PLATTFORM INDUSTRIE4.0
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Faster to Market Success

Memorandum of the Plattform Industrie 4.0 Research Council for a More Agile and Flexible Innovation System in Germany

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Plattform Industrie 4.0

This Memorandum considers the innovation system in Germany as a whole – and thus, as a framework where new innovations emerge in the form of products, processes, services or business models. The Memorandum is intended as an impulse for further development and is motivated by the experience of the members of the Research Council.

Driven by the digital revolution, a sustained acceleration of research and development processes has been observed worldwide for many years. Not only does this concern the development of digital hardware and software for an impending platform economy; all disciplines and industry aspects are also included. Throughout the entire innovation chain, this revolution is characterised by increasingly agile and interdisciplinary development methods. The acceleration of research and development has an increasingly obvious impact on the innovation system, forcing it to evolve.

The separation of applied and fundamental research is obsolete, especially in this context. Similarly, research funding that is mission-oriented and preplanned for many years is no longer sufficient on its own. It is therefore important to consider now how to design an innovation system that builds on existing strengths. These include the high quality and efficiency of German engineering sciences, the foundations of a German social partnership, the vocational training and education, and many others. At the same time, a modern innovation system must enable the development of fundamental findings to application maturity within just a few weeks, while guaranteeing the sovereignty over data and intellectual property. Thus, there is a renewed obligation to further develop the successful German innovation system with regard to speed, flexibility, agility, robustness, cooperation, cultural change, user orientation and new working methods – in order to keep up with international competition in future.

Status quo

The following list, which is by no means exhaustive, gives the most noteworthy developments:

- Today, more than ever, innovation is an iterative learning process in which interdisciplinary groups approach the desired solutions step by step.

- There is a persistent trend towards shorter innovation cycles. This trend is driven by volatile markets and agile development methods (SCRUM, etc.).

- The design and organisation of innovation processes is becoming increasingly complex for both companies and research institutions. Even the development of everyday objects today often involves special know-how – from doorbells with facial recognition to voice-controlled coffee machines. Very often innovations in Germany remain stuck in the 'Valley of Death' and reach their market either too late compared to the increasingly international competition, or not at all.

- The need to continually innovate has been recognised by companies of all sizes and is regarded as a management task ('You don't stay a market leader forever – you have to earn your position continuously!').

- Companies try to outsource innovation processes to newly formed enterprises – either start-ups or start-ins. The objective is to utilise any available creative potential while limiting development risks.

- Companies seek geographic and thematic proximity to scientific and research institutions – often additionally motivated by the legitimate search for new staff.

- There is an increasing willingness to innovate in cooperation with other companies and research institutions. This is often triggered by the need to bring together experts from a wide range of disciplines to allow development to take place on an interdisciplinary level. In the context of the fourth industrial revolution and its cyber-physical systems, this trend is becoming as significant as attempts to combine innovations with the development and introduction of cross-sector (de facto) standards.

  A good example of this is the German domain of autonomous transport vehicles that can increasingly be found in warehouses and production plants. Their development requires specialist knowledge of many disciplines, including mechanical engineering, control engineering and artificial intelligence.

- Changes to the conventional form of industrial innovation are especially visible in the field of software development. Open innovation concepts[1] and open source software[2] have established themselves as the basis for industrial product development to the same extent as crowdsourcing[3] has for the development of prototypes.

Companies of all sizes are looking for new ways of successfully engaging in innovation. In particular, small and medium-sized companies are realising that their developments – often sustained continuously and successfully for decades – and the resulting products are currently threatened by disruptive approaches.

1 'Open Innovation' means opening up innovation processes to external stakeholders outside the company (customers, universities, etc.).

2 'Open Source' denotes software whose source code can be viewed and reused by anyone (typically free of charge).

3 'Crowdsourcing' means transferring a (software) development process to a group (or 'crowd') of volunteers over the Internet.

Key points

Innovations are motivated by markets and driven by new (scientific) findings and techniques. Today's innovation chains generate new products, services and business models. Within this environment, companies and research institutions acknowledge the need for a realignment of the German innovation system according to the following key points and changes[4]:

- We should develop a culture of research and innovation that empowers universities, universities of applied sciences and non-university research institutions to collaborate with enterprises and civil-society stakeholders on specific topics in an application- and goal-oriented manner.

- A more sophisticated innovation system is founded on new forms of cooperation that are

  — agile,

  — interdisciplinary,

  — learning-based[5],

  — and also long-term.

  This requires *new spaces, innovative and agile ecosystems, and new forms of collaboration*. For example, attractive urban 'coworking spaces' should be created and promoted in close proximity to adequate research and training centres to provide an innovation infrastructure while simultaneously attracting the necessary intellectual capacity from research and industry.

4 Many of these points have already been described and concretely demonstrated in the Hightech Forum report, cf. http://www.hightech-forum.de/fileadmin/PDF/hightech-forum_umsetzungsimpulse.pdf.

5 Cf. https://www.acatech.de/Publikation/die-digitale-transformation-gestalten-lebenslanges-lernen-foerdern/.

- New funding instruments to permit developments that are both long-term and agile, but above all disruptive, are required.

- The development of technology and methods must be established and consolidated as a strategic cutting edge in order to secure Germany's role as a location for development and production.

- By providing coworking spaces, innovative infrastructure targets every level of technological maturity ('technology readiness levels') up to and including industrial added value. This also means providing adequate and efficient machinery and production equipment. In this regard, companies are called upon to accept long-term commitments.

- At the same time, a top priority is to safeguard the principles and freedom of research and teaching. A more sophisticated research and innovation system also requires new *governance oriented towards the common good*, but without creating new bureaucratic hurdles.

  — In this context, the economic benefit should no longer be a taboo, but the legitimate objective of a successful innovation system – independent of the participating stakeholders. This also requires new forms of cooperation between research institutions, universities and universities of applied sciences on the one hand as well as companies and civil-society stakeholders on the other.

  — Facilitating the transfer of knowledge and technology is a fundamental duty of universities and universities of applied sciences, as well as non-university research institutions. Successful innovation requires this knowledge and technology transfer to be anchored in the indicators of scientific and academic environments and granted the same importance as fundamental research.

The Plattform Industrie 4.0 plans to formulate a joint recommended course of action for all stakeholders that provides a foundation for uniform and reliable framework conditions. In this context, the working groups and the Research Council in particular are studying ways to advance the necessary development of the innovation system in Germany. The Research Council calls for attractive spaces with innovation-oriented infrastructure to be created, new forms of collaboration to be enabled, and hence new forms of innovation to be facilitated. At a political level, the Research Council calls for the necessary framework conditions to be established.

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