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D7.2 Innovation methods and their applicability to AI

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FIRST DRAFT OF THE ENVISIONED INNOVATION ECOSYSTEM

EXECUTIVE SUMMARY

We defined a first draft of the envisioned innovation ecosystem detailing the vision and following up with strategic components and mission items.

The envisioned innovation ecosystem for Humane AI is represented by a quadruple helix model based on a strong university–business–state partnership and inclusion of civil society, media, and the culture-based public to integrate top-down policies and grassroots innovations with a strong emphasis on citizens and their needs.

We envision the Humane AI Innovation ecosystem as a dynamic and open system involving all major innovation actors from industry, academia, civil society and public authorities, as well as all EU territories, and moreover attracting talent and actors from around the world.

Characterized by the interaction between a large number and diversity of actors; the "blurring" of disciplinary and territorial boundaries, interdisciplinary knowledge and cross-sectoral technologies; Sub-projects in multiple sectors at different levels, the use of world-class infrastructures and resources from different region, and the indefinite implementation of the project and its scaling to other EU priorities and challenges, including climate action, SDG's and digital transformation.

We are assessing the appropriate means to create an effective and efficient innovation environment and detailing roles and components that are proposed to make the innovation ecosystem economically successful and societal relevant.

Key components are a strong and efficient knowledge supplying side, research organizations as regional knowledge integrators, industry leaders as sector agenda setters and magnet for open business ecosystems as well as strong innovation policies including financial support network and measures that foster the proximity of and the relation in the ecosystem.

1. INTRODUCTION

To advance human-centric AI and keep Europe at the forefront of the key technology shaping the global economy, it is critical to maximize the socio-economic impact of the consortium's research agenda. For making the research agenda as relevant as possible to solving current challenges in European society and economy research findings need to be transformed into products and services to achieve a socio-economic impact that is elevating the European society and economy. The challenge of innovation is getting the research and technology to markets.

The ability to realize and create innovation that will result in sustainable economic growth and human enhancement is highly dependent on the overall environment that allows and fosters the transformation of **research into products and services**. Existing Innovation Infrastructure and Support Formats evolved over time and are varying over regions around the globe. Once successful regions constantly need to work to retain their innovative edge and avoid falling back in key areas. Nowadays flexibility, speed and agility are key when transforming research into products and services. Especially in the areas that are strongly dominated by software and AI these capabilities are critical. Beyond increased R&D efforts, organizations — particularly technologically-driven ones — “need to be more innovative and pioneering than before to lead, to grow, to compete and to endure. Commercial organizations need to be efficient to survive in the short-term and encourage innovation and experimentation to survive in the long-term.” (Tandon, 2019)

In short, innovations need to be seen as the result of systems. The capabilities of its innovation ecosystem will shape the future of businesses and regions as a whole. Therefore, we must emphasize efforts to connect the research roadmaps with socio-economic impact-drivers and create an effective and efficient innovation environment and economically successful and societal relevant innovations. We aim to do that by creating a Human AI innovation ecosystem that is going beyond the traditional boundaries of industrial clusters fostering innovation and emphasize a holistic approach for ecosystem thinking and acting. As the term “ecosystems” is relatively new within business settings but has grown exponentially over the last decade we will first explore the theory behind ecosystems before we discuss how to create efficient innovation environment and concretize value creation in ecosystems. Last we will draft a first vision for the Humane AI innovation ecosystem and also highlight necessary pillars and items to realize that.

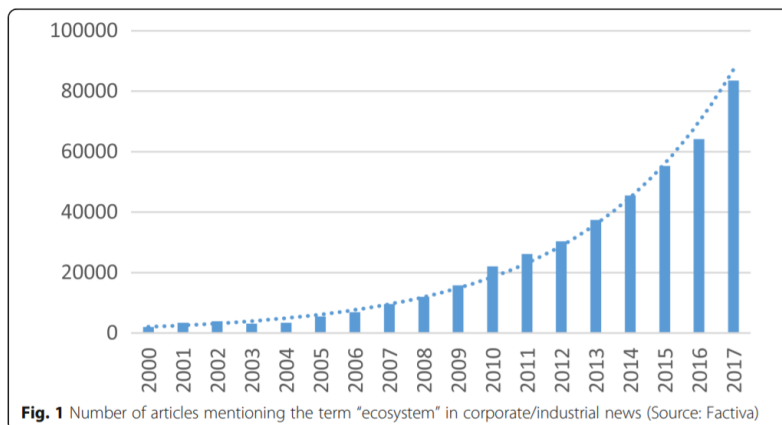


Figure 1: In general the use of the term “ecosystem” within business settings has grown exponentially over the last decade. (Kapoor, 2018)

2. THEORIE BEHIND ECOSYSTEMS AND ITS FUNDAMENTALS

Innovation is understood as invention that has reached the market or better that a successful realization with enhanced customer or manufacturer benefit happened (Watty 2013, Binz and Reichle 2005, Ericson and Kastensson 2011).

According to innovation system theory, innovation is a result of a complex set of relationships among actors in a system, which includes enterprises, universities and research institutes (Adner 2006). The exchange of technology and information among people, enterprises, and institutions is a major determinant of whether a process turns out to be innovative (Kirner et al. 2007).

In an economic sense, an ecosystem consists of exogenously defined components, the environment, and agents acting endogenously together as a system associated with capitalizing on the relationship (Acs et al., 2016).

Such ecosystems can be formed on a variety of unifying principles (from geographic and political to industrial and environmental), as well as at different levels—from local (within organizations, companies, clusters, science parks) to global, that is, wherever **stable relationships** and **a joint vision of the participants** arise. (Smorodinskaya, 2014, p. 28)

Business and innovation ecosystems (Ritala, 2013)

James Moore (1993) first introduced the term “business ecosystem” in his study. Since then the term “innovation ecosystem” becomes more and more popular in government white papers for economic development and academic papers on global innovation and competition. Most breakthrough innovations do not succeed in isolation. They need complementary innovations to attract customers. Clearly, operating in an innovation ecosystem - the synthesis of your new offerings and other firms' that creates a coherent customer solution-carries risk (Wang, 2017)

There is a growing consensus that business ecosystems provide entrepreneurial firms with resources and information to navigate in a constantly changing competitive environment (Zahra and Nambisan, 2012).

In the industry 4.0 era, innovation ecosystem means more than the former concepts. It emphasizes on the interaction between innovation units such as university, industry and other innovative organisms, communities across regions and nations to global dimensions. The main novelties for today's innovation ecosystems can be realized from flexible platform and networks. Any entrepreneur with a good idea can, irrespective of geographical location, launch business application platforms and construct an innovation ecosystem to avoid risks and improve efficiency and effectiveness.

A complete definition of the innovation ecosystem was formulated in a recent work by the authors ([Granstranda & Holgerssonb, 2020](#)): “the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations that are important for the innovative performance of an actor or a population of actors.” In this sense, the concept of “cross-industry ecosystem” is closely related to the term “innovation ecosystem.”

Alongside the triple helix model based on a university–business–state partnership is the quadruple helix theory ([Carayannis & Grigoroudis, 2016](#)), which identifies relations between various stakeholders (civil society, media, and the culture-based public) and

integrates top-down policies and grassroots innovations. That helix models can be viewed as a network of relationships.

Innovation ecosystems can be characterized by a combination of top-down and bottom-up initiatives (Jucevičius & Grumadaitė, 2014) that enhance networking and innovation development. The management and organization of such ecosystem is a challenge because of its complexity. The problem of managing both the actors of an ecosystem as well as the ecosystem is to create an infrastructure for self-directed development and the organization among “third parties”. Additionally, ecosystems usually are established spontaneously as reaction to processes of all market participants and links are formed at different levels through chaos (Tolstykh, 2021).

Knowledge-based ecosystems (Van der Borgh, 2012)

The knowledge management is a key parameter and a priority in ensuring the effectiveness of cross-industry interaction, creating an ecosystem, and a unified business environment, predetermining the need for the formation of new cross-professional competencies ([Tolstykh & Shkarupeta, 2019](#)).

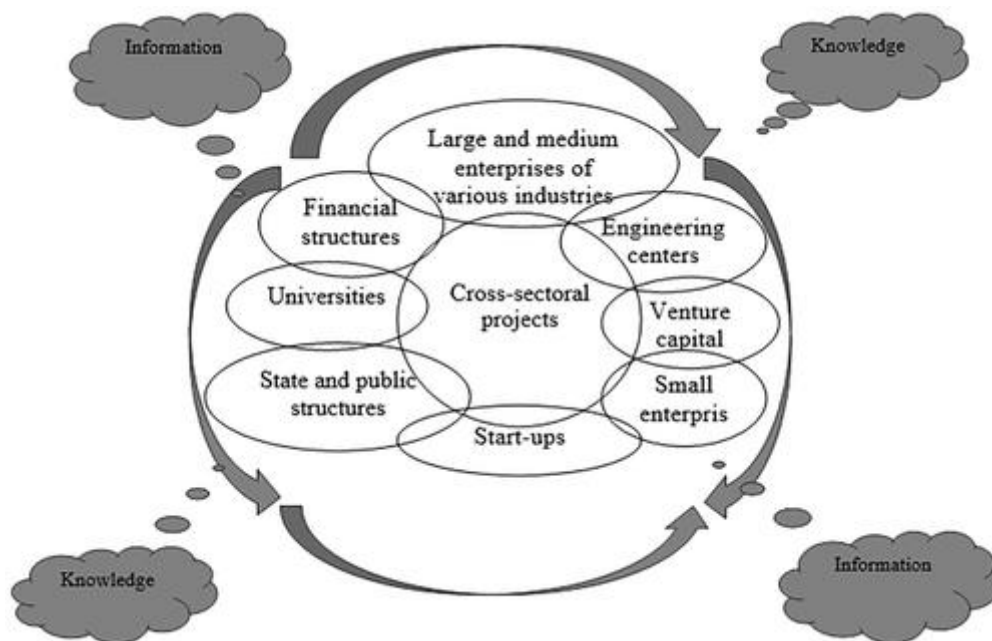


Figure 2: Knowledge as main indicator of the ecosystem development (Tolstykh, 2021)

A growing number of research and development-driven companies are located in knowledge-based ecosystems. Value creation by these ecosystems draws on the dynamics of firms itself (interacting and partnering) as well as the ecosystem at large.

There are several cases that serve as examples for knowledge-based ecosystem and the crucial components of it. Drawing on a field study of a Dutch high-tech campus, two key sources of value creation are identified: (1) facilitation of the innovation process for individual companies and (2) creation of an innovation community. (Van der Borgh, 2012). Other examples, for that include the in 2010 launched international innovation ecosystems network by Stanford University in cooperation with selected international partners (Finland, China, and Japan) or innovation ecosystems denote

Information and Communication Technology Platforms like Apple's iPhone, Google's Android, cloud computing and software platforms dominated by companies like Microsoft, Amazon, etc.

Further central components are knowledge supplier. Topics are studied coherently at universities and form a value-creating cycle as talents education- citation and open access-application and innovation. In knowledge economy and industry 4.0 context, promoting innovation ecosystem from a knowledge supplying side is embraced by multiple stakeholders as science community, company and government. Universities are the main stream of knowledge discovery and production. In America, 56% of the basic research is being conducted in universities.

A lot of frontier themes are driven by that, such as astrophysics, condensed matter physics, particle physics, and plasma spectroscopy, neuro science, bio-fuel, cancer genetics, hybrid corn, water processing, microbiology, molecular genetics, geology, traditional medicine ,nuclear magnetic resonance, terrestrial and planetary atmospheres, visualization, simulation, the renewable energy materials, energy and matter, accelerator physics, nuclear physics, aging, bioengineering, computer modelling, ultra-light, hi-strength aluminium composite conductors, digital computer, tornado simulator for wind energy, high resolution virtual reality, etc. (Wang, 2017)

An open innovation system as a space where large organizations, startups and students come together using technologies to create new sustainable business solutions helps to bring people who share a common vision together from different regions and every walk of life. Singularity University have been running an experiment in building their own local Innovation Ecosystem, which is pictured below. They have three main approaches for building the future in communities: Startup Programs, Corporate Innovation Exchange (CIX), and Funding. At a higher level, the SU University incorporates the faculties with its students, mentors and advisors. For rapid prototyping, they have a TechShop and further high-tech resources.

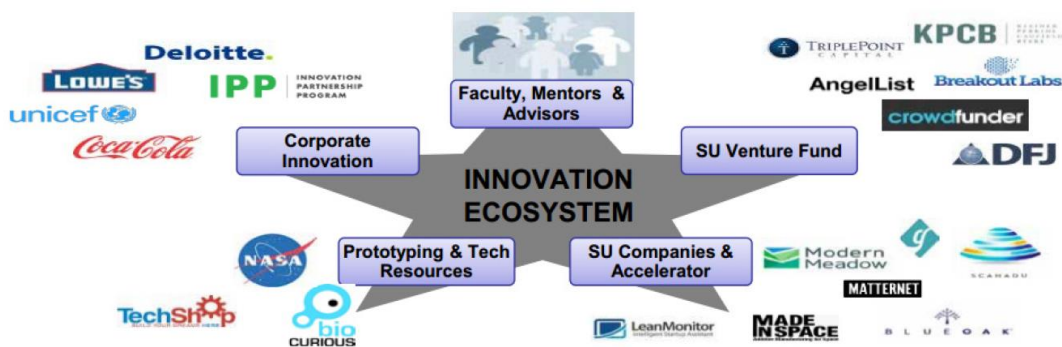


Figure 3: Example of the Innovation Ecosystem of Singularity University Labs

Taken together, we observe important factors along knowledge and business ecosystems: Level of knowledge supply, creation of an innovation community, and facilitation of innovation processes in individual organizations through common infrastructure.

Comparing knowledge and business ecosystems there is a difference on three aspects. First, the primary activity in knowledge ecosystems is the generation of new knowledge while the focus in business ecosystems is on satisfying customer needs. Second, players in a knowledge ecosystem are typically connected in a dense,



geographically clustered network while business ecosystems are represented by value networks which can be globally dispersed. Third, knowledge ecosystems are centered around a university or public research organizations whereas large corporation are the leaders of business ecosystems (Industry leaders).

3. CREATING AN EFFECTIVE AND EFFICIENT INNOVATION ENVIRONMENT

If designing traditional business models is like planning and building a house, designing an ecosystem can be compared to developing a whole residential district: more complex, more players to coordinate, more layers of interaction and unintended emergent outcomes. (Pidun, 2020)

Pidun states further, that what makes ecosystem design distinctive is that it requires a true system perspective. It is not sufficient to design the value creation and delivery model; the design must also explicitly consider value distribution among ecosystem members. This is further complicated by the limited hierarchical control in an ecosystem and the need to convince partners to participate, which poses specific governance challenges. And ecosystems exhibit strategic challenges not found in other governance models, such as how to solve the chicken-or-egg problem of creating a critical mass of partners and customers during launch and how to build a scalable and defensible model.

Business ecosystems, similar to residential districts, are extremely difficult to be entirely planned and designed. In other words, an ecosystem does not form overnight. It emerges through a shared understanding between heterogeneous players from different industries and disciplines of the partnership-based and pragmatic development of joint value creation scenarios. And that can be a lengthy process.

They rather emerge as a result of a chaotic and dense system. Such a creation process can be also one of the major strengths of ecosystems as it is offering the most efficient and adaptable environment. New players take a while to be integrated and to take on/execute a new role. In return, a new player from the outside can bring about massive changes.

However, there are some aspects that are important to get right in order to increase the odds of success. There are certain key roles in an ecosystem that are fundamental, there is the ability to build relationships between actors in an ecosystem, and there is the level of cross-organizational and diverse networks.

3.1. Key roles of actors in ecosystems

Ecosystem actors include large industrial enterprises, technoparks, engineering structures, start-ups, venture funds and financial institutions, universities and research organizations, various business structures and service providers, and government authorities. The key roles of actors in the ecosystem are described as follows (Tolstikh, 2021):

Pacemaker—is an actor who initiates an idea, project, or process that inspires ecosystem unification in a given period of time. These functions in the industrial ecosystem can be performed by digital platforms, new technologies, materials, innovative projects, and start-ups.

Integrator—is an actor who unites other actors for an idea or project and analyzes and evaluates the necessary competencies of actors and the degree of their economic security for other participants. This task can be performed by universities, research organizations, project offices, and digital platforms that accumulate knowledge, competencies, and international experience.

Developers—actors involved in the development and prototyping of new technologies, materials, and processes. This role can be implemented by technoparks, start-ups, engineering companies, and research structures.

Implementers—actors implementing new projects and processes on their site;

Promoters—actors providing promotion of implemented projects and conversion of past projects' experience into new projects and project commercialization.

For the vision of the Humane AI net, especially the relation with society and citizens is further important.

3.2. Connecting actors through relationships in the ecosystem

The ability to combine different resources, knowledge and elements traces back to the component of relationships between the actors. To foster transaction of ideas, talent and financial resources and enable value creation, relationships must be built to create an ecosystem. It is therefore quite usual to think that innovation also happens between ideas, talents and investors when they are close. Thus, the greater the concentration of the three elements, the possibility of creating relationships is great and the potential for innovation is great. In creating relationships proximity is therefore determining factor. To create an effective innovation environment, one need to embed ideas, ideas, and capital into their ecosystems, then try the right combination to link these three elements together.

The most cutting-edge innovation ecosystems in the world have gone through this process:

Israel had ideas and talent, but not capital. The Israeli government, in close collaboration with entrepreneurs, created Yozma, a government **program to create a vibrant venture capital industry**, which was seeded with \$100 million at the beginning of the 1990s to create ten venture capital funds.

London had capital and ideas, but no talent. Its strategy was to take advantage of the fact that it was already the financial capital of Europe to turn itself into the capital of financial innovation. For this, they **made it easy for entrepreneurs to move** into the City, and then they designed **very favorable immigration policies to attract talent** from other countries.

Silicon Valley had capital and talent, but no ideas. It all started with a company called Fairchild Semiconductors in Silicon Valley, which curiously was a subsidiary of Fairchild Camera & Instruments on the East Coast. There, Robert Noyce and Gordon Moore couldn't handle the limitations placed on them by their mother company and decided to abandon the company to found Intel. **The decision to start up**, which was uncommon at the time, was enough to transform the local ecosystem into the largest growing innovation economy in the world.

Through the geographical situation, distribution and fragmentation across the EU territories the factor of relationship building is a crucial one as well as the ability to create links to missing factors. While this can be enhanced to a certain degree it is a very difficult task. The distinctive features of successful ecosystems as complex self-organizing systems include the following:

- Coherence (interconnectedness): they behave as a whole;
- Deviations occurring in the system, instead of decaying, can intensify, and the system evolves in the direction of “spontaneous” self-organization;
- Chaos is a constructive mechanism of self-organization complex systems as the birth of a new one is associated with a violation of the usual system ordering.

Furthermore, for the creation of dissipative structures from a systemic perspective, certain conditions must be met:

- Dissipative structures can be formed only in **open systems**.
- Dissipative structures arise in **systems consisting of a large number of elements**.
- Dissipative structures arise only in **nonlinear systems**. Self-organization exists under special internal and external conditions of the system and the environment

Those structures and the quality of relationships in turn, hugely relate to the **sustainability of the ecosystem as a complex self-organizing system**.

3.3. Build cross-organizational networks and include disenfranchised/diverse groups

Through collaboration in a value network, firms exploit their interdependencies and have a competitive advantage over isolated companies which internalize all components of a value chain (Iansiti and Levien, 2004). Having cross-organizational networks and include disenfranchised/diverse therefore is a key. For start-ups it is for example very important to participate in such a business ecosystem (Zahra and Nambisan, 2012). Companies in a business ecosystem coevolve their capabilities and roles and tend to align themselves with the directions set by one or more central companies. Hence, start-ups which can participate in such an ecosystem align their innovation function to the expectation of the leaders and move towards a shared vision (Moore, 1996). Numerous examples describe how start-ups in business ecosystems prosper from investments made by industry leaders to maintain the network (Birkinshaw and Hill, 2005; Kaminsky, 2000). This can especially be important for big organizations that have already a challenge in interconnecting their “internal” innovation ecosystems.

Build Cross-Organizational Networks

Connect the innovator to the sponsors and the implementers. Fast connections between senior leadership and grassroots have proven to be the most important enabler for an innovative organization. Collaboration across the lines of hierarchy is one of the key elements in capturing new ideas and taking action. Building networking into the culture sparks communication across the silos and encourages and inspires new ideas, with the right cultural mindsets in place.

Examples for value creation and capture mechanisms in those networks

Often an ecosystem is structured around an industry consortium, which includes all the key actors of the ecosystem, and through which both tangible and intangible mechanisms are conducted. Examples for value creation and capture are e.g.:

- Facilitating the building of an industry consortium
- Explicitly open communication toward all the parties (including competitors)

- Crafting a common vision for the ecosystem
- Ensuring all the important horizontal actors are involved
- Communicate long-term win-win business prospects through jointly developed cooperation agreements (including shared exit strategies) around a common vision
- Internal innovation labs through internal organisation managing transversal innovation activities between business units
- External innovation labs through participation in forums and establishing formal agreements with academic institutions
- Business model prototyping and coaching as means of exploring new value horizons

Taking everything into consideration there are many aspects for making ecosystems economically successful and societal relevant.

4. FIRST DRAFT OF THE ENVISIONED INNOVATION ECOSYSTEM FOR HUMANE AI

4.1. The vision for the Humane AI Innovation Ecosystem:

The envisioned innovation ecosystem for Humane AI is represented by a quadruple helix model based on a strong university–business–state partnership and inclusion of civil society, media, and the culture-based public to integrate top-down policies and grassroots innovations with a strong emphasis on citizens and their needs.

We envision the Humane AI Innovation ecosystem as a dynamic and open system involving all major innovation actors from industry, academia, civil society and public authorities, as well as all EU territories, and moreover attracting talent and actors from around the world.

Characterized by the interaction between a large number and diversity of actors; the "blurring" of disciplinary and territorial boundaries, interdisciplinary knowledge and cross-sectoral technologies; Sub-projects in multiple sectors at different levels, the use of world-class infrastructures and resources from different region, and the indefinite implementation of the project and its scaling to other EU priorities and challenges, including climate action, SDG's and digital transformation.

4.2. The means and components for the Humane AI Innovation Ecosystem

One of the main challenges of the ecosystem is the transfer of knowledge and level of exchange to improve the network efficiency within smaller ecosystems itself and even more broadly between the ecosystems. This will be a huge contributing factor for the innovation success.

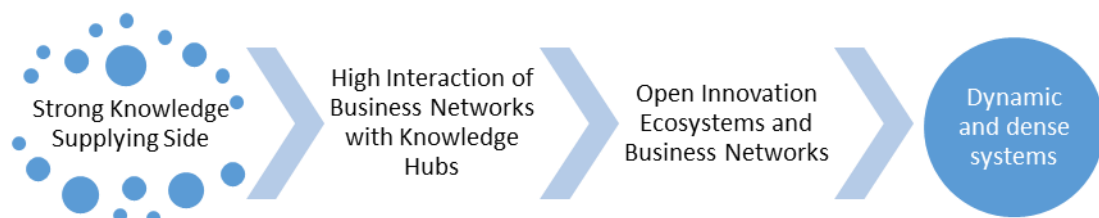


Figure 4: Creation and transfer of knowledge and level of exchange to improve the network efficiency as important challenge.

Especially, in fragmented Europe we rely on structures and forms that embrace cross-alignment, interconnectedness and increased transposition of ideas and resources from one network to another towards more dynamic, inclusive, and diverse ecosystem on all levels. This ability will determine the future of European businesses and regions in the global competition especially in future key sectors like human-centric AI and provides a strong opportunity for our society as a whole.

The success of its innovation ecosystem will shape the future of businesses and society as a whole.

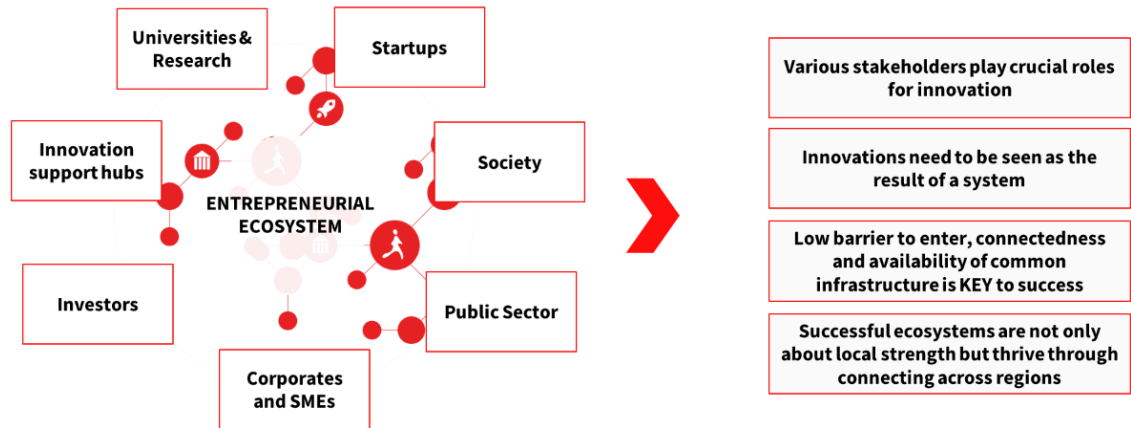


Figure 5: Connectedness of stakeholder and low barrier to enter is key.

We are seeking for means and components that embrace collaboration between stakeholders and joint value creation based on an integrated innovation system that offers knowledge, business, and access to financial networks via a common infrastructure with a low barrier to enter.

The main strategic components for the Humane AI innovation ecosystem can be structured by the following:

- 1) Strong Knowledge Supplying Side
- 2) High interaction of business ecosystems (e.g., enterprises) with knowledge ecosystems (e.g. universities)
- 3) Cross-organizational and Open innovation ecosystems and business networks
- 4) Innovation policies, Financial Support Network as well as Proximity of actors

Along these four themes we describe suggestions in more detail.

1) Strong and Efficient Knowledge Supplying Side

Universities and public research organizations are the foundation for innovation, stimulating the production and diffusion of knowledge across regions. Teaching and research are important to offer a strong knowledge supply.

To have not only a strong output but also an efficient supply of knowledge in terms of the benefit for society, we need to connect research roadmaps with socio-economic needs through innovation potential assessment and frontier tech forecasting.

An example to optimize direction and alignment of research roadmaps and outputs can be networking events and workshops like Agenda Workshops or Theme Development Workshops organized by research side and industry leaders along various sectors.

Universities should take their responsibility to **educate high-quality graduates**. The academic journals and press should take their responsibility to **public top research and liberal works**, while **knowledge platform should be constructed for open access and communication**.

The quality and literacy of graduates should be further emphasized: integrity, resilience, creativity, initiative, confidence, humanity, value making, autonomy and independent thinking. Evidence shows that students who engage in research have careers that are more successful after graduation. These students go on to become the next generation of scientists, engineers, teachers, and leaders in government and industry and will act as media to link science community with industry sectors and promote innovation. Students can participate in project and conferences and can publish a paper, apply for patent or launch start-up companies based on their research projects and experience.

2) Universities (and other regional research organizations) as regional Knowledge Integrators

Knowledge hotspots have been characterized as knowledge ecosystems where local universities and public research organizations play a central role in advancing technological innovation within the system and emphasize the knowledge spill over in all directions between all actors of the ecosystem.

Beyond their role of educating students and implementing basic research, we envision that **universities could play a key role in processes of creating and transferring new knowledge** and want to pay attention to the role that universities can play as **“original incubators”** in strengthening and developing the ecosystem as a whole. Following the discussed literature and case studies, university can act as an ecosystem integrator, applying its intellectual, reputational, and financial capital to create and maintain a strong ecosystem. Therefore, they may emphasize on entrepreneurial and interdisciplinary education and building stronger ties to external capital resources and cross-industry projects. e.g., to catalyse innovative startups into the ecosystem and having their strong knowledge ecosystems evolved into strong business ecosystems characterized by high numbers of spinoffs.

Universities play a vital role as “original incubators” in innovation ecosystems. Besides, their role is being transformed and reinforced due to the interdisciplinary nature of modern innovations and intersectoral collaboration in the process of implementing cross-industry projects.

Beyond traditional formal channels for interaction and knowledge transfer between stakeholders like research collaborations, operations with intellectual property (e.g., selling licenses, patents), spin-off organizations in the university environment, and university graduates employed in industry we recommend the university should enhance its role from a highly specialized university to an innovative university in the new economy.

Furthermore, universities are tending to organize themselves on a cross-regional level (e.g. CESAER - network of 50 tech universities in Europe, or StageTwo - pan-European competition for the best startups spinning out of leading European universities) and could therefore cross-connect stakeholders from regional ecosystems and unite and strengthen relations for the system of systems. Thus, at the micro and macro stage of ecosystem development, universities help to increase maturity and unite and strengthen relations between all actors from knowledge and business ecosystems.

3) Industry leaders as sector agenda setters and magnet for open business ecosystems

A lot of high-tech industries are organized as value chains or value networks. Business ecosystems are characterized by a large number of loosely interconnected participants dependent on each other for their mutual performance. We need to enforce this links and support industry leaders in the creation of value within the ecosystems as well as sharing the value with the other participants.

Processes, formats, and technologies are needed to stimulate the transfer of knowledge in the business environment and lead to increased productivity within companies in the supply chain and between industries. Beside the already discussed roles of knowledge hubs like universities other actors from the quadruple helix should be coordinated and activities and action plans initiated and conducted to foster collaboration and creation of common knowledge assets among innovation ecosystems' and business networks' stakeholders.

4) Innovation policies, Financial Support Network as well as Proximity of actors

We envision Europe becoming a hotbed for especially AI innovation. The underlying framework is that regions innovation policies and financial support enables the investment of a certain percentage of its GDP to directly fund R&D and innovation as well as indirect support through providing e.g., risk capital in a co-financing scheme for funds committed to invest in innovative start-ups in this sector. This should further attract private investors from around the globe.

Furthermore, we have to create proximity and connections of all stakeholders via real lighthouse formats and virtual platforms.

5. RECOMMENDATIONS FOR ACTION & NEXT STEPS

An ecosystem does not emerge overnight. It evolves through a mutual understanding between heterogeneous players from different industries and disciplines of the partnership-based and pragmatic development of joint value creation scenarios. And that can be a long-term process.

New players take a while to be accepted and to take on/execute a new role. In return, a new player from the outside can bring about massive changes.

Therefore, it is necessary, that we don't waste time and accelerate the effects via multiplier. We will join forces with other consortiums to find synergies and accelerate the development of components. As mentioned in Chapter 2 knowledge ecosystems are usually (regionally) centred around a university or public research organizations whereas large corporation are the leaders of business ecosystems in industry sectors (Industry leaders). Acknowledging this logic, we want to reach a broad regional coverage using entrepreneurial universities as multiplier and a holistic penetration in sub-sectors using industry leaders as magnets.

We outline below some of the key aspects and mission items on operational level across the different tasks based on the strategic aspects we discussed in this paper.

5.1. Recommendations for common infrastructure and increased network connectivity

We want on a cross-regional level to improve the network efficiency within the ecosystems itself and even more broadly between the ecosystems. This can be a huge contributing factor that a pacemaker can do for the overall ecosystem. It is including the development and offering of standard frameworks, scalable entrepreneurial education, shared knowledge, best practices and low-barrier (e.g., digital) solutions for ecosystem integrators and operators that are easy to scale.

While mobilizing the external ecosystem and proclaiming the mission of Humane AI net along the regions we will further open the dialogue, concretize joint needs and work on the preparation and implementation of action plans that are scalable to EU regions.

5.2. Increased startup output and international scaling and acceleration

On the aspect of startup-creation we have a clear path for improving innovation environment in Europe. Measures and solutions for a low-barrier access to entrepreneurial and scaling education like a digital module or digital bootcamp, the creation of a bench strength mentor pool accessible to founders and teams in Europe, an ease in regulation for non-European talents and startups to join the European ecosystem as well as a dedicated support infrastructure to accelerate and de-risk the international scaling of European-born ideas and ventures are fundamentals. One crucial aspect will be to build a Europe-wide network of entrepreneurship lighthouse institutions, more reputation for the European ecosystem through success stories and increase our overall startup quantity/quality. Entrepreneurial universities play a crucial role in multiplying this in the mid-term.

For more dynamic, dense, and diverse systems we recommend the set-up of entrepreneurship activities and cross-regional building of clusters that increase transfer rate and function additionally as a magnet for other stakeholder groups through activities, conferences and networking. University-driven activities can include

Special courses for pupils and students (e.g. AI Entrepreneurship course), Summer Schools, Incubation programs for emphasized Startup Creation, or Hackathons where a pan-European network of university entrepreneurs are brought together with industry and public sector to emphasize cross-organizational transactions and knowledge transfer.

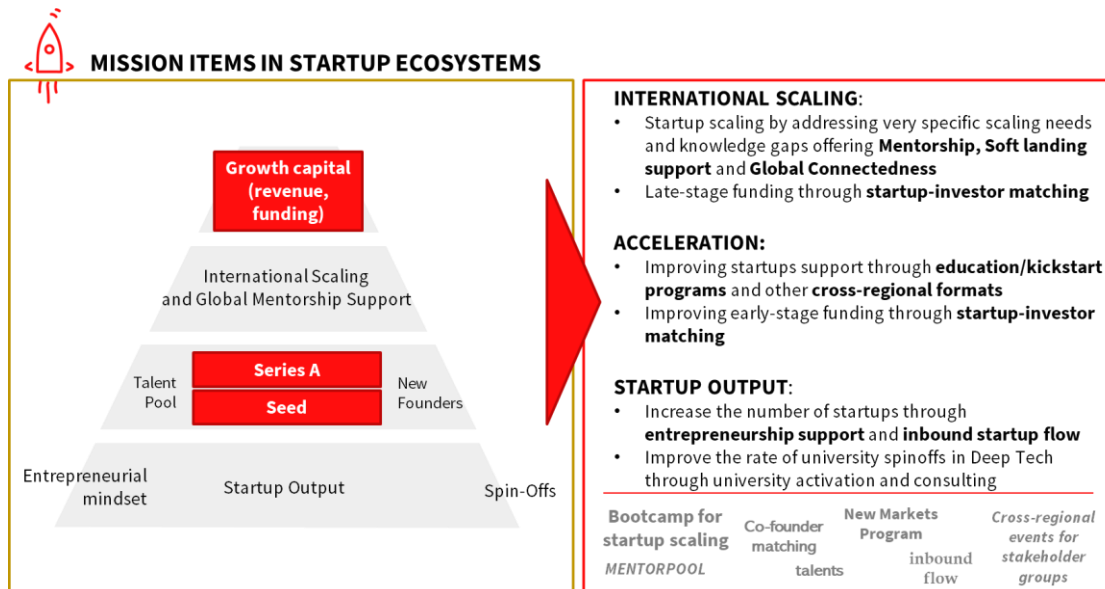


Figure 6: Mission items for increased startup output and international scaling and acceleration

5.3. Interconnected value networks in industry and sub-sectors embracing open innovation

We already have industry leaders across the different sectors as partners in the work packages. Based on that, we aim to reach a more holistic penetration along the value chain via setting up Theme Development Workshops and using those industry leaders as focal points and magnets. The Theme Development Workshops (TDW) are a joint project from Tailor, Humane AI Net, Vision and Claire. The overall target is to identify the grand challenges for AI in Europe together in groups of scientists, industrial players as well as societal stakeholders. The overarching goal is to develop the innovation Agenda for AI in Europe. Beside Agenda setting we want to come up with a set of use cases that are door-opener and touch point for other stakeholder groups to join the value network via hackathons that pick up the challenges and involve universities, startups and people from other industries to join the value network.

To promote AI in the mid-market and expand knowledge, we propose furthermore to launch an AI Cross-Industry Think Tank. This is intended to be a network of CXOs and senior innovation executives that will foster the exchange of ideas on how an organization can support radical innovation in AI. Due to the design of the format, it is particularly suitable for established SMEs and corporates.

5.4. Creating proximity and connections of stakeholders via real lighthouse formats and virtual platforms

To create real “proximity” and density between representatives of all stakeholder groups of the envisioned ecosystem a recurring lighthouse event aims to ignite new contacts and revitalize existing connections at the Future Vision Conference

To maximize the outreach of this format we already start to mobilize and partner with existing external networks and associations in Europe and include them in these formats aiming to incorporate and implement societal impact into existing structures in research, business, and industry ecosystems, and to inspire even more stakeholders on an European level through the HumanE AI Net.

To create further connections not limited by geographical boundaries and promote communication we aim the construction of a matching and knowledge platform.

Firstly, scientists and engineers from cross-disciplinary fields can match and communicate with each other to foster the exchange knowledge and to promote knowledge diffusion and innovation. Secondly, it can enhance communication between specialists and the public. Asymmetric information and incomplete information between knowledge producers and applicants often hinder innovation. The matching platform should help to overcome this and match people across borders and disciplines.

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FIRST DRAFT CONCEPT OF THE MATCHING PLATFORM

EXECUTIVE SUMMARY

The key to sustainable innovation lies in bringing together all the relevant stakeholders. To turn ideas and research results into successful ventures, it is necessary to bring the right people together with the ideas and results. It must be taken into account that different stakeholders have different demands and pursue different goals. This challenge has to be mastered. To this end, we are developing a matching platform that enables effective matching across different dimensions for innovation in AI. To this end, our first step was to build a focused understanding of matching and develop the necessary question base for a matching platform.

In the future first version, users will be able to specify and manage profile data and receive matches. The matches can be either one-to-one matches or a group of people for whom a live event (online or in-person) is beneficial to bring them together. Our goal is to evaluate the platform and get feedback from the Humane AI consortium members so that the platform can be tested within the consortium. This will allow us to get quantitative and qualitative user feedback from technology and domain experts, scientists, entrepreneurs, and startups.

Our long-term goal is to connect experts and entrepreneurs across spatial boundaries and create a vibrant and agile high-tech environment on a European scale.

8. INTRODUCTION

The key to sustainable innovation is to bring together all relevant stakeholders. To turn ideas and research results into successful ventures, it is therefore necessary to match the right people with the ideas and results. It must be taken into account that different stakeholders have different demands and pursue different goals. This challenge needs to be addressed. To this end, we develop a matching platform that enables effective matching across different dimensions for innovation in AI.

We envision an intelligent matching platform based on the knowledge of skills, interests, values, approaches and existing collaborations of experts and entrepreneurs.

In order to take this vision into account, we rely, among other things, on different micro-projects, which should help in the realization of the matching platform. The aim is to identify key success factors piece by piece and to incorporate the insights gained into further development in a continuous process. In the following, the results of the first microproject - Asking the right questions - are presented, as well as its follow-up project. Based on this, a further vision for the platform is presented.

9. ASKING THE RIGHT QUESTIONS

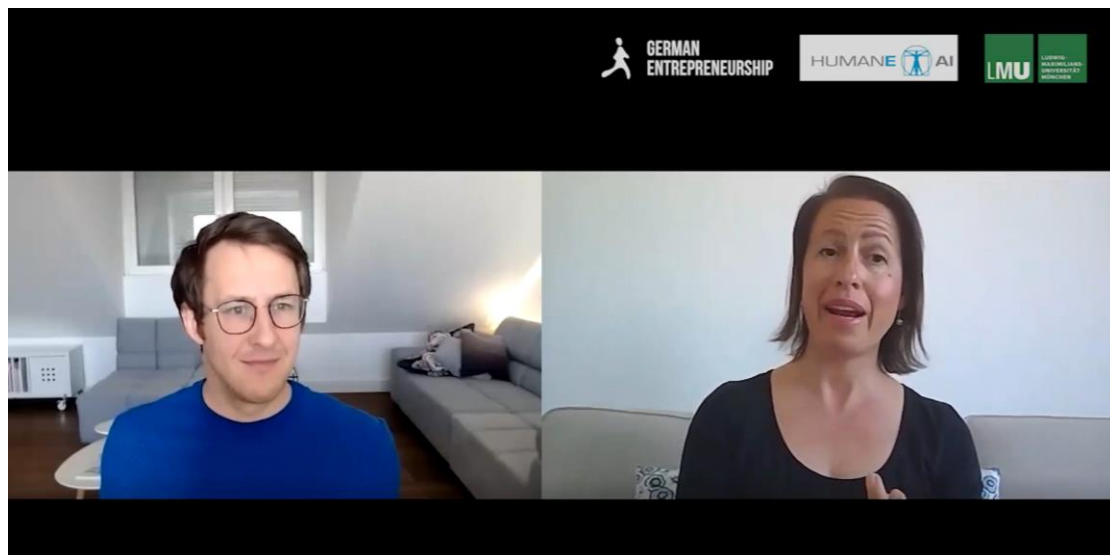
The goal of the micro project – Asking the right Questions” was to identify the right questions, what artifacts are telling, and what good indicators for potential collaborations are. Here, the key challenge is to bring people together to innovate, especially in distributed environments on a European scale. It must be achieved that as many stakeholder groups as possible can connect with each other and do so at their respective intersections of interest. Our overall goal is therefore to enable diverse startups that are compatible with European and human values, and to bring together AI experts from research and practice for modern and fair AI developments. The goal of the matching platform is to bring together different actors in the AI ecosystem (startups, SMEs, AI experts, AI business experts), who are usually not in contact or do not know each other, in a structured and intelligent way.

2.1 INTERVIEW STUDY

To get a better understanding of matching, we used a qualitative methodology to systematically investigate how matching works. In a first step, we developed a detailed questionnaire (as can be seen in the Appendix) and then tested it in a series of interviews with experts from the HumanE AI network, matching experts, start-ups and professional service providers. The focus was on the questions:

- What are critical success factors in matching?
- What profile information is needed to effectively match actors?
- Looking back, what are recurring patterns for successful matches?

In the total of 10 interviews, which lasted an average of one hour, we interviewed different stakeholder groups to incorporate the different needs and views into the matching platform.



(Figure 1: Qualitative Interview with Galina Bankova – Founder: The Matchmakers & Head of Matchmaking @ Bits&Pretzels)

2.2 AI IDEA PRIZE

To further test the findings from the interviews, a virtual event was also held - the AI Idea Prize. Here, students and other interested parties could present their prototypes or startup ideas and have them evaluated by a high-ranking jury. The jury consisted of Matthias Notz (CEO of German Entrepreneurship), Bernd Blumoser (Innovation Head of Siemens AI Lab), Prof. Dr. Albrecht Schmidt (Chair of Human-Centered Ubiquitous Media at LMU Munich), and Gülce Cesur (Project Manager and Business Analyst in Engineering at VW Data:Lab). After each pitch, the students and startups received feedback, questions and were shown further potentials of their ideas. In addition, there was an extensive panel discussion by the jury members on the topic: From AI ideas to business. This should especially show the students that their ideas have potential and that they should try to establish a business based on them.

2.3 THE RIGHT QUESTIONS

Based on our interview analysis and the insights from the event, we created a data foundation for the digital platform. This focuses on the five target groups: Future Founder, Startup, AI Researcher, AI Business Expert and Corporate.

The connected question system then queries personal data, professional background, interests and values, and skillsets. In addition, accounts such as LinkedIn can be added to expand the data points.

Sample queries include:

- How important is human interaction to you (1-5)?
- What are your business goals (long-term exit, sustainable business, social entrepreneurship, non-profit, ...)?

Professional Background						
What is your highest degree	Dropdown (Bachelor, Master, Diplom, Ph.D., Post Doc., MBA, Prof., other)					
What is your field of study	Dropdown					
How many years have you been studying	Dropdown					
Which university did you go to	Dropdown					
What are your entrepreneurial experiences	Founder	Co-Founder	Been to an accelerator	Number of founded comp	Business Angel / VC	
In which sectors did you work before	Automotive	Energy	Finance	Health industry	Transport & Logistics	
What was your last position	Dropdown					
What are your professional experiences?	Organisation 1__years	Organisation 2__years	Organisation 3__years	Organisation 4__years	Organisation 5+__years	
Interests and values						
What are your sectors of interest	Automotive	Energy	Finance	Health industry	Transport & Logistics	
In which technologies are you interested in	Artificial Intelligence	Deep Learning	Machine Learning	NLP Platforms	Predictive APIs	
How would you rate your expertise in those technologies	Rate 1-5	Rate 1-5	Rate 1-5	Rate 1-5	Rate 1-5	
What are your core business fields?	Sales	Business Development	Marketing	Finance / Controlling	Product Development	
How would you rate your expertise in those fields	Rate 1-5	Rate 1-5	Rate 1-5	Rate 1-5	Rate 1-5	
How important is teamwork for you?	Rate 1-5					
How important is empathy for you?	Rate 1-5					
How important is resilience for you?	Rate 1-5					
How important is motivation for you?	Rate 1-5					
How important is time management for you?	Rate 1-5					
How important is efficiency for you?	Rate 1-5					
How important is structure for you?	Rate 1-5					
How important is human interaction for you?	Rate 1-5					
How important is flexibility for you?	Rate 1-5					

(Figure 2: Excerpt from the matching query of the interest group: future founder)

The matching questions are structured according to personas & matching concerns. Thereby we accompany the matching throughout the entire process chain.

1. **Information about the platform user** (personal + professional level)
2. **Matching request** and specifications depending on the matching area (goals, relevance in the collaboration, required skillsets, industry focus, e.g.)

3. **Matching of persons** and personal exchange via video call or personal meeting.
4. **Feedback loop** with matching persons (how did it go on, what was a success, what could have helped more?)
5. Internal collection and **evaluation of KPIs** as well as **adjustments of the platform** (acquisition rate, churn rate, monthly active users, average match score)

In the follow-up microproject we plan to build and verify a working prototype.

3. MATCHING THE RIGHT PEOPLE

Creating a functional prototype for online matching of people and expertise for innovation.

In the first microproject “Asking the right questions” we could identify and verify a set of functional questions to match people for innovation. With this project we build on this understanding of relevant elements of a matching platform and the identified user needs in the context of AI based innovation. For this purpose, we will use the data from interviews with a diverse set of stakeholders and the experience from an online live AI matching event as well as our insides from the initial platform mockup to create a fully functional prototype.

Within the first Microproject for this bigger topic, we aim to implement an AI matching platform prototype. The first version will allow users to specify and manage profile data and receive matches. Matches could be either one-to-one matches or where a set of people is identified for which live event (online or in person) for getting them together is beneficial. We aim to evaluate the platform and get feedback from members of the Humane AI consortium for this the platform will be tested in the context of the consortium. This will allow us to gain quantitative and qualitative user feedback from technology and domain experts, scientists, entrepreneurs, and startups.

Our long-term goal is to help connect experts and entrepreneurs across physical boundaries, creating a vibrant and agile high-tech environment on a European Scale.

3.1 ONGOING DEVELOPMENT

We initially focused on designing the interaction experience of the matching platform. Here, we focused on several key views: (1) an expressive landing page that attracts both members of the Humane AI consortium and external AI development stakeholders; (2) customizable profile pages; and (3) matching views that create engagement between the users.

Next, we explored technical interfaces to existing professional networking platforms. In particular, we explored integrating *LinkedIn* user management features, i.e. registration and login, to lower the barriers for registration and profile description on our platform.

In addition, we took basic decisions regarding the platform implementation. At this stage, we highlight decisions related to three key dimensions: (1) configuration; (2) responsiveness; and (3) technology.

Related to *configuration*, we noted that future platform customization must be manageable by non-technical personnel as best as possible. This applies in particular to future insight and changes related to the profile description. To support this, we decided to use easy-to-modify JSON files, an open file format using human-readable text, to represent user profile configurations.

Concerning *responsiveness*, we stressed early on the importance of usability and user experience across the device spectrum, ranging from mobile phones to desktop computers. For this reason, we created interaction concepts for different device types. We will use a modern framework like Bootstrap to implement a responsive matching platform.

Finally, related to *technology*, we took several decisions that impact maintainability and operation of the platform. For example, we chose to use React, a modern and open-source front-end JavaScript library that can easily be deployed and scaled on various types of infrastructure, from basic custom servers to established cloud computing services.

3.2 EVALUATION

We plan to test the platform extensively. We will conduct user tests at various stages of the development cycle. Those tests are planned to examine the usability and user experience of the matching platform.

We will invite AI experts and business stakeholders once the platform is operational and tested. We plan to conduct additional evaluation sessions and brief interviews with a set of the initial users. In particular, we will attempt to map at this stage what kind of interactions between platform users have occurred and how those interactions were perceived by the users.

3.3 VISION

We envision that this matching platform will become a valuable resource in the interaction between diverse stakeholders within the AI domain. Long-term, we perceive an opportunity to systematically map and uncover relationships and opportunities across a variety of dimensions, including technical and economical ones. This will be enabled by an analysis of the information users either link to or provide directly on the matching platform.

(Figure 3: Mock-up of the Matchingplatform)

7. APPENDIX

Interview guide

Microproject - Asking the right questions.

Participant: _____ Datum: _____

Interviewer: _____

Aim: To find out categories for the right questions. To find out some specific questions that we could use.

Intro:

- For the EU Microproject: Asking the right Questions!
- Your assessment is important to us in order to better assess which questions are relevant in a matching process
- Please say something about your background
- What do you mean by matchmaking?

1. What do you look for when you do matching?

More ideas:

- Personality*
- Posture*
- Skillset*
- Values*
- Gut feeling → With which questions is this influenced?*
- ...*

2. What information do you need to make an informed decision?

More ideas:

- Experience of the parties*
- Personality tests / Info*
- Pitch Deck*

- d. *Settings*
 - e. *Expectations*
 - f. *...*
-
-

3. What questions do you ask the respective parties?

More ideas:

- a. *Top 5*
 - b. *Important elements of a matching process?*
 - c. *What are the effects of good matchmaking processes?*
 - d. *...*
-
-

4. Looking back, what was the pattern in successful matchings?

More ideas:

- a. *KPIs*
 - b. *Weighting of:*
 - i. *Personalities*
 - ii. *Posture*
 - iii. *...*
 - c. *...*
-
-

5. Questions about the platform

Further ideas:

- a. *How would you imagine a good matching platform?*
 - b. *What technologies are available for creating such a platform?*
 - c. *How can I efficiently match content from academia with institutes/corporates?*
 - d.
 - e. *Would you match ideas with people or people with ideas/technologies on such a platform?*
 - f. *...*
-
-

6. Final questions

- a. *Do you have any further comments for me on these issues?*
- b. *In your opinion, have I left out anything crucial?*
- c. *Do you have any further questions?*
- d. *What other discussion partners do you recommend?*

REPORT ON INNOVATION METHODS AND THEIR APPLICABILITY

EXECUTIVE SUMMARY

Artificial intelligence is becoming increasingly important. It plays a role not only in the everyday life of every human being, but also in almost every company. The overlap between humans and machines is getting more and more fluid, which is why methods from humans for humans are needed to facilitate the implementation of artificial intelligences.

In this report, possibilities for AI checks, strategies and AI transfers are presented, which can be assigned to small medium-sized companies (SMEs), start-ups and large industries respectively. A selection of three offerings per category has been made. It is structured according to the different types of companies, a description of the implementation and more detailed procedures. The web sources can be found at the respective checks, strategies, and transfers. Furthermore, a recommendation can help to form own opinions and make initial considerations. Overall this report contains the collected best practices on AI Implementation methods.

1. INTRODUCTION

Artificial intelligence (AI) is perceived as the great growth opportunity especially for SMEs. In a survey by the Bundesverband Mittelständische Wirtschaft (German Association of SMEs), just under 70% of respondents from SMEs state that they see a very high benefit in automation through the use of AI¹. At the same time, there is a risk that German SMEs will be left behind in the wake of international AI developments. This view is shared by 70% of the experts surveyed in the "Artificial Intelligence in SMEs" survey² conducted by Mittelstand Digital-Begleitforschung in April 2019. One of the major obstacles in this regard is seen as a lack of expertise or skilled workers³. Potentials of AI are recognized but cannot be implemented across the board. Actually, German SMEs are very strong in their respective disciplines: SMEs occupy the role of so-called hidden champions in many fields. However, relevant AI developments are taking place abroad, especially in the US. To avoid further failures in this regard, methods of AI implementation, AI checks, training and continuing education concepts as well as strategy concepts in particular must be widely published and applied.

But AI implementation is not only critical for midsize companies. For other company sizes, including startups and large corporations, AI can also lead to new value creation on a wide variety of levels. In addition to the actual software - AI is ultimately special programming of software - the physical environments in which it is embedded, such as robots or entire production facilities, also play a role. AI ultimately opens up entirely new markets, some with considerable growth potential. In its position paper "Artificial Intelligence," the Association of Bavarian Industry (Vereinigung der Bayerischen Wirtschaft e. V.) cites a study by Fraunhofer according to which global revenues from AI technologies were estimated at (only) \$0.64 billion in 2016 but are expected to reach \$37 billion in 2025⁴. Based on this potential, SMEs, startups, and large corporations need to be informed about AI implementation methods to take advantage of corresponding opportunities for themselves. In addition, not all regions have such extensive support programs available as those provided in the Free State of Bavaria by the Bavarian State Ministry of Economic Affairs, Regional Development and Energy⁵.

This white paper, created as part of the European Humane AI Net program⁶, showcases the various possibilities for AI implementation and categorizes them into the three target groups of SMEs, startups and large corporations. This publication is intended to help companies of all sizes have easier access to AI implementation measures. Further goal is that the initiatives presented here receive the attention they deserve.

¹ https://gemeinsam-digital.de/app/uploads/2020/07/ki-umfrage_bvwm_qd.pdf, S. 13

² https://www.mittelstand-digital.de/MD/Redaktion/DE/Publikationen/kuenstliche-intelligenz-im-mittelstand.pdf?__blob=publicationFile&v=5, S. 8

³ Vgl. ebda, S. 10

⁴ https://www.vbw-bayern.de/Redaktion/Frei-zugaengliche-Medien/Abteilungen-GS/Wirtschaftspolitik/2019/Downloads/Position-KI-Januar-2019_kurz_final.pdf, S. 9

⁵ <https://www.stmwi.bayern.de/service/foerderprogramme>

⁶ <https://www.humane-ai.eu/>

8. AI CHECKS

8.1. AI-CHECK FOR SMALL-MEDIUM ENTERPRISES

To master the digital transformation, SMEs in particular need support. AI-Checks are very helpful here. They identify the current conditions and detect precise landmarks and weaknesses in the SME. AI-Checks are the first step in identifying the current state of the company's possibilities to implement artificial intelligence. This step is necessary to initiate the best possible development

8.1.1. “Software Development Check/CCE-Check” by fortiss

This Check is identifying the present software design on its potential to develop the product and reduce costs (Potential evaluation). It also explores previous working methods and development activities for an increase of productivity and less barriers (Retrospective analysis). The Software Development Check evaluates and analyses the software design comparing to other organizations and contemporary technologies (Benchmarking).

Method:

- Mutual conversation: CCE-team explains the exact procedure and supports company in selecting interview participants.
- Preparation of the interviews: Setting up access for the participants to the platform, where the interviews are conducted online.
- Conducting the interviews: Participants record their essential daily activities. Only the relevant aspects of each participant are recorded.
- Completion and online results: The collected information is put into relation and a first automated analysis regarding quality attributes is immediately available online.
- Workshop at companies' site: The results are discussed in a personal workshop, possible potentials are identified and action measures are developed together.

Source: <https://cce.fortiss.org/check>

Recommendation:

With the help of the CCE Check, small and medium-sized enterprises receive a review and assessment of their software development activities using the development of a software system as an example. The assessment forms a valuable starting point for identifying and building up improvement potentials of techniques and competences based on the current state of the art within a company. By means of interviews, the main activities, their embedding and coordination in the development process and the techniques used that contribute to the development of the software system are recorded. Based on the activities and roles of the participants, only the relevant aspects are considered and collected. These range from requirements management to testing and software deployment. The collected information is correlated and a first automated analysis in terms of software/system quality attributes (e.g., maintainability) and process attributes (e.g. traceability) is immediately available. The individual results of the CCE Check are presented in detail to all participants together with selected managers on site in a half-day workshop and discussed together. Based on the results, potential improvements are identified and prioritized, incentives are created, and

concrete measures are developed to promote the mastery of software technology and corporate competences.

8.1.2. AI Maturity Check by U-TUM

Based on the expertise of numerous large German and international corporations and organizations, appliedAI has collected more than 120 challenges that companies typically face along their journey towards AI maturity. The goal of making the journey available is to help SMEs guide their way towards AI maturity: “We use it as a proven framework to guide the development and implementation of your own AI strategy.”

Methods used in the AI Maturity Check:

- Systematically assess the company’s current position with the ‘AI Maturity Assessment’: The appliedAI Maturity Assessment is used to assess the status quo of AI adoption in the companies organization they can work against. It is applied in 9 European countries as a standard tool for assessing and benchmarking AI maturity.
- Define the companies AI-strategy following the proven ‘AI strategy house’: The AI strategy house serves as a framework for content creation and structure for the AI journey. More details can be found in our whitepaper 'Elements of a comprehensive AI strategy'.
- Develop the company’s roadmap for AI maturity avoiding common challenges: The AI Journey Map gives an overview about the challenges a company typically faces along their AI journey. Different workshop formats build upon a maturity assessment and AI Journey as a toolset to create a working plan for each company to structure their way forward. More information about our AI courses and trainings can be found on the AI trainings page.

Source: <https://www.appliedai.de/services>

Recommendation:

The appliedAI maturity assessment has established itself as a very good tool for measuring the level on AI in Europe. Since its development it is now being used in more than nine European countries. The Assessment in combination with the proven methodology for journey workshops serves as a basis for identifying the companies’ current level but also to create a roadmap of how to advance. It creates a quantitative basis for the status quo and for the expected success.

A workshop is a time-limited event in which a small group deals intensively with a specific topic. As a learning tool, approaches to solutions and results for a concrete problem are to be developed jointly.

8.1.3. AI Maturity Tool by VTT Technical Research Centre of Finland LTD

By understanding the level of an organization’s AI, the VTT’s AI Maturity Tool can be used as a free-of-charge self-assessment web tool, which produces a basic visualization of AI maturity.

Method:~

Level of the companies organization's AI: It gives a baseline of the current AI maturity by evaluating the Strategy and Management, Products and Services, Competence and Cooperation, Processes, Data and Technology.

Source: <https://ai.digimaturity.vtt.fi>

Recommendation:

The compact information gets to the essence of the AI Maturity Tool of VVT. Interested parties might have problems disclosing data (A Sign-Up is needed for further steps).

8.2. AI-CHECK FOR START-UPS

Start-ups face naturally the special challenge of launching a business. They are in the starting blocks ready to take off. In this formative stage, artificial intelligences can figure out how competitive the start-up is in comparison to existing companies. Where are the strengths and weaknesses?

8.2.1. AI Readiness Score by Appen

The AI Readiness assessment is designed to level-set an organization in its AI journey, with practical guidance on how to get to the next stage.

Method:~

Take this Assessment to:

1. Understand where the AI industry is as a whole on their journey.
2. Learn where the organization stands in comparison to the AI industry benchmark
3. Uncover what steps the organization can take to advance its AI initiatives.

Source: <https://appen.com/ai-readiness-score/>

Recommendation:

Has not a special start-up -focus but can be used for start-ups as well.

8.2.2. AI Corporate Assessment (AIRA) by Stallion AI

Stallion AI has developed a proprietary methodology, based on deep experience and aligned with global best practices, to assess the artificial intelligence readiness and software development and deployment processes within any enterprise.

This assessment serves to establish a customized roadmap for future AI projects, applied research initiatives and integration of intelligent solutions. It helps guide executives on how best to adopt an AI and machine learning innovation culture across one or many governments or business units. This is the first step towards AI-driven digital transformation for any large enterprise in the public or private sector.

Source: <https://stallion.ai/en/ai-readiness-assessment>

Recommendation:

Proprietary methodology comes to play. The Check also has not a special start-up -focus but can be used for start-ups as well.

8.2.3. Assess your AI maturity by Visium

Visium has developed an assessment designed to help leaders understand the necessary factors that will allow them to successfully prepare for and implement AI solutions.

The assessments process steps to identify AI maturity is based on three main dimensions:

1. Data Governance
2. Innovation Potential
3. Initiative Management

Source: <https://www.visium.ch/ai-maturity-assessment>

Recommendation:

The test of Visa includes only three minutes. This can potentially lead to an inaccurate and unsatisfactory final result. On the other hand, if the right questions are asked in the three minutes, the result is not necessarily incorrect. Nevertheless, we would take the evaluation of the test with a grain of salt.

8.3. AI-CHECK FOR BIG INDUSTRIES

Even big industries need to stay up-to-date when it comes to AI. Even though many big industries are far advanced in implementing artificial intelligence, they should always be adapted and updated to the latest developments in AI but also to the new products, business models and organization of the company.

8.3.1. AI Readiness Assessment by Omina Technologies

The AI Readiness Assessment identifies a competitive strategic AI roadmap. Your current AI maturity is compared to your competitors, followed by a SWOT analysis and the development of a roadmap on how you can strategically exploit AI.

Further procedure:

1. An AI Readiness Assessment enables companies to expand their offering and include new advancements in the field of Artificial Intelligence and Machine Learning.
2. In conjunction with core team members within the company, Omina Technologies identifies key strategic areas where the company could best use new AI technologies and Machine Learning.
3. Following a preliminary meeting with the company, Omina Technologies establishes what information is required to determine the specific needs and opportunities within its portfolio.
4. Omina performs a formal assessment of existing competencies and gives advice on the medium and long-term strategic direction with respect to the integration of AI and ML technologies.

Source: <https://ominatechnologies.com/ai-readiness-assessment/>

Recommendation:

The AI Readiness Assessment by Omina Technologies also includes fields of machine learning and business development. Their recommended strategies are designed for

long-term goals. This holistic approach fuels an even more successful implementation of AI.

8.3.2. AI Readiness Assessment by Fujitsu

The AI experts of Fujitsu discuss the following questions: “How ready are you for AI? What concrete and individual competitive advantages can you realize through AI? What could your "Roadmap to AI" look like?”

Fujitsu’s more accurate process is as following:

1. Overall positioning of the own company for the use of AI
2. Kick-off call for interdepartmental analysis
3. As-is analysis according to dimensions, opportunities and risks
4. One-day workshop in which they transfer their experience to your company
5. Personal "Roadmap to AI" with recommendations
6. Results report and results dialogue
7. Agile, goal-oriented cooperation through a structured approach and procedure and moderation
8. Short time frame of only about three weeks

Source:

https://sp.ts.fujitsu.com/dmsp/Publications/public/50928_Kuenstliche_Intelligenz_im_Unternehmen_So_gelingt_der_Einstieg.pdf

Recommendation:

Fujitsu focuses on the very individual situation of the customer and is holistically oriented. In the three-week-assessment, they look at six dimensions of AI and evaluate how well the business already is positioned in these dimensions. The more rash visible in the chart, the better it is for the company. Very illustrative!

8.3.3. Understanding your AI maturity with Avanade

Avanade’s AI Maturity research was designed to help understand organizations progress against five categories: AI Strategy, AI Talent and Culture, Digital Ethics, Data Supply Chain as well as Analytics and AI Technology and Process.

Process steps:

1. AI strategy for resilience and business results (in uncertain times)
2. Rethink the use of AI technologies and processes to respond
3. Rethink AI strategy to address Digital Ethics (during uncertain times)
4. Rethink Data Supply for resilience and results (in uncertain times)
5. Rethink AI Talent and Culture Agenda/The secret weapon to scale AI for the long-term.

Source: <https://www.avanade.com/en/solutions/analytics-and-ai/artificial-intelligence/data-and-ai-maturity/ai-strategy>

Recommendation:

In times of Covid 19 pandemic, it is important to adapt to the circumstances. Avanade does this very well by referring to the pandemic again and again. This way, the assignee feels securely supported even in times of uncertainty. Very contemporary!

9. AI STRATEGIES

9.1. AI-STRATEGY FOR SMALL-MEDIUM ENTERPRISES

Especially educational trainings can be very helpful for building an AI strategy in an SME. They cover the breadth and necessary depth that a strategy can provide. Adapting this individually to the SME is in the hands of the training participants and remains a challenge.

9.1.1. Online Course by University of Leeds

This Postgraduate Certificate pathway provides a strong foundation of AI skills to give you what employers are looking for. You will study two compulsory modules and two optional modules of the Artificial Intelligence Masters and exit with the Postgraduate Certificate award, or continue to complete the full Masters degree.

Participants will acquire the knowledge to influence company strategy and impress employers, helping them to evaluate the risks and opportunities associated with new technologies and market approaches.

Source: <https://courses.leeds.ac.uk/d997/artificial-intelligence-postgraduate-certificate>

Recommendation:

Only for professionals with previous academic knowledge and some experience in AI topics. Solid mathematical knowledge and a minimum of calculus, algebra and linear fundamentals are required.

9.1.2. AI Strategy Course by Kellogg School of Management

Only for professionals with previous academic knowledge and some experience in AI topics. Solid mathematical knowledge and a minimum of calculus, algebra and linear fundamentals are required.

Trusting that Artificial Intelligence can live up to its hype requires companies to become comfortable with advancements such as the cloud and big data. It also requires companies to gain confidence that AI can deliver competitive advantages. This program will lead companies to breakthrough thinking about AI's capabilities, so the company can thrive in the era of AI.

1. Understand the business applications and outcomes that can be achieved with AI.
2. Represent the voice of the business as well as the customer to data scientists and engineers.
3. Craft the companies' AI journey, from strategy and capabilities to execution and organization.
4. Navigate the black box and ethical considerations of Artificial Intelligence to drive responsible AI initiatives.
5. Join a community of like-minded professionals who are successfully deploying AI in their organizations.

Source: https://online.em.kellogg.northwestern.edu/artificial-intelligence?utm_source=Google&utm_medium=c&utm_term=%2Bai%20%2Bcourse&utm_location=9042527&utm_campaign=B-

365D.ROW.GG/SE/KAI/AI/P1/Geo1&utm_content=Artificial-Intelligence_Course&qclid=CjwKCAjw9r-DBhB

Recommendation:

This online program is designed to prepare experienced executives, managers, and consultants to implement AI across enterprise functions. It is also an ideal curriculum for investors seeking a deeper understanding of AI.

9.1.3. AI Implications for Business Strategy – MIT Management Executive Education and MIT CSAIL

In this program, participants gain the knowledge and confidence to support the integration of AI into their organization. The outcome will be:

1. A practical grounding in Artificial Intelligence and its business applications, equipping the company with the knowledge and confidence the company needs to transform its organization into an innovative, efficient, and sustainable company of the future.
2. The ability to lead informed, strategic decision-making and augment business performance by integrating key AI management and leadership insights into the way the organization operates.
3. A powerful dual-perspective from two MIT schools – the MIT Sloan School of management and the MIT Computer Science and artificial intelligence Laboratory – offering a sound conceptual understanding of AI technologies through a business lens.

Source: https://executive-education-online.mit.edu/presentations/lp/mit-artificial-intelligence-online-short-course/?ef_id=c:342455541759_d:c_n:g_ti:aud-733905065437:kwd-308165721725_p:k:%2Bai%20%2Bcourse_m:b_a:61508430205&qclid=CjwKCAjw9r-DBhBxEiwA9qYUpbBvBUlv7

Recommendation:

The cooperation between the MIT Sloan School of management and the MIT Computer Science and artificial intelligence Laboratory is very prominent and helps integrating AI more holistically.

9.2. AI-STRATEGY FOR START-UPS

AI, as we already mentioned, can be of great benefit to start-ups. Start-ups that are in their first stages may not be aware of the possibilities that AI can offer. A roadmap of how AI is most strategically used can be supportive.

9.2.1. AI Sweden Start-up Program by AI Sweden

AI Sweden Start-up Program helps participants if their start-up is working with AI. Furthermore it helps Start-ups if they want to learn more about what they could use AI for. The Swedish National Center for applied Artificial Intelligence has the mission to accelerate the use of AI in Sweden.

1. Learn: Online courses, open events, workshops and seminars
2. Connect: Access to AI Sweden start-up community, bi-weekly start-up community meetings, meet-ups with AI Sweden partners and collaborators

3. Accelerate: Full AI Sweden partnership, project access and engagement, access to the Data Factory & testbeds, legal and ethics, introduction to corporates and investors

Source: <https://www.ai.se/en/start-up-program>

Recommendation:

The first two stages (learn and connect) are open for all and free of charge. The third stage, accelerate, is accessible only by invitation from AI Sweden.

9.2.2. How to Achieve AI Maturity and Why It Matters – OVUM

In this AI maturity assessment model and road map, the journey to AI maturity places 4 stages: AI Novice (the company has not taken proactive steps on the AI journey and at best is in "assessment mode"), AI Ready (sufficiently prepared in terms of strategy, organizational set-up, and data availability to move forward and implement AI technology and solutions in defined operational scenarios), AI Proficient (reasonable degree of experience and an understanding of how to move forward with AI, but there are limitations in strategy road map, data capabilities, and technology resources) to AI Advanced (ahead of other companies in the AI journey and have AI expertise and experience, with a proven track record in AI-powered use cases).

The model includes a definition of Key dimensions; each dimension is evaluated to determine its maturity at which point an action plan can be developed.

Source: [ai-maturity-model-whitepaper.pdf \(amdocs.com\)](#)

Recommendation:

Detailed description of the individual AI phases and profound derivation of the individual measures.

9.2.3. The AI Maturity Playbook: Five pillars of enterprise success – Altimeter

This report lays out a maturity model for AI adoption in the enterprise. It outlines four macro shifts that define the impact of AI in organizations and society and five stages of AI maturity based on how organizations approach business strategy, data science, product and service design, organization and culture as well as ethics and governance. It also offers recommendations to build out one's own AI playbook.

1. Dimensions considered:
2. Strategy
3. Data Science
4. Product & Service Development
5. Organization & Culture
6. Ethics & Governance.

Maturity phases in each dimensions:

1. Exploring (organization is considering use cases, consulting with experts but not yet committed significant time or resources to AI)
2. Experimenting (using either internal or external resources to experiment with AI for various use cases albeit viewed as discrete and non-scalable implementations)

3. Formalizing (data is now a core competency across the organization and AI is a key part of corporate strategy, implementations are market and customer oriented)
4. Integrating (AI is embedded into processes, products and services across the company and is delivering value to the business).

Source: <https://insights.prophet.com/ai-maturity-playbook>

Recommendation:

Sound coverage of all relevant dimensions.

9.3. AI-STRATEGY FOR BIG INDUSTRIES

The reach and responsibility that large industries have is huge. That is why it is even more important that large companies have good AI strategies and do not neglect any important points. Here, an individual strategy helps to lead the way.

9.3.1. Online Course by University of Leeds

Arm is forging a path to the future with solutions designed to support the rapid development of AI. Arm combines the hardware, software, tools and strategic partners you need to accelerate development. They are providing everything the company needs to deliver a new generation of ideas and products.

1. Extensive Ecosystem: Arm's AI ecosystem accelerates time to market and redefines application portability for AI solutions.
2. Scalable AI Solutions: Arm delivers performance, scalability and extended configurability to simplify the deployment of AI across all markets.
3. Open Tools: Leverage Arm's global developer community to develop opensource industry standard tools for AI that eliminate lock-in and lower cost.

Source: <https://www.arm.com/solutions/artificial-intelligence>

Recommendation:

Broad service-portfolio around AI innovation. Among other services, arm offers inference processors for support. Unfortunately, the company is silent about prices.

9.3.2. National strategy for AI by Federal Government of Germany

Against the backdrop of the dynamic developments in the technology, the Federal Government's National Strategy on Artificial Intelligence provides the essential framework conditions. The AI strategy is designed as a learning strategy that needs to be continuously readjusted by politics, science, business and civil society.

Germany's AI Strategy is summarized in twelve fields of action.

1. Strengthen research in Germany and Europe in order to be a driver of innovation
2. Innovation competitions and European innovation clusters
3. Transfer to the economy, strengthen SMEs
4. Awaken start-up dynamics and lead them to success
5. Shaping structural change in the working environment and labor market

6. Strengthen training and attract skilled workers / experts
7. Using AI for sovereign tasks and adapting the competencies of the administration
8. Make data available and facilitate use
9. Adapt legal framework
10. Set standards
11. National and international networking
12. Conduct dialogs in society and further develop the political framework for action

Source: <https://www.ki-strategie-deutschland.de/home.html>

Recommendation:

Especially the eleventh and twelfth field of action of Germany's AI Strategy could be important for big industries. Development is global, which is why big industries must also think and act in international cooperation. Also intensifying the social dialogue on AI, discussing opportunities and risks helps industries to gain more transparency.

9.3.3. Artificial Intelligence for Business Course by Wharton School and University of Pennsylvania

In the Artificial Intelligence Course, fundamentals of Big Data, Artificial Intelligence and Machine Learning are taught. Participants learn how to deploy these technologies to support the organization's strategy.

The course is subdivided in the following modules:

1. AI for Business Introduction, Big Data Overview/Analysis, Data Management Infrastructure, Data Analysis
2. Introduction to Artificial Intelligence, a Detailed View of Machine, Learning, Specific Machine Learning Methods
3. Business Applications of Machine Learning and Personalization, Challenges to Adoption
4. AI-Driven Business Transformation, Developing a Portfolio for AI Projects, Lowering Barriers for AI Use, AI in the Organizational Structure, Risks with AI, Governance

Source: <https://online.wharton.upenn.edu/ai-business/>

Recommendation:

This Strategy course also includes many Business Aspects and not only AI relevant topics.

10. AI TRANSFER

10.1. AI-TRANSFER FOR SMALL-MEDIUM ENTERPRISES

Transfer serves as the final step in the implementation of AI. What company-specific decisions need to be made to best implement AI? These are the decisions SMEs need to make in order to take the final step towards becoming an AI-supported company.

10.1.1. fortiss Mittelstand – fortiss

fortiss Mittelstand supports SMEs on the path to the digital transformation and relies on an extensive network of experts from research, industry, associations and administration in order to find the best possible solution. Through cooperation with AI-relevant fields of competence, SMEs are supported in analyzing potential, prototyping and validating new, AI-based products and services. The services are illustrated by the installation of demonstrators from various fields of competence in the "fortiss lab". Furthermore, fortiss is part of the DIH Munich Innovation Hub for Applied AI. This opens up its activities across Europe and can thus network Bavarian SMEs with research institutions and industrial partners from all over Europe.

Approach in discussion with SME:

1. Is my product still competitive?
2. How can I adapt my product to changing market conditions?
3. In what direction does my company have to move in order to remain competitive?
4. How can I improve my processes?
5. How can I train and educate my employees?
6. Is a research project really the right thing for my company?

Source: <https://www.fortiss.org/en/about-fortiss/fortiss-mittelstand>

Recommendation:

Scientifically very profound approach by very competent research fields. The broad service portfolio offers needs-based support for all questions concerning AI, among other things, also for those SMEs that are at the beginning of the digital change process.

10.1.2. AI-Transfer – Mittelstand 4.0 Kompetenzzentrum

The Mittelstand 4.0 Competence Centre Augsburg supports small to medium-sized enterprises and the skilled trades with free offers on their way to digitalization and into implementation of AI.

1. Approach in discussion with SME:
2. Which AI approaches can already be implemented in manufacturing companies today?
3. What distinguishes AI approaches from conventional approaches?
4. How do companies have to proceed in order to integrate AI technologies into their own processes or products?

Source: <https://kompetenzzentrum-augsburg-digital.de/schwerpunkte/#1>

Recommendation:

Scientifically very profound approach by very competent consortium consisting of sound scientific institutions.

10.1.3. AI Campus Berlin

The AI Campus is a not-for-profit space where research, start-ups and corporates come together and collaborate on Artificial Intelligence projects.

Network and Residents:

1. The AI Campus Berlin is partnering with a global network of AI researchers and universities. With co-locating event formats and more they ensure the constant flow of new inputs and inspiration.
2. They are building a strong foundation with their tech partners. Each of them bringing in a different set of expertise and exchanging with the community.
3. They offer permanent single desks as well as office spaces for select individuals and teams who are looking to engage and collaborate on a more regular basis.

Source: <https://www.aicampus.berlin>

Recommendation:

In times of the Covid-19-pandemic it can be difficult to work and get inspired together at their co-locations. A virtual space to meet up would either be great.

10.2. AI- TRANSFER FOR START-UPS

There are many ways to implement AI. For start-ups that are just taking their first steps, the decision to use AI in the right places in a supportive way can be a challenge. A roadmap can help make crucial decisions.:

10.2.1. AI-based Recommendation Engines by Ideamotive

AI-driven product recommendation engines are one of the most popular existing applications of machine intelligence in retail and e-commerce.

Ideamotive help companies anticipate consumer behavior to offer personalized recommendations and boost revenue through upselling and cross-selling.

Source: <https://www.ideamotive.co/ai-developers/guide#top-industries-being-disrupted-by-ai>

Recommendation:

Especially for start-ups, when the raising company needs to gain popularity, AI-based recommendations can help by making aware of new products.

10.2.2. AI for start-ups: common artificial intelligence tools and uses in business – RIC centre

The RIC centre provides a list of common artificial intelligence tools and uses in business:

- A. AI features in enterprise software
- B. Artificial intelligence tools for analytics

- C. Programmatic advertising with AI
- D. Predictive analytics for recommendations
- E. Virtual assistant services
- F. Deploying AI chatbots at start-ups
- G. Artificial intelligence tools for hiring at start-ups
- H. Build your own AI with open-source platforms

As complicated as AI technologies are themselves, implementing them across an organization of any size can be difficult for any team. It requires everyone involved to get on board and a lot of trial-and-error before things can be optimized.

1. Identify a process
2. Show the value of the artificial intelligence tools
3. Get buy-in from all stakeholders
4. Acknowledge the capability gap in your organization
5. Identify, collect, and clean the required data
6. Run a pilot project to test the artificial intelligence tools
7. Start small and slowly
8. Get ready to grow

Source: [AI for Startups: How to Use AI in your Software - Business Startup and Incubator Services \(riccentre.ca\)](#)

Recommendation:

Can be recommended for software start-up founders who want to learn the basis of AI for start-ups when considering how to use AI in their products.

10.2.3. School of Artificial Intelligence/hands-on mentoring program by PI School

A selection of the best engineers receives personalized coaching and guidance from experts. They apply their new skills on the industry project provided either by their own employer or by world-leading tech companies such as Google, Facebook and Amazon, and fast-growing start-ups.

The principles are:

1. Merit first – Top engineers get in for free, PI School is used to give to those who transfer from abroad a travel and accommodation grant. Not anymore as the program is 100% online.
2. Learn by doing – Rather than listening to lectures, participants run into issues and solve them. Desks and environment are organized to support small project teams, agile co-development, interactions with mentor.
3. Real world projects – The partners sponsor top engineers to solve real challenges.

Source: [School of Artificial Intelligence - Pi School - Machine Intelligence meets Human Creativity \(picampus-school.com\)](#)

Recommendation:

This hands-on mentoring program is recommended for "the best" engineers with previous experience – and therefore exclusive and not accessible to everyone.

10.3. AI- TRANSFER FOR BIG INDUSTRIES

Big industries face big challenges. A lot of coordination is needed to keep track of everything. In this mass of information, the right clues must be found. This is exactly when large industries can benefit from the right use of artificial intelligence. But the transfer of AI itself to the large enterprise remains a challenge ...

10.3.1. Bayern Innovativ

Bayern Innovativ is knowledge manager, initiator and accelerator of innovations. The vision is a Bavaria where every viable idea and technology becomes an innovation.

Types of offers:

1. **Networks & Thinknet:** Connecting companies with universities and research institutes, important companies of the State of Bavaria, organizations supported by the State of Bavaria and many other technology and knowledge networks to form a strong think tank - the Thinknet Bayern. Thinknet Bayern, which was set up by Bayern Innovativ, combines experts and expert knowledge with modern methods of innovation management. The networks focus on the exchange of information on new developments in technology-oriented topics such as digitalization, energy, health, materials and mobility as well as the transfer of knowledge with lesser-known - but no less important - sectors such as the cultural and creative industries.
2. **Consulting & Promotion:** An important element of the daily work is to create transparency about funding opportunities and access to funding sources - at Bavarian, national or European level. In addition, Bayern Innovativ is the sponsor of several Bavarian funding programs. The experts advise companies, research facilities and institutions on the most suitable funding programs for their future projects. They provide equally competent advice on intellectual property rights, international projects or business models in the cultural and creative industries.
3. **Events & Fairs:** To ensure optimal knowledge transfer in Thinknet Bavaria, organization of large congresses, top-class working groups, workshops and coaching sessions and "Events 4.0". Many of their digital platforms and communication channels already use artificial intelligence. By appearing at the events or at the joint exhibition stands organized by Bayern Innovativ, they actively support the customers and partners in marketing their products and in accessing and developing new markets.

Source: <https://www.bayern-innovativ.de/en/page/bayern-innovativ-living-innovation>

Recommendation:

The challenge for Bayern Innovativ is to identify ideas as potential innovations and to assess them correctly. Through networks, marketing and events, the idea can be further developed, the right people can be approached and the technologies can be brought to the public.

10.3.2. Intelligent (Chat)bots by Ideamotive and Google

Bots have infiltrated the enterprise sector. Savvy companies leverage open frameworks such as Google Dialogflow or Motion.ai to build their own chatbot solutions and tap the opportunities from an additional channel of proactive customer engagement. While AI-powered bots are usually associated with conversational marketing, they can also become useful in performing routine tasks. Intelligent bots

can support humans by scheduling appointments, sending notifications and reminders, handling travel bookings, or conducting basic employee training.

The available solutions range from basic, pre-programmed automated bots ^{answering a} limited number of queries to fully-featured, AI-driven chatbots utilizing machine learning to replace a human agent at every step of customer interaction.

Sources: <https://www.ideamotive.co/ai-developers/guide#top-industries-being-disrupted-by-ai>

<https://cloud.google.com/dialogflow/>

Recommendation:

Especially in big industries, where there is a large number of employees and customers, bots can be helpful by answering customer questions, scheduling appointments and conducting basic employee training.

10.3.3. How AI can transform Enterprise? – Automation AI

Automation AI postulates that companies across all industries can optimize and automate their processes to boost profitability by using data analysis and Artificial Intelligence capabilities, such as system automation or data-based decision-making.

Automation AI explains in his blog how AI can transform big industries:

1. Automatization with Intelligent Process Automation:
IPA will set to increase the business process transparency, it will optimize back-end operations, and improving workforce productivity will increase process efficiency and customer experience.
2. Cutting edge analysis/Intelligent customization capabilities:
In the company, AI will be leveraged to conduct extensive data analysis in less time to enhance the efficiencies of business processes, products and services.
3. AI can evaluate usage trends and then provide in-depth insights that bring data-driven decision-making to the next level.

Source: <https://automatonai.com/how-ai-can-transform-enterprise/>

Recommendation:

This blog also underlines the financial benefits. The IPA market is expected to be worth \$13.75 billion by 2023.

FIRST DRAFT OF THE LEARNING APPROACH

EXECUTIVE SUMMARY

In today's world, learning and personal development are seen as an essential factor for all people. Technologies such as the Internet, sensor technology, mobile technologies, but also artificial intelligence have influenced the transformation of education and learning concepts. These new technologies offer educators and researchers a new perspective on thinking. They offer learners the opportunity to connect textbook knowledge with their real-world environment. Different learning approaches therefore also represent enormous potential for the field of artificial intelligence, to have a holistic positive impact on the European Union.

The following paper presents different learning approaches as well as associated formats. The learning approaches and formats presented are intended not only to support the transfer of knowledge to learners, but also to help Europe position itself as a pioneer in the field of human-centered AI in the long term. To best accompany this mission, we will implement some of the presented formats ourselves and further develop them based on feedback.

11. INTRODUCTION

To advance human-centric AI and keep Europe at the forefront of the key technology shaping the global economy, it is critical to maximize the socio-economic impact of the consortium's research agenda. This is achieved firstly by making the research agenda as relevant as possible to solving current challenges in European society and economy. Second, to further advance and disseminate the findings and knowledge of human-centric AI to achieve a societal impact that is clearly felt by European citizens. Therefore, the goal is to apply learning approaches that address different target groups and impart knowledge in a targeted way to have a holistic positive impact on the European Union.

In today's world, learning and personal development are seen as critical factors. Creative methods and frameworks such as design thinking are based on the idea that individuals and teams have the ability to expand their innovation capabilities through various tools and methods, regardless of their predisposition to creativity and innovation (Meinel & Leifer 2018, p. 41). Driven by today's digital developments, opportunities are increasing for the learning process to change (Mandal 2004, p.32). Technologies such as the Internet, sensor technology, and mobile technology have influenced the transformation of educational and learning concepts. These new technologies provide educators and researchers with a new perspective of thinking. They offer learners the opportunity to connect textbook knowledge with their real-world environment (Chang et al. 2018).

However, in order to apply new approaches to knowledge transfer, it is necessary to have a rough understanding of human learning. For this reason, a brief overview is given in the following chapter, before the respective learning approaches for the different target groups are discussed in the following chapter. Subsequently, the approaches are examined in a holistic perspective before an outlook is explained.

12. HOW HUMANS LEARN

To extend AI competencies and impart knowledge, it is necessary to have some understanding of human learning. Daniel Reisberg provides a possible definition. He states that "learning can be understood as a change in an organism's capabilities or behavior brought about by experience" (Wilson & Keil 1999, p. 460). Rodriguez (2009, p. 144) links the definition of learning to a change in behavior and performance. According to him, it leads to a derivative change in memory. Therefore, he understands learning as the result of experience and is relatively permanent. In line with this is the definition of David A. Kolb (2014, p. 49), who defines learning as the process by which knowledge is created through the transformation of experience. When comparing the above definitions of learning, it is particularly noticeable that experience seems to be an essential component of learning.

This is closely related to the findings made by Edgar Dale in his textbook on audiovisual methods in teaching, when he summarized and classified different types of mediated learning experiences in the so-called cone of experience (Molenda 2003, p.1)

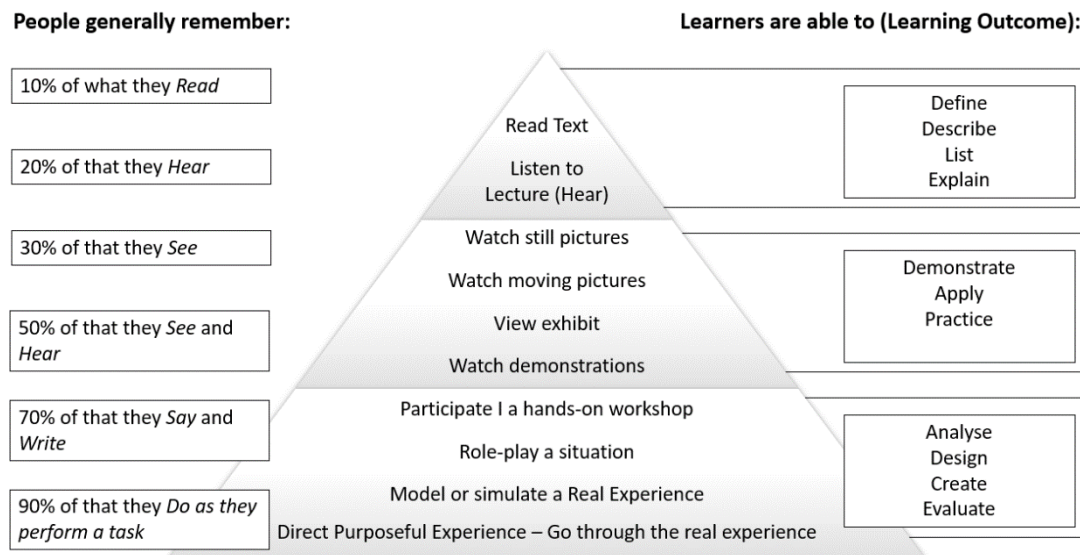


Figure 1: Edgar Dale's cone of Experience (Own illustration based on (Dale 1969))

As can be seen from Figure 1, a person remembers about 90 percent of the things he experienced directly and purposeful. Based on these observations, a close relationship between experience and learning is hypothesized. Therefore, we would like to embrace the experience of AI as one of the central drivers for knowledge and competence transfer by means of different learning approaches.

13. SPREADING AI COMPETENCIES THROUGH SELECTED LEARNING APPROACHES FOR DIFFERENT TARGET GROUPS

Both traditional and modern learning approaches can be used to spread AI knowledge. However, it is important to note that different target groups have different needs and therefore require different learning approaches. Therefore, learning approaches are presented below, divided into traditional and modern learning approaches. In order to obtain the best possible results for the EU, concrete formats are explained based on this knowledge and the suitable target groups are determined. For the target groups, we distinguish between pupils and students, startups, SMEs as well as large corporates.

13.1. TRADITIONAL LEARNING APPROACHES FOR AI

Traditional learning approaches are usually applied to a linear understanding of causality, where the same cause leads to the same effect (Schöllhorn et al. 2012, p.100). In addition, traditional learning methods are often tied to physical locations where learning takes place face-to-face at a specific time. In addition, the learning process is often not supported by technology and is mainly used in adult education (Yigit et al. 2014, p.808).

From this description, it is clear that the definition of a traditional learning approach cannot be attributed to age. Rather, traditional methods are defined by their methodology and scope.

13.1.1. Lectures

Lectures are a suitable teaching-learning form in which knowledge is imparted in a deliberate and planned manner. It is characterized by the fact that teachers and learners come together at the same time in one place or virtually. Moreover, communication takes place face to face and is therefore more direct. This method belongs to the traditional forms of knowledge transfer as it has been practiced for centuries in the school system as teacher-centered frontal teaching (Broßmann & Mödinger 2011a, p.68). Likewise, a specialized lecture can be considered a form of frontal teaching since knowledge is transferred directly from the expert to the learner in a frontal situation. As a rule, the teacher begins and ends the lesson and controls the entire learning process through oral instructions (Peterßen 2009, p.113).

AI Lectures

In order to deepen the understanding of Artificial Intelligence and to take advantage of the business opportunities offered by AI, we consider it necessary to expand AI courses and keynote lectures at schools and universities. The focus is mainly on students and pupils who are not regularly exposed to the topics. They should learn in the course what artificial intelligence is, what machine learning is and how they can use artificial intelligence to address future challenges.

For this, participants will learn real-world examples of how these technologies are changing society as well as different industries around the world and how you can prepare for the future of Artificial Intelligence and graduate with the skills you need to implement AI in a business of your own.

13.1.2. Workshops

A workshop is a time-limited event in which a small group deals intensively with a specific topic. As a learning tool, approaches to solutions and results for a concrete problem are to be developed jointly.

EU AI Summer School

To promote this approach of learning and to increase interactivity among students and thus influence learning behaviour, we also build on the European AI Summer School. The European Entrepreneurship Summer School will be setup to be a three-day program where several university students as well as Postdocs, PhD candidates and researcher come together virtually to develop entrepreneurial solutions that meet the world's as well as Europe's biggest challenges. In the spirit of promoting "cooperation, innovation and development", the European AI Summer School focuses on the networking of young people in Europe, on the exchange of technological knowledge and on the implementation of future-oriented and sustainable ideas.

The teams are intensively coached and provided with inputs and feedback. In addition, participants will receive the complementary knowledge in a series of interactive sessions with renowned entrepreneurs and mentors with relevant expertise. The summer school agenda is a mix of input from AI experts, corporate and startup decision makers, team working sessions, and team building and presentations. At the end of the course, each team will present their idea to a wide audience and potential investors.

13.1.3. Guided Tours

A guided tour is a mixture of an exhibition and a focused lecture. Thus, different artifacts of interest are shown and at the same time concrete examples of use are demonstrated. The aim is to give participants the opportunity to touch different objects habitually and to experiment with them themselves. This raises awareness and reduces people's fear.

Tour through different AI Labs

The Siemens AI Lab is one example that enables guided tours. It allows experts to investigate the feasibility of new ideas in the top topic of artificial intelligence. Here, central Siemen's research works closely with the company's business units and also external idea providers. It aims to communicate AI-related scientific and technological topics to your broader target group in order to contribute to a critical and reflective society. An extensive program of activities in the form of exhibitions, labs, workshops, conferences, lectures, performances, concerts, mentorings and residencies will promote interdisciplinary work, transnational mobility and intercultural exchange.

13.1.4. Coaching

The term is often associated with consulting relationships in the client's field of practice. Coaching can be regarded as one of the oldest learning approaches and has enjoyed increasing popularity since the early 19th century (Graf & Edelkraut 2017, p.8). The coaching process itself can be divided into three different phases. In the first phase of each coaching, the desired goals of the participants are defined. A rough framework is then created to facilitate latter implementation. Finally, in the last phase, a concrete strategy is worked out, how the previously set of goals will be achieved and how the coach will coordinate the participants (Backhausen & Thommen 2017, pp.109–110).

AI Case Clinic

For startups, we would therefore like to launch an AI Case Clinic. The main learning approach will be coaching. At the case clinic, teams, or groups of 3-4 peers are guided through a process in which a coach presents a case whereas the team members serve as consultants. The focus will be on exciting AI topics that startups are currently struggling with or that will be relevant in the future. The case clinics can take place online or in person (if physical distance can be maintained) and allow participants to find new ways to address a challenge or questions. The purpose is to access the wisdom and experience of peers and support a peer in addressing an important and immediate AI challenge in a better and more innovative way.

13.1.5. Mentoring

In a professional context, mentoring is the activity of an experienced person, for example an (ex-)manager (mentor), who lets a person who is willing to learn, for example a young, promising manager (mentee), share his or her professional and implicit knowledge and experience. The goal is, among other things, to support mentees in developing their professional identity and reflecting on their current professional actions. In addition, the mentor can give the mentee access to his or her networks, introduce him or her to important decision-makers, and explain spoken and unspoken rules in the organization. Formally, mentoring aims to provide support outside the usual manager-employee relationship. Mentoring is thus a participant-focused and protected type of relationship. What is discussed between mentee and mentor is confidential. They agree with each other how they want to proceed and which topics they will work on. Mentoring thus requires a high degree of openness, trust and commitment from both sides. As part of mentoring programs, mentors should therefore be prepared for their task because, unlike coaching, they are not usually trained for this activity.

Mentor Matching

To enable more efficient matching between experienced mentors and mentees, we propose a two-step approach. On the one hand, we recommend using the matching platform that is currently being developed within the framework of WP7. In the future, this should enable different target groups to match with each other, which match thematically but also in terms of interests. In addition, live events should be held in a second step. The AI Idea Prize should be mentioned here, but also a direct mentoring matching. This is often used within accelerator programs to match startups with experienced founders or investors, followed by a deep dive mentoring session.

13.1.6. Seminars

A seminar is a learning and teaching event designed to acquire or deepen knowledge interactively in small to medium-sized groups. Seminars are conducted by a seminar leader or trainer.

AI Network Events: Best Practices: Digitalization and Artificial Intelligence for SMEs

We will also use this learning approach at the event "Best Practice Digitalization and Artificial Intelligence for SMEs". This will focus on concrete practical examples of how SMEs can implement AI and digitization projects in their companies in a meaningful and profitable way. The event is aimed at managing directors, decision-makers and executives from SMEs who want to take the next step in the field of digitization and AI.

The event consists of a mix of input sessions and interactive workshop sessions where participants can work on their own problems. Participants benefit from the knowledge of the experts, but also from networking with other SMEs and sharing their experiences.

13.1.7. Advanced training

Continuing vocational training is intended to give individuals the opportunity to maintain and expand their professional knowledge and skills in their previous occupational field to adapt their qualifications to technical developments (adaptation training) or to enable them to move up the career ladder (advancement training).

Online Advanced Trainings

There are already many advanced training formats, both online and live. For example, the website <https://ki-campus.org/> provides a wide range of AI-focused courses. Employees, as well as anyone interested, can acquire additional knowledge on the topic of AI at their respective skill level.

13.2. MODERN LEARNING APPROACHES FOR AI

In addition to the traditional learning approaches, the so-called modern learning approaches can also be identified. Compared to the traditional learning methods, which have been explicitly used in adult education for decades, the modern learning approaches are primarily company related (Weiß 2010, p.82). The different learning approaches within the modern approaches mainly include different methods that contribute to rapid product development. By evaluating customer feedback, for example, it is possible for companies to develop profitable business models.

In summary, three different conditions can be defined that serve to classify a modern learning approach. All three criteria do not necessarily have to be met at the same time. In addition to the requirement that they be business-related, they should also be technology-related and involve a "customer".

For the EU, it is relevant that modern approaches are applied in addition to traditional learning approaches. Due to their often-technical support, they allow for further scaling and can thus be used across Europe.

13.2.1. Blended Learning

Blended learning refers to a combination of different methods and media in conjunction with face-to-face instruction and e-learning (Kuhlmann & Sauter 2008, p.101). It thus belongs to the modern learning approaches because it optimally combines classic learning methods with the possibilities of networking available today via the Internet and intranet. Blended learning is a learning system that combines problem-oriented workshops with multi-week phases of self-directed learning based on web-based training and communication via a learning management system (Kuhlmann & Sauter 2008, p.101). This learning approach is an efficient way for learners to qualify themselves through action-oriented, self-directed learning. According to Kuhlmann & Sauter (2008, p.102), blended learning solutions have a particularly high efficiency if, for example, the following points are considered: Learning takes place in an alternation of workshops, self-organized learning phases and transfer phases.

Entrepreneurship in the context of AI (Albrecht/LMU)

To help the EU position itself as a long-term frontrunner in human centric AI, we recommend the development of a blended learning course for students, with a special focus on entrepreneurship in the context of AI. Students will be empowered through online courses to develop their skills in the two core areas. Afterwards, they will be able to put into practice what they have learned in person or in virtual workshops. Through methodical support, the participants will develop and advance their own AI startup ideas. The advantage of this learning method is that it is very easily scalable across Europe, especially when the workshops are held virtually. This supports the goal of generating a stronger next generation of AI Startups in Europe.

13.2.2. Learning by Doing

In "learning by doing," the social and cognitive learning content is applied in practice. The target audience can be pupils, school classes, students, startups, as well as employees and teams. The goal of the approach is to enable and encourage participants to take active action. What is learned is to be applied in practice. In this way, those acting gain experience that they also reflect on in the process.

AI Projects

To cement the practical orientation in learning approaches for pupils and students, we also recommend integrating AI projects. Here, pupils or students can come together to work on technical projects and put theory into practice. The projects should focus on innovative technologies around artificial intelligence.

The goal is to lower the barrier of entry into AI development and use for people from all backgrounds by creating a platform where they can gain hands-on experience through a series of applied AI projects. Therefore, we train and bring together pupils or students from diverse backgrounds to incentivize new interdisciplinary AI projects and promote the development and use of applicable and safe AI in all fields.

13.2.3. Trial & Error

A modern approach to learning is the principle of trial and error. Here, the learner should learn independently through an intrapersonal construction process. The environment cannot be completely neglected (Broßmann & Mödinger 2011b, p.248). Every trial and rehearsal involves inaccuracies and misconceptions. Making mistakes is not seen as a problem. The mistakes made only become a problem when they are not investigated further. It is not considered pedagogically sound for teachers to show learners a specific correct solution to an existing problem. This leads to a very narrowly knit suggestive pedagogy that denies learners the opportunity to use their individual talents and interests.

AI Use Case Testing

To actively apply this learning method in practice, we recommend an AI Use Case Event. Use case testing is a technique that helps identify test cases that cover the entire system from start to finish on a transactional basis. The participants should be given the opportunity to test their existing use cases on relevant target groups together with other peers and to generate new learnings. In this way, potentials can be identified at an early stage, but also unsuitable approaches can be dropped at an early stage. The goal is therefore not only to confirm the existing use cases, but also to learn from mistakes and iron them out. The event format is therefore particularly relevant for

startups, SMEs and industry players. However, students with concrete use case ideas can also be addressed.

13.2.4. Gamification

Gamification is the transfer of game-typical elements and processes into non-game contexts. The goals of gamification are to increase motivation and change behavior among users. Game-typical elements include descriptions (goals, participants, rules, possibilities), points, prizes, and comparisons. Game-typical processes include the accomplishment of tasks through individual or collaborative performance.

AI Pop Up Experience Stand

The AI Pop Up Experience Stand is a format where exciting use cases around AI can be presented. Guided turns alternating with exciting lectures and the opportunity to experiment with the use cases themselves will give participants the chance to experience AI first-hand. This is intended to reduce the distance to the technology and at the same time stimulate creativity so that the participants themselves generate new ideas for useful use cases. This makes the approach suitable for all target groups, although the AI Pop Up Experience stand should be adapted for the respective participants.

In addition, the participants can network with experts and peers. In principle, this format can be held both as a live event and virtually, however, haptic learning increases the learning success and thus the impact. But supplementary on-demand content can be delivered in a forward-thinking and immersive environment to give participants a further innovation boost.

13.2.5. Peer Learning

Peer education strategies mean the use of specially trained target persons, here called multipliers or peers, to inform a certain group (e.g., student groups, startups, employees) regarding a certain topic (in our case AI). The aim here is to achieve a multiplier effect, whereby not only do the trained peers inform the group, but the members of the group who have been informed as a result in turn pass on this knowledge in their respective peer groups, which in this way multiplies within the respective overall target group. In this way, the previous target group can ultimately become the new multiplier, which can theoretically continue.

AI Accelerator Batches

Another opportunity to advance AI for startups and expand and accelerate learning is offered by an aligned AI Accelerator. Programs such as Rockstart in Den Bosch, Netherlands, could be used as a guide. Talented men and women from across Europa could spend around 180 days developing and refining their products, talking to mentors, and connecting with potential investors and customers.

Rockstar shows that an AI accelerator has great potential in Europa, with three alumni raising a total of EUR 1.2 million within the first six months of completing the program, and a number of technology collaborations between startups and companies have been initiated.

However, Rockstart is only one example of an AI accelerator. Since there are already several accelerator programs in Europa (see also Deliverable 7.2 - List of Lighthouse Accelerators), the EU should try to activate the existing programs for AI batches through various incentives. This would make the effort for the EU manageable; the

existing programs would be strengthened and especially the existing and future AI startups would benefit.

Challenger Round

Another form of peer learning can take the form of a challenger round. Here, participants from a target group can come together to present their ideas and then receive hard feedback from the other peers. The idea is to challenge the existing ideas and at the same time offer different points of view and incorporate their own experiences. The aim is to develop the participants' ideas further or, if necessary, to drop them if they are not considered useful. In principle, this format is suitable for any stakeholder group, as long as enough peers come together. However, it is crucial that the feedback given is hard on the subject but gentle on the person.

The Theme Development WS

The Theme Development Workshops (TDW) are a joint project from Tailor, HumanE AI Net, Vision and Claire Aisbl. The overall target is to identify the grand challenges for AI in Europe together in groups of scientists, industrial players as well as societal stakeholders. The overarching goal is to develop the innovation Agenda for AI in Europe.

Cross Industry Thinktank

To promote AI in the mid-market and expand knowledge, we propose to launch an AI Cross-Industry Think Tank. This is intended to be a network of CXOs and senior innovation executives that will foster the exchange of ideas on how an organization can support radical innovation in AI. Due to the design of the format, it is particularly suitable for established SMEs and corporates.

14. THE DIFFERENT APPROACHES LEAD TO HOLISTIC CHANGE

Now that the previous chapter has presented the individual learning approaches and the associated formats, the following section will justify both the selection of the approaches and the formats chosen. In the graphic below, all learning approaches as well as the formats are assigned to the respective target groups. This already illustrates that different approaches and formats are relevant for the respective target group.

Stakeholder Group	Pupils / Students	Startups	SMEs	Corporates
Learning Approach				
Lectures	AI Lectures			
Workshops	EU Summer School			
Guided Tours	Tour trough AI Labs	Tour trough AI Labs	Tour trough AI Labs	Tour trough AI Labs
Coaching		AI Case Clinic		
Mentoring		Mentor Matching		
Seminars			AI Network Events	
Advanced Trainings			AI Advanced Trainings	AI Advanced Trainings
Blended Learning	Entrepreneurship in the Context of AI			
Learning by Doing	AI Projects			
Trial & Error		AI Use Case Testing	AI Use Case Testing	AI Use Case Testing
Gamification	AI Pop Up Experience Stand	AI Pop Up Experience Stand	AI Pop Up Experience Stand	AI Pop Up Experience Stand
Peer Learning	Challenger Round	Challenger Round; AI Accelerator Batches	Challenger Round; Cross Industry Thinktank	Challenger Round; Corss Industry Thinktank; Theme Development Workshops

Figure 7: Overview of the Learning Approaches and the respective Formats for the Target Groups

The selection of learning approaches and formats is based partly on the information from Chapter 2. We don't just want to give people books to work with, we want to give them as many opportunities as possible to work with the technology themselves. Therefore, many formats have a very practical focus, rather than just going into the theory behind the technology. This also results from the overall goal of our work package. As we have a focus on mechanisms to bring theory into practice. Since we also aim to develop and foster an AI innovation ecosystem, we have chosen as many learning approaches and formats as possible where participants can interact with peers, experts, or other target groups in order to support networking.

Nevertheless, there are differences for the respective target groups. For pupils and students, for example, the focus is on generating as many contact points as possible for the masses. The aim is to get more people excited about the topic and thus position Europe as a leader in the field of human-centric AI in the long term. Examples of formats are AI lectures, Tours through AI Labs, or the blended learning course Entrepreneurship in the Context of AI. These formats are complemented by special formats for students who already have some expertise in AI. Here, the "experts" of the target group are to be further promoted and new ideas are to be developed with the aim of generating tangible use cases and business models. Formats such as the EU AI Summer School, AI Projects or the Challenger Round should be mentioned here.

The picture is somewhat different for the startup target group than for schoolchildren and students. Here, it is less about introducing startups in general to AI technology. The focus is much more on supporting existing AI startups in reaching the next level and overcoming existing problems. For this purpose, we rely on the support of experienced experts through coaching and mentoring via the AI Case Clinic and Mentor Matching. On the other hand, startups should exchange ideas directly with peers and develop new solutions here. This should provide added value for all participants. As formats for this, we build, for example, on the Challenger Round and AI Accelerator Batches.

For SMEs the focus is again more on introducing the technology and generating as many contact points as possible. SMEs are often the drivers of the economy, but the EU and various experts have identified the fact that the technological edge is faltering in the broad masses as a key problem. For this reason, employees in particular, but also management, are to be introduced to the technology through formats such as tours of AI Labs, AI Advanced Training or the AI Pop Up Experience. At the same time, however, the network within the Europe-wide SME sector is to be strengthened and synergies better exploited. For this, a personal exchange is inevitable. Therefore, we build on formats such as the AI Networking Event, the Challenger Round and Cross Industry Thinktanks.

For corporates, the situation is similar when comparing the individual learning approaches. Here, too, employees must be introduced to the technology and fears must be allayed. The same formats are suitable for this as for SMEs. In the corporate world, however, networking among management is of the greatest importance. A shared vision and the bundling of resources can create an enormous impact in the long term - even beyond industry boundaries. That is why approaches such as the theme development workshops already implemented are of major relevance. This can be supplemented by other formats such as the Challenger Round or Cross Industry Thinktanks.

15. OUTLOOK & NEXT STEPS

The learning approaches and formats presented are intended to support not only the transfer of knowledge to learners, but also to help Europe position itself as a frontrunner in the field of human-centric AI in the long term. To accompany this mission as well as possible, we will implement some of the presented formats ourselves and further develop them based on the feedback. For capacity reasons, however, not all learning approaches and formats can be accompanied by us. Therefore, it is even more important that as many stakeholders as possible participate in the transfer of AI knowledge. In the long term, the EU itself in particular will also play a central role. According to our assessment, an early imparting of knowledge and competencies already at an early school age as well as during studies would be a good leverage to get as many people as possible involved in the topics and to equip them for the future challenges.

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LIST OF LIGHTHOUSE ACCELERATORS

EXECUTIVE SUMMARY

To drive innovation, predefined support structures as well as a broad network of different players are conducive. In this context, startups in particular offer a great catalyst for innovation due to their agility and market orientation. For this reason, this paper provides an overview of structured innovation advancement for AI startups - in the form of accelerators.

For this purpose, we have identified and presented a list of ten best practice examples of European Lighthouse Accelerators.

17. INTRODUCTION

To advance human-centric AI and keep Europe at the forefront of the key technology shaping the global economy, it is critical to transform research results into products and services to create a socio-economic impact that uplifts European society and economy. The ability to realize and create innovation that will result in sustainable economic growth and human enhancement is highly dependent on the impact of private organizations to leverage research results and transfer **research into products and services**.

The challenge here is to build innovation in a structured way and bring technology to market. Especially startups can be a great catalyst for innovation due to their agile and market driven nature. For this reason, we focus on accelerator programs that are already successfully advancing startups - and thus innovations - in Europe.

In the following paper, we list Lighthouse accelerators as examples of funding AI startups that put people first. To do this, we looked at existing accelerator programs with an excellent track record, which are presented as best practices.

18. WHAT IS AN ACCELERATOR

A startup accelerator program is an intensive business and personal development program that supports a small team of founders who usually have their own business idea. The support comes in different forms, such as mentoring, affordable office space and some startup capital.

Usually, accelerator programs include the following core elements:

- An application process that is open to all, but still highly competitive. This is done to ensure that only truly select startups are accepted into the programs.
- In some cases, the Accelerators work with an upfront investment, usually in exchange for a single-digit equity investment.
- A focus on small teams, not individual founders.
- Time-limited support through programmed events and intensive mentoring.
- A final event - a "demo day" - where startups pitch their ideas to get their first major funding.

At the same time, it's important to know that startup accelerators are ultimately investment management firms. They look for the most promising companies at a very early stage and then invest in them, either with capital or pure time investments. However, they aim for the companies to raise the next rounds of funding and eventually (hopefully) exit - either through corporate acquisitions or initial public offerings (IPOs).

19. LIST OF LIGHTHOUSE ACCELERATORS

We highlight Lighthouse accelerators, as examples of how to promote human centric AI startups and be able to learn from existing accelerators with an excellent track record an exclusive set will be selected and show cased as best practice.

Trying to quantify the fertility of accelerators is difficult as there are many different aspects from pure participation or “exit” numbers to program support quality (length, money, network, coaching amount). Furthermore, most accelerators do not provide the public with detailed stats of their programs and participants.

Therefore, we collected accelerator programs that fulfil certain aspects that are rather relevant to high-tech startups (not business model driven ones) and then boiled down the longlist to a shortlist via comparing their overall traction. Also we included accelerators that have specific programs for AI startups that are top-nudge like TECHNATION Applied AI program.

Accelerator	Duration	Headquarters	Most notable startups
German Accelerator	5 months	Munich, Germany	Celonis, N26, Forto
<p>German Accelerator empowers German startups to scale globally. They take high potential companies on a fast-paced learning journey in the world’s leading innovation hubs in the U.S. and Asia. German Accelerator provides mentoring from dedicated experts, access to their vast global network of business partners and investors, as well as free office space in all our locations. Their programs are highly customized to the participants’ individual needs to help them enter international markets and succeed quickly.</p> <p>They don’t take any equity and their programs are free of charge with the exception of “Next Step,” a market discovery program for the Asian region. Since launching in 2012, German Accelerator has nurtured 288 startups which have raised more than US\$4.9 billion in funding so far. German Accelerator is currently run by German Entrepreneurship GmbH and is supported by the German Federal Ministry for Economic Affairs and Energy (BMWi). Visit www.germanaccelerator.com for more information.</p>			
Entrepreneur First	6 months	London, England/ Paris, France	StatusToday, upstride, and Brolly
<p>Entrepreneur First is the place where the ambitious come together to build globally important technology companies. Through their platform running in 6 cities across 3 continents, they invest in high-potential individuals to help them meet their co-founder, develop their ideas and secure funding from leading investors in the shortest possible time. They have built over 300 companies from scratch; have over 2500 alumni worldwide; and their portfolio is valued at over \$4bn.</p> <p>EF companies include Tractable (Computer Vision, currently valued at \$1bn as of June 2021), Magic Pony Technology (AI, acquired by Twitter for a reported \$150m), Represent (social commerce, acquired by CustomInk), BloomsburyAI (acquired by</p>			

Facebook), Cleo (fintech), OpenCosmos (space), CloudNC (manufacturing), Transcelestial (satellite communications) and many more.

They're backed by some of the world's best tech founders and investors, including Reid Hoffman (LinkedIn), Greylock Partners, Founders Fund, Demis Hassabis (Google Deepmind) and Taavet Hinrikus (TransferWise). For more information about Entrepreneur First, visit www.joinef.com.

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Antler is a global early-stage venture capital firm that invests in the defining technology companies of tomorrow. The firm has offices across five continents and most major entrepreneurial hubs, including cities such as London, New York, Singapore, and Sydney. Founded in Singapore in 2017, Antler is on a mission to fundamentally improve the world by enabling and investing in the world's most exceptional people building the defining companies of tomorrow. Antler has already invested in over 300 companies since its launch. Of these companies, 40% have at least one female co-founder, and the founders represent 70 nationalities. Antler enables exceptional people to build impactful technology startups by building complementary co-founder teams, supporting the teams with deep business model validation, and providing a global platform for scaling their startups.

Startup Wise Guys	5 months	Tallinn, Estonia	VitalFields, Epiclist, and StepShot
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Startup Wise Guys is one of the most active early-stage investors in the broader CEE region and Nordics, has been voted Top VC fund in the CEE in year 2019. To help techy startup founders become true entrepreneurs, they are running a world class startup accelerator since 2012. They have accelerated more than 220 startups, focusing on B2B SaaS, FinTech and Cybersecurity. Portfolio has already had 2 major exits and overall startup survival and success rate is above 77%.

The intensive up to 5 months long accelerator program is focused on validating, developing and selling products to business customers. Over 200 international and local mentors help startups move through those stages much faster than they would on their own. Founders are also prepared to sell their vision to investors, and the program culminates Demo Days & major tech event visits, where startups get to present to venture capitalists and angel investors. Post program, startups join the alumni community of 220+ startups in more than 40 countries and become eligible for invite-only alumni events such as SWG Getaway focused on business development, fundraising and experience sharing.

NDRC	6 months	Dublin, Ireland	SilverCloud Health, Boxever, and Artomatix
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NDRC builds high-impact new ventures. By providing the people, time, space and investment needed at the earliest stages of dedicated commercialization work, NDRC is creating companies worthy of commercial investment and with the ability to scale.

The NDRC team has the breadth of knowledge and expertise in technology and markets. NDRC worksside-by-side with researchers, entrepreneurs and venture teams to turn great ideas into successful new ventures			
Axel Springer Plug and Play Accelerator	3 months	Berlin, Germany	dentolo, ZenMate, and Jobspotting.
<p>Axel Springer Plug and Play is a Berlin-based pre-seed startup accelerator. They do not just invest money. They know that the real value is in the people. The founders, the people in their team but most importantly the people they know. They connect their companies to mentors, clients, and investors.</p> <p>They are a joint venture between the Plug and Play Tech Centre and Axel Springer. They support them in every way possible. It also means they are not bound to one region, one topic, one opinion. They offer a global network and international opportunities.</p>			
SeedRocket	3 months	Barcelona, Spain	Holded, Deporvillage, Petsy
SeedRocket is a technology startup accelerator that provides training, funding, and advisory services for entrepreneurs. It offers a complete seed funding venture program for entrepreneurs with technology-based startups. SeedRocket provides access to investors and business angels with a strong focus on technology-based startups at a seed stage. SeedRocket was founded in 2008 by Vicente Arias and Jesús Monleón.			
Sting. (Incubate Deeptech)	6 months (24 month)	Stockholm, Sweden	Sellpy, Karma, Airmee, Yubico
Sting offers a startup support ecosystem in the Nordics. This includes tailored business coaching, peer-to-peer learning, financing, recruitment support and a community of inspiring startups to work alongside. At Sting, 70% of companies are still active and growing which is an extraordinary track of record. Sting Incubate Deeptech gives you up to 24 months of tailormade coaching and support, but fewer hours per week than in Sting Incubate. In addition to all the support that startups in Sting Incubate enjoy, you get access to specific deeptech-related resources.			
LMU EC	6 months	Munich, Germany	Flixbmobility, Yfood
The Accelerator of the LMU Entrepreneurship Center supports startups and founders with a scalable and high-growth idea within the framework of a free accelerator program. The focus is on the topics Sales, investment and impact.			
TECHNATION (APPLIED AI)	6 months	London, UK	Chosen AI, AI Nostics, Deepplanet

Tech Nation is playing its role by fueling the growth of the companies and founders transforming society and the economy. 800 startups have been through their growth programs valued at over \$110 billion. Applied AI is Tech Nation's first growth program for Artificial Intelligence to help the UK's most promising founders who are applying AI in practical areas and creating real-world impact. The program is based on peer-to-peer support and the shared experience of later-stage founders, all curated under the values of honesty, intimacy, and trust.

They know that scaling an AI company comes with its own set of unique challenges. This is a network that will unpack the AI-specific scaling journey, led by those who have done it and with the support of like-minded peers.

In the future, we aim to build a network of Lighthouse Accelerators across Europe and have therefore identified best practice examples in the list provided as a first step. This will also serve as the basis for the vision of establishing an AI European accelerator program.

FIRST DRAFT OF INITIAL SPECIFICATION OF THE EUROPEAN DATA HUB

20. INTRODUCTION

‘The availability of data is essential for training artificial intelligence systems, with products and services rapidly moving from pattern recognition and insight generation to more sophisticated forecasting techniques and, thus, better decisions. [...] Moreover, making more data available and improving the way in which data is used is essential for tackling societal, climate and environment-related challenges, contributing to healthier, more prosperous and more sustainable societies.’ (European Commission, 2020:2-3)

This statement of the European Union underlines the importance of quality data to build meaningful AI applications and use cases. However, it is currently still a great challenge to obtain such data. To address this problem, a European Data Hub is to be developed in which universities, startups, SMEs and industry players share their data under certain conditions and in return receive complete access to the existing data sets. The aim should be to collect data from partners in addition to open-source data and to process and manage it in such a way that all stakeholders can derive added value from it.

21. PANEL ON OPENDATA BUSINESS CASES – WHAT IS THE VALUE OF DATA?

We hosted a panel discussion to discuss business models for open data with experts from academia, industry, and startups. The goal was to gain an in-depth understanding of the needs and concerns, as well as desires and opportunities, of open data usage from the perspective of various stakeholders.

The panel was joined by:

Roberto Di Cosmo is a computer science professor at the *Université Paris Diderot* and director of IRILL, the *Innovation and Research Initiative for Free Software*. Further, he is directing the *Software Heritage* initiative with the mission to collect, preserve and share all software that is publicly available in source code form.

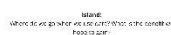
Ana Trisovic is a Sloan Postdoctoral Fellow at the Harvard University in the National Studies on Air Pollution and Health (NSAPH) group. Further, she is affiliated with the Institute for Quantitative Social Science of Harvard's Faculty of Arts and Sciences, working on Harvard Data Commons and the Dataverse project.

Sebastian Feger is a computer scientists and Postdoctoral User Experience researcher at LMU Munich. One important thread of Sebastian's research revolves around the design of interactive systems that reward and motivate research data management and open data/science contributions.

Feng Wang is COO and Co-Founder of AICAN. AICAN helps radiologists detect cancer metastases using whole-body MRI scans. They have fully anonymized data from 1,600 cancer patients (whole body MRI scans). They are currently training supervised and unsupervised AI models to highlight or localize metastases and regions of interest.

Richard Niestroj is responsible for roadmap planning, project/ product development as well as business case calculations as the leading product manager for data science products in the connected car field for the Volkswagen Data:Lab in Munich.

We started the panel with an ideation round to understand the different perspectives on why the participants use data and what benefits they expect, but also on the problems they face. Regarding the goals of using open data, the panelists mentioned that they want to verify the reproducibility of research, generate customer value and improve the understanding of needs. Taken together, participants expect a wide availability of open data to result in better products and services and generate value for society. Asked what is stopping them from using data, participants named difficulties to record, share and access data because of licenses, proprietary formats or the GDPR as reasons (see Fig. 1). As a further impulse for the panel, in his keynote Roberto Di Cosmo gave insights into the Software Heritage project and drew parallels between the success principle of openness behind the Free and Open-Source Software (FOSS) movement and open data.



Based on a set of guiding questions (see Fig. 2), the discussions of the panel (see Fig. 3) revolved around the question of how we can motivate individuals as well as companies to share data more widely and how much regulation on what data can be recorded and shared is necessary. We uploaded the full recording of the panel to Youtube¹. Below are some key statements from the participants to provide insight into the results:

“We have to give individuals a benefit for sharing their data, just like we already do with cheaper policies for sharing your driving data.” - **Sebastian Feger on how to motivate individuals to share data.**

“We should do it like in the public transport system: When you go there, you do not need to show your ticket. However, if you get caught, you get punished.” – **Feng Wang on how to make access to data easier.**

“We have to promote the use of data repositories among researchers.” Ana Trisovic on how to make access to data easier.

“We can convince private companies to share data of public interest with researchers under specific regulations to publish aggregate results.” **Roberto Di Cosmo on how to convince companies to share data.**

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Some Questions

- How to make access to data for all easier?
- How can we motivate companies to share data more widely?
- How can we motivate individuals to share data more widely?
- Do we need different legal structure (e.g. cooperative / Genossenschaft) to deal with data commercially?

Panel on OpenData Business Cases
What is the Value of Data?

Roberto Di Orio
Software Heritage

Ana Trifunovic
IOSB, Rijeka University

Silvana Fager
Post Doc, LMU Munich

Feng Wang
Co-founder of AICAN

Wolfgang Hirsinger
Wolfgang Hirsinger Digital Lab

<https://amp.ubicomp.net/panel-on-opendata-business-cases/>

Figure 9 : Our four guiding questions for discussion.



Figure 10: Panellists and audience members in the zoom session.

22. CONCLUSION, OUTLOOK & NEXT STEPS

What became clear during the panel is that there was no clear opinion between the experts on what an open data hub could look like. While there is agreement that access to data should be made easier and more open, there is no agreement on how to achieve this.

It became clear that, especially on a European level, there are still many hurdles in the way of implementing a European Data Hub. It is also apparent that any data that includes personal data would not to be contributed to an open data hub by companies, as this is most likely in conflict with the GDPR. Even the possibility of a legal conflict from companies providing data to the European Data Hub will prevent companies from contributing. Some further challenges are:

- Technical aspect (e.g., what platforms to use?)
- Ownership issues (e.g., who owns the original data, who owns derivatives?)
- Responsibility questions (e.g., who takes responsibility for misuse?)
- Security and access rights (e.g., who can get to the data? who can guarantee that the platform is long-term safe?)
- Data quality (e.g., who will be responsible for ensuring quality of the data?)
- Semantic information (e.g., how will the meaning of the data and items be encoded and communicated?)
- Data manipulation (e.g., how will the data be secured against manipulation?)
- Ethical aspects (e.g., who is empowered by data and who may be harmed?)
- Legal aspect (e.g., what can the data be used for?)
- Value of data and competitiveness (e.g. who is compensated for the provision of data? Can data be deliberately manufactured to make others less competitive?)

This is just a subset that was discussed and there are many further issues. There is always the simple (yet hypothetical) solution “Put everything under creative commons licenses and put it on a public sever location in Europe.” This will not work for company data, due to the challenges outlined above.

We argue that there needs to be a broader discussion on the value of data for individuals, for society, and for enterprise. It also must be understood that there are many tradeoffs. If certain data is open some players may benefit whereas if the data is not open others benefit. Hence there should be a societal debate.