for *Future Skills* Adoption

<div align="right">

# A 4

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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).
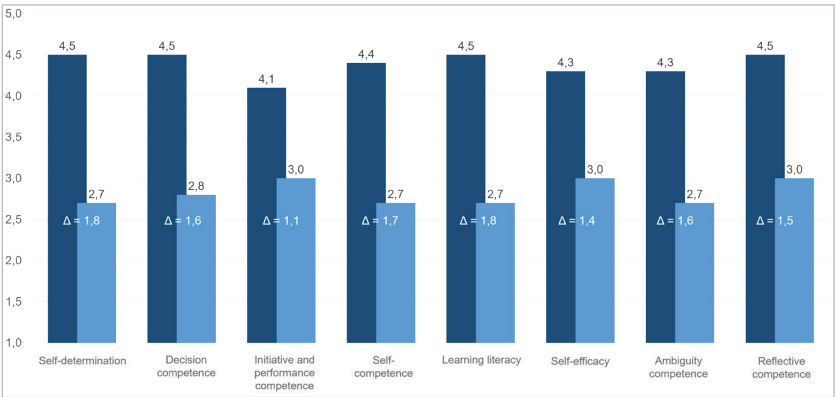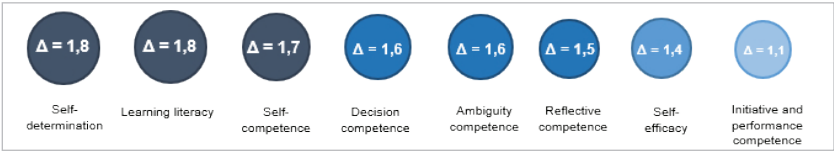


**Fig. 15**  Subject development-related skills: Importance versus higher education institutions' readiness to promote *Future Skills* development (N = 46)[18]

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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)

## A 4.2   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.
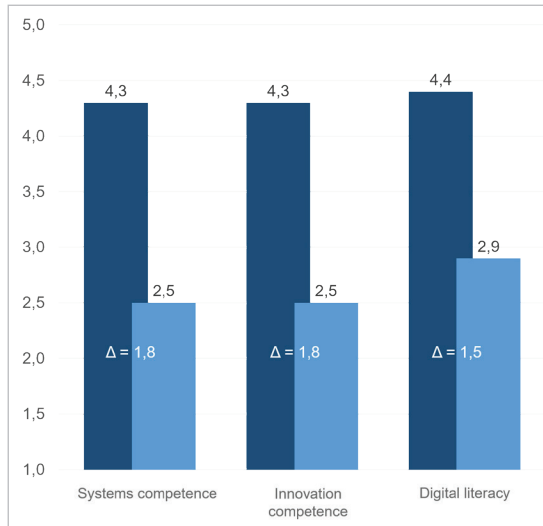
**Fig. 17** Object-related skills: Importance versus higher education institutions' readiness to promote *Future Skills* development [19]

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 ($N_{Importance}$ = 44, $N_{Support}$ = 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.
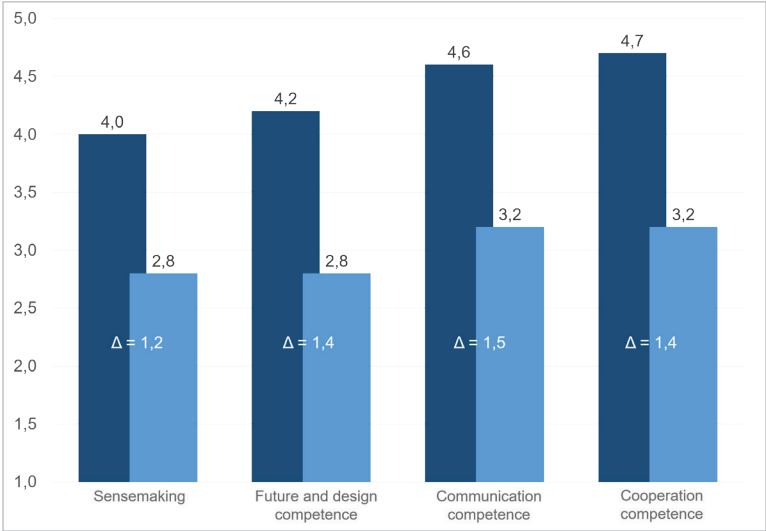


**Fig. 19** Organisation-related skills: Importance (dark blue bars) versus higher education institutions' readiness to promote *Future Skills* development (light blue bars) (N = 45)

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.