

# SUPPORTING SMEs IN THE DIGITAL TRANSFORMATION – REFLECTIONS ON A FLAGSHIP SUPPORT PROGRAM IN GERMANY

PHILIP MEIER SONJA KÖHNE MIRIAM WOLF CHRISTOPH GERLING



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Philip Meier, Humboldt Institute for Internet and Society Sonja Köhne, Humboldt Institute for Internet and Society Miriam Wolf, Association for Digitalization in the Social Economy Christoph Gerling, Humboldt Institute for Internet and Society

Reference to this paper should be made as follows: Meier, P., Köhne, S., Wolf, M., and Gerling, C. (2022) "Supporting Small and Medium-Sized Enterprises in the Digital Transformation – Reflections on a Flagship Support Program in Germany", The Digital Revolution and the New Social Contract series, Center for the Governance of Change, IE University, July.

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#### **ACKNOWLEDGEMENTS**

The research project was funded by the German Federal Ministry for Economic Affairs and Energy (BMWi). The authors wish express their gratitude to the project team and its supporters at the institute for the project's successful implementation over the past 5 years: Jessica Bachmann, Nicolas Friederici, Annika Ulich, Teresa Völker, Klemens Witte, Ali Aslan Gümüsay, Tanja Zagel, Karina Preiss, Martin Wrobel, Thomas Schildhauer and all interns and research assistants without whom the whole project could not have been possible.

#### INTRODUCTION

Digital transformation has disrupted whole sectors, including the automotive (Chanias & Hess, 2016), telecommunications (Schmitz et al., 2019), and media (Karimi & Walter, 2015) sectors. The transformation is a significant organizational shift caused by digital technology (Barthel & Hess, 2019). As part of this transition, organizations must rethink, change, and reinvent their processes, products, services, and business models (Wiesböck & Hess, 2020).

In order to do so, they need to adjust their strategies, organizational structures, and cultures to new digital technology (Vial, 2019). They don't just have to cope with new technology, but also with new competitors from various sectors, each with their own business plan (Downes & Nunes, 2013). This disruption is commonly viewed as both an existential threat and a lucrative opportunity (Meier, 2018). Surviving or even prospering from digital disruption requires mastering digital transformation (Matt et al., 2015).

Large organizations can handle both in parallel: They can build and implement digital technologies and ecosystems while dealing with the challenges of digital transformation (Abolhassan, 2017). They can orchestrate internal resources to generate crucial competencies that allow them to overcome organizational inertia and resistance to change due to a wealth of resources and capabilities (Cui & Pan, 2015).

In contrast, most small and medium-sized enterprises (SMEs) lack adequate digital capabilities and resources (Kesting & Günzel-Jensen, 2015). Digital transformation represents a substantial hurdle for them (Pelletier & Cloutier, 2019), because they need to analyze digital technology needs and contingencies (Berghaus & Back, 2016), because they lack competencies necessary to handle new digital technologies and business models (Neirotti et al., 2018), and because they need to take into account the ecosystem's expanding complexity (Levy et al., 2003). As a result, the majority of SMEs rely on third-party digital capabilities (Banerjee & Ma, 2012).



Yet, despite this urgent need to respond to digital disruption, many SMEs are unaware of how to adapt and cope (Gimpel et al., 2018). There is, in particular, a lack of understanding of how capabilities, skills, and knowledge may be developed internally or acquired from outside sources. While policymakers are currently seeking to promote SMEs' digital transformation, little is known about the efficacy of individual measures. To address this gray area, we seek to collect and present practice-oriented knowledge from the perspective of a government-sponsored project.

We therefore wish to reflect on the five-year project *Gemeinsam digital* which is part of a larger program *Mittelstand 4.0* funded by the German Federal Ministry for Economic Affairs and Energy (renamed the Federal Ministry for Economic Affairs and Climate Action in 2021) to boost the digital transformation of SMEs in Germany. We formulated the following guiding question in order to share and reflect on our experiences: How can publicly funded programs be designed to support SMEs in the digital transformation?

In order to achieve a better understanding of specific measures, the remainder of this paper is structured as follows. First, we start by introducing the project's background. Thereafter, we outline the four unique activities, which encompass business model innovation, digital skills, collaboration with start-ups (capability perspective) and artificial intelligence (AI) (digital technology perspective). We then reflect on the process and challenges. Thereafter, we present five policy recommendations based on the project team's experiences and insights. We conclude by providing a prioritization list, indicating three dominant themes that should be taken into account in national funding landscapes for SMEs and implications for further research.

With this, we advance the ongoing scientific discussion on digital transformation of SMEs. From a political perspective, this study can provide guidance to decision-makers on how to design publicly funded programs to facilitate, incentivize and guide digitalization in SMEs.

# THE SUPPORT PROGRAM MITTELSTAND 4.0 AND THE PROJECT GEMEINSAM DIGITAL

In Germany, SMEs – or the so-called "Mittelstand" – are considered the backbone of the economy. However, in 2016, only 25% of the organizations felt well prepared for the digital transformation. Therefore, the federal government identified a strong need for action in order to maintain Germany's competitiveness as an internationally recognized and innovative business location (Bundesministerium für Wirtschaft und Energie, 2016).



In order to tackle the challenges SMEs face in the digital transformation and to establish support mechanisms, the Federal Ministry for Economic Affairs and Energy funded the program *Mittelstand 4.0* from 2016 until 2021. The funding program will continue, slightly modified, from 2021 until 2025 and is now called *Mittelstand-Digital*.<sup>1</sup>

The goals of the program were (1) to sensitize decision-makers in SMEs and support them in making use of the technological and economic potential of digital transformation, (2) to strengthen the competitiveness and innovative ability of SMEs through thematic networking (sectors/cross-cutting issues) of relevant actors, (3) to strengthen the capacity of SMEs to engage in data-based networking across the value chain, (4) to open up new business areas and business models for SMEs – also in cooperation with public institutions or administrations – and (5) to promote technological, organizational and work design skills as well as strengthening security and trust through interdisciplinary cooperation (Bundesministerium für Wirtschaft und Energie, 2016).

These goals were implemented by 26 regional competence centers which where tasked with sensitizing, informing and training SMEs in the context of digital transformation.<sup>2</sup> Sensitization activities included raising awareness about the opportunities coming with digital transformation, giving practical examples, providing showcases and sharing best practices. Information activities included providing access to expert networks, events, and publications specifically tailored to SMEs' needs. Finally, training activities provided support in first practical steps toward digital transformation in SMEs through workshops, educational programs and support in digitalization projects.

This paper is based on the work of the research group at Alexander von Humboldt Institute for Internet and Society (HIIG), a partner of the Mittelstand 4.0 Center Berlin (*Gemeinsam digital*). The Mittelstand 4.0 Center Berlin focused its activities on SMEs in the Berlin/Brandenburg area. As far as the target group is concerned, the situation in this region is unique in Germany: digital pioneers coexist with barely digitalised SMEs.

While Berlin is ranked as one of the top startup environments in Europe, up to 80% of the companies in the neighboring, mostly rural area of Brandenburg are medium-sized companies in typically less innovative sectors. Therefore, the Mittelstand 4.0 Center Berlin aimed to provide a diverse range of offers in order to satisfy the needs of these divergent groups. At the same time, the center also aimed to make use of and mobilize

<sup>&</sup>lt;sup>1</sup> see also <u>https://www.mittelstand-digital.de/MD/Navigation/DE/Home/home.html</u>

<sup>&</sup>lt;sup>2</sup> See here for an overview: https://www.mittelstand-digital.de/MD/Redaktion/DE/Artikel/Mittelstand-4-0/mittelstand-40-kompetenzzentren.html



this diversity as a resource, bringing together startups and SMEs to exchange knowledge and skills and stimulate partnerships.

Within the Mittelstand 4.0 activities of the Berlin center, the team at HIIG was responsible for research, transfer and support activities with a thematic focus on the cooperation between start-ups and SMEs, business model development, skills for digital transformation and artificial intelligence in SMEs. We introduce the related activities more in detail in the following section.

#### **PROJECT ACTIVITIES**

The project followed a common practice in which funding is granted for a limited period of time, in this case three years. If the measures within the project were successful with regard to the target group and goals, there was an option to extend the project by reapplying, in this case for a limited period of two years. The activities implemented during the two funding periods were guided by different motivations. As demonstrated in the introductory section, there is a long standing digitalization gap between large corporations and SMEs. At the start of the first funding period in 2016, the initiatives were all about raising awareness and a sense of urgency for action required with regard to tapping into the potential digitalization can bring to SMEs.

Therefore, the first three years of the project were characterized by events and formats to highlight the need for action, demonstrate potential benefits through simple examples and establish access to the target group. Various formats were implemented as part of the project in Berlin (among others):

- Production and distribution of best practice videos with SMEs that have successfully carried out a digitalization project,
- Provision of introductory workshops on new working methods such as design thinking or agile working,
- Organization of a series of events on digital technologies with the aim of sharing knowledge about possible areas of application, removing fears and obstacles, and creating a space for interested SMEs to network.

At the end of this period, the *Gemeinsam digital* team reached approximately 1,700 business owners, SME representatives and disseminators via events, workshops and projects in the Berlin/Brandenburg region. More than 60 basic consulting or training projects with SMEs were carried out by project partners. Through extensive networking activities at events, via social media communication and through targeted public



relations work, the center achieved a high level of awareness both regionally and nationally.

The numerous information events reached an average of 110 participants, from which 80% felt that they have been well or very well sensitized to digitalization topics. 88% of participants were generally satisfied with the events. Over 55,500 visitors were registered on the website.

Due to these successful awareness-raising activities and the general media coverage of digitalization, many SMEs have transitioned to an orientation phase. In other words, the potential of digitalization strategies has been largely recognized, and the orientation phase now focuses on analyzing requirements, recognizing individual problems and identifying concrete solutions.

The need for support thus shifted from entry-level information to applicable guidance. The design and subsequent implementation of content for the funding extension was therefore determined by the need for transferable, tangible solutions, concrete strategies and prototypical processes to support SMEs in problem identification and needs assessment. In 2022, even without intensive awareness programs, we assumed that a general need for action among organizations has been recognized, leading us to describe this second phase in more detail. In addition to reflecting timely needs, the second-phase activities were based on rigorous empirical needs analysis – which had accompanied the awareness raising activities during the first period.

Four key themes were identified and turned into formats to support the SMEs' orientation towards digital transformation during the second funding period:

# Business model innovation projects

The holistic view of digitalization remains a challenge for SMEs. Thus, it is not just important to promote selective digitalization activities in the organizations but also to support and accompany the development of holistic, longer-term strategies. In the business model sprint format, we worked directly with individual organizations to question, adapt or renew existing business models. The sprints consisted of four phases: analysis, synthesis, brainstorming and transfer (Ulich et al., 2020). HIIG project staff worked closely with the SMEs over several weeks. During the selection of the 14 projects, we paid attention to diversity in terms of the sector, size and requirements of the participating companies in order to create a broad set of case studies that were distributed via the center's website.



## Digital training framework

Digitalization enables and requires a paradigm shift in corporate training strategies. The SME landscape is very diverse with regard to the current state of development of digital continuing education. Thus, large differences can be observed between SMEs with regard to both digital maturity and the learning culture (Köhne et al., 2021). An effective digital training strategy must therefore be tailored to the company's individual needs. We developed a process model for the implementation of a digital continuing education strategy in SMEs. In order to do so, we conducted qualitative interviews with company representatives and drew up case-study-based learning archetypes. Results were implemented in an online self-study guide that determines where SMEs stand and offers needs-based recommendations for action.

#### Cooperation with startups

SMEs' networks are often very sector-specific and stable, but they are also typically not very dynamic and strongly oriented towards similar companies. New contacts with technically advanced, differently structured companies thus bring significant potential for igniting new thoughts and innovation. In this context, it is important to find gateways to facilitate a common language and to lay the foundation for joint value creation. Established companies usually know a lot about problems and processes – start-ups, on the other hand, are experts in disruptive technologies and innovative business models. In cooperation, both sides often complement each other without bureaucracy and large investments. We thus built on Wrobel et al. (2017) in conducting theme-oriented event series to match SMEs with startups and offer a structured procedure model for different modes of collaboration between them.

## Artificial intelligence consulting

AI is often perceived as a complex, knowledge-intensive and capital-intensive technology – because of this, companies often can not relate it directly to possible applications in their own operations. For SMEs in particular, it is therefore important to render the technology tangible with the help of practical experience. We offered consultation hours to more than 30 organizations tailored to their individual needs and doubts around AI. For this purpose, SMEs filled out questionnaires in advance so that customized application examples could be conveyed and possibilities for the use of AI in the company were elicited during the conversations. Furthermore, we developed a 4-part workshop format for SMEs together with an expert practice partner, in which we supported 5–8 companies each in classifying and creating their own technology roadmaps for the validation and implementation of AI applications.



In order to attract companies to participate in the respective formats, we distributed organic advertising via the popular social networks along with active campaigning via business directories. Furthermore, we documented and published all formats and lessons learned as blog posts or in specialized media for an SME target group.

#### REFLECTIONS ON THE PROJECT PROCESS AND CHALLENGES

The very nature of the project as well as its larger embeddedness and funding structure – in the field of tension between scientific research and practical business support – offered us rich opportunities for learning. Five key lessons that are abstracted from the project's motivation to support digitalization of SMEs directly relate to the formats and their execution, address the challenges of (1) working with heterogeneous groups who (2) have limited resources, (3) are difficult to reach through the usual digital channels such as social media and homepages, (4) tend to slip into old patterns easily and (5) are reluctant to engage in scientific enquiry for its own sake.

## Lesson 1: SMEs differ significantly in demands and capabilities

Designing and communicating structured processes for each format proved to be important for ensuring that participating SMEs have clear indications of what to expect. However, during the practical implementation of the formats, we learned that the requirements and capacities of the companies differ significantly, even within the same sectors. This applies both to the collaborations between SMEs and startups as well as to group consultancy on AI applications or digital business models. Formats that tried to channel a high number of participating companies through largely standardized programs often failed to realize their potential because some companies were left behind while others were not sufficiently challenged.

The individual AI consulting and the intensive one-to-one exchange in the context of the surveys on digital skills and the business model projects appeared to be much more in line with requirements. In order to scale the insights and results gained, great attention must be paid to comprehensive documentation and description. We published case studies based on the innovation projects and disseminated application examples of AI technologies via a dedicated podcast format.<sup>3</sup> These activities not only contributed to disseminating knowledge but also acted as an acquisition channel for new SMEs and as illustrative examples in follow-up activities.

<sup>&</sup>lt;sup>3</sup> See <a href="https://anchor.fm/gemeinsamdigital">https://anchor.fm/gemeinsamdigital</a>



## Lesson 2: Barriers to enter a format must be low and permeable

SMEs mostly operate in low-margin sectors and therefore have to act with high efficiency in order to operate in an economically sustainable way. Therefore, before investing time in one or several of the offered formats, SMEs evaluate the trade-off between investing in digitalization and investing the same time in working on other things. The crucial question here is whether invested time can be quickly translated into added value for the business.

To this end, we tried to ensure two things quickly in all formats. First, we sought to clearly communicate in advance what the program is about and what SMEs can expect or not expect when participating. Second, we sought to ensure that formats were modular, with the first modules requiring little resource commitment, yet providing a comprehensive understanding of how a more intensive engagement with a technology or way of working is worthwhile for the SME at that particular stage.

# *Lesson 3: The mountain does not come to the prophet*

Broad, passive targeting of a diverse range of SMEs, for example, by advertising the offers or events on a website, has not proven to be particularly effective. In comparison to Europe or the rest of the world, Germany's corporate landscape may appear homogeneous. However, entrepreneurial focal points can vary greatly from region to region in Germany. The south of Germany is home to many engineering firms, whereas Berlin, in addition to being the seat of government and higher education institutions, has a strong media landscape. Reflecting this, we took two steps to address the challenges of increasing SME participation via a website and regional requirements.

First, we established a thematic focus for format groups, for example, digitalization in the media and communication sector. We narrowed it further down and concentrated on AI in that group in order to provide an appealing, needs-based offer that local businesses could understand and evaluate. Second, we teamed up with a local media innovation center that had dedicated business contacts and could thus actively support us in approaching potential participants that would benefit from taking part. Both measures demonstrate and reinforce the importance of flexibility and productivity.

## Lesson 4: Perils of one-off training and support activities

The resources available in SMEs are limited, thus the companies face severe challenges in releasing employees from day-to-day operations to commit to long-term development activities. In our experience, however, the impact of a one-time, external intervention such as workshops or a single-day consulting engagement is often limited. The external expertise that support programs like *Gemeinsam digital* offer have the potential to



kickstart an organization's transformation. They should not, however, provide training once and then leave organizations on their own, with the result that they remain stuck in old patterns. If there is no sustained support and knowledge within the SMEs, any transformation efforts die down fast.

We thus found that the development of digital skills and motivation within the workforce were crucial success factors. Often, we observed that SMEs tended to implement occasional, one-off measures that were not embedded in their overall company strategy and goals, e.g. training skills that cannot be applied in day-to-day operations. This often led to frustration among employees. We also found that an increased degree of individuality in the formats positively affected long-term commitment and impact. Such individualization, however, required project team to invest much more effort unless the formats were designed in a very modular way and project partners were actively involved in adapting them to their specific cases.

## Lesson 5: Trade-offs between tactical support vs generating scientific insights

As a research institute the team at HIIG was highly committed to not only providing hands-on support for the target groups of the program but also to generating robust and high quality scientific insights about how the digital transformation affects SMEs and the challenges and opportunities emerging during this process. However, in practice, this turned out to be a challenge as the goals, set-ups, and time scales for these activities were fundamentally different. For instance, we encountered challenges relating to scientific sampling versus open registrations for events, scientific discourse vs practice discourse, short-term challenges for organizations vs long-term challenges for research and amount and depth of data needed for scientific research vs engagement with the target groups on the basis of their specific needs. Last but not least, the amount of time available for scientific research while developing support programs was limited.

Trade-offs further occured during the program evaluation. While the program included incentives for measuring the number of participants reached and their satisfaction, it was far more complex to measure the outcomes of the program within organizations and people within them. However, it would be important to understand what kind of interventions work and why. Due to this, the research output in high level journals based on the project is limited and does not live up to the learnings and knowledge generated during the 5 years of the program.

Building on these lessons, we have formulated policy recommendations to be considered in future funding call designs. In the following chapter, we discuss five recommendations that form an adapted framework for funding calls within comparable programmes for the digitalisation of SMEs or for related areas in which the target group has similar



characteristics. This can help project teams to benefit from our lessons during the proposal preparation phase and in developing their own solutions, which must match the national or local context.

# FIVE POLICY RECOMMENDATIONS TO STRENGTHEN DIGITAL SUPPORT PROGRAMS FOR SMEs

Initiatives like *Gemeinsam digital* in Germany have the potential of institutional support to assist SMEs in the digital transformation. These initiatives, however, will fall short of meeting their full potential if they are not tailored to the specific needs of their target group (see also Ulich & Wolf, 2020). Based on the challenges and lessons learned outlined above, we conclude this paper with five key policy recommendations. They aim to offer guidance to policy-makers in designing future calls for support programs, and in making them more effective and sustainable in the long run. In doing so, we abstract the lessons learned to the higher level of program design requirements.

#### Recommendation 1: Leave room for flexibility and adaptation

In response to the heterogeneity of the SME population, we recommend enabling and embracing flexibility and adaptability in support programs. This takes two elements into account. First, SMEs face highly diverse challenges in the digital transformation, leading to equally diverse support needs. A program thus highly benefits from deploying a large variety of formats that target organizations of various digital maturity levels. Asynchronous offers as well as those that can be taken up individually or as a package allow participating SMEs to stay in control over the extent and speed of their transformation. The goal is to neither overwhelm nor underchallenge.

Second, the needs of the target group may shift during the course of the program or a mismatch between the anticipated and actual needs may be uncovered. It is thus crucial to enable those in charge to respond to emerging needs and to adapt their specific offers accordingly. The AI-consultations-turned-podcasts serve as a prime example. Flexibility and dynamic adaptation of formats and content should therefore be expected and incentivized. In order to establish a structured framework for these dynamics, procedural models for the ongoing collection and implementation of feedback as well as their implementation into format adaptations can be requested from the very beginning.

# Recommendation 2: Ask for highly practical and tailored services

The fact that SMEs lag behind in digital adoption is, in part, caused by the situation that most commercial offers are tailored to the needs of large enterprises, e.g. in the context



of AI. We therefore ask for highly customized support services for SMEs. Making content accessible for SMEs requires a translation of digital developments to their specific context and challenges. Complex technologies such as AI need to be broken down to those elements that are relevant to the target group, e.g. possibilities of AI-as-a-Service (Schmeiss & Friederici, 2019).

Building on that, we recommend going another step further by breaking down funding initiatives and particularly asking for content tailored to specific sub-sectors within the SME population, e.g. AI in the media sector. At first glance, this high specialization may seem to run contrary to calls for more flexibility. However, we consider these complimentary. Both approaches require potential recipients of funding to identify the target group's needs in advance and address them during project planning and execution. This applies to content as well as to formats. SMEs in particular require hands-on and practice-oriented offers to make technologies like AI tangible, and develop their own use cases with limited internal resources.

## Recommendation 3: Build legitimacy - in advance

A major challenge in *Gemeinsam digital* was to create or rather tap into the demand for the offered support formats in the first place. Low participation rates are a common problem publicly-funded support programs face. Two reasons are a lack of awareness of the existence of the program and the lack of a sense of urgency to adapt to digital transformation in the organization. We recommend keeping this challenge in mind when designing the boundaries of a potential project consortia that has to prove it can build legitimacy early-on.

We see two main levers for this. First, funding institutions should explicitly ask and look for multipliers whom SMEs trust. German examples include the local Chambers of Commerce, industry associations, or industry-oriented research institutions. Second, funding institutions make it a requirement for applicants to involve representatives of SMEs in the design phase of the program. This can be implemented in the form of joint workshops, qualitative studies, or bia the direct involvement of one or more SMEs as part of a consortium. SME support programs must be developed not only for but also with the target groups in which they are to be effective.

#### Recommendation 4: Build and develop resources within SMEs

External multipliers can only go so far. Eventually, the digital transformation needs to be driven from within. Therefore, we recommend focusing funding calls on building awareness and skills inside SMEs. A reflection on the extent to which learning and innovation culture are part of every organization's own corporate identity is a key



prerequisite for a successful transformation. Building digital skills within their internal workforce enables SMEs to comprehensively evaluate and harness new technologies. This requires a long-term commitment from SMEs and long-term programs from policymakers – one-off training has not proven to be effective.

Therefore, the measurement of success for SME-related support programmes should be based on the intensity and long-term impact of implemented activities rather than solely on the number of companies reached. This can mean additional effort for qualitative assessments that also transcend the project duration and must therefore be included as a requirement in the call and be addressed by the applicant throughout the project duration as well as in a possible dissemination plan.

Recommendation 5: Scientific research must be a core element, not the byproduct

Scientific research and practical business support follow different time horizons and requirements. This is a major challenge in the framing and setup of many publicly-funded initiatives like *Gemeinsam digital* that aim to combine both research and business support. If the funding is primarily targeted towards solving short- and medium term challenges of organizations, the quality and impact of research inevitably suffers. Scientific research as a byproduct of practical support activities can only go so far. Yet, it is the basis for measuring the input and output values for meaningful and sustainable business support. It thus places the rigorously generated insights of organizations in a larger context and makes them accessible.

We therefore recommend creating program calls that ask for hands-on support by practice oriented partners that have well established ties with target groups combined with meaningful research and publication activities from university partners in equal measure. Policy-makers must, once again, take a long-term perspective. Resources for both activities need to be provided in a combined project setting but must eventually follow differentiated success measures. It has to be clear that rigorous research goals can not be compromised. On the other hand, the practical needs often need pragmatic solutions which should be given space separately. Then, and only then, can we create impact in business and science.

Building on these meta-recommendations and on relevant experiences we conclude with a prioritization list indicating three dominant themes that should be addressed in national funding landscapes for SMEs.

1. **Attracting talent**. We must improve access to talent and build relevant skills in companies now and in the future. SMEs often appear unattractive to tech-savvy



graduates. Therefore, support programmes should be set up to address this and to better understand which measures and incentives can be used.

- 2. **Reducing power asymmetries**. We must better understand what impact the increasing expansion of digital platform providers beyond the consumer sector to the B2B sector, including SMEs, has or will have (Friederici et al., 2020). While SMEs are likely to be platform users rather than providers, targeted regulations based on empirical evidence can help reduce power asymmetries between parties.
- 3. **Enabling innovation.** Startups that specifically develop new technologies for SMEs often fail due to the high fragmentation and poor accessibility of the target group. Therefore, future funding initiatives should aim to understand how and under which conditions innovative problem-solvers with commercial interest can be supported in targeting and accessing SMEs.

#### CONCLUSION

Building on our experience with *Gemeinsam digital*, we have outlined five lessons and proposed corresponding actions to strengthen future SME support programs. We hope that policy-makers will recognize the untapped potential of SMEs across Europe and of research and support programs to assist them. In this process, the balancing act between scientific rigor and the practical implementation of support programs needs to be acknowledged and addressed. Developing project calls in close cooperation with researchers, multipliers such as associations and target groups may mean longer preparation and more investment before publishing program calls but this development approach may pay off by offering more impactful programs.

The stakes are high: SMEs are a crucial economic factor, in Germany and in Europe, and we can hardly afford to miss the opportunity for a bottom-up, decentralized digitalisation movement equipping SMEs with the knowledge and skills to evaluate solutions in the market and perhaps even to offer adequate alternatives themselves. The COVID-19 pandemic accelerated certain digital developments across sectors, but many barriers and challenges persist.

SMEs are for small participants in global markets that are increasingly dominated by digital giants. Despite the demonstrated areas of improvement, projects such as *Gemeinsam digital* make a crucial contribution to support these small but important market participants. In this context, SMEs in other European countries and also social sector organizations and NGOs might serve as target groups for future support programs. They face similar challenges of resource scarcity, yet bear much potential for bringing



about sustainable and inclusive digital innovations that society as a whole would benefit from – there is still much to be done.

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