

# Economic and Administrative Analyses of Potential Needs for Public Support Mechanisms to Promote Non- Technological Innovations

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## Executive Summary

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### *This project*

German manufacturing firms are among the leading companies worldwide. German carmakers, machinery and equipment manufacturers or companies from the medical engineering sector have strong competitive positions worldwide. They contribute substantially to Germany's economic prosperity and play a strong role in German exports.

However, in new fields of economic activities such as industries in the business-to-consumer sector strongly driven by digitalization (among others in the creative industries) German companies do not play a role comparable to the one in the classical manufacturing sectors. Prominent features of these new sectors are often innovations for which a technological basis plays only a secondary, supportive role. Examples for this phenomenon include innovations in the music industry such as streaming services pushed by Spotify or Napster; innovations in the gaming and movie industry such as social or serious gaming or virtual reality applications; or innovations in the mobility sectors with companies like Uber or Gett. German companies often address these markets as well (for example Blacklane in the mobility sector), but often fall short of their competitors at least in public perception.

Against this background, a consortium of Technopolis Group, ISIconsult and VDI/VDE-IT carried out the project “Economic and Administrative Analyses of Potential Needs for Public Support Mechanisms to Promote Non-Technological Innovations” on behalf of the German Federal Ministry for Economic Affairs and Energy. The project was structured in three work packages.

- Firstly, we developed a clear conceptual understanding of the term “non-technological innovations” and built a framework to distinguish it from other types of innovation. The basis for this work was an extensive literature review as well as interviews with companies and experts from intermediaries and business associations.
- Secondly, based on the definition developed in the previous work package, we carried out an economic analysis of potential market failures which would call for a public intervention. In addition, we analysed the German innovation system regarding the question, whether there are barriers or inhibitory factors constraining the realisation of non-technological innovations. These analyses resulted in the identification of different action fields in which instances of market failures and non-optimal characteristics of the innovation system in Germany principally call for a public intervention/support mechanisms.
- In a third step, we analysed the existing portfolio of public support instruments in innovation policy with regard to whether it could be applied in the context of non-technological innovations and whether it addresses the identified action fields from work package two. This work resulted in recommendations regarding adaptations of the innovation policy portfolio if non-technological innovations were to be publicly supported.

This project focused on a broad, cross-industry analysis of non-technological innovations. This approach was meant to result in insights on non-technological innovations transferable to different sectors of economic life. However, on request of the Ministry some economic sectors were analysed in more detail. This included creative industries such as the games industry, but also the energy sector, the digital health sector and other digital industries.

### *Definition and Examples of Non-technological Innovations*

So far there is no established definition of the term “non-technological innovations” in the political or scientific arena. On the one side, in the scientific literature, the understanding of innovation often goes beyond technological aspects. Similarly, publications aiming at a use in the area of innovation policy (such as the OECD Oslo Manual) refer to non-technological innovations such as organisational or marketing innovations. However, the conceptual basis remains unclear and, in addition, there are different terms (social innovation, non-technological innovation, non-technical innovation) used in different ways and in a different relationship to each other.

Against this background, this project aimed to deliver a clear definition of non-technological innovations. This definition was to be subsequently used to analyse market or innovation system failures related to non-technological innovations and to develop mechanism to support non-technological innovative activities. The resulting definition builds on the insight that there are certain fundamental characteristics which distinguish technological from non-technological innovations. Two aspects are named in the following:

- Technological innovations are not modifiable in the short run, because they often have the nature of a physical artefact (like a machine). Non-technological innovations, on the other side, have an interactive character. This implies that they are – in contrast to technological innovations – continuously adaptive and changing, even after they are introduced to the market. The user is a significant source and driver for these adaptations in the market. Examples for these processes are adaptive web designs or online-based video games which can be optimised in real-time based on the user behaviour and user interactions.
- Technological innovations generally have objective characteristics. An example would be the breaking distance of a car, which stops within 40 meters from a speed of 100 km/h. Non-technological innovations tend to not have these objective, predetermined characteristics. A design innovation or an organisational innovation, for example, only unfolds its added value conditional on future acceptance of the design or within the organisation. Similarly, an innovative web platform like Airbnb driven by user-generated content only creates value if users (eg potential landlords) are willing to list their property. Due to the missing predetermined, objective characteristics it is often difficult to identify and communicate a clear value proposition of the non-technological innovation *a priori*.

Based on these and other differences between technological and non-technological innovations we deducted our definition of non-technological innovations. The mechanics through which value is generated by these innovations plays an important role in this definition:

*Non-technological innovations are novel products, services, processes, organisational or marketing concepts as well as business models. The primary added value is generated not by technologies (eg technical components, software), but rather by changes aiming at the usage contexts, potential applications, organisational structures or mechanics of generating revenue or value-added. Non-technological innovations may have a primary focus on the market or on social goods, while there also are hybrid forms.*

In the context of a definition and an analysis of non-technological innovations, it is important to note that these can also comprise technological aspects. There are overlaps between technological and non-technological types of innovation. However, for non-technological innovations, technology has more a characteristic of a “means to an end”.

Furthermore, it is important to note that our definition only aims at classifying certain innovations as non-technological innovations. The fact that the definition matches a certain innovation does not automatically imply that the innovation needs to be publicly supported.

In the public debate (in Germany for example in the context of the “New High-Tech Strategy”) the term social innovation is often used. According to our definition, social innovations are a subset of non-technological innovations. In our understanding, social innovations primarily aim at promoting a “social good” and do not focus on a commercial application (although a commercialization can take place as a “side effect”). An example of a social innovation in the understanding of this project would be, for example, a participatory concept in urban development. In this present project, the focus was on innovations which focus primarily on a commercial application of the innovation as innovations with this focus would be – in principle – eligible for a public support by the Federal Ministry of Economic Affairs and Energy. At the same time, also non-technological innovations in the sense of this project can have “social” effects. An example would be a commercial video game like “Cloud Chaser” which facilitates a better understanding of the situation of refugees. A further example would be a

product design of a smartphone for elderly people. This design can translate in commercial success, but can at the same time also promote “digital sovereignty” of elderly people (in the sense of the ability to use digital devices) and can thus have “socially desirable” effects.

Non-technological innovations can have various manifestations. In this project, we distinguished the following three types of non-technological innovations:

- **Product innovation with a technological reference:** Innovations with an interface to technological or IT components, mainly by exploiting the existing technological state of the art. Examples are digital gaming products, video or audio streaming, online consultations offers in areas like banking or health; configurators for individual products (mass customization), new or different communication services (for example Threema compared to WhatsApp)
- **Product innovations without a technological reference:** concepts for new goods (often services) without a reference to technological components like new marketing concepts (eg viral marketing, new designs, a new open innovation concept etc.)
- **Business model innovation:** new approaches to generate customer value or designing the underlying revenue or value creation model; business model innovation can take place in newly founded firms (entrepreneurship in start-ups like Airbnb, Uber, Deliveroo) or within established firms (intrapreneurship like new business models in creative/games industry like “free-to-play” or the evolution of ebay’s business model from an auction platform in the area of consumer-to-consumer to a selling platform for business-to-consumer applications)

### *Analysis of potential market or innovation system failures*

Using the framework of a classic, micro-economic analysis of market failure as well as the concept of the “National Innovation System” we carried out a comprehensive economic analysis examining the various potential forms of market failures or barriers within innovation system which could – if identified – require an innovation policy intervention.

We identified several **action fields** for which we see barriers for non-technological innovative activities on the individual (for founders, innovators etc) or the system level. These barriers are not adequately addressed by the market mechanisms and can therefore be a potential target for innovation policy. In part, these barriers are also given for technological innovations, but are particularly relevant for non-technological innovations and consequently for this study. The following aspects are, among others, relevant:

- High uncertainty, information asymmetries and risk regarding the commercial exploitation of non-technological innovations (intensified by the characteristics of non-technological innovations like a non-objective features or high market interactions in the development or evolution of the innovation)
- Improvable networks between actors from different industries or between types of firms (creative industries with manufacturing industries or start-ups with SMEs)
- Improvable infrastructures for non-technological innovators like business incubators, start-up centres, or co-working spaces with adequate (technological) facilities.

Furthermore, systemic framework conditions like

- human and financial capital resources for innovative activities (trained staff, financial resources in the growth phase of companies),
- attitudes towards innovation and entrepreneurship as well as
- regulations hampering innovations (in general, but particularly in data-driven and/or sensitive industries like digital health)

also seem to have inhibitory effects for non-technological innovations. Addressing these factors – also by the public actors – can therefore generally lead to higher innovation dynamics with regard to non-technological innovations.

### *Screening of the existing funding landscape with respect to an application to non-technological innovations*

In a next step, the project team screened existing support instruments of innovation policy which are currently predominantly focused on technological innovations. One of the aims of this exercise was to assess whether these instruments can be transferred or expanded to support non-technological innovations. The above described characteristics were important in this context of non-technological innovations as well as the action fields relevant for a possible support for non-technological innovations.

The following aspects are central outcomes of this analysis:

- The existing mechanisms of public innovation support have largely been proven suitable with respect to a support of technological innovations. However, they are often not directly transferrable to a support of non-technological innovations. Due to the special dynamics of the innovation processes of non-technological innovations (often short pre-competitive phase, fast time to market, quick adaptation processes) a support needs to be realised via considerably adapted or specifically designed support instruments.
- At the same time, there are existing instruments in different action fields which seem suitable also for a support of non-technological innovations (for example the German start-up competition “ICT Innovative”). Similarly, it can be noted that there are existing support measures/programmes which can (and are intended to) support also non-technological innovations. However, a support of non-technological innovations in these programmes happens often “by accident”: they are not explicitly excluded, but also not actively encouraged or explicitly included.
- There are some approaches of an explicit inclusion of non-technological innovations (also using this terminology) in more recent public support instruments. An example is the programme “KMU-NetC” of the German Federal Ministry for Education and Research. However, even in this programme notification there is no definition of non-technological innovations or a criterion to differentiate technological from non-technological innovations.

### *Focus on support instruments*

Based on considerations of the „intervention efficiency” of different support measures in different potential fields we focused on a limited number of action fields. Criteria for the selection of these action fields were considerations such as how effectively the “target group” of the support programme could be addressed, how efficiently the programme’s goals could be achieved, how the programme could be implemented transparently and how compatible it would be with regulatory policies (“*Ordnungspolitik*”).

Based on these considerations the recommended measures are concentrated to the following action fields:

- Information asymmetries between actors in the innovation process
- High uncertainty regarding the commercial application due to special characteristics of non-technological innovations
- Infrastructures for non-technological innovation activities
- Cross-sectoral interactions
- Human resources
- Financing in the growth phase

Within these prioritised action fields, we developed concrete recommendations for actions. These are aligned with the different phases of an innovation process (or a simplified model thereof): Incubation, Validation, Pioneering, Commercialisation.

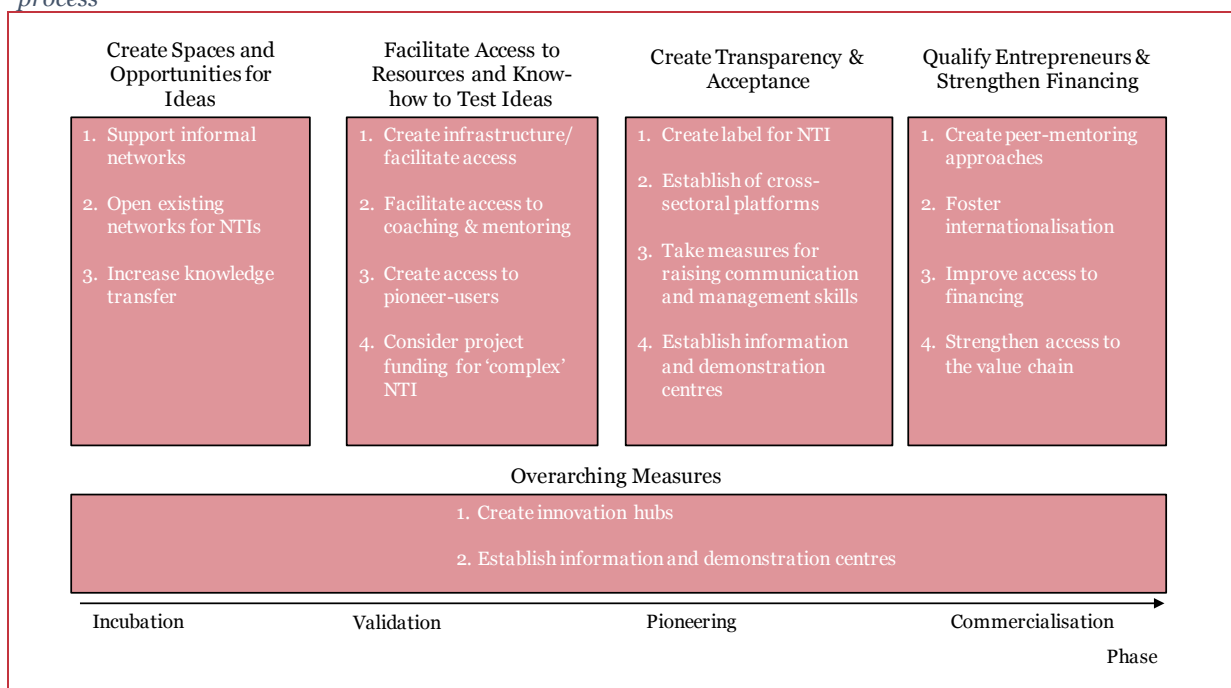
*The recommendations*

In drafting our recommendations, we were led by the view that innovation policy instruments should only be used in situations where economic analyses show clear indications of market or innovation system failure. In these situations, it is not possible for market actors to generate economically optimal outcomes by themselves. Based on these considerations we formulated our central recommendations for a support of non-technological innovations. They are aligned with the identified action fields and are - in line with the objectives of this study – not addressed at specific industries, but are of a cross-industry nature.

It should be noted that operationalising concrete support instruments warrants additional detailed analyses, for example of industry characteristics or specificities of certain types of innovation. In what follows, it is therefore difficult to prioritise or recommend specific policy instruments in a “one-fits-all” way. Instead instruments need to be specifically designed in order to be able to address specific market or systemic failures in these industries or areas. In this sense the following recommendations should be understood as a portfolio of potential instruments. Policy makers can choose from this portfolio based on actual requirements to complement existing support measures in certain industries or areas. This way a duplication of innovation policy efforts can be avoided. **We do not recommend to implement all recommendations immediately in all industries.** This would be an unrealistic endeavor, simply because of financial and administrative constraints. Additionally, a support of non-technological innovations means largely *terra incognita* for policy making. We thus recommend a careful and cautious implementation.

Our recommendations are structured along the different phases of the innovation process and the associated innovation barriers. In its entirety, the recommended instruments are a consistent set of measures to support non-technological innovations and specifically business model innovations. The following graph gives an overview of our recommendations.

Figure 1 Portfolio of instruments to support non-technological innovation in different phases of the innovation process



Source: Technopolis Group

The recommendations displayed in Figure 1 are based on the following reflections:

During the early innovation phase, the **incubation phase**, it is difficult to stimulate specific innovations externally as the idea and development process are still undefined and the development path is highly uncertain. However, there are ways to create **framework conditions** which facilitate the process of finding ideas and their establishment. We recommend to further strengthen **networks** of stakeholders with different backgrounds. These networks can lead to ideas building the base for the development of non-technological innovations. Hence for this phase, we recommend to generally make use of activities fostering the transfer of knowledge (eg between start-ups and established medium sized companies) or/and the cross-sectoral knowledge exchange (also between different sectors such as the creative and manufacturing industries etc.).

Testing and further developing an idea in the **validation phase** requires certain resources such as **infrastructure and time**. For non-technological innovations – in contrast to their technological counterpart – the further development of an initial idea does often not take place in a ‘controlled laboratory environment’. Instead, the exchange and interaction with internal and external experts or potential users in an application-oriented context (open innovation) is a highly relevant setting for non-technological innovations. However, start-ups and small enterprises are often struggling to get access to the resources needed to initiate and to participate in these kinds of processes. Facilitating the **access to infrastructure** (eg to business-incubators) and **pioneer users** as well as initiating activities to strengthen the management skills of the companies are recommended tools to address challenges in this phase. Traditional support instruments may be relevant in this phase as well, for instance for “complex” non-technological innovations (eg because of a technological reference).

In the **market introduction phase** (pioneering and commercialization), information asymmetries between innovators and potential customers or investors are a specific challenge. They are rooted in the distinctive characteristics of non-technological innovations (such as a lack of objective product characteristics). Hence, for innovators it is often difficult to communicate the added value of the invention in order to convince investors or to gain market shares. Appropriate measures addressing systemic or market failure in this phase should consequently foster the **transparency regarding the added value** of non-technological innovations. This also raises the user acceptance of innovations. Strengthening the market competences of companies and their access to financing – especially in the growth phase – are further actions recommended in this phase.

All measures in the different phases should be intertwined to generate synergies. It is therefore – wherever possible and useful – recommended to link instruments for the support of non-technological innovations across the different phases. This bundling could be realised via innovation infrastructures such as **information and demonstration centres** (locations for discovering and experiencing innovations) as well as **innovation hubs** (locations in which different measures aiming to support innovations are brought together).

The recommendations for different innovation phases are completed by recommendations referring to the design of the measures. As non-technological innovations have **specific characteristics** and are generated in **highly dynamic processes**, their design should be flexible and easy to handle. The design needs to meet the specific requirements of innovation process of non-technological innovations. This may apply for instance to the assessment procedures for proposals: elements such as competitions involving a jury consisting from stakeholders with different backgrounds, ‘project pitches’ instead of complex application procedures or voucher formats with low administrative burdens could be relevant here.

The support of non-technological innovations itself can be considered a **non-technological innovation project** as well (in the sense of a „public sector innovation“). Therefore, funding organisations are also required to participate in a **learning process**. Consequently, experimental policy measures and comprehensive analyses of these policy experiments are required in order to plan an efficient implementation of new support activities for non-technological innovations in a larger scale.

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