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Prospective Report on the Future of Non-Formal and Informal Learning: Towards Lifelong and Life-wide Learning Ecosystems

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Prospective Report on the Future of Non-Formal and Informal Learning: Towards Lifelong and Life-wide Learning Ecosystems

Report prepared by AIT and DUK

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Table of Contents

Executive Summary

A key challenge for our society is how we view and organise learning and education in the context of rapidly changing technological, economic and societal developments. To respond to this challenge, the European Commission and the DG for Education, Youth, Sport and Culture (EAC) initiated a debate to generate new, forward-looking policy ideas. A major development in education, triggered by different drivers, is the growing importance of non-formal and informal learning.

Today, learning already takes place across many different places in different settings. Apart from traditional formal learning, we see that non-formal and informal learning is happening in different spaces and contexts nowadays. Youth work has been considered one of the main providers of non-formal and informal learning. Such types of learning are typically taking place voluntarily in real-life situations and often through peer interactions and participatory approaches. In addition, non-formal and informal learning take place in work and leisure. Work and career-oriented learning, upskilling and reskilling on the job, and learning for personal development are frequently associated with informal, flexible and collaborative ways of learning. At the same time, we can also observe that the boundaries between formal, non-formal and informal learning are blurring. Digitalisation enables this development by allowing online courses to be provided in a more flexible manner and to promote peer-learning among learners with different backgrounds.

At the European level, several initiatives have been launched in the past 15 years to support non-formal and informal learning, and to promote its validation and recognition. The European Qualification Framework, the Europass and the validation process scheme for non-formal and informal learning (identification, documentation, assessment, certification) can be mentioned here as significant milestones.

To develop a vision of the future of non-formal and informal learning, this study identified major trends and drivers on different forms of learning. These trends were assessed by an online survey involving around 200 experts from different sectors and countries. Based on the outcome of their assessment, three scenarios and their corresponding implications for society, economy, education systems and policy have been developed and discussed.

The three scenarios envision three different coherent and possible futures of learning and education with a focus on the role of non-formal and informal learning. The scenarios are sketched as follows:

Scenario 1: „Hybrid Learning"

In this scenario, new institutions will emerge and specialise to promote and recognise non-formal and informal learning especially based on digital learning. They will provide alternative paths through digital learning based on flexible and modular learning systems. These new institutions will emerge from both the public and private sectors. Moreover, public and private education institutions collaborate to foster non-formal and informal learning. Recognising non-formally and informally acquired skills and competencies will be easier due to measurable competency assessment and modular and competencies-based teaching which will be developed by new types of institutions. There will be increasing policy support for recognition of non-formally acquired skills and competency-based learning. On the other hand, formal education will slowly adapt to the changes in skills and their provision. Teachers will be able to cope with the development and deliver both transversal skills and digital skills. Even more, teachers will be able to address the needs of increasingly diverse groups in the formal education system.

Scenario 2: „Market-driven Education"

The public education system is responding poorly to new trends. Only a limited group of teachers can translate new technologies into better teaching and transfer the new skills to the learners. These gaps will be filled by (new) private institutions but also Civil Society Organisations (CSOs) and Non-Governmental Organisations (NGOs) that will provide modular and flexible, tailor-made learning programmes according to the needs of each individual. This society is characterised by an increasing economisation of the education system. The stratification for adults and people already in a job is reflected by the educational opportunities: training on the job, or second or third career training is available only commercially, thus only affordable for very few employees and their employers. The education system is perpetuating increasing inequality as a social trend. Vulnerable groups, such as families with low income, single parents, families with many children, migrants from the global south, etc. are strongly disadvantaged in this setting. Due to modest policy support for acknowledgement of non-formal and informal learning, the recognition of alternative education paths will become difficult.

Scenario 3: „Digital Transformation"

In this scenario, almost all spheres of life are permeated by digital technologies. Large global players dominate the content provision, have total control of data and exert influence over the curricula and on hiring people directly after graduation. Within the education system, STEM (Science, Technology, Engineering, Maths) subjects are promoted at all levels, leaving other subjects behind. For the education sector this means that schools are fully digitalised and children learn from early on to handle the technology and work with it. The same applies to adult education, for which mainly digital content is provided. There is heavy use of information technologies and platforms, also for informal and non-formal learning, provided by online content providers. Acknowledgement of certificates by firms and authorities is easy. However, there is also a persisting digital inclusion ("diginclusion") gap. Although the level of digital competencies increases as adults have now been familiar with digital technologies starting from an early age, the pace of technological development is so fast that some can benefit extensively while others can only benefit at a minimum. Teachers and the education system are unable to develop and provide the necessary basic skills and complementary learning skills (transversal, meta) parallel to digital learning and cannot keep up with the digital transformation.

Based on these different scenarios it is also possible to identify some conclusions for policy-making. Although the scenarios are not forecasts of the future, the assessment of the likelihood and desirability of the three possible development paths can reduce the risk in decision-making. The participants of the workshop were asked to assess the three scenarios showing that the scenario "Hybrid Learning" was considered clearly as the most desirable scenario followed by the "Digital transformation", with the "Market-based" scenario identified as the least aspiring picture for the future. In regards to likelihood, the "Market-based education" scenario was considered as most likely, closely followed by the "Hybrid Learning" and "Digital transformation" scenario.

Policy conclusions can be derived from a specific scenario assuming that policy aims to promote a specific scenario or avoid risks associated with the scenarios. Moreover, there are some fundamental trends and challenges associated with all scenarios. Among others, the ambiguous borders between formal, non-formal and informal learning will force the formal sector to develop clear strategies and practices to cope with the increasing demand to provide transversal skills. In addition, cross-sectoral collaboration and peer-learning among teachers as well as with other stakeholders within and across education institutions need to be promoted. There is a lack of acknowledgement of learning outcomes of non-formal and informal learning and hence methods for the acknowledgement of learning

outcomes of non-formal and informal learning need to be developed and/or improved. A change of practices is required for the assessment of non-formal and informal learning in Europe.

Digitalisation is a major trend that will undoubtedly change the education system and the way we learn. Digital technologies have wide-reaching positive effects but may also have negative effects which could foster the digital divide and existing inequalities. Assuring digital access in education does not necessarily mean having equal access to learning opportunities. Investment in people and widening access to different forms of learning is as important as investments in digital technologies. Better support for teachers and educators in using digital technologies in different learning environments is needed to address the initial professional competencies as well as digital skills.

The current high speed of development leads to the expectation that companies and private education providers are better equipped to adapt and provide related services, and thereby may even shape developments. In contrast, the public education system is adapting rather slowly and demonstrates immense inertia. Thus, public policy has to facilitate the transformation of the public education sector encompassing the training of school leaders as well as the flexibilisation of the education programs offered to provide a holistic lifelong and life-wide learning perspective for the future.

1 Introduction

Education and learning have undergone fundamental changes in the past decades and are seen as key for the future development of society and the economy. Many economic, social and technological trends have an impact on where we learn and how we learn. Moreover, the learning contexts and spaces have widened, going beyond schools and formal education. Learning can happen almost anywhere, anyplace, anytime. Different forms of learning allow achieving the learning outcomes needed to cope with challenges and situations faced in everyday life, at work and in society at large. In this environment, non-formal and informal learning have gained momentum and will most likely play a growing key role in the future.

Non-formal and informal learning are clearly defined by the European Council in the recommendations on the validation of non-formal and informal learning (2012)[1] and these definitions are adopted for this report. Non-formal learning takes place through planned activities (in terms of learning objectives, learning time) where some form of learning support is present (e.g. student-teacher relationships). Very common cases of non-formal learning include in-company trainings, e.g. structured online learning (e.g. by making use of open educational resources), and courses organised by civil society organisations for their members. Informal learning results from daily activities related to work, family or leisure and is not organised or structured in terms of objectives or learning support. It may be unintentional from the learner's perspective. Examples of learning outcomes acquired through informal learning are skills acquired through life and work experiences, project management skills or ICT skills acquired at work, languages learned during a stay in another country, cultural activities, youth work or learning through activities at home. These definitions corroborate with UNESCO's International Standard Classification of Education (2011).

Looking at the current situation of non-formal and informal learning, it is important to highlight that Europe has taken strategic and considerate measures regarding the future of learning and education in Europe.[2] Non-formal education has a long tradition in Europe and it has been increasingly recognised by the civil sector and by policy at the national and European levels. The EU has developed a comprehensive educational framework in the last decades on different types of learning and provided the policy context that supports non-formal and informal learning as well as lifelong learning as a key to deal with the social demographic and economic challenges Europe has been facing. This framework is based on three pillars or key policy issues: key competencies and skills[3]; qualification frameworks based on learning outcomes[4]; and validation of non-formal and informal learning. Validation, recognition, credit transfer and qualification frameworks create a permeable education system. It is underlined that "permeability must enable learners to transfer and build on all types of their prior learning – formal, non-formal or informal – wherever that learning took place, at school, work, "or even during leisure".[5]

Europe has been a pioneer in permeability, especially with the development of the National Qualification Frameworks (NQF) and the European Qualification Framework (EQF) and in transfers from Vocational Education and Training (VET) systems to academic higher education. "Formalising the informal and non-formal" and making all learning visible have been on the EU agenda and several steps have been taken to create a better system for a Europe-wide systematic framework that works hand-in-hand with the development of NQF

[1] Recommendation on the validation of non-formal and informal learning: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32012H1222(01)&from=EN
[2] See ET2020: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=LEGISSUM:ef0016&from=EN
[3] Recommendation on key competences for lifelong learning: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&from=LT
[4] Recommendation on European Qualifications Framework for lifelong learning: https://ec.europa.eu/ploteus/sites/eac-eqf/files/en.pdf
[5] See CEDEFOP (2012, p.2).

and national competencies. NQF "aims to be a unifying device, to create ladders, linkages, and pathways that afford seamless mobility to lifelong learners".[6]

Within this increased scope for mobility, validation plays a crucial role in paving pathways to education, training, and qualifications; promoting workforce development and participation in the labour market; enhancing social inclusion and democratic citizenship; and personal and professional empowerment.[7] This is also important for professional areas such as youth work which contributes significantly to the learning context in Europe. Youth work has been considered one of the main providers of non-formal and informal learning. Such types of learning are typically taking place voluntarily in real-life situations and often by peer interactions and by participatory approaches. This type of learning often follows an individualised approach and is accessible to different groups irrespective of their social or educational background. Youth work thus supports personal and social development through non-formal and informal learning.[8] Youth work not only develops skills and competencies but also strengthens the social networks of the learners. However, across Europe, youth work varies considerably in regard to opportunities, support structures and possibilities for recognition.

Adult education happening after leaving the initial education and training system is the second important area where non-formal and informal learning takes place. In terms of participation in non-formal and informal learning, European statistics show that most adult education and training provided in the EU-28 was non-formal education and training that took place outside of formal institutions such as schools, colleges, and universities.[9] In 2016, around 12% of the working-age population (aged 25-64) participated in non-formal and informal learning activities. The participation rate is higher for younger people compared to those who are above 55. The content and the purpose of the learning activities are important to underline. In 2016, approximately 80% of the non-formal learning activities for adults in the EU-28 were job-related and only 19% were not job-related. Parallel to this, employers were the most common providers of non-formal education and training activities (35% of the non-formal learning activities). Although there were differences across countries, this shows that non-formal learning activities are shaped around work-based/related learning which targets work-related skills and competencies.

As an addition to the discussion about institutional frameworks of non-formal and informal learning, the role technology plays in shaping the adult learning context is crucial to explore. Technology has been accepted as the major driver of global transformations and it becomes more prominent within policy and practice due to its more direct and rapid impact on education, work and skills since the first industrial revolution. The connection between technology, the nature of work and the training of skills is stronger than ever before. It has significantly changed the nature of work and business already, yet education is slow to keep up. We can observe that a number of education institutions have already started to use digital technologies and, for instance, offer online courses and provide free leaning content digitally. This enables non-formal and informal learning for individuals not officially registered at the school. Besides online courses, blended-learning is increasingly gaining momentum. Digitalisation also offers new opportunities for employers, enabling new ways of learning.

Altogether, we can observe that the boundaries between formal, non-formal and informal learning are blurring. This means that on the one hand, a formalisation of non-formal and informal learning is taking place, and on the other hand, an informalisation of formal learning becomes evident.[10]

The increased importance of non-formal and informal learning raises new questions concerning the assessment, recognition, and validation of the learning outcomes. This is

[6] See Harris (1999, p. 124).
[7] See Singh (2015, p. 63).
[8] See also Expert Group on Youth Work Quality Systems in the EU Member States (2015).
[9] See Eurostat (2018).
[10] See Heikkinen et al. (2012).

particularly challenging for the recognition of non-cognitive skills and learning experiences gained outside school. In the workplace, for instance, employers accredit work-integrated learning outcomes and thus informal learning becomes more formal.

It is clear that the European Union is aware of the importance of lifelong learning and adult learning and its role for the future of education. Europe considers education as a "social right" above anything else. The European Pillar of Social Rights places education as the first principal. It states that "everyone has the right to quality and inclusive education, training, and lifelong learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market."

Based on the threats, risks, chances, and opportunities in relation to different social, economic and technological trends, this prospective study aims at plotting possible and probable scenarios for the development of non-formal and informal learning in education. The study hence investigates possible development paths for non-formal and informal learning. To support policy-makers, this project aims at clearing up the blurry picture and at arriving at well-defined scenarios of development in non-formal and informal learning in the midterm (2030).

In order to develop scenarios for 2030, in-depth desk research on the future of non-formal and informal learning was conducted in the first stage of this study. A horizon scanning approach was adopted to identify those trends and drivers that will have a potential effect on different forms of learning. The documents used as sources covered the literature strand on non-formal and informal learning, on education policy and foresight, and forward-looking studies. From a body of about 300 sources, the first scanning filtered 81 documents that were analysed in more detail for drivers and trends pointing towards a time horizon of 2030. The findings were then structured according to a STEEP (society, technology, economy, education, policy) analysis classifying education as a single category, too.

From this analysis, 50 trends were selected to be explored in more detail on their potential impact and role in the future of non-formal and informal learning. Based on further analysis, the top 25 were identified to represent the ones with the estimated highest impact and the highest uncertainty at the same time. These trends and drivers were subsequently assessed with an online survey by approximately 200 experts from different sectors and countries. The survey delivered a systematic picture of the possible impact of various drivers for the future of non-formal and informal learning.

Finally, based on the outcome of the survey, three scenarios were developed based on a limited set of trends and drivers. The scenarios were discussed with experts from different areas during a workshop in Brussels organised in July 2019. For each scenario, the implications for the society, the economy, the education system, and policy were elaborated in more detail. The three scenarios presented in this study do not aim at predicting the future but show possible development paths for the future of learning and thus can guide policy-makers and stakeholders in shaping the future.

2 Major Trends and Drivers

The basis of this task was in-depth desk research comprising a structured analysis of the literature sources about the future of non-formal and informal learning. Our analysis included potential challenges, opportunities, threats, weaknesses, wild cards, and weak signals. Our horizon scanning approach went beyond the beaten path and also considered out-of-the-box thinking and unconventional aspects. The findings were then structured according to a STEEP (society, technology, economy, education, policy) analysis classifying education as a single category as well. For each area, specific trends[11] and drivers[12] were identified. The main development trends in the different dimensions and their possible impact on non-formal and informal learning are presented next. The list of the identified trends and drivers can be found in the Appendix.

2.1 Society

Major societal transformations have an impact on the future of employment and non-formal and informal learning. Ageing in combination with low fertility rates will lead to overall developments so that by 2050, the number of over-60s and the number of children will amount to equal proportions.[13] This has an impact on afflictions like non-communicable diseases and increased disabilities, and it will considerably increase demand for health and social care jobs and associated education and training. In addition, technological advances for the promotion of physical and cognitive capacities could allow the elderly to remain in the work progress. This, in turn, requires familiarity with technology and digital competencies from early on.

The extent of non-standard work is increasing, which has an impact on the precariousness of jobs, incomes and the segmentation of the labour market. The definition of non-standard employment includes the self-employed, employees with a temporary or fixed-term contract, and those working part-time or fewer than 30 hours per week, as well as caretakers. With this in mind, around 42% of the working population in 2014 in the EU were in non-standard employment.[14] The concept of 'flexicurity', which has been a central part of the European Employment Strategy, relates to the reconciliation of two objectives: one, the demand from firms for more flexibility to adjust to volatile markets and two, workers' need for stable incomes and security. Non-standard work entails a high amount of non-formal and informal learning and has impacts on the dissolution of boundaries between work, learning, and life.

Attaining equity and increasing educational levels of young people is a policy priority for the EU. In 2015, more than a quarter of the EU population aged 25-64 had left initial education and training with at most a lower secondary education qualification. There is a general agreement that these people face serious difficulties concerning stable employment and further Vocational Education and Training (VET) [15]. This is because most jobs increasingly require transversal skills like critical and innovative thinking, interpersonal skills (e.g. presentation and communication skills, organisational skills, teamwork, etc.), intra-personal skills (e.g. self-discipline, enthusiasm, perseverance, self-motivation), global citizenship (tolerance, openness, respect for diversity, intercultural

[11] A trend is an emerging pattern of change likely to impact on large social groups or even governments. Trends are experienced by everyone and often in more or less the same contexts (e.g. artificial intelligence substituting routine work) (Council of State Governments (USA), http://ssl.csg.org/Trends/Megatrends%20Definitions%20and%20Categories.pdf).

[12] Drivers are defined as developments causing change, affecting or shaping the future. A driver is the cause of one or more effects, e.g. you tube is a driver for non-formal learning (Council of State Governments (USA), http://ssl.csg.org/Trends/Megatrends%20Definitions%20and%20Categories.pdf).

[13] OECD (2016).

[14] Eurostat, Matsaganis *et al.* (2016).

[15] Council Recommendation of 19 December 2016 on Upskilling Pathways: New Opportunities for Adults (2016/C 484/01) p1f

understanding), and media and information literacy (such as the ability to locate and access information, as well as to analyse and evaluate media content)[16]. Low qualifications go along with fewer employment opportunities, and higher vulnerability to precarious jobs and a twice as high likelihood of long-term unemployment[17].

Through in-migration, while potentially solving anticipated labour and skills shortages in countries with in-flows of migrants, the size and importance of ethnic minority groups will grow leading to labour markets with more cultural diversity. However, limited integration bears increased danger of disadvantages and vulnerabilities, with potential impacts on educational levels, access to employment, health and well-being.

In the coming 10-20 years, people are likely to be more empowered than ever to share knowledge, become aware of their environment, and make informed and responsible decisions. They are more active on a global level. New platforms for social networking will allow citizens an increased ability to self-organise into communities that will emerge as new powers that are able to exert influence and address shared problems in a more structured, responsible, and concurrent manner. Key competencies[18] such as entrepreneurship, citizenship, and transversal skills are of increasing importance.

2.2 Digital Technologies

The advancement of technologies, especially digitalisation, is a trend that is expected to continue developing in coming decades. It is expected that a high proportion of working activities will change due to human-machine collaborations; what cannot be carried out better by machines will be the driving force of job specialisations. This, in turn, has an impact on skills requirements.

There have already been effects on the education system and these are likely to expand. Digital technology has been used to increase the accessibility of education, providing new instruments and solutions for innovative pedagogical concepts and distance learning tools like massive open online courses (MOOCs) and webinars. Thus, technology can develop and promote access to learning opportunities.

There are two basic forms in which digital technologies will further continue to impact education: First, the joint influence of a range of technologies (e.g. Internet of Things, additive manufacturing, advanced robotics, etc.) and new processes (e.g. big data analytics, artificial intelligence, etc.) will impact the skills people will need and develop in their education and training activities throughout their lives. Second, digital technologies potentially reshape the role and mission of teachers and trainers. All this is also dependent on the digital cultures of societies. Digital culture then becomes a pillar of intellectual and social capital in the more advanced societies. Complex digital technology proficiency will be commonly measured by the popularisation and accessibility to future and emerging technologies; as well as coding literacy levels; and education entrepreneurship levels (as new ways of production will have changed due to the separation of capital and labour, shifting the focus of higher education institutions from organiser of citizen personnel to enabler of social entrepreneurs).

Although digital competencies and digital culture will be of high relevance in the future context of lifelong learning, there will be further crucial skills and competencies complementing the digital: soft skills are important, they include skills such as empathy, creativity or imagination.[19] Furthermore, the ability of critical and problem-solving-oriented thinking belongs to human skills, as well as a high level of productivity and responsibility. Meta skills are of a higher order than the first two types of skills. They enable dealing with

[16] UNESCO Bangkok (Asia-Pacific regional bureau for education), UN (2014).
[17] Communication from the Commission, A New Skills Agenda for Europe, COM (2016) 381 final.
[18] European Reference Framework of Key Competences for lifelong learning; Proposal for a Council Recommendation on Key Competences for Lifelong Learning COM(2018) 24 final.
[19] Carretero et al. (2017).

the requirements of increasingly dynamic and short innovation cycles that shape the working environment and allow individuals to work in a context characterised by ambivalence and uncertainty.[20]

2.3 Economy

Projections show that global growth will slow from 3.6% in 2010-20 to 2.4% in 2050-60.[21] At the same time, production in industrialised countries will move away from energy-intensive physical assets to intangible assets (i.e. knowledge-based capital). In the past, within global value chains (GVCs), more labour-intensive activities have typically been offshored from industrialised economies to economies with lower labour costs. Wage increases in countries with traditionally low labour cost, e.g. in China, are quickly eroding this competitive advantage. Furthermore, digitalisation and industry 4.0 technologies make reshoring more attractive. All these developments point to jobs that require both a higher level and a broader range of skills and fewer jobs of an elementary nature. It is expected that even jobs which traditionally required low-level qualifications or no qualifications at all are becoming more demanding.[22]

Sector-specific requirements for skills and competencies make additional solutions necessary to tackle skills shortages in economic sectors. Social partners in several sectors, including commerce, construction, and telecommunication, have reached joint positions on skills, including specific initiatives on apprenticeships and traineeships[23]. Self-organised informal learning communities are of increasing importance also with respect to sectoral or disciplinary specificities. Circular economy activities, highly valued and much expected, can gather momentum across the world in both developed and emerging economies, only if they go along with long-term changes in mindsets, policy approaches, business opportunities, and business models, which requires lifelong learning of an informal and non-formal way and the acquisition of transversal competencies. Sustainable development goal 12 – Responsible Consumption and Production – requires related informal and non-formal learning activities, as well as integration into formal education and training. Entrepreneurship is generally expected to rise due to dynamic employment relationships, and because the costs of equipment and computing will continue to decrease, while the increase of open source initiatives will create further communities of practice, not only in software but also in hardware and "wetware", e.g. in do-it-yourself synthetic biology.

2.4 Education

The education landscape in 2030 will be characterised by the "blurring of boundaries"[24] between the different levels and directions of education, between education and industry. It will provide greater flexibility in designing educational pathways tailored to individual needs and combining several education modes into a lifelong and life-wide stimulating learning experience[25]. Changes will be observed in the following areas of non-formal/ informal learning: skills and competencies; access and participation; resources and systems and strategies.

The link between the economy and education will be stronger due to changing forms of production and industry in relation to technological and industrial developments as well as fundamental changes in teaching and learning processes driven by key developments like

[20] Lebert and Gahren (2019).
[21] OECD (2016).
[22] Council Recommendation of 19 December 2016 on Upskilling Pathways: New Opportunities for Adults (2016/C 484/01), p1
[23] Communication from the Commission, A New Skills Agenda for Europe, COM (2016) 381 final, p 13.
[24] Redecker (2014).
[25] See Paris Communiqué (2018, p. 3).

digitalisation but also ageing society[26]. Education is seen as a key to provide necessary human capital to adapt to the new modalities of the economy as well as the emerging challenges more than ever before. Thus, skills and competencies will become more important than formal qualifications and degrees.

Access to non-formal and informal learning will be widened due to mainly requirements of the occupations and businesses and also to increased numbers of offers. Yet, there will not be equality in accessing non-formal learning activities.

A more permeable open education system that allows individuals to create their own learning path in line with their individual lifestyles and preferences will appear. Validation of prior learning will gain more importance in creating the individual learning paths through non-formal and informal learning experiences[27]. Lifelong learning, non-formal and informal learning will be formalised through validation systems[28] Digitalisation's impact on education will be more visible.

Within this system, the educators' role will also take a new form. The paradigmatic change that started already in teaching methods and instruction will be more concrete as the educators/trainers will be more a facilitator to individuals to accompany and guide them throughout their learning path. Career guidance and counselling will gain more importance in providing support to individuals when they are overwhelmed with the choices that need to be made. It is important to note that these developments do not lead to disassembly or devaluation of the formal education system. However, formal education systems will also need to adapt to the developments described above.

Last, but not least, resources for non-formal and informal learning will mainly be provided by companies and learners.

2.5 Learners

After all these transformations, learning will also take a new shape. Learning space will lose its physical structure and boundaries. In line with that, learners will need to be more aware of their own learning needs, learning gaps and learning paths in order to pursue a good working and social life. Despite the increasing role of companies in measuring the skills and assessing the learning needs of the employees, the role of the learners will change, especially with more individualised and tailor-made learning programmes. Learners will need to be more aware of the requirements of the positions they want to aim for and upskill or reskill themselves according to that, as the skills will be obsolete in more frequent intervals. The challenge for learners will be the diversity and range of the offers provided by the institutions and their ability to evaluate alternatives and find the right programmes for their needs. They may get lost among the countless number of offerings and may end up with irrelevant programmes. They will need to create, follow and continue their learning path lifelong and life-wide in line with their work and life goals and requirements in order to adapt to changing professional landscape and skills ecosystems[29]. Moreover, collaborating in learning will be an important asset for being successful.

2.6 Institutions

Institutions will be service providers instead of educational factories, with a strong focus on programmes, products, and educational system hierarchies. There will be a shift from

[26] Council Recommendation on Key Competences for Lifelong Learning, 2018/0008 (NLE), p. 2.
[27] Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning (2012/C 398/01).
[28] Redecker (2011, p. 168).
[29] Please note: "ability to adapt to change" is identified as one of the key future skills by the EC. See Council Recommendation on Key Competences for Lifelong Learning, 2018/0008 (NLE), p. 2.

transaction orientation into relationship orientation in lifecycles on teaching and learning partnerships. The main role of institutions will be to develop structures and strategies to support individual learners inside and outside institutional boundaries. As learner's needs become more crucial, educational programmes will lose their predominant position in learning processes. Recognition of learning outside institutional structures and programmes will push institutions to develop skills and competencies and structures to meet these demands and act as a service provider.

New types of educational organisations (e.g. for virtual validation) will lead to a higher diversity of players as well as to new and further quality management concepts and instruments to ensure both developed skills and competencies outside formal structures as well as the recognition of those within new structures and institutional legal frameworks. Yet, all these institutions will need to work together and collaborate to meet the demands of the learners and the economic system. Institutions will be highly influenced by big data, artificial intelligence, digitalisation as well as new synergies between education and innovation e.g. towards virtual as well as real learning and innovation places with specific services to foster innovation towards education. The transition from research into innovation will become a driving force also for education. The shift from research-led education to innovation-led education will transform education institutions into responsible science hubs with a strong emphasis on the community of practice initiatives.

2.7 Educators

While learning systems change, trainers/educators will also face several challenges concerning the characteristics of the students, content of teaching and most importantly methods of teaching. Their responsibilities and requirements will also increase in a more sophisticated and challenging learning system. New requirements are associated with adopting adaptive learning methods, forward-thinking and being "tech-smart" among others. People are expected to be lifelong learners and team workers. However, one of the most prominent requirements is moving away from traditional teaching roles where the teacher is the transmitter of knowledge to being a mentor and guide to learners in their learning paths to reach their goals. Continuing Professional Development will also be a major issue for educators. Digital learning will affect professional development largely due to more digitalisation in the learning environment. Furthermore, innovation pedagogy will become a core part of teaching and learning processes and will foster educators to become innovation facilitators within learning processes.

2.8 Policy

The new cycle and role of policy formation will drive lifelong learning resulting in further differentiation of the educational system (functional differentiation). The sector will develop towards positioning and classification of different LLL providers, recognition of skills and competencies collected and developed outside traditional learning environments as well as permeability and individualised learning pathways. As open education system(s) will lead to the transformation of educational domains and the volatilisation of the protected teaching and learning environments by the hierarchy of the educational system. Skills and competencies followed by qualifications will be the drivers of lifelong learning policies instead of functional structures of the educational systems. Diversity will be the new complexity as the engine of policy-driven changes. In order to respond to stakeholder values and economic and societal demands and in contrast to the past middle and long-term perspectives, short policy development cycles and their implementation will become key instruments in lifelong learning policy development. Lifelong learning will become a horizontal driver in all policies as a substantial cross-cutting part of all developments.

Following the recent developments including the European Qualification Frameworks and its national translation, as well as the European Standards and Guidelines and its national and institutional implementations, future European policy initiatives have to respond to global, national and regional needs. Further, individualisation and diversification in lifelong learning, and the role and position of individuals like learners, teachers or decision-makers will be dominantly influenced by new policy formations. Evidence- and stakeholder-driven policy development including broad consultation processes supported by new technologies, big data and new media will play a crucial role in the future too. The fast-changing society will demand faster developed policies, forward and future-looking processes, and tailored solutions.

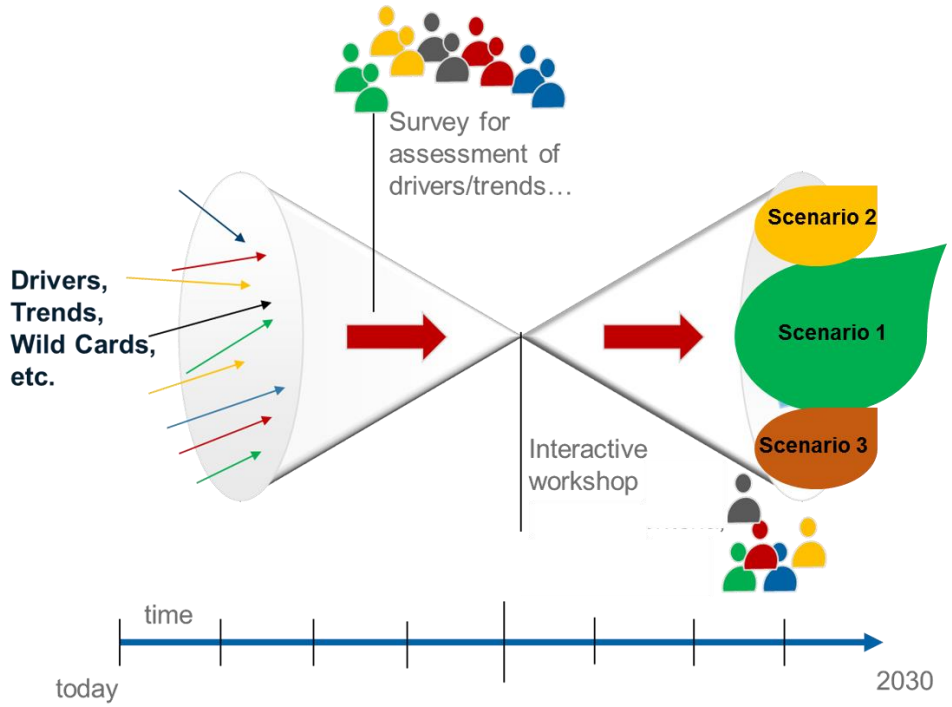
New public management will be transformed into a new form of public management. The concept of neoliberalism and neo-institutionalism will be replaced by public management, which has a strong focus on responsible science, and an education focus including a shift from accountability towards sustainability and global citizenship. The leading force, defined by the importance of autonomy, will be replaced by communities of practice, peer-learning and informed and evidence-driven policy formation with a strong emphasis on inclusion, shared values, and translation of global and international initiatives in regional and local policy implementation.

3 Construction of Scenarios

3.1 Methodology

In all methods for developing scenarios, different trends and drivers are selected and integrated into coherent pictures of the future. We followed a three-stage process to define scenarios for the future of non-formal and informal learning. In the first step, we collected explicit trends and drivers found in a literature review. In the second step, we assessed these trends and drivers using an expert survey concerning their impact and uncertainty. In the third step, based on a ranking of the trends and drivers, we selected six factors to construct scenarios and discussed and revised them in an interactive workshop.

Figure 1: Overview of the process



Source: Own depiction

In total, 50 trends and drivers were identified in the literature review (see Section 2 and Appendix). From those trends and drivers, 25 were identified by the team members that reflect two criteria: the highest impact, and the highest uncertainty. The combination of these two criteria is essential to construct differentiated scenarios. The logic behind is that trends that have a high impact and high certainty will happen anyway, so they are not apt to build possible but different future scenarios. Trends that have high uncertainty but are not likely to have large impacts are negligible for distinguishing future scenarios as well. However, those trends that have major impacts but large uncertainties are the ones that make a difference in prospects and allow different prospective lines of thinking. Following this logic, so-called megatrends[30] and related trends which usually are considered as highly likely were not included in the survey.

[30] Megatrends are the great forces in societal development that will very likely affect the future in all areas over the next 10-15 years. Once in place, megatrends influence a wide range of activities, processes and perceptions, both in government and in society, possibly for decades. They are the underlying forces that drive trends (e.g. digitalisation (Council of State Governments (USA). See: http://ssl.csg.org/Trends/Megatrends%20Definitions%20and%20Categories.pdf).

The purpose of the expert survey was to assess the impact of various trends and drivers on the potential evolvement of non-formal and informal learning for education (scale: no/very little impact, some impact, strong impact, very strong impact). In addition, the respondents were asked to assess their confidence about their assessment (scale: uncertain, certain). The assessment of the impact and uncertainty allowed ranking the trends and drivers which served as base for the selection of trends and drivers for the construction of the scenarios.

The corresponding survey questions for each factor were:

- How do you assess the future impact (until 2030) of the following factors on the development of informal and non-formal learning?
- How certain are you that this development will become true?

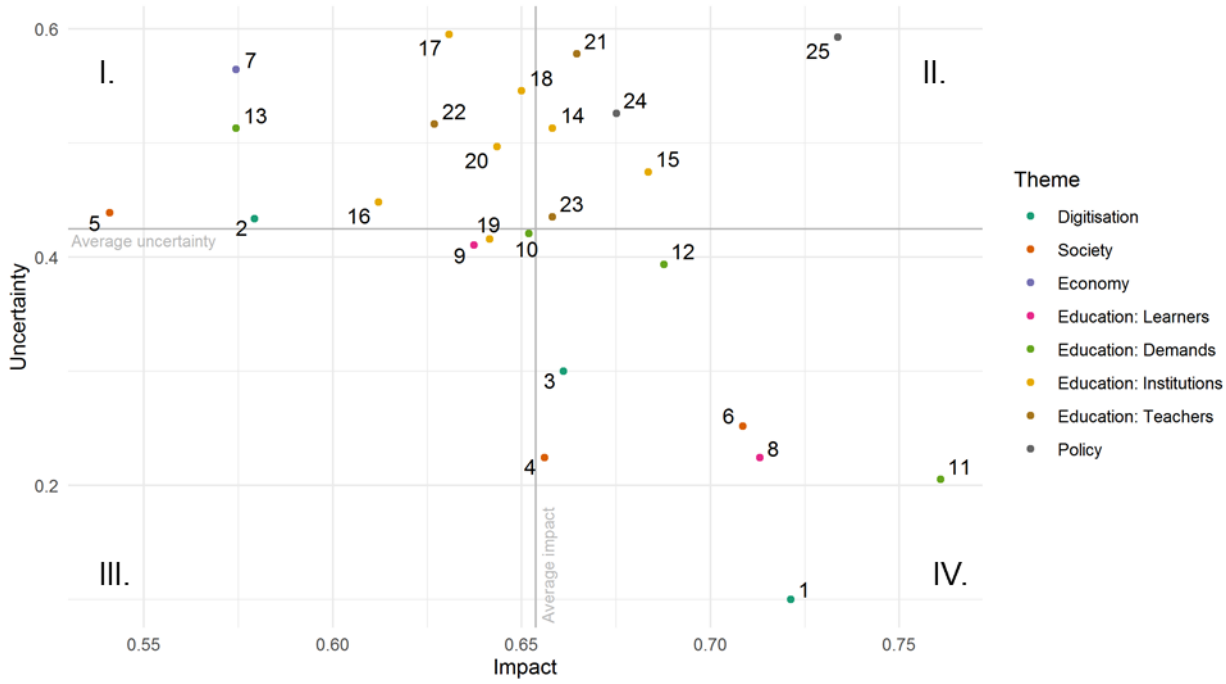
The survey was implemented as online survey and ran from mid-June until mid-July 2019. In total, 741 experts from different organisations have been contacted for the survey. The geographic scope was concentrated on Europe (not only EU countries), but considered also of overseas expert views in order to capture a broader field of perspectives. The experts contacted covered teachers, school administrators, representatives from intermediaries, education researchers, foresight experts and policy-makers. In addition, the experts contacted within the survey on social innovation (which is carried out in the parallel project for the client) had the opportunity to answer the questions on non-formal and informal learning optionally at the end of the survey. In total, 201 experts answered the questionnaire about the future of non-formal and informal learning.

3.2 Results of the Survey

The following diagram (see Figure 2) gives an overview of all trends and drivers assessed according to the impact they would have by 2030 and according to the uncertainty that this trend will take place until that time. For the detailed results of the assessment see also Annex (Table 6).

The diagram consists of four quadrants: Quadrant I (left top corner) shows what respondents estimated to have the highest uncertainty and the lowest impact. These results (e.g. factor no. 5 and no. 7) can usually be neglected for the scenario building because if in the unlikely case that they occur, they will not have a noticeable impact, at least not until 2030. Quadrant II (right top corner) displays the trends and drivers with the highest estimated impacts and the highest uncertainty to take place. These (e.g. factor no. 24 and 25) are the most interesting trends and drivers for the construction of the scenarios in the subsequent steps of the study. If they occur, they might have a very big impact. The next, quadrant III (right down corner), displays the trend and drivers with the highest certainty and the highest impact. They are sometimes taken for scenario construction, but often, they are taken care of by policy-makers, so there is less need to point to these trends and drivers. The last quadrant, IV, contains those trends and drivers with the lowest uncertainty and the highest impact. So, these factors will most likely have an impact in the future.

Figure 2: Assessment of trends and drivers



Source: Own depiction

Note: Average responses to the questions "How do you assess the future impact?" (Impact) and "How certain are you that this development will become true?" (Uncertainty) for each driver (only complete responses have been considered for the analysis). Dots correspond to the numbered driver list (See Appendix, Table 6). Answer categories are aggregated as follows: Little impact: 0; Some impact: 0.33; Strong impact: 0.66; Very strong impact: 1 and Uncertain: 1; Certain: 0.

3.3 Three Scenarios

Based on the ranking of the trends and drivers we selected seven trends (mainly those with a high impact and at the same time a high uncertainty) for the construction of a set of scenarios integrating factors from different dimensions. These seven trends and drivers (factors) were:

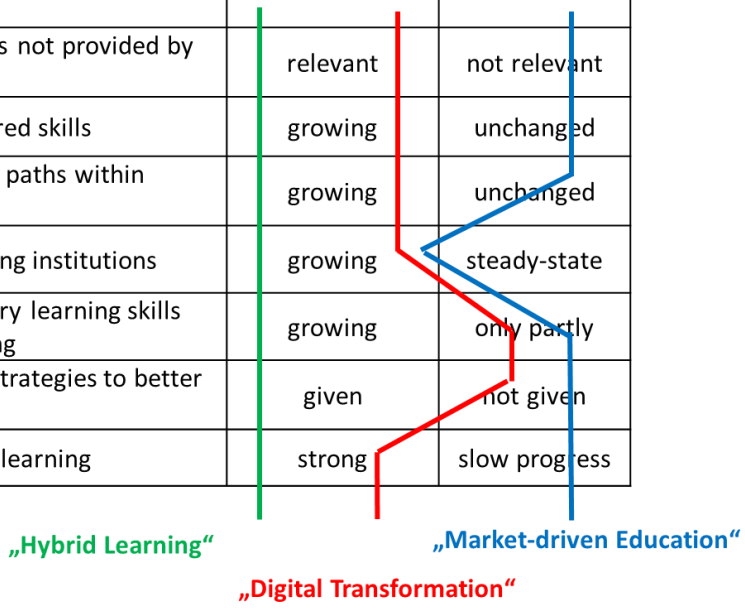
- digitalisation will require high competencies not provided by institutions focusing on formal learning (no. 2);
- importance of recognising informally acquired skills (no. 12);
- acknowledgement of alternative education paths within education institutions (no. 15);
- new types of schools and alternative learning institutions (no. 16);
- supporting the acquisition of complementary learning skills (transversal, meta) parallel to digital learning (no. 23);
- better multicultural learning and teaching strategies to better cope with diversity (no. 22);
- policy support for non-formal and informal learning (no. 25).

To construct a limited set of coherent plausible scenarios we used a morphological analysis.[31] Within a morphological grid for all factors (trend and drivers) selected the possible projections are given. We performed a consistency analysis in order to test the plausibility of possible combinations. The three scenarios result from an individual combination of all seven factors considered.

The scenarios were discussed and prepared during a workshop organised in Brussels on the 8 July 2019 with about 25 experts from different fields (education sector, civil society organisations, policy-makers, researchers, etc.).[32]

Figure 3: Morphological box for the construction of scenarios

Factor		
Digitalisation will require high competencies not provided by institutions focusing on formal learning	relevant	not relevant
Importance of recognising informally acquired skills	growing	unchanged
Acknowledgement of alternative education paths within education institutions	growing	unchanged
New types of schools and alternative learning institutions	growing	steady-state
Supporting the acquisition of complementary learning skills (transversal, meta) parallel to digital learning	growing	only partly
Better multicultural learning and teaching strategies to better cope with diversity	given	not given
Policy support for non-formal and informal learning	strong	slow progress



Source: Own depiction

The three scenarios "Hybrid Learning", "Market-driven Education", "Digital Transformation" are described and discussed in more detail in the next section.

[31] See for instance Johansen (2018).
[32] We originally developed and discussed four scenarios but focussed on three scenarios finally as two were rather similar.

4 Scenarios for the future of non-formal and informal learning

In the following section, the three scenarios and their implications for society, economy and education are presented and discussed in detail. The implications for policy are discussed in the subsequent chapter.

4.1 Scenario "Hybrid Learning"

The main characteristics of this scenario include an explorative perspective of existing recent developments and established policy initiatives, together with their future implications. The hybrid learning scenario is therefore a balanced mixture of tradition and future trends. The scenario explains the needs of new types of institutions concerning new learning formats and environments. It also describes the relationship with and increasing role of the economy as co-producer and collaborator towards qualitative and quantitative transformations of learning.

Emergence of new institutions

New institutions will emerge and specialise to promote and recognise non-formal and informal learning, especially based on digital learning. They will provide alternative paths through digital learning based on flexible and modular learning systems. These new institutions will emerge from both the public and private sectors. Moreover, public and private education institutions collaborate to foster non-formal and informal learning. Recognising non-formally and informally acquired skills and competencies will be easier due to clearly defined and measurable competency assessment and modular and competency-based teaching, which will be developed by new institutions. Through these newly emerged institutions, learners will be able to critically assess their skills and learning gaps to find the right programme for upskilling/reskilling or for their personal goals. There will be increasing policy support for the recognition of non-formally acquired skills and for more modular and competency-based learning. Informal learning will be elevated and will become more valuable for recognition and validation practices and new offers of educational service providers. Learning will lose its connection to the physical space and will take place everywhere. The institutional, programme or course structures and the importance of structured teaching and sectoral boundaries during the learning process will loosen. This is partly due to the slow adaptation of formal education to the changes on skills/learning ecosystems and provision. Teachers will be able to cope with the development by providing both transversal (soft skills) and digital skills while attending to the needs of increasingly diverse groups in the formal education system.

New forms of learning

There is a growing education sector including non-formal education providers and informal learning content developers, but also including the traditional education sector with all its players and institutions. To help individual learners manoeuvre within this growing sector, as well as to help align individual learning needs, career perspectives and available learning content, lifelong learning avatars will support individuals. These avatars are like digital virtual butlers and act as individual lifelong learning service providers. They identify skill gaps and learning needs, search for learning content and possible learning solutions, including programmes and available content, but also support the recognition of prior learning. Virtual butlers learn from each other, identify similar profiles and recommend learning solutions for their "owners". As learning possibilities and resources are manifold, the half-life of knowledge is decreasing while the lifespan of learning is increasing. Such services, tools and functions may decrease the imbalanced information asymmetry between education providers and lifelong learners.

Digitalisation will change societies and the meaning of work-education-life balance. Societies will value more non-formal and informal education, which will lead to a more diverse society where educational attainment cannot be measured by today's indicators. Digitalisation and the use of new media devices will be important and predominant research fields in education. There will be no division between work, education, and recreation in everyday life, nor structured individual careers. Educational leaves, continuing education or professional development and other formalised trainings will lose their predominant position. Learning portfolios, participation in trainings, or formal degrees will be accompanied by informal and non-formal learning activities and skill development.

Economy as partner

The education sphere and the economy will work together more closely, which will lead to higher employment rates and a better balance between the demand and supply of educated and skilled workforces. In return, the economy will respond more to human well-being, diversity and work-education-life balance by supporting flexible working conditions and employment scenarios. Lifelong learning will become a substantial part for employees whose work and education in the future will not be two different tasks and fields but more integrated life-wide and lifelong missions for individuals. Vertical and horizontal mobility of the workforce between different economic sectors will increase due to digitalisation and the better acquisition of transversal skills on the job market. Other developments such as the platform or sharing economy might decrease the quality of welfare and the benefits of lifelong learning too. However, a strong focus on transversal skills might lead to neglecting basic skills.

The economy is a valued partner in learning processes and skills development by education institutions as well as by employees. In recognition of prior and non-formal learning, the sector plays a vital role. To help employees recognise and validate their skills, and present those credentials, companies introduce new services. Human resource departments will take advantage of lifelong learning experts as companies enter into new educational cooperation with education institutions beyond traditional dual or cooperative education. However, the pressure of increased competition, the fear of war and unstable political and societal developments might lead to instability of those lifelong learning co-operations. These political and economic insecurities might lead to major cuts for learning and human resource development in the economy as well. Therefore, the need for a systemic and systematic inclusion of all stakeholder groups in policy formation becomes a pre-requisite to avoid market failures and mistrust in education and skills development.

Qualitative and quantitative transformation of learning

In return, the educational sector will continuously open more towards the economy, and accept and recognise the validation expertise and power of the economy, but also other societal organisations and NGOs as well. The formal education sector will open towards non-formal learning activities, skills and competency developments outside their comfort zone and will be more open to adapt their services, teaching and learning processes where recognition and validation become a more fundamental and core part of teaching and learning. Teaching the past will become as important as teaching the future. The education system will change to a more forward-looking sector and will become a more open, flexible and responsible ecosystem.

The importance of formal education led by different interest groups and its translation into a formal hierarchical education system is foiled by recognition practices. However, validation is one of the powerful tasks that will remain as a domain in the current educational architecture and system structure. The open access to knowledge might also overwrite the educational system and foster not only intersectional but cross-sectoral alliances and initiatives. Digitalisation, new teaching and learning methods, virtual learning avatars, more accessible knowledge, and widening participation initiatives towards knowledge-based services– just a few of the enablers – lead to a more qualitative education

with a strong emphasis on individual learners' needs. The borderlines between informal and non-formal learning on the one hand and formal education, on the other hand, will be statured by new inclusive networks and initiatives to foster e.g. innovation pedagogy inside and outside the educational sector. The education domain includes new types of educational service providers, the economy as a stronger partner in educational processes, including support in assessment and validation practices. All these lead to a broader educational sector with core and support service institutions, service providers and knowledge brokers.

With the use and access to the internet and other sources, the role and importance of informal learning will increase within lifelong learning frameworks starting at elementary education. Understandably, informal learning has a greater influence on primary and secondary education. In some schools, teachers adapt faster, take advantage of prior learning or knowledge available in the classroom, and revise their learning and teaching processes. Others will follow more slowly and adapt only slightly towards individual needs and availability, for example, transversal competencies in the classroom. A better focus on informal learning opportunities and the use of these in formal education will become a key quality indicator for single institutions.

Digitalisation as an important driver

In this scenario, digitalisation becomes increasingly important and enables and enhances non-formal learning for all parts of the population. It enables and empowers learners and makes it easier to access the content in order to fulfil learning needs not only in professional life but also in private life for almost all parts of society.

Table 1: Main features of non-formal and informal learning of scenario 1 in 2030

Key questions	
Where does non-formal and informal learning take place?	In both inside and outside institutions in real and virtual learning spaces
How does non-formal and informal learning take place?	Influenced and recognised by education institutions, developed by new types of institutions and services
What fields does non-formal and informal learning cover?	Professional as well as general education fields
Who provides non-formal and informal learning?	Education institutions (e.g. adult education) as well as other content providers (e.g. digital and social media factories)
Who receives non-formal and informal learning?	The society at large with no significant focus on one segment or professional field
Who finances non-formal and informal learning?	A mixture of individuals (participation costs), institutions (community outreach initiatives), companies (professional development, media, etc.) as well as governments (social dimension of education and education governance and policy initiatives) value non-formal and informal initiatives
Who validates non-formal and informal learning?	Traditional education institutions as well as specialised new types of institutions
Who regulates non-formal and informal learning?	Regulations mainly take place between market functions and government initiatives with a strong influence by validation actors and processes

4.2 Scenario "Market-driven Education"

This scenario is characterised by rapid changes in skills and competencies and unequal access to non-formal education despite the increasing new forms of learning, e.g. online

learning. Resources for non-vocational programmes will be limited and private funding will increase while new private institutions will emerge in areas of quality assurance, validation and guidance, and counselling due to shrinking involvement and funding from governments.

Privatisation of education

In this scenario, the education sector is strongly driven by further privatisation of education and close collaboration between the providers of education and market demand. In the formal education system, the privatisation trend has been observed for decades. Yet for non-formal learning, the delivery of the education is dominantly completed by private institutions and NGOs (except public education centres). Another step into the direction of an enlarged area of operation for the private actors including assessment, validation, and certification is taking place at the same time that public involvement is shrinking. The role of non-formal learning is increasing and this is particularly addressed by the private actors. Thus, private actors, intermediaries and corporate social organisations (CSOs) are further growing and serving changing market needs, also due to the digitalisation of society and the economy. Private institutions will be quick to respond to the changing requirements from the economy and market-driven in-demand skills. In contrast, public education institutions and public policy only slowly adapt to the transformation and requirements of society and the economy. The fragmentation within Europe further enables this development.

In general, there is little regulation which allows private providers to shape their training offers according to market demands. Thus, quality assurance and transparency are the most important challenges. It is difficult to provide clear guidelines for quality assurance through public regulations. Hence, the quality will be a main concern for private actors. Rankings of the non-formal education providers are becoming common and the rankings determine the prices of training. Also, a few large private education providers will shape the development mainly focusing on employability. Thus, non-formal learning will be reduced to vocational purposes where the main goal will be achieving upskilling/reskilling or cross-skilling required by different occupational areas. In terms of equal access, these developments will bring along the risk of social exclusion when the profit margins for the offered courses are not sufficient and learners are supposed to pay for the training, as the return and the benefit of the non-formal training will be mainly to the learner. However, CSOs and community-based organisations fill this gap. The challenge in this is the limited resources of CSOs which often operate on a small scale. Inequality and social exclusion, which is created through privatisation of non-formal learning, will be an important issue to deal with both for policy and for the economy, although the first principle of the European Pillar of Social Rights – is that "(e)veryone has the right to quality and inclusive education, training and lifelong learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market"[33].

Thus, the education sector loses its role in being the main driver for social change and continues the reproduction of an unequal and fragmented society. Certain groups will have social and economic disadvantages and will be at risk of losing their jobs or being unemployed for a prolonged period, low skilled, low educated, people with a migration background, etc. In a very extreme case, this scenario might even be labelled as a privatisation scenario.

Economy as driving agent

The main driver of non-formal education is the demands of the economy. As the relationship between the economy and non-formal sector develops into a symbiotic form, demands to shape the content and the form of the non-formal education offers emerge. Learning is based and built around business needs instead of taking learners' needs into

[33] European Pillar of Social Rights (2017, p. 11).

account. Thus, it is expected that less emphasis will be put on transversal skills compared to occupational skills; many actors operate with a short-term outlook and may overlook the long-term needs for the economy, e.g. the need for creativity and innovative thinking as a basic skill. Formal qualifications, especially those with a short-term perspective, might have a higher value on the labour market while transversal skills might be less appreciated. Thus, non-formal and informal training and education are either focused on specific skills or completely removed from the labour market. Here the vocationalisation of non-formal learning activities is observed, while an emphasis on basic learning programmes targeting civic and democratic values or leisure activities is decreasing and these topics are losing their value. This is also related to resources and funding for these programmes. They will not have a measurable direct impact on the economy, thus there will not be financial support for many non-vocational non-formal learning activities especially for active citizenship and civic values. Moreover, as the labour market is changing rapidly we cannot accurately predict which skills will be needed by 2030 and this requires programmes to be easily adaptable to new developments and quality issues may arise.

Although the public, private and societal actors are collaborating and addressing diverse needs, a lack of communication between the different actors of the education system, which tend to operate in silos, will remain. Private actors acquire an advantaged position, while CSOs and the public sector suffer from this lack of communication and collaboration especially in addressing the needs of the economy.

Lack of basic skills

As mentioned above, within this scenario we expect a development where the traditional humanistic subjects will lose significance in part due to a rather short-termed and market-driven behaviour of the (global) actors (learning only for achieving employability). Increasing emphasis on employability and skills for employability will undermine the value of civic and democratic values, different types of literacies, for example, media and information literacy, and leisure activities. However, in the long-term social, transversal and generic skills may also be in danger which in turn hurts the economy. Moreover, the costs of trainings will also create the problem that market-driven skills for the economy will bring more profit compared to programmes for basic skills. Only some CSOs will continue to provide these types of content with limited public support.

Digitalisation

The increased use of digital technologies, data and sharing platforms is also a driver within this scenario. Private actors will be faster and more flexible in adopting the newest technologies in learning. Thus, most of the trainings provided online are offered by private actors. Digitalisation of learning will not be limited to course content but also assessment, validation and certification will be heavily digitalised. Privatisation and digitalisation of non-formal learning will support creating more flexible and adaptable learning paths which can be seen as an opportunity, as alternative learning routes can be recognised more easily. On the other hand, digitalisation will support the acquisition of new skills required by the market. In addition, digitalisation will also play an important role in assessing and ranking not only formal but also non-formal education institutions. It will increase both the standardisation and competition among private actors.

Societal challenges

The biggest challenge in this scenario is the increasing social inequality and social exclusion. Privatisation is shifting the burden of learning onto the individual and this generates a considerable division among social groups. Those who can afford to invest in their learning will be more skilled, which in turn increases their employability and income. There is added responsibility of individuals to become lifelong learners and to invest in their learning, which not everyone will be able to do . There will be an exclusion of some learners which puts more people at risk of poverty or social exclusion and can be the cause for low

prospects of social mobility. Young people may not be prepared to respond to problems because their education is out of touch with social issues. In addition, we will see a disintegration of social welfare systems across Europe and further spatial disparities. Thus, inequalities in society are likely to persist in this scenario. Diversity and multiculturalism are not a concern for private actors and it will be off the table in most of the learning programmes.

Shortage of trainers/educators

In this scenario the teaching/training profession becomes less and less attractive due to less public investments, high demands to cope with diversity, and other issues, , which undermines the sustainability of education in the long-term. For this reason, we will see a shortage of teachers and educators in the public sector. Teachers and trainers often work for the private sector due to superior compensation and only a small group of teachers will be well-skilled and greatly valued. In non-formal learning, especially those who can teach the skills and competencies highly demanded by the economy will be advantaged.

Limited role of public policy

Policy has a rather modest role in this scenario and is only partly able to shape the development and support the transformation. However, education policy works hard to ensure that education goes beyond the commercial track. A lack of investments by the public results in the above-mentioned further emergence and growth of private education providers. Although policy aims to support the process of validation of non-formal and informal learning, the fragmentation within Europe remains and hinders the effective acknowledgement of non-formal and informal learning for different areas. In this context, there is also the risk of losing control of quality. In general, learning as such will not be in "danger" but the process of recognition will be at risk.

Table 2: Main features of non-formal and informal learning of scenario 2 in 2030

Key questions	
Where does non-formal and informal learning take place?	In virtual and physical learning space (work and institutions)
How does non-formal and informal learning take place?	Through online learning, blended-learning, face-to-face teaching, modular and flexible programmes, work-based learning and project based learning
What fields does non-formal and informal learning cover?	Focus is on employability, thus technical skills that need to be upgraded and new soft skills that will emerge in the new forms of production and business forms
Who provides non-formal and informal learning?	Private (global) companies
Who receives non-formal and informal learning?	Employees who need to upskill / cross-skill and unemployed people who need to reskill and those who can afford the cost of the training
Who finances non-formal and informal learning?	Individuals and companies
Who validates non-formal and informal learning?	Global private actors
Who regulates non-formal and informal learning?	Minimum regulation from public sector

4.3 Scenario "Digital Transformation"

Digital transformation here covers two different aspects: the digital transformation of learning, which extends learning processes to the virtual space via online courses, virtual

teaching and testing; and the digital transformation of our environments, especially industry 4.0 with its new requirements for innovation and learning.

Focus on combining digital competencies with other skills

Within the education system, STEM subjects are promoted at all levels. This means that digital competencies are embedded in school curricula, encouraging children from early on to handle the technology and work with it. Thus, strong control of the digital industry on the learning content tends to play down topics such as social sciences, the arts, humanities, crafts or philosophy. Outside of using digital devices, there is little room for creativity.

Virtual teaching and testing have taken over many tasks previously carried out in classrooms and by teachers, leaving teachers with new tasks such as enabling social learning in teams as opposed to individual-centred virtual teaching and testing, teaching critical thinking, and critical use of media, etc.

At the same time, digital technologies reshape the nature of jobs and make new skills necessary. This is because digital technologies have an impact on what people do on the job, and how they do it. Jobs now and in the future require a combination of digital and non-cognitive skills (communication, planning, teamwork…) which cannot be easily replaced by automation. Employers seek versatile team workers keen to social interactions with above-average ICT skills.[34] Big data and digital tools drive HR methods and the selection of employees.

Dominance of large companies

Big data and powerful algorithms are the key drivers of this scenario. However, there is an economic concentration of power as only a few companies own the technologies and life cycles are dictated by the purchasing licences for determined time periods. New technological solutions and vocational trainings entering the market must prove compatible with increasingly proprietary software and technologies. Only a couple of multi-national companies have total control of data. IT-companies are developing and providing various kinds of digital infrastructure for education. Not only the digital infrastructure for schools is provided by such companies but also learning material as well as the algorithms deciding who will have access to which education facility or programme and how to evaluate students, workers, scientists, etc. Such companies also influence the curricula and the hiring of people directly after graduation. Algorithms used by them for strategic issues, decisions, and rules are not always transparent. However, there is a power struggle between large multinational companies and public policy about the development of free applications and open-source software as alternatives to the big data companies.

Adult education and training

Firms and countries that have successfully embraced the digital transformation will experience a rise of performance and competitiveness. Individuals that combine high digital competencies with advanced social skills and analytical thinking can choose between a variety of jobs and enjoy a high standard of living and quality of life. For technical competencies, there is heavy use of technologies, data, and platforms, also for informal and non-formal learning, provided by online content providers. Virtual classrooms will spread first in adult education because they need flexibility in space and time. Social and meta skills however, cannot be conveyed via online content. Furthermore, there is an increased necessity of skills like media literacy, critical information literacy, and analytical skills. Other skills become obsolete, especially routine manual tasks of low qualification levels.

For individuals who first seek vocational qualifications as well as mid-career workers, i.e. those who want to change career paths, the link between firms and education and training,

[34] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/changing-nature-work-and-skills-digital-age

in non-formal as well as in informal learning, will be increasingly stronger. There is a tendency of those who have employment receiving more training. Companies increasingly buy non-formal learning courses. The implementation of fast-moving technological progress into firm structures calls for adaptive learning, non-formal and informal learning that takes place in the processes of innovation and implementation. No ready-made education modules, neither public nor private, can fully anticipate the necessities of these processes. "Translating skills" will be crucial, i.e. people able to translate diverse disciplinary approaches into a mutually understood and coherent concept that diverse teams can work with. Validation of these learning processes will happen with complementary courses, but the acquisition of these skills happens in social spaces. However, the challenge for individual learners will be to have learning validated in courses after the actual learning has taken place on the job. In fast-moving learning environments, this often falls short, which results in learning pathways not being documented and lower wages. Employing firms can be expected to (co-)finance qualifications to the extent that they directly benefited from associated learning. Shorter employment periods in firms make these validations of informal and non-formal skills more necessary.

Informal learning will happen mostly on a self-directed basis. It will also involve the growing market of psycho-social trainings - these comprise motivation seminars, anti-burn-out trainings, self-coaching and self-optimisation trainings of various kinds. Parts of these are paid for by individuals and fall under private health care expenditures.

Digital inclusion gap

Understandably, access to digital tools and the web is essential for participation in learning in this environment. However, there is also a persisting digital inclusion ("diginclusion") gap evident in this scenario. Tensions arise because too many segments of the population are excluded. Although the level of digital competencies increases as adults now have been familiar with digital technologies since early on, the pace of technological development is so fast that still only some can benefit while others do not. School drop-outs are high among those who are unable to develop the necessary basic skills and complementary learning skills (e.g. transversal, meta-skills) in parallel to digital learning. Those excluded by the industrial digitalisation process must be supported and policy tries hard to enhance digital social inclusion in 2030. A further possible negative effect is that social connection in general becomes rare.

Oversupply of non-formal and informal learning content

Many people/learners are overwhelmed by the number of teaching offerings and learning offerings of an informal and non-formal nature. They have difficulties finding their pathway in the impermeable jungle of courses and online information. Informal learning takes place digitally which to a large extent also bears huge risks of losing focus and getting lost in all forms of infotainment/entertainment. Education institutions are confronted with the challenge of supporting individual learners according to their personal needs, which often means supporting inside and outside institutional boundaries. Especially in pre-vocational education and learning, educators struggle with all forms of challenges ranging from too little human connection/learning from each other/soft skills, essential for all forms of coalescing and teamwork to socially responsible behaviour [*loss of human values*]. Digital dementia, as coined by Spitzer in 2015[35], describes the adverse effects of technology overuse in children, ranging from sensory deficits to postural changes, increased rates of ADHD and autism spectrum disorders, obesity through reduced physical activity and anxiety/depression disorders.

[35] https://fidalgoislandhealthcenter.com/digital-dementia-the-dark-side-of-technology/

Challenges for educators and trainers

As technology evolves quickly, teachers have to keep up and engage in continuous vocational training and qualifications, especially with technology and new pedagogical methodologies. This makes investment and additional financial resources necessary to finance new human resources. Furthermore, recognition and validation systems and the necessary ongoing teacher training in fast-moving generically digital technologies, i.e. Continuing Professional Development, is challenging.

New opportunities and demands for learners

Software tools and social networks can support individualised learning based on individual biography and demand. For adults, a personalised profile can be established and the validation of qualifications can be provided through an e-form online. The variety of open source materials (e.g. smaller chunks, unstructured) vs broader digital (fee-based) learning environments can be distinguished and combined with "digital" certification.

Digitalisation provides a way to grow and enrich oneself every day through the vast non-formal and informal learning opportunities. For learners, this means a difficulty of choice, a necessity of limitation/focus/concentration of attention. For adults, digital skills are necessary for online collaborative tools, communication tools, and social media, data protection knowledge, design platforms, etc.

New tasks for NGOs and Intermediaries

NGOs have a new role of mentorship in this context. They provide "new frontiers in learning" harnessing particularly non-formal and informal learning. NGOs, CSOs and other non-public stakeholders put in place strategies for the training of those excluded from digitalisation, such as groups of society who never used the internet, have low digital skills, or who have no infrastructure available. They become smaller but still exist. And even among those who have been familiar with digital technologies from early on, there is a conflation of familiarity with technologies/skills and understanding technologies. NGOs try to maintain some face-to-face dimensions to trigger participation, empowerment, and interest. They are the ones who argue that not everything that can be performed digitally should be carried out so. Civil society engagement and new forms of collaboration with various stakeholders and companies are essential for creating a learning ecosystem that is harnessing collective intelligence by the use of digital tools.

Table 3: Main features of non-formal and informal learning of scenario 3 in 2030

Key questions	
Where does non-formal and informal learning take place?	In virtual space, in companies, schools, at home
How does non-formal and informal learning take place?	Work-based learning and self-directed learning heavily based on digital technologies and data
What fields does non-formal and informal learning cover?	Mainly related to digitalisation of the economy; new skills and competencies (e.g. technical and vocational skills) required by the economy due to digital transformation
Who provides non-formal and informal learning?	Private education providers and companies
Who receives non-formal and informal learning?	Employees, short-term unemployed, students, in general the more affluent part of society will benefit from the supply of courses
Who finances non-formal and informal learning?	Individuals and companies
Who validates non-formal and informal learning?	Private companies and interest groups
Who regulates non-formal and informal learning?	There will be no standards, public sector plays no major role.

4.4 Assessment of Scenarios

The presented scenarios for the future of non-formal and informal learning are not predictions of the future but instead provide descriptions of possible pathways for development. They can guide all stakeholders interested in preparing for and shaping the future of education.

For the development of strategies and policies, it is helpful to assess the different scenarios concerning likelihood and desirability. We therefore asked the participants of the workshops to assess the three scenarios concerning their likelihood and desirability (see Table 4). This assessment revealed that the scenario "Hybrid Learning" was considered clearly as the most desirable scenario followed by the "Digital transformation scenario" and the "Market-driven education" scenario was the least wishful picture for the future. Concerning the likelihood, the "Market-driven education" scenario was considered as most likely, followed by the "Hybrid Learning" and "Digital transformation" scenario.

Table 4: Assessment of scenarios

	Likelihood	Desirability
Scenario „Hybrid Learning"	***	***
Scenario „Market-driven Education"	***	*
Scenario „Digital Transformation"	**	**

*** very likely/very desirable
** somehow likely/slightly desirable
* not likely/not desirable

5 Conclusions

In the following chapter, challenges and implications for education policy with a focus on the European level were presented in the context of the scenarios. In general, the three scenarios can guide policy-makers and other stakeholders to be prepared for possible and different futures.

Therefore, it is also useful to assess and compare the scenarios. The assessment by the experts during the workshop revealed that the scenario "Hybrid Learning" was clearly considered as the most desirable scenario (see also 4.4.) while the "Market-driven education" scenario was considered the most likely. This judgement by the experts provides an orientation for policy-makers in developing specific strategies and measures. However, it is not the task of this report to make a distinct recommendation for different actors (educators, learners, school directors, companies, trade unions, CSOs, policy-makers, etc.) in relation to the strategies or behaviour they have to adapt or change. Nor is it the intention to draw a conclusion on which scenario policy should focus on.

There are different ways for stakeholders or policy-makers to use scenarios for strategy development and decision-making.[36] One approach is to develop "proactive strategies" and to focus on those scenarios which can be shaped sufficiently and are in line with political goals. In contrast, the traditional planning approach suggests taking the scenario which is assessed as most likely and developing a strategy in line with this scenario. In our case, this is the scenario "Market-driven education". Another approach is to develop "preventive strategies", which means to avoid that a specific scenario with a very high risk turns into reality, which is, for instance, used in risk management. A further, more advanced way is to develop "adaptive strategies" which can cope with more than one strategy and leave

[36] Fink et al. (2002)

some flexibility to respond to changing conditions in the future. Such strategies or policies are more robust and help with navigating today's complex economic, social and political environment. Defining strategies based on the presented scenarios thus carefully has to compare risks and opportunities. However, one has to keep in mind that the philosophy for using the results of a prospective study based on scenarios is to shape the future and not to predict it.

5.1 Scenario-specific Conclusions

5.1.1 Conclusions for the scenario "Hybrid Learning"

Avoiding "expertisation" towards the market

Polices need to respond faster to the digitalisation and market-driven educational processes. Otherwise, the danger of market failures will lead to "expertisation" of the society e.g. towards a limited focus on STEM. The danger of a focus only on present needs and/or market-driven changes, e.g. dominant private funding in non-formal education, causes a narrow view on specific skills and competencies. It will be a public task to provide a solid teaching and learning environment where the risk of market failure is considered, and effective instruments are in place for avoiding this altogether or for recovering fast if it happens.

New measures and indicators

Therefore, better monitoring of all educational sectors and evidence-driven policy-making are necessary. Informed policy formations based on the increased diversity of the non-traditional and non-formal sectors and the complexity of education systems and their blurred boundaries between the different types and institutions is needed. A balance between top-down and bottom-up interactions, processes and shared decision-making requires future-looking planning. In such a case, the importance of proactive policy practice will become even more important. If digitalisation, for example, running ahead, the digital gap not only between different parts of the population but also between educational sectors will increase. As a result, no adaptation would take place between society, the economy, and the educational sector. OECD and other international and global organisations will need to provide alternative indicators and measures to assesses, analyse and interpret those data. Data sources of education including the individuals and their habits and learning behaviours in non-formal and informal contexts will become central for data analysis and informed policy formation.

Mega policies

The increasing competition by new types of institutions, additional service providers and the need for cooperation between the private and public sectors, including teaching and learning processes, but also funding of education, foster wider and cross-sectoral policy developments. The complexity, interdependences and fast developments need not only educational policies but also mega policies touching different spheres e.g. employment, social and health sectors.

Diversity and integration

The integration and positioning of new institutions with new and diverse services e.g. recognition, knowledge broker or lifelong learning avatars' services need a more opportunistic policy formation. Sectoral boundaries of the very structured institutional architecture of educational domains and hegemonies need to be revisited.

5.1.2 Conclusions for the scenario "Marked-driven Education"

Regulation and quality assurance

Quality assurance for the programmes offered by private actors is the main concern in this scenario. Thus, the necessary steps have to be taken to ensure the quality of the programmes and to regulate the programmes to hold the providers accountable. Policy can lead the way and shape the path to the development of the tools for measuring the quality of the programmes. An agency for supervision or an intermediary institution can provide the frameworks for provisions. Here we do not predict a strong public control but strict quality assurance and accountability policies to avoid abuse of the system and to guarantee high-quality education and training.

Increasing the visibility of non-formal and informal learning

In increasingly market-driven education systems, it is important to increase the visibility of non-formal and informal learning and to support the acquisition of basic skills while answering to the demands of the market. Necessary measurements such as financial and institutional support to CSOs and public providers for basic skills and values are needed for the survival of the basic programmes in comparison to market-driven programmes. Preparing for the validation of the results of the non-formal education programmes is a necessary step for strengthening non-formal and informal learning as a sector. At the European level, a more consistent framework would be helpful for this step to reduce the fragmentation.

Collaboration and civil engagement

To prevent the sharp division, it is necessary to strengthen the cooperation between stakeholders in non-formal and informal learning. CSOs can play an important role in dealing with societal challenges such as increasing social exclusion and inequalities., A civil engagement plan can be developed to support CSOs with limited resources, and increase the communication and cooperation between them and the private providers. The creation of a common framework that is designed through dialogue and collective work of the education providers of different sectors can provide some answers to challenges mentioned before. Triggering this dialogue is necessary not only at the EU level but also at the national, regional and local level.

Policy on equal access in education

The biggest challenge in privatisation is the social exclusion of disadvantaged groups and increased inequality. Policy measures are necessary to mitigate the impact of increasing privatisation in equal access to education. It is also important to provide equal access to non-formal education, see it as a fundamental right and create education without barriers.

Public investments

To mitigate the risks of privatisation, public investment is required. This means more money and a better distribution of money among the providers. Certain incentives such as tax reductions or nudging can be utilised as strategies of investment in non-formal education. Without public investment, the impact of privatisation will be irreversible in the long run.

Holistic policies

In order to make the connections between stronger and more relevant among the economy, society and education, a holistic approach needs to be developed. This requires overarching policies with a long-term vision of the relationship between the structures and goals of the different sectors. Moreover, a close collaboration among the multiple stakeholders is important. Especially for education which crosscuts all the other sectors, a

shared vision on the aims of education between multiple stakeholders, including closer collaboration with industry towards meeting common goods should be developed. A dedicated lifelong learning (LLL) strategy should also be included at all levels and should be supported at all levels. National LLL strategies require revision and adaptation to deal with the challenges. A comprehensive view from local, regional, national and European levels is also required.

5.1.3 Conclusions for the scenario "Digital Transformation"

There are several risks and opportunities associated with this scenario that stress some challenges for (European) policy.

Supporting digital citizenship

In order to streamline digital citizenship into education curricula the role that education plays in enabling all children to acquire the competencies they need as digital citizens need to be defined and shaped. For this, a mapping of digital competencies is necessary to be able to implement the acquisition of related competencies into curricula. In addition, a situation in which representatives from the business sectors gain dominance over the public actors and interests should be avoided.

Ensuring an ethical digitalisation

The use of digital technology needs to be shaped by citizens in their interest. This includes data protection issues and citizens' awareness of data protection issues, as well as the transparency of algorithms respecting democracy and human rights in contrast to segregation and exclusion. Furthermore, ethical digitalisation means decentralisation of data generation independence from globally dominating firms.

However, this has to be put in place with care and learning from experiences in the past: GDPR was aimed at large dominant internet firms, but hit the "small ones" (e.g. swim clubs which have difficulties now to contact parents). More open source data and user control of personal data must become viable alternatives to dependence on a few big players.

Mastering the dependence from dominating IT firms

A couple of multinational IT firms such as Google, Apple, Facebook, Amazon and Microsoft (often called GAFAM) already have strong market power and possess relevant data. This dominance is already unavoidable – because of social media accounts, search engines, etc. – and one may argue that education institutions, CSOs, and NGOs are already dependent on these large players. This bears the risk of biasing information in an undesirable way because of information filters.

So, shaping the development of the relationship between the public sector and companies is a big challenge for policymaking. An element of this struggle is how the algorithms as a main element of the platform economy can impact the political system, and who creates the algorithms. Within this context, public policy permanently has to defend its role trying to develop a means to govern and control the development of digitalisation to develop IT-capacities and competencies in the public sector to be somehow independent of the big players. Otherwise, the pedagogical freedom of teachers and educators is eroded in the long-term. Within this context, it is also important to assure cybersecurity and privacy.

Put social dimension on centre stage

One risk of the digitalisation scenario is that social connection becomes a matter for elites: Human connection and learning become exclusive and thus bear disadvantages in terms of personal well-being and socially responsible behaviour and a loss of human values and well-being (e.g. due to reduced physical activities, anxiety, depression, disorders). While digital technologies bring education provision closer to the needs of the labour market, there is also the risk that learners turn into consumers and that the true learners' needs

are eroded. Thus, learners should not become consumers of digital technologies but digital citizens able to exploit the full potential of learning in various forms on a continuum between formal, non-formal and informal learning.

Avoid leaving groups behind

Several types of skill gaps may lead to clusters of the population being left behind in association with i) digital fatigue (tired of decision to adapt to digital), ii) language skill gaps for those who do not speak English well (automatised translation will be mainly to English), iii) social gaps (e.g. urban–rural), iv) generational gap (older generations are usually less inclined to adapt to new technologies) and v) gender gap (there are differences in gender use of technologies).

A dichotomy between creative face-to-face learning of complex content and the digital distribution of facts and easy skills (e.g. MOOCs) must constantly be re-balanced. It is a policy task to coordinate the diverse learning sites into a living ecosystem. Those excluded by the digitalisation must be supported and integrated (digital social inclusion).

An obsession with the STEM subjects (Science, Technology, Engineering, Mathematics) is much too narrow for preparing for digitalisation. Instead, embracing the multidisciplinary nature of problem solving, more computational thinking not coding, and higher student agency is required. Policy thus has to assure that apart from providing digital competencies, soft skills can be built-up, such as adaptability, creativity, empathy, public speaking plus active listening, flexibility, multi-tasking, and teamwork. Analytical skills such as critical reflection, challenging, and arguing are necessary as well.

Civil society engagement and new forms of collaboration with external stakeholders and enterprises have to be supported. In addition, cohesion policy should ensure that no citizens are left behind, otherwise, there is the risk that people with the lower skills drop out and are least likely to participate in digital technologies.

Digitalisation of education institutions needs financial resources and dedicated public policies

Education institutions need to be properly equipped with financial and human resources. Teachers' education and training take place on top of their workload, this makes grants and social help for learning a necessity. Public and private sector cooperation is seen as a solution, as this combines regulative power from a public authority to avoid abuse in combination with financial resources from private partners.

Regulations concerning recognition frameworks are needed as well: At the Member State level, there are recognition regulations necessary for i) learning outcomes, ii) training outcomes of teachers and iii) digital credentials. For practitioners' qualifications (teachers, trainers in companies, etc.), the design and implementation of a validation process are necessary, too.

Investments in infrastructure by the public are needed: Apart from hard infrastructure (internet, basic accessibility for all) investment monitoring plus regulation is required to monitor hate speech online, fake news, cybercrime, etc.

Table 5 summaries the main conclusions for education policy about the three specific scenarios for five main activities (research, regulation, public investments, awareness raising, coordination, and harmonisation).

Table 5: Overview of scenario-specific issues for policy

	Scenario „Hybrid Learning"	**Scenario „Market-driven Education"**	**Scenario „Digital Transformation"**
Research	Integration of new types of institutions in an educational system, quality of and in recognition and validation, interplay of digital and real learning places and providers, intersectoral and cross-sectoral impact of educational policies related to non-formal and informal education	Role of non-formal and informal learning in social inclusion, benefits of non-formal learning at the individual and social level, recognition and validation of prior learnings, how to provide equity in access to non-formal learning, work-based learning and upskilling, reskilling and cross-skilling, open learning and permeability	Alternative open source solutions (WhatsApp, Facebook, etc.)
Regulation	Establishment of new types of education institutions	Regulation for the accountability of providers	Ethical digitalisation, master dependence from GAFAM
Public Investment	Stimulating inter and cross-sectoral collaborations, seed funding for new types of educational providers and brokers	Investments in NGO and CSO and non-vocational adult learning	Strong investment in alternative IT infrastructure (open source, non-GAFAM)
Awareness	recognition of non-formal and informal learning as key function within education	Policy and public awareness regarding the importance of non-vocational adult learning and role of non-formal	Citizens' awareness of data protection issues; transparency of algorithms; "Ethical guidelines"
Coordination and harmonisation	cooperation between educational sector and economy	Holistic and comprehensive long-term policies developed together with all stakeholders including CSOs, public institutions and business sector	Regional cohesion in IT infrastructure

5.2 Generic Conclusions

The presented scenarios are possible pictures for the future development and role of non-formal and informal learning in the education system. The analysis and discussion of the scenarios allow also presenting some generic findings about similar opportunities and risks which appeared in all scenarios.

Challenge 1: Alignment of formal, non-formal and informal learning systems

The borders between formal, informal and non-formal learning will lose their rigidity and clarity. The fast-growing sector of informal learning, e.g. multimedia application, access to knowledge, MOOCs, etc., will force the formal sector to develop clear strategies and practices to incorporate these often transversal skills in educational credentials or the not yet verified expertise into their learning and teaching processes. As the "only" need to

verify but not develop learning, this can lead to increased educational effectiveness and efficiency of those education institutions. However, due to massification and the importance of validated knowledge and skills, traditional education will keep the position as a strong player in the educational sector. This is due to the recognition and validation initiatives. However, due to scarce resources, the formal educational sector will be not able to deal with the fast-increasing informal education (e.g. in form of recognition within formal educational structures) and take full advantage of it. As the competition for new jobs with new qualifications increases in the future, the importance of credentials towards formal education will also play an important role in digitalisation and the future of the world of work.

New skills will require new methods and forms of learning. Customised learning towards individual learning pathways, which are less structured and more interest-driven, will lead to higher and faster skills and competency development in the future. This can only take place if the informal learning sector will get support from formal education sector (e.g. in innovation pedagogy), from the economy as recipient and "user" of these skills and competencies (e.g. in community of practice initiatives) as well as from policy-makers (e.g. integrated educational policy formations and mega policies).

Challenge 2: Fostering cross-sectoral collaboration

An important task for policy is to support collaboration and peer-learning among teachers and other stakeholders within and across education institutions. Opening public education institutions to other education providers, to different communities and society is particularly important. Very often, CSOs play an important role in the validation process, particularly for disadvantaged learners. Increased collaboration and participating allows the creation of new links and synergies between formal, non-formal and informal learning. There is also a lack of guidelines and support for new collaborative methods.

Challenge 3: Develop methods for the acknowledgement of learning outcomes of non-formal and informal learning

There is a lack of acknowledgement of learning outcomes of non-formal and informal learning. Within the survey, the respondents were also asked to rank the most important barriers for further development and diffusion of non-formal and informal learning. This question revealed that a lack of the recognition of non-formal and informal skills and competencies was the most relevant barrier.

A change of practices is needed for the assessment of non-formal and informal learning in Europe. No one-size-fits-all or standardised approach or method for the validation of non-formal and informal learning exists. Assessment methods need to be adapted to the needs of the target group and hence more flexible assessment tools and methods are required. This is particularly relevant when non-traditional learners and disadvantaged groups should benefit from non-formal learning. Again, digital technologies can be used to accomplish real-time, formative assessment. Several projects are preparing more specific recommendations and have proposed methods for the validation of non-formal and informal learning.[37] The European Competence Framework, Competence Cards, open badges, and video-based assessment tools can be mentioned in this context.

It is also important that education providers, employers, trade unions, CSOs and other relevant stakeholders are involved in the validation process which can increase the acceptance among the formal education sector and the labour market. Moreover, non-state actors sometimes use their own assessment methods which are not recognised by public education institutions.

[37] e.g. innoVal Project (www.inno-val.eu), VINVE project (http://vince.eucen.eu).

Challenge 4: Dealing with digitalisation

Digitalisation is a major trend that will undoubtedly change the education system and the way we learn. Digital technologies have the potential to contribute to upward mobility, increase labour market integration and improve citizen engagement. However, digital technologies could also enhance the digital divide and existing inequalities. Assuring digital access in education does not necessarily mean equal access to learning opportunities. Investment in people and widening access to different forms of learning is as important as investment in digital technologies. In order to fully exploit the potential of digital technologies for all societal groups the development of basic skills is crucial, because digital skills, in turn, build upon a certain level of basic skills.[38]

Education policy should also promote the systematic use of free software solutions and should set incentives for providing free digital resources. In addition, the interoperability of hardware and software used in the education sector must be guaranteed. Finally, ensuring data security and privacy is a topic that deserves attention.

Challenge 5: Train the trainer

Better support for teachers and educators in using digital technologies in different learning environments is needed for addressing the initial professional competencies as well as digital skills. Participatory teaching methods are of specific importance.

Challenge 6: Facilitate institutional change

The current speed of development and change particularly due to digitalisation is tremendous. We expect that companies and private education providers are better equipped to adapt the level push of the development. In contrast, the public education system is adapting rather slowly and displays immense inertia. Thus, public policy has to facilitate the transformation of the public education sector encompassing the training of school leaders as well as the flexibilisation of the education programmes offered.

[38] See also LLLPlatform (2017).

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Appendix

Table 6: Overview of the assessment of the impact and uncertainty of the examined 25 trends and drivers in the survey

		Average[39]		Impact			
No.	**Drivers and trends**	**Uncer-tainty**	**Impact**	**Very strong**	**Strong**	**Some**	**Little**
DIGITALISATION							
1	Increased use of digital technologies (e.g. webinars) for learning	0.100	**0.721**	38%	41%	21%	0%
2	Digitalisation will require high competencies (e.g. critical analysis) not provided by institutions focusing on formal learning	0.433	0.579	20%	39%	36%	5%
3	Digitalisation will require highly specialised skills inspired by the collaboration of human and machines	0.300	0.661	25%	50%	23%	2%
SOCIETY							
4	Growing Inequalities in learning participation (social origin, migration, vulnerable groups)	0.224	0.656	23%	52%	23%	2%
5	School drop-outs, truancy and causes (families in crises, caring children, etc.)	0.439	0.541	12%	45%	37%	6%
6	Dissolution of boundaries between work, learning and life	0.252	**0.709**	36%	42%	22%	1%
ECONOMY							
7	Informal self-organised learning communities	0.564	0.574	22%	35%	37%	6%
EDUCATION: **LEARNERS**							
8	Rising willingness of people to upskill in their profession and/or reskill for another profession	0.224	**0.713**	30%	53%	16%	0%
9	Rising willingness of individuals to take responsibility for own qualifications	0.410	0.637	23%	47%	29%	1%
EDUCATION: DEMANDS							
10	More personalised learning strategies in multi-cultural environments (language, etc.)	0.420	0.652	27%	43%	30%	1%
11	Increasing importance of transversal skills (e.g. critical thinking, teamwork)	0.205	**0.761**	46%	39%	13%	3%
12	Increasing importance of recognising informally acquired skills	0.394	0.688	36%	38%	22%	4%

[39] Answer categories are aggregated as follows:
- Impact: Little impact – 0; Some impact – 0.33; Strong impact – 0.66; Very strong impact – 1
- Uncertainty: Uncertain – 1; Certain – 0. Uncertainty averages are equal to the percentage of respondents indicating "Uncertain".

13	Increased importance of peer to peer-learning	0.513	0.574	19%	38%	39%	4%
EDUCATION: INSTITUTIONS							
14	Greater institutional openness for assessing and recognising informal skills	0.513	0.658	28%	45%	24%	3%
15	Acknowledgement of alternative education paths	0.474	0.684	34%	39%	25%	2%
16	New types of schools and alternative learning institutions	0.448	0.612	25%	38%	35%	3%
17	Ability of education institutions to re-connect with society to better align learning objectives and societal needs	0.595	0.631	27%	39%	29%	4%
18	Ability of education institutions to consider learners' interests	0.545	0.650	30%	40%	27%	4%
19	Increasing international standardisation of foreign degrees and qualifications	0.416	0.642	28%	43%	22%	7%
20	Better monitoring and assessment mechanisms to detect individual learning needs	0.497	0.643	25%	49%	22%	5%
EDUCATION: EDUCATORS							
21	More capacity of teachers to address individual needs	0.578	0.665	29%	44%	23%	3%
22	Better multicultural learning and teaching strategies to better cope with diversity	0.516	0.627	24%	46%	25%	6%
23	Supporting the acquisition of complementary learning skills (transversal, meta) parallel to digital (= instrumental) learning	0.435	0.658	29%	41%	27%	3%
POLICY							
24	Rising attention to education in all policy domains	0.526	0.675	30%	43%	25%	1%
25	Increasing policy support for non-formal and informal learning	0.592	**0.734**	42%	38%	19%	1%

Table 7: List of trends and drivers

Digitalisation	**Relevance and possible impacts on leaning**
Dominant ICT players will control technological opportunities for non-formal and informal learning	International big IT firms will collect data, create social networks and develop algorithms which can be used for learning.
Digitalisation will require high competencies not provided by institutions focusing on formal learning	Human skills like empathy, creativity and imagination, as well as meta skills like being responsible under uncertainty, ambiguity are important skills and competencies.
Digitalisation will require highly specialised skills inspired by the collaboration of human and machines	A high proportion of working activities will change due to human-machine collaborations (specialisation on what cannot be better carried out by machines).
Economy	
Adult education, post-professional education	A high proportion of current job activities changes through technologies, which makes further adult education and post-professional education a necessity to upskill.
Recruitment of workforce from older population	Ageing populations lead to higher retirement ages, which in turn entail a higher age of total workforce and recruitment from there.
Return to pre-industrial apprenticeship era (dual system)	Necessary specialised skills make apprenticeships more attractive in order to provide basic training on the one hand, and training for new types of [sectoral] activities on the other hand.
Unemployment rate	Slower economic growth, plus transformations of work environment results in higher unemployment rates.
Willingness of business to organise and finance training programmes and support participation of lifelong learning	Changing skill requirements will lead firms to finance trainings in order to adapt to their special needs.
Skills shortage and mismatch	High dynamics in skill requirements lead to mismatches, at least in the short run.
Acquiring and maintaining the relevant skills needed in a changing world of work	From a worker's perspective it will be a constant challenge to stay ahead of job and skill requirements.
Demand for interdisciplinary and transdisciplinary approaches	Systemic changes, like a circular economy approach, will make interdisciplinary and transdisciplinary approaches an imperative. This has impacts on the skill and competency levels.
Society	
Ageing workforce	Later retirement ages lead to ageing workforce.

Participation of older adults in lifelong learning	Longer working lives make retraining even more necessary.
Increase of non-standard forms of employment	Self-employment, free lancing, project-by-project activities.
Inequalities in learning participation (social origin, migration, vulnerable groups)	Education is still socially inherited in many countries; less educational opportunities for migrant populations and vulnerable groups.
Voluntariness to serve as "teacher"	Elderly, private individuals support training and teaching in their spare time.
School drop-outs, truancy	Causes for truancy and school drop-outs (e.g. families in crises), and impacts of truancy and drop-outs (low education levels, precarious jobs, etc.)
Increased amalgamation of work, learning and life	Digitalisation, constant online availability, satisfying occupations, etc. lead to the amalgamation of work. Learning and life.
Implementation of universal basic income	Universal basic income will impact on expectations of work-life balance, will impact on expectation of job quality.
Education: Demand	
Willingness of people to upskill in their profession and/or reskill for another profession	Due to new demands and developments in skills required by the new economic forms, people will be aware of the need to learn new skills.
Willingness of individuals to take responsibility for own qualifications	Self-directed learning will be more common which will bring the responsibility of being aware of skills and how to improve them on the learners.
Professional careers will become more flexible and dynamic	Dynamic nature of professional life, will make constant personal improvement a must for people to keep their jobs, but it will also enable more opportunities and space for learning.
formal qualifications and degrees will not be sufficient to qualify for a job	Formal school system is slow to adopt the changes occurring/will occur in the society and economy and hard skills will be difficult to attain only through formal education.
more personalised learning strategies in multi-cultural environments (language, etc.)	Increasing diversity will require a more individualised approach as "one-size-fits-all" will not meet the needs of the diverse population.
more fluent transition from school to work (e.g. internship)	The connection between work and school will be stronger and many educational outcomes will be influenced by business sectors according to skills required.
increasing importance of transversal skills (e.g. critical thinking, teamwork)	Soft skills have become so important that they are identified as the predictor of future success. Thus, it creates it pressure on educational systems to focus and develop soft skills.

increasing importance of recognising informally acquired skills	RVPL plays a crucial role as paving pathways to education, training and qualifications; promoting workforce development and participation in the labour market. It is also an important condition for open learning.
Education: Institutions	
greater institutional openness for assessing and recognising informal skills (modified assessment and validation mechanisms and closer collaboration with other societal players, including tertiary education providers and prospective future employers)	Accountability but also effectiveness and efficiency are key drivers for the use of (public) educational resources. The shift from teaching to learning will continue to recognition and validation. These "investments" lead to a better use of resources, less "overproduction" of skills and short cuts for all stakeholders.
Acknowledgement of alternative education paths	Diversity needs individualised learning, which leads to better results and outcomes in skills developments. A complex societal and working environment call for more alternatives and permeability to meet expectations and ensure learning success.
Open education and horizontal and vertical permeability	Alternative paths are only possible, if permeability is given and accepted within the system.
New types of schools /alternative learning institutions	Institutions need to adapt to demands (e.g. digitalisation) and shareholder values (e.g. employability). Those new services (e.g. validation) will change institutions but also create new types (virtual service providers, validation agencies…). Divers leaning paths support higher institutional diversity, specialisation but also additional services.
Collaboration between education institutions	Scared resources (knowledge production, availability of infrastructure and access to media and content) and competition foster educational partnerships and co-operation in all types of teaching and learning activities as well as (learning) content development. Specialised organisations (e.g. validation) with defined profile and portfolios will interact in order to meet expectations, to set up ad hoc structures but also to help to implement policies.
Ability of education institutions to re-connect with society to better align learning objectives and societal needs	The interplay between supply and demand is driven by fast changes in society at large and agile structures at institutions. New channels, monitoring, market research but also learning analytics will help to understand and develop learning paths and services and meet expectations.
Stronger focus on lifelong learning services by unemployment	The concept of unemployment as status will be replaced by unemployment as a risk in lifecycle. LLL services will be used not only reactively to solve the situation but

	also to avoid unemployment, which creates additional costs for society.
Privatisation of the education sector	LLL needs more flexible and agile structures where demand can be detected quickly and supply developed fast. The shift between LLL as public towards private good will lead to more private initiative to meet demand.
Cultural institutions offering educational services	Culture as a public value and pillar of a society plays an important role in a more and more diverse society. In order to create shared values it is important to offer cultural education to a broader audience and to help integration.
Leisure time institutions become learning institutions	Skills are not only limited to professional organisations in the context of a professions. Skills can be developed elsewhere as well. Diversity of learning institutions is the result of the fall of privileges.
Ability of education institutions to take into account learners interests	The transformation of institutions with a strong focus on products/programmes into relationship driven organisations leads to a strong focus on interests, segmentation and service orientation.
Increasing international standardisation of foreign degrees and qualifications	
better monitoring and assessment mechanisms to detect individual learning needs	LLL guidance is a key service to help individuals but also to use educational resources in a best way. Matching between needs and demand in a divers and complex environment. But also learning analytics, learning diaries, etc. help to adjust and adapt learning paths.
Education: Teachers	
Capacity of teachers to address individual needs	In relation to increasing diversity, and individual paths of learning, teacher will need to attend to the learning needs of students. Teacher training institutions need to pay attention to this.
Ability of teachers to become mentors and coaches	Teaching-learning interaction will take a new form of relationship based on mutual learning and more learner-based form. Thus, teachers will need to prepare themselves for this change.
multicultural learning and teaching strategies to better assist migrant children	Intercultural communication will be an important issue in multicultural societies and education will be the main tool for both teaching and practising these skills.
complementary learning skills parallel to digital learning	Even though digital learning skills will gain importance, other types of learning skills, especially in relation to self-directed learning, cooperative learning, multicultural learning, innovative learning,

	etc., be an important part of the education and training systems both for teachers and learners.
Peer to peer-learning	In line with the more open learning, peer-learning will be an important tool especially for non-formal and informal learning. Teachers' changing roles have also an impact on it and it will require team working and collaborative working skills.
Policy	
Education in all policies	Education is the enabler for growth and development. Education as integrated part of all policies has a direct and major influence on the implementation and outcomes.
Extending compulsory education / reducing early school leaving to combat unemployment	The interplay between unemployment and educational credentials is the key to help disadvantaged and/or underrepresented groups. Reducing unemployment towards education and the development of skills and competencies increase well-being and economic welfare.
Increasing policy support for non-formal and informal learning	These learning types have little institutional power, support and appropriate representations so far in policies. To force all educational players and providers to recognise other teaching and learning approaches than their own, policies need to address these in a vertical and horizontal way.
Policy to support sabbatical leaves	Traditional concepts of work-life-education balance will be influenced by digitalisation and other fast developments. Portfolio workers, non-traditional employer-employee relations as well as factors like ageing of the society will force all parties to adapt to these new conditions. Longer and/or periodical educational leaves will lead to longer (absolute) working capabilities by individuals and will be beneficiary for employers towards regular knowledge, skills and competency developments.
Institutionalisation of the right for education for all citizens	In the past educational concepts were driven by institutional domains and providers. In the future, instead the focus on LLL institutions education as a public good will be the main driver of institutional developments. Education for all means then more individualisation following a diverse society and providing context-driven education.

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