



HIGHTECH FORUM

The future of value creation

A discussion paper from the High-Tech Forum*

* This discussion paper was examined at the fourth session of the High-Tech Forum, on March 11, 2020. The responsibility for content lies with the contributing committee members Prof. Holger Hanselka, Prof. Anke Hassel, Prof. Katharina Hölzle and Frank Riemensperger.

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New models of value creation are changing the rules for business, government and society.

The pressure is on and Germany needs to act. The rules of international cooperation and worldwide trade are changing in response to a shift in the global balance of power and the rise of protectionist ambitions. Climate change and the transition to renewables are very much in the public spotlight and now demand real action. All the while, digital technologies are spawning new business models, and the rules of the data economy – the sharing and trading of information – are transforming industrial manufacturing practices. Global value chains are being reinvented in the wake of radical structural change across the economy and society.

Germany's manufacturing industry currently generates a quarter of the country's gross value added (24.2 percent) and employs nearly a fifth of the nation's workforce (18.9 percent).^{1,2} At the same time, German industry is deeply anchored in global networks of value creation, which are the root of much of the nation's export strength. Yet the growth of German exports has been slowing since the 2008 financial crisis, especially in key industries such as mechanical engineering and automotive manufacturing. In the interim, China, in particular, has become a supplier of high-tech products and reduced its imports from other countries.³ At the same time, Chinese companies are investing more in their own manufacturing capacity as well as in research and development.

Germany risks being relegated from vendor of choice to a mere supplier among many.⁴ Its dwindling share of global economic output underscores this trend. Germany's contribution to global gross domestic product (GDP) amounted to 8.4 percent in 1995.⁵ By 2018, this had dropped to just 3.2 percent.⁶ In the same year, global automobile production fell by 1.7 percent, the first downturn since the financial crisis.⁷

German industry therefore faces a two-pronged challenge: first, in line with the coming data economy, it must bring about disruptive change in its manufacturing-based model of value creation; second, it must pursue a new and preferably European path – not least with geopolitical shifts and the threat of trade barriers looming large on the horizon.

In view of these challenges, the present High-Tech Forum discussion paper addresses the following key question:

- How can Germany secure a leading role in future global networks of value creation?

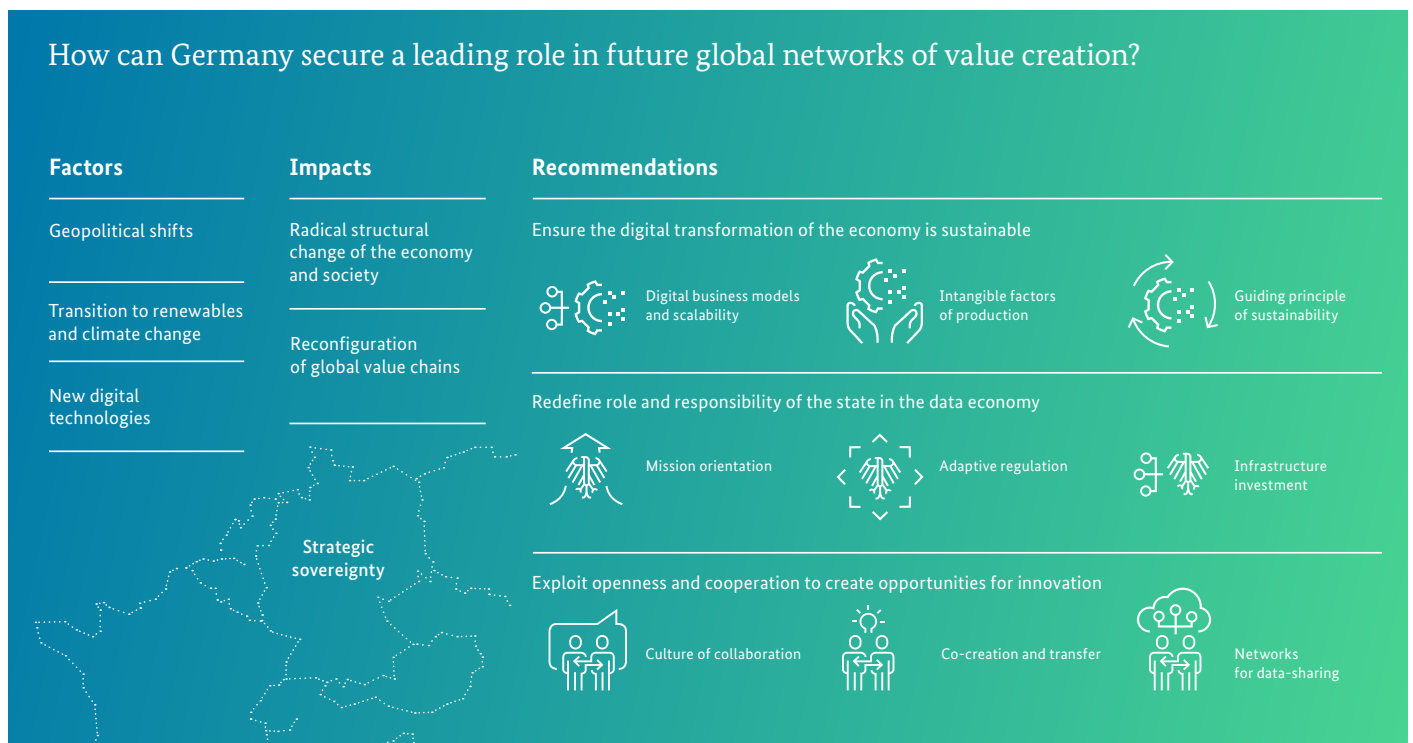


Fig. 1: Overview of the recommendations presented in this discussion paper.

The following sections address three key recommendations:

- Ensure that the digital transformation of the economy is sustainable: establish digital business models that incorporate intangible factors of production and sustainability criteria.
- Redefine the role and responsibility of the state in the data economy: develop new government strategies for mission-oriented policymaking, regulation and infrastructure investment.
- Exploit openness and cooperation to create opportunities for innovation: establish collaborative cultures, use co-creation for innovation development and create networks for data-sharing.

Based on the deliberations of the High-Tech Forum and input from interviews with chosen experts, we have identified three fundamental assumptions that underpin the above recommendations for action:

1. Base future strategies and competitiveness on national strengths: The data economy will radically change existing value chains. If Germany is to successfully effect structural change and exploit the opportunities presented by Industrie 4.0, it will have to base future strategies on its current industrial capabilities.⁸ What distinguishes Germany's industrial base and performance are its technological expertise and its huge diversification and specialization in, for example, the manufacturing and processing industries. With its deep knowledge of the industrial domain and its expertise in IT and data analysis – i.e., the combination of the analog world with the potential of the digital world – Germany is in a strong position to tap big opportunities for value creation.⁹

2. Take an integrated view of research, innovation and industrial policy: Forward-looking industrial policymaking must be based on a research and innovation policy that has the express goal of creating sustainable value for society.¹⁰ The German federal government has drawn up an agenda for its innovation policy: the High-Tech Strategy 2025.¹¹ At its core are 12 missions that formulate research objectives in terms of society's pressing requirements. The Industrial Strategy 2030, drawn up under the aegis of the German Federal Ministry for Economic Affairs and Energy, presents recommendations to maintain Germany's standing as an industrial location.¹² The task now will be to implement and refine both of these strategies in a coordinated manner across all departments so as to sustain and boost the performance of the German innovation system. In addition, government, business, science and civil society will have to harmonize closely in order to ensure a successful transfer of new technology.

3. Act in concert with European partners: There is but one way to tackle the aforementioned challenges – jointly and in dialog and cooperation with European partners. European collaboration is the most sustainable strategy for achieving a leading position in the global innovation stakes. It will take a shared narrative and joint upscaling in order to strengthen the competitiveness of European innovations in the European single market and on a global level. At its core, this is about equal access to international markets and to secure technology and infrastructure. Germany would be well advised to take advantage of its presidency of the Council of the European Union in 2020 in order to drive policy forward in this area. European partnerships are imperative to maintaining competitiveness and quality of life in Europe.

2

Ensure that the digital transformation of the economy is sustainable

New information and communication technologies are transforming products and industrial manufacturing. These new technologies enable manufacturers to make their production lines more flexible and to customize their products. The digital transformation of the economy is not just one of the great challenges of our time. It is also wholly unprecedented, which means there is no blueprint for this change. Companies that sell a combination of goods and services – i.e., the operation and maintenance of those products – are doing very well right now. Smart, data-driven services enable companies to retain a greater proportion of value added. In addition, the digital control of the physical world – combined with new value propositions – creates potential for German companies in Germany, Europe and around the world. The current section addresses the options available to companies to make value chains not only more efficient but also more transparent and sustainable.

Build and upscale digital business models: Digitalization is changing the entire value chain. This should give rise to new value propositions that are of benefit to society. Digital value creation is less about digitally refining products – e.g., through the addition of predictive maintenance – and more about making the physical world function on the basis of

data. This will create new products and update existing ones or put them to different uses. And it can also give rise to data-based business models and new forms of value creation. Platform-based business models will continue to carve out new niches and gain traction.¹³ To date, German companies are using digital platforms primarily in support of in-house

infrastructure. They account for a very small share of gross value added in manufacturing (1.5 percent).¹³ A successful implementation of digital business models rests, in particular, on three imperatives:

1. Improve data quality and exploit its (economic) value and utility in order to increase the benefit of the service offered – i.e., the value proposition – and improve organizational processes.¹⁴
2. Focus on platforms and create the conditions for an upscaling of digital business models, including adjustments to the regulatory framework.
3. Exploit networks and economies of scale by shifting from individual companies or customers to comprehensive ecosystems. As conventional value chains become more open and flexible, dynamic digital networks subsequently develop.

Increase investment in intangible factors of production: As the economy restructures and the pendulum swings towards services, intangible factors of production become increasingly important assets. As a share of gross value added, investment in intangible factors of production remains relatively low in Germany compared to other countries, despite rising by around two percentage points between 1995 and 2016.¹³ Software and databases (structural capital), employees (human capital) and customer and market data (relational capital) play a crucial role in the digital economy – not least for small and medium-sized enterprises (SMEs), whose success depends even more heavily on human capital.¹⁵ Unlike tangible assets, these intangibles are infinitely reusable, are more likely to be scalable and are context-specific.¹⁶ However, their value is hard to gauge in terms of their contribution to business success.

In order to underscore the importance of intangible production factors both for individual companies and for economic productivity, three concrete actions are recommended:

1. Fund research to enable better identification and evaluation of intangible factors of production so as to emphasize the connection between investment in these intangibles and business success.
2. Step up investment in intangible factors of production so as to close the gap to competitors abroad.
3. Place intangible factors of production on the political agenda, understand their macroeconomic contribution to GDP and productivity growth, and emphasize their importance.

The High-Tech Forum discussion paper “Innovation & Qualifikation” takes a detailed look at the changing requirements for qualification and knowledge management. It is scheduled for publication in July 2020.

Strengthen emerging green markets and increase sustainability in value chains: The combination of ecological and digital transformation – e.g., in the form of green IT – will play a key role in Germany’s future as an industrial location. The German economy and government can play a leading international role in the promotion and expansion of emerging green markets. Here, greater use should be made of digitalization in order to achieve sustainability goals.¹⁷ Digital infrastructure can serve to increase not only the efficiency but also the transparency of value chains. In this way, it becomes possible to measure the degree of sustainability and resource efficiency along all the links of the value chain and thereby generate new opportunities for creating value. The growing importance of sustainability can lead to an increase in innovation for products, processes and smart services in, for example, the circular economy or the sharing economy.¹⁸ In order to develop emerging green markets in a sustainable way and bolster the competitiveness of German companies worldwide, the following is required:

1. Business, science and government must join forces to investigate and systematically promote new technology such as battery, hydrogen and alternative propulsion systems.
2. Regulation must become an additional driver of innovation, with a use of transparency monitoring, for example, to ensure the inclusion of environmental and efficiency criteria in the innovation process – e.g., by applying key performance indicators for sustainable development in the manner of the UN Sustainable Development Goals.^{19,20}
3. Industrial and environmental policy must mesh more closely so as to expedite the emergence of markets for green technologies and their widespread adoption.

3

Redefine the role and responsibility of the state in the data economy

Public administration needs to deliver standard procedures and provide legal certainty. Disruptive changes such as digital transformation necessitate a reinterpretation of the organizational structure and culture of government agencies with a view to making them more purposeful, responsive and participatory. The following section focuses on the role of the state in the data economy and formulates recommendations for political action. The creation of a mission-oriented, democratic and responsible innovation policy is based on the following three interrelated elements: public interest, regulation and investment.

Align innovation policy with social missions and reinforce trust:

A forward-looking and responsible innovation policy must be oriented towards the missions, goals and needs of society and ensure that technological progress brings a benefit to society.²¹ Rather than being an end in itself, the use of new technology, data and scientific findings is a means to tackle the major challenges facing society. The direction of technological and social change should be subject to a broad public debate. This can be achieved by reaching out to citizens and engaging them in dialog, and by pursuing local initiatives and providing funding to establish transformational processes on the regional level.²² In order to enable participation according to context and to properly benefit from this, it will first be necessary to identify the options for civic participation within the research system and along the value chains of the innovation system. In addition, this requires a participatory discourse about which criteria should be used in order to assess if a new technology is of benefit to the common good. This way, further public funding can help promote a responsible research and innovation policy.²³

Use adaptive regulation responsibly: Conventional regulatory approaches are ill-suited to shaping digital transformation processes and managing platform-based business models. The recommendations of the Commission of Experts on Competition Law 4.0 and of the Data Ethics Commission on how best to strengthen consumer sovereignty, data privacy and fair access to data have now become basic principles to prevent the misuse of data and an abuse of market power, but without hampering the growth of digital companies in Germany and Europe.^{24,25} Adaptive approaches of regulation and governance may provide an answer to the increasing acceleration and complexity of current and future innovation processes.^{26,27,28} In regulatory living labs or test beds, new technology can be tested along with its societal use and uptake in real-world environments. They further allow for the simultaneous design and shaping of new technology and its regulation.²⁹ Such an approach is relevant in relation to, for example, the development of laws to govern autonomous vehicles. This requires the involvement of a wide range of innovators and the collective identification of public interest criteria for the evaluation of such public experiments – and ought therefore to mitigate fears that these labs could facilitate a deregulated rollout of new technology. Even though the idea of innovation labs is now part of government policy making, their potential for a responsible regulation

of innovation is far from being exhausted.³⁰ The example of the General Data Protection Regulation (GDPR) shows that European standards can play a pioneering role on the international stage – but may also hamper business activity.^{31,32}

Step up investment in digital and physical infrastructure:

If Germany is to seize the opportunities offered by digital business models and close the widening gap to global competitors, it will require more than just substantial investment in the establishment of a nationwide high-performance digital infrastructure.³³ The federal Digital Infrastructure fund, created in 2018, is a big step in the right direction. At the same time, however, there is also a need for public and private action to modernize analog infrastructure, not least transportation and energy networks.

Alongside infrastructural investment, further demand-side government measures to promote innovation – such as the use of public procurement – are also a key part of a mission-oriented innovation policy.³⁴ By using public investment and procurement, the state can strengthen its role as a purchaser and driver of innovation. This in turn provides incentives for companies to enter emerging sectors and contributes to the diffusion of new technology.¹³ Furthermore, as a lead user of new technologies, government can also help them achieve breakthrough.

4

Exploit openness and cooperation to create opportunities for innovation

Global trends towards protectionism and economic nationalism are endangering global competitiveness and thereby prosperity and innovation. German industry's success to date is rooted in the openness of its economy and its deep integration in international value chains.³⁵ For Germany and Europe, the question of how to establish and preserve sovereignty in a digitalized, connected world is an urgent issue that still needs to be resolved. It is vital that the recently kindled debate on sovereignty does not destroy confidence in free competition and trade. Instead, it should serve as a springboard for a self-assured examination of the options for political and economic action, and for the development of strategic sovereignty. It is against this backdrop that the fourth section addresses the diversity of actors in global networks of value creation and argues for a culture of collaboration and openness.

Create a culture of collaboration: The transition from conventional cooperation in value chains to working together in dynamic networks and alliances of value creation requires a culture of collaboration that should be taught at school and university. The digital transformation calls for a cultural change such that an opening of the innovation process and a sharing of knowledge are seen as opportunities rather than threats. Companies can encourage their employees to think and work in ecosystems by, for example, adopting a collaborative management style, abolishing individual remuneration schemes and according greater recognition to team performance. Similarly, the creation of excellence clusters or industry labs that span different departments can encourage the use of teamwork to deal with complex issues and challenges.

Co-creation in the development and transfer of innovation: A transformation of how companies create value has blurred the boundaries between individual sectors of business. As a result, unusual alliances are emerging and new players entering the market. This is happening extremely rapidly at the interface between former areas of business, where new markets are now starting to form – in, for example, the transportation, energy and IT sectors. The rise of new collaborative models between established companies, start-ups, SMEs, and university and nonuniversity research institutions can also be seen. In addition, approaches such as co-creation and crowdsourcing mean that consumers and users are increasingly involved in the innovation process from an early stage onward. In other words, they have become partners in value creation.³⁶ Since technology paths and future areas of business are often identified early on in the research and development process, such involvement should be instituted from the outset. This means that innovations can be tailored more closely to the needs of society. Meanwhile, the state can use funding policy to create appropriate incentives for a joint, collaborative creation of value. One option here would be to offer start-up funding or tax incentives that encourage collaboration across system boundaries.

Provide networks for data-sharing: Future success in the digital economy will be determined by the availability of, and access to, data. In order to tailor business models to customers' needs and seize the opportunities afforded by digital business models and smart services, companies will have to maintain even closer contact to their customer base. At the same time, a growing connectivity and automation of processes in value creation mean that common standards are essential in communication and other areas. This in turn will require new forms of cooperation in the realm of data transfer, so that knowledge and data can be shared but without compromising the principles of data protection. On the European level, the GAIA-X cloud project can provide the requisite infrastructure for this purpose. However, its realization also depends on cooperation and mutual trust between all the various partners. Here, the state can establish a framework for the development of digital ecosystems by delivering the following: access to platform markets, a level playing field for all actors, and appropriate amendments to competition law with regard to scalable business models.

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About this discussion paper

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The positions presented in this paper do not necessarily reflect the views of the German federal government.

This discussion paper was produced by the High-Tech Forum team appointed to work on the topic of “The future of value creation.” Its purpose is to advise German federal government on the implementation of the High-Tech Strategy 2025. The team comprises the following members: Prof. Holger Hanselka, Prof. Anke Hassel, Prof. Katharina Hölzle and Frank Riemensperger (spokesman).

In addition to the contributions of the High-Tech Forum team, various experts were also consulted. These were selected on the basis of proposals from within the team. Interviews with experts lasted an hour, on average, and were conducted in the period between November 2019 and January 2020.

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About the High-Tech Forum

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