Experimental innovation policy for SMEs: Findings and recommendations

Final Findings Report EASME/H2020/2018/005

Period covered by the report: October 2019 - October 2022

EUROPEAN COMMISSION

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1. Abstract / Résumé

1.1. Abstract

This report from the Innovation Growth Lab brings together analysis and key findings from thirteen projects that were chosen to break new ground in many agencies by applying experimental approaches to innovation policy.

Randomised Controlled Trials (RCTs) are a powerful way to determine whether an intervention causes the expected outcomes. As part of a broader experimental approach, RCTs can help innovation agencies to explore new ideas, optimise actions and find out what works. RCTs are, however, rarely used.

Within the Horizon 2020 Work Programme, 2018-2020 - 7. Innovation in small and medium-sized enterprises (INNOSUP), the European Commission launched a call to directly incentivise innovation agencies to engage in policy experimentation and use RCTs to evaluate their support schemes for SMEs.

The selected projects include feasibility studies of new support, such as training to encourage SMEs to adopt new innovation methods and technologies. Others seek to optimise programme delivery, for instance how best to offer SMEs feedback on their grant applications. Results are presented alongside lessons learnt by all agencies during experiment design and implementation. Recommendations and tools are also provided for innovation agencies wishing to follow the approaches of the experimental pioneers and undertake their own experiments.

1.2. Résumé

Ce rapport du Innovation Growth Lab (IGL) rassemble l'analyse et les principales conclusions de treize projets qui ont été choisis pour innover dans l'application d'approches expérimentales à la politique d'innovation.

Les essais randomisés contrôlés (ERC) constituent un moyen efficace de déterminer si une intervention produit les résultats escomptés. Dans le cadre d'une approche expérimentale générale, les ERC pourraient aider les agences d'innovation à explorer de nouvelles idées, optimiser les actions et découvrir ce qui fonctionne. Les ERC sont cependant rarement utilisés.

Sous le programme de travail Horizon 2020, 2018-2020 - 7. Innovation dans les petites et moyennes entreprises (INNOSUP), la Commission Européenne a lancé son appel afin d'inciter de l'expérimentation de politiques d'innovation et utiliser des ERC pour évaluer leurs programmes.

Les projets comprennent des études de faisabilité d'un nouveau soutien, tel que des formations visant à encourager les PME à adopter de nouvelles méthodes et d'autres cherchent à optimiser l'exécution du programme, par exemple la meilleure façon d'offrir aux PME un retour d'information sur leurs demandes de subvention. Les résultats achevés sont présentés, ainsi que tous les enseignements tirés lors de la conception et l'exécution des expériences. Des recommandations et des outils sont également fournis pour ceux qui souhaitent entreprendre leurs propres expériences.

2. Executive Summary / Résumé exécutif

2.1. Executive Summary

By introducing a dedicated funding call 'Supporting experimentation in innovation agencies' ('INNOSUP-06-2018') within the Horizon 2020 programme, the European Commission has found that innovation agencies will engage in policy experimentation if provided with the means and freedom to do so.

Innovation agencies face continual demands to innovate and adapt their support for Small and Medium-Sized Enterprises (SMEs). One way to address these challenges is for innovation agencies to become more experimental - introducing new ideas but also putting in place systems to learn whether they are working. Within this experimental approach, Randomised Controlled Trials (RCTs) can be one of the most powerful ways to determine whether an intervention can achieve its intended impacts.

In this report, we provide a comprehensive analysis of the consolidated findings covering the experiments in INNOSUP-06. We bring together the key findings from the thirteen projects and from the experiences of all participants as they designed and implemented their experiments. We look at the rationale for encouraging innovation agencies to run experiments, discuss the experience of learning from them, and study the main elements for consideration by innovation agencies who wish to take up or replicate findings.

Innovation is getting harder, and with new challenges to be addressed, agencies need to develop strategies that could become new instruments in their toolbox. Experimentation provides agencies with a unique opportunity to develop and test new tools and ideas to support businesses. We provide a comprehensive discussion of the different types and context of interventions that the projects are testing, the motivations for experimentation, and an exploration of why these are of wider interest to EU policymakers.

The report presents the main findings and results from the experiments, including context and evaluation design. Many of the projects were not of sufficient scale to generate clear findings or robustly evaluate impacts. Even so, each of the projects has generated insights that are applicable both within the respective agencies and more widely. This includes learning about how to recruit SMEs to take part in new programmes, about how to implement new interventions effectively, and how to integrate experimentation into the rollout of a new intervention.

We introduce some emerging findings and policy lessons, combining overall conclusions from the INNOSUP experiments with existing evidence to present insights on the different policy challenges. We present findings on what should be tried within SME innovation support, as well as proposals to deal with implementation challenges when introducing new SME support and lessons from applying the experimental approaches.

Experimentation does not come to an end when the first experiment is finished. Instead, this should be seen as a recurrent and continuous process of learning and development, which involves additional steps once the experiment is completed. We provide recommendations for innovation agencies who may wish to learn how to interpret, scale and replicate findings from experiments. Replication helps to increase the evidence on the impacts of an intervention, and can provide agencies with more confidence in expanding the programme later. However, when scaling up programmes, there are some elements that need to be taken into consideration, such as the fidelity to the intervention and the cost-effectiveness of scaling.

The INNOSUP-06 programme has provided agencies with the opportunity to introduce new methods and ideas for the first time, and it is prompting them and other agencies to improve the way they provide services to businesses.

2.2. Résumé exécutif

En lançant l'appel à financement dédié 'Soutenir l'expérimentation dans les agences d'innovation' ('INNOSUP-06-2018') dans le cadre du programme Horizon 2020, la Commission européenne a constaté que les agences d'innovation prendront part à l'expérimentation politique si on leur donne les moyens et la liberté de le faire.

Les agences d'innovation doivent sans cesse innover et adapter la manière dont elles offrent de soutien aux petites et moyennes entreprises (PME). Pour relever ces défis, les agences d'innovation pourraient devenir plus expérimentales, en introduisant de nouvelles idées, mais également en mettant en place des systèmes permettant de vérifier si elles fonctionnent correctement. Dans le cadre de cette approche expérimentale, les essais contrôlés randomisés (ECR) peuvent constituer l'un des meilleurs moyens de déterminer si une intervention peut avoir les effets escomptés.

Dans ce rapport, nous présentons une analyse complète des résultats consolidés couvrant les expériences de l'INNOSUP-06. Nous rassemblons les principaux résultats des treize projets et des expériences de tous les participants au moment où ils ont conçu et mis en œuvre leurs expériences. Nous examinons les raisons pour lesquelles les agences d'innovation sont encouragées à mener des expériences, discutons de l'expérience acquise à partir de ces expériences et étudions les principaux éléments à prendre en compte par les agences d'innovation qui souhaitent reprendre ou reproduire les résultats.

L'innovation devient de plus en plus difficile, et avec les nouveaux défis à relever, les agences doivent développer des stratégies qui pourraient devenir de nouveaux instruments dans leur boîte à outils. L'expérimentation offre aux agences une occasion unique de développer et de tester de nouveaux outils et idées pour soutenir les entreprises. Nous offrons une discussion complète des différents types et contextes d'interventions que les projets testent, les motivations pour l'expérimentation, et une découverte des raisons pour lesquelles celles-ci sont d'un intérêt plus large pour les décideurs de l'UE.

Le rapport présente les principales conclusions et les résultats des expériences, y compris le contexte et la conception de l'évaluation. De nombreux projets n'étaient pas d'une ampleur suffisante pour générer des résultats clairs ou évaluer les impacts de manière approfondie. Chacun de ces projets a cependant permis de dégager des enseignements applicables à la fois au sein des agences respectives et à plus grande échelle. Il s'agit notamment d'apprendre comment recruter des PME pour participer à de nouveaux programmes, comment mettre en œuvre de nouvelles interventions efficacement et comment intégrer l'expérimentation dans le déploiement d'une nouvelle intervention.

Nous présentons quelques résultats émergents ainsi que des leçons politiques, en combinant les conclusions générales des expériences INNOSUP avec les données existantes pour proposer des idées sur les différents défis politiques. Nous présentons des résultats sur ce qui devrait être essayé dans le cadre du soutien à l'innovation des PME, ainsi que des propositions pour faire face aux défis de mise en œuvre lors de l'introduction de nouvelles mesures de soutien aux PME et des leçons tirées de l'application des approches expérimentales.

L'expérimentation ne s'arrête pas une fois la première expérience terminée. Il faut plutôt y voir un processus récurrent et continu d'apprentissage et de développement, qui implique des étapes supplémentaires une fois l'expérience terminée. Nous formulons des recommandations à l'intention des agences d'innovation qui souhaitent apprendre comment interpréter, mettre à l'échelle et reproduire les résultats des expériences. La reproduction permet d'augmenter le nombre de preuves sur les impacts d'une intervention et peut donner aux agences plus de confiance pour étendre le programme à l'avenir. Cependant, lors de la mise à l'échelle des programmes, certains éléments doivent être pris en considération, tels que la fidélité à l'intervention et le rapport coût-efficacité de la mise à l'échelle.

Le programme INNOSUP-06 a donné aux agences l'occasion d'introduire de nouvelles méthodes et idées pour la première fois, et il les incite, ainsi que d'autres agences, à améliorer la manière dont elles offrent des services aux entreprises.

3. Introduction: Adopting experimentation and learning from the results

3.1. INNOSUP-06-2018 - Outline and Objectives

In 2018, the European Commission introduced a new EU Horizon 2020 programme (INNOSUP-06-2018)[1] to encourage and support innovation agencies across Europe to experiment with their support schemes for SMEs. Previous actions, such as INNOSUP-05, had encouraged agencies to explore new topics and approaches in innovation support. This new call was the first directed at the application of Randomised Controlled Trials (RCTs) when evaluating the outcomes from new policy ideas. RCTs can be a robust[2] but underutilised[3] way of evaluating the causal outcomes from innovations in policy approach, whether these be small changes to design or testing the impact of a whole new support programme.

The expected impact of the call was that:

1. The number of innovation agencies engaged in policy experimentation significantly increases;

2. The use of RCTs in the design and testing of innovation support schemes significantly increases;

3. A broad range of new or significantly improved SME innovation support schemes are investigated and developed and their impact is rigorously tested. Pilot agencies scale up these new schemes.

The reasoning behind the creation of a dedicated call for innovation policy experiments was to go beyond action and overcome inertia amongst agencies due to a 'lack of funds, time pressure to deliver new support, and the fear of a backlash against "money wasting".'[4] With additional gains to be achieved from raising the awareness of this approach and building the capabilities and openness[5] amongst agencies to experiment - many agencies noted that knowing the European Commission had requested the use of RCTs provided reassurance.

To achieve this, INNOSUP-06-2018 ('INNOSUP-06') offered funding for two levels of experiments:

- Small grants of up to €60,000 were available for small-scale experimental pilots of novel innovation support ideas.

- Larger grants (€300.000-€500.000) for more substantial RCTs that evaluated scalable SME innovation support schemes whose feasibility had already been proven.

Thirteen projects received funding, with 27 agencies involved in delivering the experiments to provide and evaluate new innovation support for SMEs located across 14 countries. These included national agencies such as the Austrian Research Promotion Agency (FFG) and the Business and Cultural Development Centre (KEPA), as well as regional agencies such as Torino Wireless Foundation from Piedmont in Italy and the Institute for Business Competitiveness (ICE) of Castilla y León in Spain. The interventions tested include training for SMEs in innovation methods such as user design, co-creation and investment readiness but

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[1] https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/innosup-05-2016-2017

[2] https://ec.europa.eu/competition/state_aid/modernisation/state_aid_evaluation_methodology_en.pdf

[3] See: Bravo-Biosca (2019) 'Experimental Innovation Policy', for further discussion

[4] Horizon 2020. Work Programme 2018-2020: Innovation in small and medium-sized enterprises

[5] These concepts are discussed in greater detail in our earlier report 'Boosting Experimental Innovation Policy in Europe'

also smaller tweaks such as how feedback is presented to applicants for innovation grants. (See Section 4).

It was recognised that, with RCTs rarely used within innovation policy, project teams were likely to require additional support to design and deliver their experiments. Therefore in the autumn of 2018, the Innovation Growth Lab (IGL), based at Nesta, was selected by EISMEA to provide this expert support, which was delivered through a range of peer learning and individual support activities. IGL was also tasked with capturing and sharing findings, so that other agencies could learn from the experiments and be both encouraged and better equipped to undertake their own experiments.

This report is the second and final report that IGL has produced under EASME/H2020/2018/005 'Support to design and running of randomised control trials'.[6] It presents the context and set-up of all thirteen projects, bringing together key findings that are emerging from each project, the challenges encountered as agencies designed and implemented their experiments, and shares recommendations for innovation agencies wishing to undertake similar approaches in future.

3.2. Why innovation policy needs experimentation

Innovation agencies are responsible for many decisions on the focus, design and delivery mechanisms used to support innovation amongst SMEs. But what are the right choices? Are they making the most of each investment? Are there more effective or inclusive ways of using their funding?

Answering these questions is difficult. Innovation systems are complex and continually evolving. With so many factors at play in both determining who participates in innovation support and economic outcomes, there is significant uncertainty in establishing counterfactuals - i.e. making a credible case for what would have happened in the absence of the policy support or if different approaches had been taken. Policymakers too rarely introduce new ideas with intent and systems to genuinely test assumptions about what works, when and why. As a result there is a lack of depth and rigour in the existing evidence to confidently guide decisions, with scarce resources being invested in policies that are less effective than alternatives (or potentially even counter-productive).

One solution is to apply a more experimental approach to policymaking. A policy experiment has a clearly structured approach to learning - defined before the experiment starts rather than afterwards - and it generates new information, evidence or data. A rigorous policy experiment will have a theory of change, systems and processes in place to capture learning, and a clear timeframe with limits or checkpoints where results will be assessed and decisions made about whether it should be adjusted, scaled up or discontinued. By becoming experimental, an agency creates evidence to directly inform their own decisions but also adds to the wider knowledge base on what new ideas should be tried and when these should be adjusted, scaled up or discontinued.

Policy experiments can be used in different contexts and with different objectives. We can consider two broad categories with one framed around exploration and discovery (understanding how the world works) and the other group focused on evaluation (finding out what works).

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[6] The first findings report can be found here: https://op.europa.eu/en/publication-detail/-publication/ee94d850-2fb9-11ec-bd8e-01aa75ed71a1/language-en/format-PDF/source-265306657

The first category of experiments are used to explore the feasibility and potential of a new intervention: Can it be delivered? What types of outcomes are likely to emerge? How do people or businesses respond to it? Do the underlying assumptions about the problem and the way change will occur hold?

The second category of evaluation experiments can be further divided into two groups: impact evaluations that will estimate the ultimate impact of an intervention on outcomes, and process optimisation experiments that measure intermediate impacts of changes in the process.

Most of the INNOSUP-06 project teams had initially developed their experiments to be impact evaluations with the aim of establishing more robust evidence on 'what works'. For many, however, it soon became clear that their policy ideas were actually at a much earlier stage of development and the value of their experiments proved to be the opportunity to explore the feasibility and potential of their approach.

Improving the evidence base is one motivation for experimentation, but an often overlooked benefit is in encouraging organisations to become more agile and innovative, continuously searching for new ideas to test rather than defaulting to the status quo.

Ideally, policy experiments start at a small scale, not being larger than what is required to answer the question or validate the hypothesis being tested. With entirely new programmes there is often high uncertainty and limited prior knowledge to build on. Because of that, there are clear benefits from setting up prototypes and continuously iterating and adapting designs to improve through trial and error, and only then advancing to full impact evaluations where costs and timeframes can be substantial.

3.3. Randomised Controlled Trials

RCTs are a methodology for determining whether an intervention is achieving its aims and intended impacts. In their most simple form, participants are randomly assigned to either an intervention group, who are given the intervention, or a control group who are not.

Randomly assigning participants to a control group removes selection bias, and enables you to compare the effectiveness of the new intervention against what would have happened if you had changed nothing. Creating the potential to deliver a concise and clear-cut conclusion on the causal impacts of an intervention on the outcomes of participants and avoiding the lengthy caveats and complexity that may come from other approaches.

RCTs are very good at answering specific impact questions, such as, 'does offering intervention "x" to a sample of SMEs cause a change in outcome "y"?' However, they need to be combined with other research methods to answer wider questions.

In practice there are many factors that will determine whether an RCT can be applied to the evaluation of a particular policy intervention. These include the nature of the intervention itself (e.g. is it possible for the agency to control what intervention each participant will receive) and the analytical viability of the trial (e.g. whether the sample size will be sufficient to establish balance across the trial arms and create the statistical power to be confident of detected meaningful differences in outcomes).

All projects funded by INNOSUP-06 had to ensure their experiments included some form of randomisation with how interventions were allocated across participants. Despite this, many could not be considered full RCTs in that they lacked the statistical basis to provide reliable estimates of impacts on the available outcomes.

4. The use of innovative policy instruments for business support

In recent years, there has been growing concern that new ideas are becoming harder to find. Successful technological innovations are more complex to achieve, as more and more R&D effort is necessary to sustain the present rates of technological progress.[7] Science is getting more challenging as well. Even as the number of scientists and publications rises substantially, we do not appear to be seeing a significant rise in discoveries that supplant older ones.[8]

Alongside worries about the growth of the knowledge frontier are concerns with the rate of diffusion, in particular how readily smaller businesses are adopting proven technologies and management practices. This has resulted in substantial and widespread investment in public interventions to promote technology adoption amongst SMEs.

It is also argued that institutions, including innovation agencies, have failed to adapt to the growing importance of intangible capital, a failure that has contributed to the sluggish growth levels of recent decades.[9]

Finally, there is an increasing prominence of mission-oriented innovation policy, which now forms a core element of Horizon Europe. Despite this, there remains very little knowledge and practical guidance for how to implement it successfully.

This poses several challenges to innovation agencies, whose primary goal is to support innovation, science and technological development. Instruments that innovation agencies used in the past may be less impactful now, given the challenges posed by the slowdown in technological process. For missions, agencies are likely to have to adapt and try new ideas as they contribute to defining missions, bringing communities together, choosing instruments and optimising processes.[10]

IGL's research with Taftie (the European Network of Innovation Agencies) and Relai (the Latin American Network of Innovation Agencies) has shown how many agencies in Europe and Latin America are moving away from providing traditional forms of financial support to more holistic and comprehensive types of support that consider additional barriers faced by would-be innovators. For instance, there are behavioural barriers that limit opportunities for businesses to grow which can be overcome by means other than financial support. These potential barriers include overconfidence, lack of a growth mindset, information gaps, complexity, and scarce mental resources.

These and other barriers indicate the need to develop new innovative tools and instruments. Unfortunately, agencies have little time and space to explore and test these new tools in a controlled environment. INNOSUP-06 has provided agencies with the framework and strategies to build better evidence to make informed decisions. It has also allowed them to test new ideas and tools that could be groundbreaking in innovation development.

If innovation is getting harder, and with new challenges to be addressed, agencies need to develop strategies that could become new instruments in their toolbox. In the end, beneficiaries of INNOSUP-06 were required to learn how to improve SME innovation support schemes. While some aimed to determine whether new approaches would optimise the effectiveness of existing programmes, others tested completely novel ideas.

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[7] Clancy (2021) 'Innovation (mostly) Gets Harder' https://www.newthingsunderthesun.com/pub/bvmu4ol2/release/7

[8] Clancy (2022) 'Are ideas getting harder to find because of the burden of knowledge?' https://www.newthingsunderthesun.com/pub/zsc23qxz/release/14

[9] Haskel and Westlake (2022) 'Restarting the Future: How to Fix the Intangible Economy'

[10] https://www.innovationgrowthlab.org/blog/mission-oriented-innovation-policy-how-can-experimentation-help-0

INNOSUP-06 not only provided agencies with the opportunity to implement new ideas, it also pointed them to ways to rigorously test these and other ideas in the future.

Each of the thirteen projects used an experiment to test the overall impact or optimise the design of targeted direct support to SMEs. The projects can be grouped into four themes. The first group of projects tested interventions intended to build SMEs' innovation capabilities by providing training and access to innovation practices, methods or tools.

A second group hoped to inspire SMEs to develop new innovations. Create4value used co-creation workshops, DepoSIt adopted an innovation audit tool to highlight the potential for more social innovation, and InDemandRCT enhanced collaboration between large and small businesses.

For a third group, the aim was to encourage SMEs to adopt new technologies, with the interventions themselves also involving new innovation. The fourth group contains those interventions connected to the provision of finance for innovative SMEs – SIM Crowd explored how an innovation agency's involvement could motivate external private investors, whilst InReady involved targeted support to build an SME's capability to attract finance.

Main Policy Objectives of INNOSUP-06-2018 Projects

Policy objective	Projects
Building the innovative capabilities of SMEs (How to innovate)	DCS-iSMEs 200SMEchallenge InnoCAP DINNOS FeedS First
Helping SMEs develop new innovations (What to innovate)	Create4value DepoSIt InDemandRCT
Encourage SMEs to adopt or better use technology	RCT4MANU D3T DIHnamic
SMEs' access to innovation funding	SIM Crowd InReady

Within this policy objective, some agencies used new and innovative instruments, while others were prompted by previous INNOSUP calls. For instance, Create4value's intervention built on the 'Innovators2B' project carried out under INNOSUP-05, in which the implementers used a user-centred design approach to develop ideas for how to encourage SMEs to become first-time innovators.

Other projects also involved the innovative element of co-creation or design thinking. For example, the InDemand-RCT sought to test the impact of involving small businesses with more prominent companies to help them confront the challenges they may face and develop new innovations. Challenges relating to improving agricultural efficiency, measures of business productivity, energy efficiency or digitalisation of business processes were highlighted. Initially, the treatment group would be composed of SMEs randomly selected to co-create a solution along with a more prominent company, to observe whether making the development process more interactive and participatory would result in more useful solutions. The 200SMEchallenge involved SMEs participating in 'design sprints', alongside design

professionals and teams of students or recent graduates, to create prototypes for improvements to the user interfaces of the businesses' products. Under the DCS-iSMEs project, SMEs were given several hours of one-to-one support from a design specialist in applying design thinking to their business. The implementing agency, the Business and Cultural Development Centre (KEPA), has extensive experience promoting the use of design thinking in the past, but the DCS-iSMEs project gave them the opportunity to test a more intensive package of support.

The DINNOS project took a very different approach to building innovation capacity, focusing specifically on the question of age diversity within businesses. The team implemented a package of two complementary interventions, to enable SMEs with age-diverse teams to realise benefits from this (in particular by taking advantage of the diversity of perspectives available to the business) while minimising the potential downsides (such as the potential for working relationships to be affected by conflict or negative stereotypes). Managers from the business took part in a training course on 'servant leadership', a model which was intended to create a better working environment and thereby boost employees' creativity and ability to innovate. Alongside this, older employees within the same businesses were invited to participate in a package of cognitive training, which was also expected to have benefits on their level of creativity and divergent thinking.

The DepoSIt project involved adapting the use of an existing tool – a company-level innovation audit – to prompt participants to consider more opportunities for innovation that would have positive social impact. The idea behind this approach was that including questions about social innovation when companies are being interviewed as part of the audit process would open up opportunities for more discussion on this subject during a follow-up meeting.

5. Analysis and key findings from individual projects

5.1. DepoSIt: Development and testing of the European Innovation Audit tool for Social Innovation

5.1.1. Key Details

Deposit: Key Details	
Research question	Will innovation-driven SMEs who receive one-to-one support in using an innovation audit tool that includes a set of specific questions on social innovation potential increase their knowledge about social innovation, be pushed to consider collaboration opportunities with civil society, and take advantage of business opportunities related with social challenges, more than similar firms who did not take the innovation audit?
Innovation agencies	Steinbeis Europa Zentrum, Croatian Chamber of Economy, Agenţia pentru Dezvoltare Regională Sud Muntenia, Fomento de San Sebastián, Business Development Friesland, Friuli Innovazione (Germany, Croatia, Romania, Spain, Netherlands, Italy)
Tested intervention	Innovation audit tool, with a focus on social innovation
Current status	Completed
Key deliverables to date	D2.1 – Joint report on innovations and new solutions/trends for the innovation audits D4.2 – Report on applied RCT methodology and testing results D4.4 – Impact assessment report
Further information	DepoSIt Project – Homepage DepoSIt Project – LinkedIn DepoSIt Project – Facebook Homepage DepoSIt Project – Twitter (@deposit_project) Development and testing of the European Innovation Audit tool for Social Innovation | DepoSIt Project | H2020 | CORDIS | European Commission

5.1.2. Rationale and project logic

The DepoSIt project is based on the observation that SMEs are missing out on opportunities to bring products and services to market that could potentially have positive social impacts as well as benefits for the businesses themselves. The consortium of agencies behind the project believe that this type of 'social innovation' can be promoted through encouraging businesses to engage with civil society and local communities, so that they become aware of opportunities that they had not previously considered.

Innovation audits are already used by innovation agencies to help businesses understand where they have unmet potential for innovation, and to put in place strategies to meet this potential. Under the DepoSIt project, an existing innovation audit tool was adapted to include questions relating to social innovation. The results of this tool were then discussed with companies, with the aim that this would increase their knowledge and awareness of the

potential of social innovation and help them find opportunities to engage in social innovation in the future.
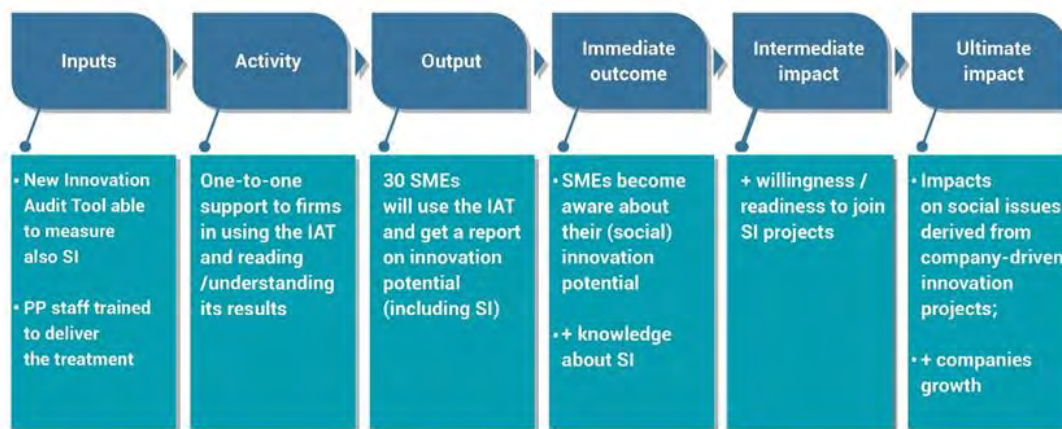
Figure 1: Logic model for the DepoSIt project
(SI = social innovation; PP = project partners; IAT = innovation audit tool)

5.1.3. Intervention

The intervention was targeted at SMEs that operate in the smart health, smart mobility and smart living sectors. Steinbeis Europa Zentrum's existing innovation audit tool was adapted to include a number of questions that related specifically to social innovation. In total the tool consisted of 58 questions, to which companies responded by rating themselves on a five-point scale. This questionnaire was completed during a one-to-one meeting between a senior representative of the company and the innovation agency. The agency then used the questionnaire responses to prepare a report for the company, rating their performance on various areas of innovation and providing analysis and tailored recommendations. The report and recommendations were then discussed in a follow-up meeting with the company, held within a month of the initial interview.

5.1.4. Evaluation design

The DepoSIt project was implemented as an RCT with a strong design, but a relatively small sample size.

72 SMEs were recruited to take part in the project (slightly fewer than the original target of 90), across the six countries in which it was implemented. These businesses were told that the project may involve them participating in an innovation audit, but they were not told that there was a specific focus on social innovation. Of the 72 SMEs, 30 were randomly selected to undergo innovation audits, that number being based on the capacity of the implementing partners to carry out the audits. The remaining 42 SMEs were allocated to a control group, and were not given any support or information during the project's lifetime.

Surveys were carried out to capture SMEs' knowledge about social innovation, their awareness of the potential of social innovation for their business, and their intentions to pursue social innovation projects (as evidenced by practical steps they had taken in that direction). This data was collected at baseline (prior to randomisation and implementation of the innovation audits), as well as immediately after the implementation of the innovation audits

and then again six months later. Knowledge, awareness and intentions were each measured through a set of 4–5 questions. Response rates to the two follow-up surveys were high, at 89% and 82% respectively. Response rates were similar in the treatment and control groups (particularly in the case of the second follow-up survey, from which the primary outcome measures are obtained).
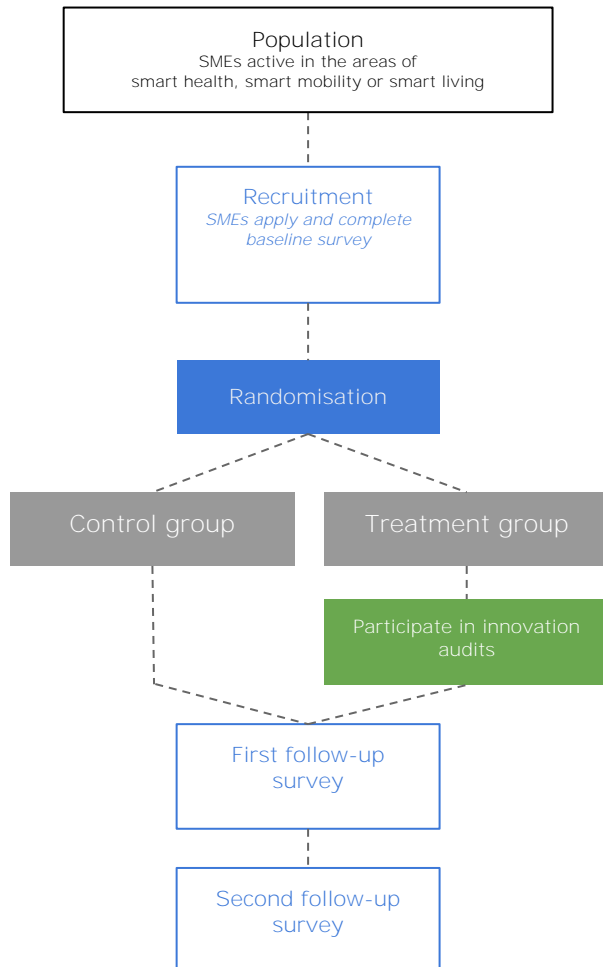
Figure 2: Trial diagram for the DepoSIt project

The statistical power of the trial is such that the intervention would need to have an impact of at least 18–20 points on the knowledge or intentions measures and around 14 points on the awareness measure (each of which are measured on scale from 0 to 100), in order for the evaluation to be reasonably (80%) confident of being able to detect it.[11]

In addition, as a supplement to the survey-based measures set out in the trial protocol, the project team sought to assess whether the Innovation Audits had led to businesses communicating more about social innovation by searching their websites and social media feeds. Data was collected on the number of website or social media posts in which companies used any one of a list of keywords related to social innovation (such as 'community projects', 'sustainable products', or 'social enterprise') during 2021. In principle, this data provides a

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[11] This power calculation does not account for the covariates that were used in the analysis of outcomes, meaning that the power of the trial is a little higher than implied here (i.e. the minimum detectable effect is smaller). On the other hand, this calculation also does not take account of the multiple hypotheses being detected, which reduces the power of the trial somewhat.

more objective measure of companies' actual behaviour than is possible with self-reported survey data, and has the added advantage that it does not depend on survey response rates. However, an important caveat is that the search for content was carried out by the same staff who had implemented the intervention (and therefore knew which companies had and had not participated in the innovation audits), so it is possible that there may be some inadvertent/unconscious bias in the way the data was collected.

Finally, qualitative interviews were conducted with six companies from the treatment group (one in each country), to gather their perspectives on the Innovation Audit experience.

5.1.5. Impacts

The evaluation results suggest that the innovation audits had a positive impact on SMEs' awareness of the potential of social innovation for their business. Those that went through the innovation audit process scored on average 16 points higher on the 0–100 scale by the time of the six-month follow-up survey than did those in the control group. There was no indication that the innovation audits made an impact on respondents' knowledge about social innovation, nor on intentions to pursue social innovation projects.

Further evidence comes from the search of participant businesses' online activity. 63 of the 72 businesses enrolled in the trial had active websites or social media feeds during this period and were therefore included in the search. Of these, businesses that had received the innovation audits posted much more content related to social innovation: an average of 6.2 posts during 2021, against an average of 1.8 posts among the control group. It appears, then, that the intervention had a positive impact on whether businesses were communicating publicly about social innovation. (However, this finding should be treated with caution, given the potential for bias noted above.)

The qualitative interviews carried out with companies that had participated in the innovation audits showed mixed results. Three of the interviewees saw the process as having been valuable and had started making changes in response, while the other three felt that the recommendations were too general to be of practical use to them.

5.1.6. Potential for further testing or scale up

This experiment shows that there is promise in the approach of promoting social innovation through an innovation audit process. While we should be cautious about drawing definitive conclusions from a small trial, the results suggest that the innovation audits led to SMEs becoming more aware of the business potential of social innovation and to being more likely to discuss social innovation in their external communications. On the other hand, there is no evidence that this prompted companies to take further steps to engage in social innovation during the six-month period after the intervention. It is possible that some of the participant companies had made progress in this direction but that the trial did not have sufficient sample size to detect them, or that such actions would take longer to become evident than the six-month window allowed for in this trial. On the other hand, it is also possible that many companies remained unpersuaded about the potential of social innovation despite their greater awareness.

The qualitative interviews suggest that, while many of the businesses that underwent the innovation audit process found the experience valuable, a significant proportion did not. This suggests that there is potential both to refine the process (perhaps finding ways to provide more practical recommendations for follow-up actions), and also to target the intervention at those companies that have the greatest potential to benefit.

The innovation audit process has potential to be applied in many different settings and to promote different aspects of innovation. We would encourage innovation agencies to build on this experiment by finding further opportunities to develop and test the use of innovation audits in this way.

5.1.7. Wider Learning

Measurement of outcomes

The use of data from companies' websites and social media feeds was an innovation that IGL particularly encouraged, and which demonstrated its value in this trial. The resulting data implies that the innovation audits had an impact on businesses' public communications, adding weight to the conclusions from the survey data that their awareness of social innovation had increased. Given the challenges encountered with survey response rates in many experiments with SMEs – as well as the potential for survey data to be affected by social desirability bias, recall error and other biases – using publicly-observable data like this has great potential for measuring outcomes in future experiments. The robustness of this type of data could be enhanced further by blinding those who are involved in collecting the data (that is, having the data collected by staff who are not aware of which companies participated in the intervention being evaluated) or automating the process.

5.2. DINNOS: Diversity Innovation Support Scheme for SMEs

5.2.1. Key Details

DINNOS: Key Details	
Research question	For SMEs with high age diversity among their workforce, does the administration of leadership training for entrepreneurs facilitate employee innovation behaviours, compared to a control group to which the training was not administered?
Innovation agencies	Trinity College Dublin, Aston University, University of Wuppertal, Kienbaum Institute, Birmingham Chamber of Commerce and Industry (Ireland, UK, Germany)
Tested intervention	Leadership training for entrepreneurs, cognitive training for employees
Current status	Delivery complete, analysis ongoing
Key deliverables to date	D5.1 – Online tool to benchmark innovation capacity at the organisational and individual level Trial registration
Further information	Project website Diversity innovation support scheme for SMEs	DINNOS Project	Fact Sheet	H2020	CORDIS	European Commission

5.2.2. Rationale and project logic

As the European working population ages, age diversity within organisations is expected to increase. Research suggests that increased age diversity can be beneficial to a business, as ideas and knowledge from a diverse set of employees can lead to innovation. However, there are also potential downsides, with workplace relations being affected by conflicts and negative stereotypes.

The DINNOS project team designed a set of interventions for SMEs that were intended to reduce the negative aspects of increased age diversity and promote the positive aspects. The first aspect of this was to offer a programme of cognitive training for older employees. This training made use of an existing commercial training package, CogniFit, which has been shown to slow the decline of executive functions and working memory with age. Regular participation in the cognitive training is also expected to improve complementary cognitive functions, including creativity and divergent thinking – so resulting in more engagement in creative processes and eventually more innovation at the business level.

Alongside the cognitive training, DINNOS also provided a programme of leadership training to SME managers. This training programme was based on the model of 'servant leadership', which has been shown to boost creativity and innovation among employees by satisfying their basic psychological needs, managing conflicts, and creating a climate of psychological safety. The content of the programme particularly focused on managing the challenges of age diversity in a business environment.
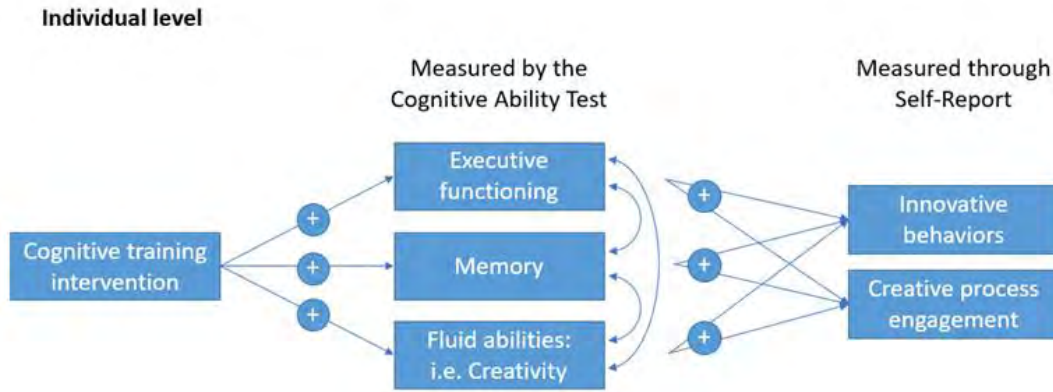
Figure 3: Logic model for the DINNOS project – cognitive training
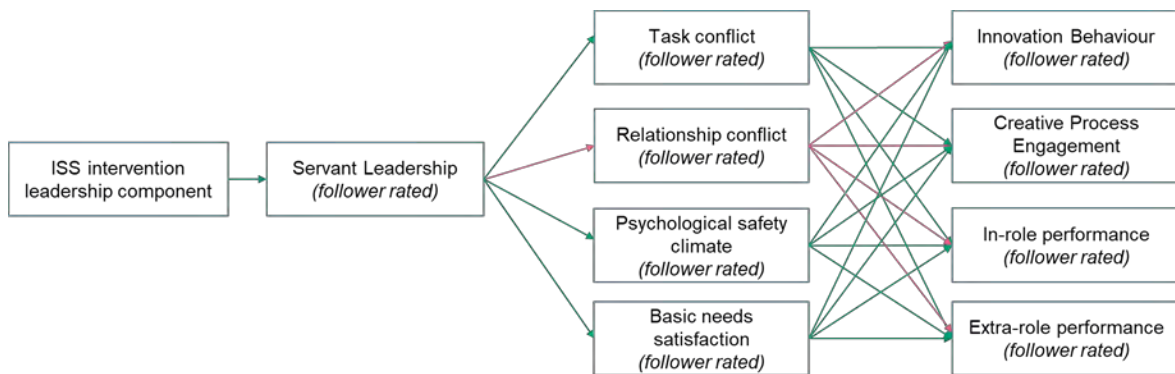
Figure 4: Logic model for the DINNOS project – leadership training

5.2.3. Intervention

Under the original plan for the DINNOS project, SMEs would sign up to participate in both elements of the package concurrently: managers participated in the leadership training, and older employees in the cognitive training.

The leadership training was developed in house by the DINNOS project team. The programme consisted of five modules, with content shown in Figure 5. In Germany and the UK, where the programme was implemented in early 2021, all activities were carried out online. Participants were asked to work through some exercises on an e-learning platform as well as participating in five interactive online sessions in groups of 10 to 15. The total time commitment to the programme was estimated at 8 to 16 hours, over an eight-week period.

In a later phase of the project, the leadership training was carried out with SME managers in Ireland who were enrolled on Trinity College Dublin's executive MBA programme. The structure and content of the modules was similar to the programme as implemented in Germany and the UK, but it was delivered in person over two days, with groups of 20 to 30 students.

	Gain Knowledge	Feel the Change	Implement Changes
Servant Leadership	Gain knowledge about leadership behaviours, i.e. Servant Leadership	See the benefits of Servant Leadership	Concrete behaviours in daily communication
Basic Needs	Get to know your team members' interests and needs	Realize the relevance of Basic Needs	Concrete behaviours for goal setting
Diversity and Innovation	Learn about the potential of diversity and innovation	Appreciate Diversity and Innovation	Concrete behaviours to foster Innovation
Individual Feedback	Analyze your own leadership behaviours	Accept and value the feedback from your team members	Concrete behaviours when giving/ receiving feedback
Changing Behaviours	Learn how to successfully implement changes	Become motivated to improve your leadership skills	Concrete behaviours in appraisals

Figure 5: Modules of the DINNOS leadership training programme

Under the cognitive training component of the DINNOS project, older employees within the SMEs signed up for free access to CogniFit's online platform, where they could access a variety of cognitive training exercises. They were asked to carry out exercises on the platform for 30 minutes, at least four times a week for six weeks. However, among the cohort in Germany, less than half of the SME employees who began the cognitive training met this level of usage, and many did not use the system at all. Response rates to the follow-up survey were also low. For these reasons, no attempt was made to assess the effectiveness of the cognitive training among the SME employees in Germany, and the cognitive training element was dropped when the project was implemented in Ireland. Instead, the project team are now testing the use of the cognitive training package among a sample recruited online (not necessarily consisting of SME employees).

5.2.4. Evaluation design

The DINNOS project was designed as a cluster-randomised controlled trial. SMEs in Germany and the UK would be recruited to participate in the project, and would be randomly allocated either to participate in the interventions (including the leadership training and the cognitive training) in the first phase, or to a 'waiting list' control group. The control group would then be invited to participate in the interventions in the second phase.

Detailed surveys were carried out with three groups of individuals at the start of the project. These surveys were repeated at the mid-point of the project (after the implementation of the interventions with the treatment group) and again at the end, after the control group had also received the interventions. The content of the surveys was as follows:

- SME managers who had signed up for the leadership training were asked about characteristics of their business and their specific team, as well as questions relating to their use of servant leadership styles, the environment and relationships within the team (including whether the environment promotes trust, psychological safety and the satisfaction of team members' basic needs), and their innovation behaviours.

- Each manager was also asked to nominate five of their employees to complete a survey, covering the manager's use of the servant leadership approach, the environment and relationships within the team, and the individual employee's level of engagement with their work, their creativity, and their innovation behaviours.

- Employees who signed up for the cognitive training were asked to complete surveys covering their innovation behaviours, engagement in creative processes, cognitive flexibility, engagement with their work, and psychological strain.

The original target was for 150 SMEs to be recruited in each country. It was expected that one manager from each SME would participate in the leadership training (although multiple managers were allowed to participate), and an average of five employees would participate in the cognitive training.

The levels of recruitment into the trial and engagement in the interventions were lower than anticipated. In Germany, 106 SMEs were recruited and completed the baseline survey. A total of 301 managers from these 106 businesses signed up for the leadership training, but only 132 employees enrolled for the cognitive training. The response rates to the first follow-up survey were disappointing, with only 39% of the managers who registered for the leadership training and 63% of their employees responding.[12] Response rates among those that registered for the cognitive training were higher, but many of those in the treatment group had not completed the training.

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[12] Unusually, the response rate from managers was considerably higher among the control group (50%) than among the treatment group (30%), suggesting that the offer to participate in the training in the following phase of the project may have acted as an incentive to some in the control group.

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│       Population         │
│        All SMEs          │
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│       Recruitment        │
│  Expression of interest, │
│   eligibility checks,    │
│ SMEs identify candidates │
│ for leadership training  │
│  and cognitive training  │
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│     Baseline surveys     │
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│ Waiting-list │  │  Treatment   │
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                  ┌──────────────┐
                  │ Participate in│
                  │  leadership   │
                  │   training    │
                  │  (managers)   │
                  │and cognitive  │
                  │   training    │
                  │ (employees)   │
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│     First follow-up      │
│        surveys           │
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│ Participate in│
│  leadership   │
│   training    │
│  (managers)   │
│and cognitive  │
│   training    │
│ (employees)   │
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┌─────────────────────────┐
│    Second follow-up      │
│        surveys           │
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Figure 6: Trial diagram for the DINNOS project

In the UK, a large number of businesses originally registered their interest in participating in the project, but the majority later dropped out. This appears to have been largely due to the extremely challenging business environment in the UK during the recruitment period, as new pandemic-related restrictions were imposed and then eased. In the end, it was not possible to recruit a sufficient sample of businesses to implement the DINNOS project in the UK. The leadership training was delivered to 42 SMEs, but without a control group.

Instead, the DINNOS project was expanded to be offered to SME leaders who were enrolled in the executive MBA programme at Trinity College Dublin. 68 participants signed up for the leadership training, of whom approximately half were randomly allocated to the treatment group, to receive the training in the first stage. Despite high rates of participation in the training, the response rate in the first follow-up survey was again low, at 41% of the managers and 53% of their employees.

The recruitment difficulties and low survey response rates have limited the sample size available for the analysis of outcomes. For the primary analysis (which is based on the survey responses provided by employees about their managers), data is available for only 50 of the SME managers in Germany and 18 in Ireland. Given the large differences between Germany and Ireland in the profile of participants recruited and in the implementation of the project, the project team have not sought to combine data from the two countries in analysing outcomes. However, even if they were combined, statistical power analysis suggests that the project would need to have an effect of at least 0.7 standard deviations on any of the outcome measures in order to be reasonably (80%) confident of detecting that impact – a large effect.[13]

Aside from the considerations of statistical power, the fact that survey response rates were so low means that there is potential for the resulting data to be biased, in two respects. Firstly, those who responded to the surveys are unlikely to be representative of the larger number who initially signed up to the project. Secondly, it is possible that there are important differences between those who responded to the survey in the treatment and control groups, which would bias any comparison of outcomes between them.[14] The comparisons of outcomes between the treatment and control groups should therefore be interpreted with caution.[15]

The project team are also carrying out 'path analysis', to map the connections between different steps on their logic model. This analysis may provide further insights on the intervention logic, although it relies on stronger assumptions than the pure analysis of outcomes from an RCT.

5.2.5. Impacts

Given the difficulties discussed above, it is difficult to draw conclusions about the impacts of the leadership training carried out under the DINNOS project. Initial analysis shows a statistically significant difference between those in the treatment and control groups who responded to the follow-up survey in one of the nine outcome measures assessed in Germany (climate of psychological safety) and one of the six measures assessed in Ireland (innovation behaviour). However, these results should be treated as tentative, both because of the potential for bias in the treatment/control comparison and because of the potential for finding spuriously significant results when testing a large number of outcomes.

One interesting observation from the survey data from Germany is that the training may have been more effective in promoting servant leadership behaviours among leaders with higher self-efficacy (that is, with higher confidence in their own capabilities). Again, this result cannot be treated with high confidence, but it would be an interesting point to explore in future research.

5.2.6. Potential for further testing or scale up

The DINNOS project was designed to explore important questions around the effects of age diversity in the workplace and how SMEs can be supported to overcome challenges related

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[13] This approximate power calculation does not take account of the likely clustering of outcomes between leaders from particular businesses in Germany, nor of the testing of multiple hypotheses. The implication is that the minimum detectable effect size is probably larger than 0.5 in reality.

[14] The draft evaluation report confirms that there is little indication of any such bias in three basic characteristics of the businesses, but it is not yet known if there is any bias in the other business-level and individual-level characteristics that were collected in the baseline survey. Even if the two groups were found to be balanced in these characteristics, the potential for bias in unobserved characteristics remains.

[15] In addition, the analysis carried out in the draft evaluation report does not take account of the clustered randomisation in Germany when assessing outcomes. Taking account of this would increase the standard errors of the estimates to some extent, and hence reduce their statistical significance.

to age diversity. These remain valuable questions to examine, but the project has unfortunately not been able to generate the evidence that had been hoped for. The low levels of engagement in the cognitive training have led the project team to test this through an alternative route, work that is still ongoing at the time of writing. The leadership training involved a reasonable number of participants (particularly in Germany), but the low response rate to the follow-up survey meant that there is little potential for drawing conclusions about its effectiveness.

The DINNOS project has effectively acted as a pilot that has produced valuable learning about how to recruit for and implement the activities. We recommend that the project team seek another opportunity to test the leadership training at scale. It will be particularly important in this future replication to find ways to maintain survey response rates, including by incorporating learning from other INNOSUP-06 projects.

Recommendations for moving forward with the cognitive training will depend on the findings of the online experiment that the DINNOS team are now engaged in.

5.3. RCT4MANU: Testing an innovative support scheme for manufacturing SMEs and accelerating the use of RCTs in innovation agencies

5.3.1. Key Details

RCT4MANU : Key details	
Research question	To what extent does 4Manufacturing® support increase the number of industrial digital technology adoptions by manufacturing SMEs, compared with offering no such support?
Innovation agencies	Innovate UK, Innovate UK KTN
Tested intervention	Tool to support tech adoption among manufacturing businesses
Current status	Completed
Key deliverables to date	Trial registration
Further information	Homepage	KTN 4Manufacturing® KTN plays a part in European research and innovation projects - KTN Test an innovative support scheme for manufacturing SMEs and accelerate the use of RCTs in innovation agencies	RCT4MANU Project	Fact Sheet	H2020	CORDIS	European Commission

5.3.2. Rationale and project logic

The increasing availability of industrial digital technologies (IDTs) – including artificial intelligence, robotics, and increased interconnectivity and automation – is widely seen as having the potential to result in major increases in productivity in the manufacturing sector. However, Innovate UK KTN has seen that SMEs lack access to good information and advice about how they can best make use of these new technologies. The 4Manufacturing® tool was created to support Innovate UK KTN's business advisors in working with SMEs to explore options and develop plans for their implementation.
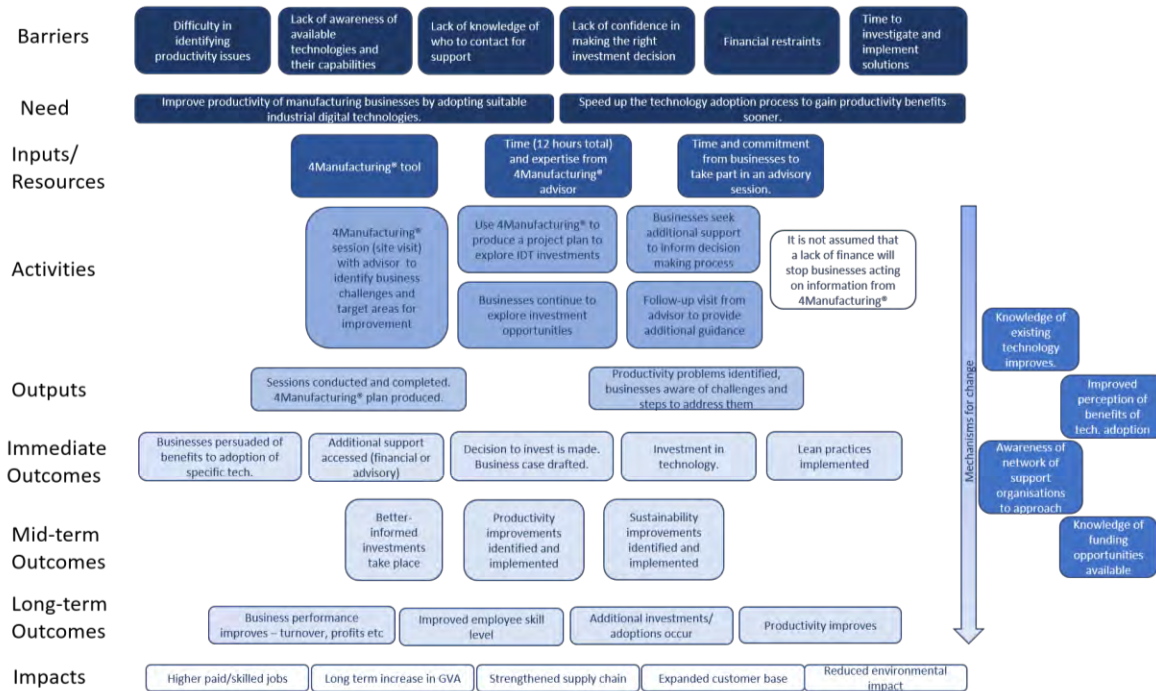
Figure 7: Logic model for the 4Manufacturing® approach

5.3.3. Intervention

The 4Manufacturing® approach provides a framework for use by business advisors when providing one-to-one support to SMEs on the adoption of IDTs. The approach is based on addressing three key questions: what the business is seeking to achieve, how this objective can be achieved, and how IDTs can support in this process. IDTs are categorised under the tool into 22 themes, such as robots and automation, digitally-assisted assembly, simulation, energy and water efficiency, and cyber security. The process begins with participants being given a 4Manufacturing® card deck that provides initial information linking challenges with solution themes and enabling technologies. Representatives of the business then take part in a workshop with the advisor, in which they identify a small number of IDTs (usually between one and three) that may be appropriate for the business and then discuss case studies of other businesses that have used these technologies to address similar challenges. The advisor and the business then together build a business case and set a plan to work towards adoption over the following six months. The workshop typically takes two to three hours with each business. The adviser is then available for further advice or support after the workshop.

Manufacturing was created in 2016 and had been tested by Innovate UK KTN at a small scale prior to this project. The workshops and later support were primarily to have been delivered face-to-face with representatives of their business at their factory. However, the onset of the COVID-19 pandemic and various restrictions meant the team had to consider alternatives. This led to enhancements to the online tool and adoption of online facilitation and training approaches, including asking businesses to prepare a 'walk around' video to help advisors better understand their current operations.

5.3.4. Evaluation design

The project was designed as an RCT. However, it suffered from low levels of recruitment and high levels of attrition, which severely limit what can be learned from the comparison of the treatment and control groups.

The project team originally planned to recruit 350 manufacturing SMEs into the project. Implementation was delayed until after the first phase of the COVID-19 pandemic had passed, but the extremely difficult environment faced by manufacturing businesses at that time made recruitment very challenging. In the end, only 91 SMEs were recruited. Of these, 51 were allocated to the treatment group and were invited to participate in a workshop under the 4Manufacturing® approach. The remaining 40 businesses were allocated to a control group: they were not given support under this project, but were told that they would be prioritised for 4Manufacturing® support in the future if further funding became available. As noted in the baseline report, this experiment would have had only 37% power to detect a difference of 20% in the key outcome measures, the expected size of impact that had been specified in the trial protocol. That is, even if the intervention had had an impact in line with expectations, it is likely that the experiment would not have been able to detect this difference.

Baseline data was collected from participating SMEs on registration for the programme, with a follow-up survey being carried out 9 to 12 months after the end of the intervention. Only 33 of the original 91 participants responded to this survey, with the response rate being particularly low among the control group (at 27%). This has two implications when drawing conclusions from the survey data. Firstly, there is little statistical power available for comparing outcomes between the treatment and control groups. Secondly, it is likely that the intervention itself had some impact on businesses' decisions about whether to respond to the follow-up survey – meaning that the original randomisation cannot be relied on to ensure that the treatment and control groups are comparable. There is, therefore, potential for any comparison of outcomes between the two groups to be biased.

As part of the implementation and process evaluation, the final survey included several additional questions that were asked to the treatment group only, asking about how useful they found the 4Manufacturing® workshops. Responses were collected as Likert scores (on a zero to 10 scale), with follow-up open-ended questions giving respondents an opportunity to provide further written comments. A formal coding and synthesis process was applied to these textual comments, with common themes being identified inductively.

The evaluators publicly registered the trial design prior to launch, although as noted above, the final evaluation differed substantially from what was registered.
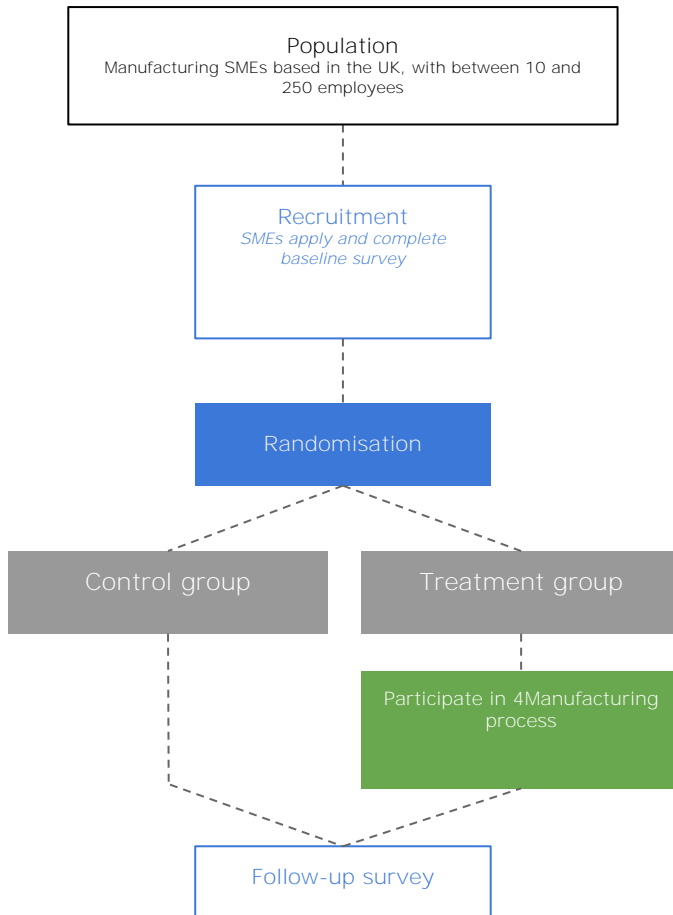
Figure 8: Trial diagram for the RCT4MANU project

5.3.5. Impacts

Of the 51 businesses that were allocated to the treatment group, 33 (just under two thirds) went on to participate in the 4Manufacturing® intervention. The relatively high number of drop-outs is thought to be a consequence of the challenging and rapidly changing business environment in the UK at the time, as well as of a long time delay that many experienced between applying for the programme and the intervention getting under way.[16]

Because of the small sample size and low response rate to the project's final survey, there is little potential for learning about the impacts of the project from the comparison of the treatment and control groups. One alternative would have been to examine changes in key outcome indicators between the baseline and follow-up survey, among the treatment group only. Instead, understanding of the effectiveness of the intervention is based largely on the feedback provided during the follow-up survey by those who had participated in the 4Manufacturing® intervention.

Participants were generally positive about the content of the 4Manufacturing® workshops, with the most common rating given in response to most of the questions being eight points out of ten. The written comments suggest that the intervention was often successful in its aim of lowering barriers to decision-making among SMEs, by increasing participants' awareness of the potential for IDTs and focusing their attention on technologies that could be of benefit to

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[16] This time delay was a consequence of the decision to wait until recruitment was complete before beginning implementation of the 4Manufacturing® intervention. This would not arise in a normal situation, where 4Manufacturing® would be available on a continuous basis.

the specific business. Some participants pointed to concrete steps they had taken as a result of the workshops, including moving to adoption of a new platform in at least one case. Some participants also mentioned that it was valuable to have an opportunity to discuss the challenges faced by their business, independently of the specific advice about IDTs.

On the other hand, many of the participants felt that the recommendations from the workshops were not applicable to their business. In some cases this was because they were early-stage (or even pre-revenue) businesses and could not afford to make significant investments in IDTs. In other cases, the recommendations that came out of the workshops were seen as too generic, and not adapted enough to the needs of the specific business. In a small number of cases, participants were not clear about the objectives of the workshops or felt that they had not received any specific objectives.

The survey responses also identified some areas for specific improvement in the workshops. In particular, many felt that the workshops had been too short, and there had not been time to address the business's training needs.

A common theme arising from the survey responses was there are other barriers to adoption of IDTs, beyond the lack of awareness that the workshops had primarily sought to address. Lack of funding for investments in IDTs is one key issue. However, many participants mentioned that they would have been able to make more progress if there had been some follow-up support from the advisor, and were disappointed that this was not part of the 4Manufacturing® package.

5.3.6. Potential for further testing or scale up

Although the goal of carrying out an RCT to provide rigorous evidence about the effectiveness of 4Manufacturing® has not been met, this project has functioned as a valuable pilot of the intervention, and has provided valuable insights about how it can be further developed.

One conclusion to draw from the feedback received is that this form of support should be targeted at businesses that are at the right stage of development to invest in IDTs. There are also some adjustments that can be made to implementation of the workshops – in particular, allowing more time, so that it is possible to get into more detailed discussions. Although 4Manufacturing® is a standardised tool, participants' experiences differed: the implementers could investigate whether this depended on the specific adviser. If some of the advisers were consistently rated more highly than others (in terms of the feedback provided by workshop participants), there could be potential to transfer learning between them about the best approaches. Finally, it appears that there is demand from at least some of the businesses for follow-up after the workshop (as was originally envisaged in the original proposal for the RCT4MANU project), to help SMEs overcome the next hurdles in the adoption process.

Once the lessons from this project have been incorporated into the way the 4Manufacturing® tool is implemented, we recommend that the implementers look for an opportunity to test it again, ideally at larger scale and examining longer-term outcomes.

5.3.7. Wider learning

Confidence in use of RCTs

An explicit objective of the RCT4MANU project was to promote the use of RCTs among partners, by building knowledge, experience and confidence in their use. One factor that became clear to the team was the challenge of implementing a trial as complex as RCT4MANU at the same time as building their own capacity to deliver RCTs. It is unlikely that future projects will have to tackle the challenge of delivering a trial during the onset of such a

large-scale crisis. Nevertheless, a key recommendation from the team for others was to start smaller, applying the approach in more controlled settings where results can be delivered more rapidly, before launching a full-scale impact evaluation.[17]

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[17] The SIM Crowd project is an example of the type of 'rapid fire' trials that agencies might first apply.

5.4. DCS-iSMEs: Design Customised Support for Innovative SMEs

5.4.1. Key Details

DCS-iSMEs: Key details	
Research question	For SMEs that receive innovation grants, does providing them with access to customised support in design thinking (in addition to the grant) lead them generate better performance, compared to receiving only limited support on design thinking?
Innovation agencies	Business and Cultural Development Centre (KEPA) (Greece)
Tested intervention	Customised mentoring in design thinking
Current status	Completed
Key deliverables to date	Feasibility study
Further information	KEPA Homepage - Design Customized Support for Innovative SMEs Design Customized Support for Innovative SMEs | KEPA Project | H2020 | CORDIS | European Commission

5.4.2. Rationale and project logic

KEPA has several years' experience in promoting the use of design thinking among SMEs. However, previous programmes have normally involved providing light-touch diagnostic support to SMEs, and the organisation has seen that this is often not sufficient to fully embed the principles and process of design thinking within organisations. Under the DCS-iSMEs project, KEPA developed a more intense package of support to guide SMEs through the process of using design thinking. The organisation sought to test the potential impacts that this programme would have on adoption of design thinking and on business performance.

5.4.3. Intervention

Eleven SMEs were recruited to participate in the project. The only specific eligibility requirement was that SMEs should have received funding from programmes implemented under the Greek National Strategic Reference Framework. Many of the SMEs were already known to KEPA from their participation in these previous programmes.

The DCS-iSMEs intervention consisted of two stages. Companies began by participating in a one-hour design clinic, in which one of KEPA's in-house designers worked with them to understand their operations, workflow and needs. Following this meeting, the designer carried out research on the sector and comparable businesses, and proposed a particular challenge faced by the company that design thinking could help to address.

The second stage involved a two-hour design sprint workshop with the designer, followed by five hours' further coaching on design thinking over the subsequent weeks. Over the course

of these sessions, SMEs were guided through the process of deciding on the challenge to be addressed, coming up with ideas for potential solutions, and developing and testing prototypes of those solutions. The aim was that the SMEs would then be able to implement the solution that emerged from this design process with little additional support from the designer. However, they were free to contact the designer again during the subsequent eight months.

Businesses that were allocated to the control group participated in the initial one-hour design clinic and then received a brief report from the designer about the challenges discussed. They also received written guidance on how to apply design thinking in their business.

Implementation of the design clinics and the follow-up support happened in mid-2020, after the end of the first lockdown of the COVID-19 pandemic. Implementation of solutions that came out of the design process was interrupted by a subsequent lockdown in late 2020 and early 2021.

5.4.4. Evaluation design

Of the 11 SMEs enrolled in the project, five were randomly selected to participate in the full DCS-iSMEs intervention. The remaining six were allocated to the control group.

The effectiveness of the DCS-iSMEs service was assessed through qualitative interviews carried out by KEPA staff eight months after the end of the intervention. These interviews focused on what changes the businesses had been able to implement during that time, and on their attitudes towards design thinking.

5.4.5. Impacts

In the final interviews, four out of the five SMEs that received the full intervention reported that the exposure to design thinking had been a positive experience and that they felt able to explain to others what design thinking involves. They also reported that the process had changed managers' perceptions of the problems to be addressed, with them becoming better able to see problems from customers' and employees' perspectives. These results were in clear contrast to the control group, most of whom said that the initial design clinic and written materials were not sufficient for them to have a good understanding of the design thinking process, and that their perspectives had not changed.

Four of the five treatment group businesses also reported that the prototypes that had been designed under the DCS-iSMEs project were feasible and met their needs. In the case of the business that did not respond positively to these questions, the problem was said to be that a department that was crucial for implementation of the proposed solution had not been involved in the process of designing it.

Most of the treatment group were not able to implement the proposed solutions because of the lockdown in late 2020 and early 2021, but they reported that they were planning to do so once they had fully resumed operations.

5.4.6. Potential for further testing or scale up

Feedback from the companies that received the customised support on design thinking was largely positive, and it seems clear that the light-touch intervention received by the control group was not sufficient to generate an understanding of design thinking. Providing a high-touch customised service to SMEs clearly presents a challenge to scalability, although KEPA believes that the cost of delivery was commensurate with the benefits.

Since businesses were not able to implement the solutions that had emerged from the design process during the lifetime of the project, longer-term follow-up would be required to understand more about the effectiveness of the support. Given that the intervention has shown promise in this project, there is clearly potential for a larger-scale experiment to investigate its impacts and cost-effectiveness.

5.5. 200SMEchallenge: Design-driven Open Innovation Challenge for 200 SMEs

5.5.1. Key Details

200SMEchallenge: Key details	
Research question	For SMEs who operate in the digital industry sector or other SMEs who develop products with digital interfaces, does participating in the UX Challenge enhance knowledge, awareness and intention to adopt the innovative approaches in the design of digital products, compared to not participating?
Innovation agencies	Hub Innovazione Trentino, Steinbeis-Europa-Zentrum, FUGEN – Espaitec, Lithuanian Innovation Centre, Business Oulu, Dansk Design Centre, Tehnopol, Fondazione Bruno Kessler (Italy, Germany, Spain, Lithuania, Finland, Denmark, Estonia)
Tested intervention	'Design sprint' events
Current status	Completed
Key deliverables to date	D2.1 – Partners' handbook on implementing the intervention D2.2 – UX Challenge playbook D4.3 – Report on the results of the large-scale pilot and guidelines for improvement D4.4 – Evaluation of scheme impact through RCT Trial registration
Further information	200SMEChallenge Homepage 200SMEChallenge Twitter (@2Echallenge) 200SMEChallenge LinkedIn Homepage Design-driven Open Innovation Challenge for 200 SMEs | 200SMEchallenge Project | H2020 | CORDIS | European Commission

5.5.2. Rationale and project logic

The 200SMEchallenge project is based on the hypothesis that the use of design thinking and user-centred design has the potential to improve the design and user experience of digital products and services provided by SMEs. An improved user experience leads in turn to growth in the user base and/or market share and ultimately to higher productivity and profitability, as well as building the business's capacity to innovate further. However, many SMEs have little awareness of design thinking and user-centred design, or knowledge of how to put it into practice. By giving them an opportunity to participate in a facilitated 'design sprint', the 200SMEchallenge project sought to improve SME managers' awareness of the potential benefits of design thinking and user-centred design and their knowledge of the design process, to enable and encourage them to use design techniques for themselves.
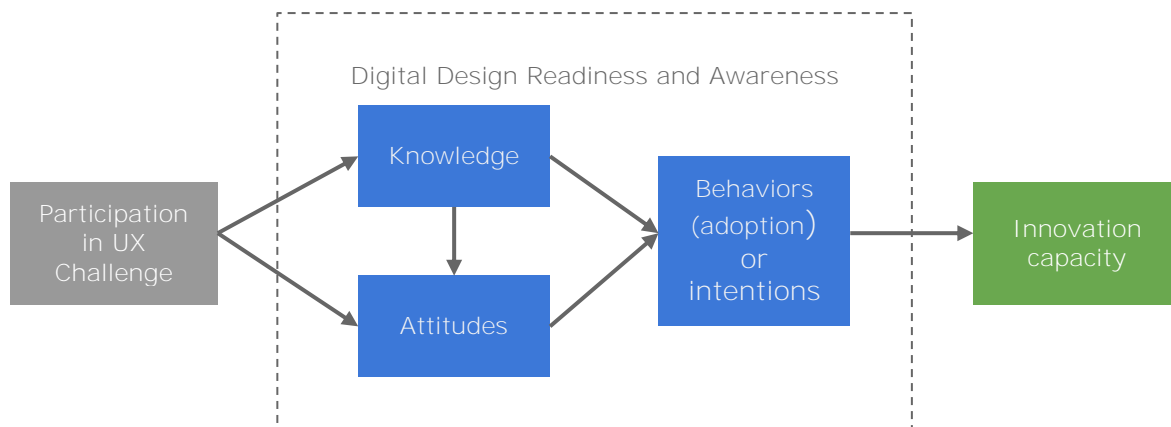
Figure 9: Logic model for the 200SMEchallenge project

5.5.3. Intervention

The User Experience Challenge (UX Challenge) is an event in which SME staff work together with user experience (UX) design professionals and teams of students or recent graduates to develop and test approaches to improving the digital user interfaces of products and services, according to an open innovation paradigm. The format is based on the 'design sprint' method, a practical approach to applying design thinking used by GV (formerly Google Ventures), and has been refined and tested by Hub Innovazione Trentino in recent years.

The design sprint consists of five phases, beginning with mapping out the problem, followed by sketching out potential solutions and selecting one to take forward, before developing a prototype and testing it with target customers or users. The UX Challenge has normally been held as a two-day in-person event, but this was adapted as a result of the COVID-19 pandemic to be held online over five days.

Under the 200SMEchallenge project, the UX Challenge was carried out by seven innovation agencies in seven countries across Europe, under the guidance of Hub Innovazione Trentino. Participation was open to SMEs with any products or services that make use of a digital user interface, including those providing services through websites, mobile or web applications or other software, as well as companies that produce devices or equipment with a digital interface – including industrial machinery.

5.5.4. Evaluation design

The 200SMEchallenge project was implemented as an RCT with a strong design.

A total of 190 eligible SMEs were recruited to participate in the project, just short of the target of 200. Of these, 60 were randomly selected (stratified by country) to participate in the UX Challenge. The remaining 130 SMEs acted as a control group, and were not given any support during the project's lifetime.[18]

The aim of the evaluation was to assess the impact of the UX Challenge on SMEs' Digital Design Readiness and Awareness. Specifically, data was collected on six outcome measures, including three indices of participants' knowledge about design principles and the design sprint

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[18] Two of the companies allocated to the treatment group were not able to participate in the intervention, and were replaced with two randomly-selected companies from the control group. For the purposes of the analysis, those companies continue to be treated as members of the control group, with the consequence that the impacts of the intervention may be slightly underestimated.

process, a measure of their attitudes towards the use of design, and indicators of their aspirations and expectations for adopting the use of design thinking and user-centred design techniques in the next 6–12 months. Data was collected from all trial participants at baseline (prior to randomisation and to the implementation of the UX Challenge), and again in a follow-up survey carried out three weeks after the UX Challenge. The outcomes were all measured on 10-point scales.[19] The statistical power of the trial is such that an impact on any of the outcome measures would need to be approximately one point or larger on the 10-point scale in order to be reasonably (80%) confident of being able to detect it.

The most significant challenge to the robustness of the evaluation is that only 63% of the control group responded to the follow-up survey (against 95% of the treatment group). While there are no clear differences in the characteristics of those who responded to the follow-up survey and those who did not, it is possible that there are unobservable differences between them (e.g. in their motivations) that could bias the results of the evaluation. The evaluators have attempted to account for this by using alternative statistical models and by calculating 'bounds' for the estimates of the impact of the intervention.
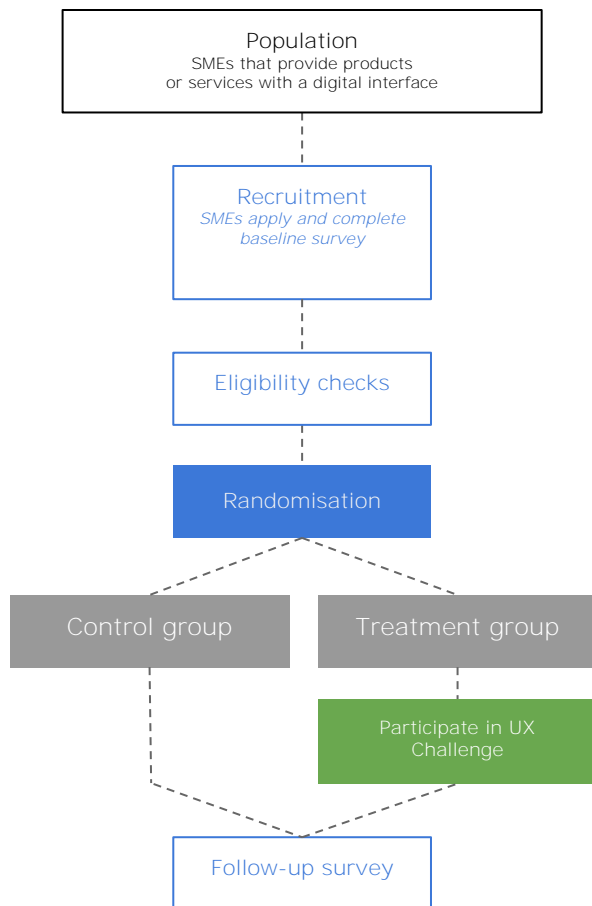

Figure 10: Trial diagram for the 200SMEchallenge project

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[19] The specific methods for constructing the six outcome measures varied: refer to Section 2.2 of Deliverable 4.4 for the 200SMEchallenge project for full details.

5.5.5. Impacts

The evaluation results suggest that the UX Challenge had positive impacts on participants' knowledge about design sprints and their ability to implement design sprints. In the post-intervention survey, the treatment group on average scored 1.1 points more than the control group on the 10-point scale for design sprint knowledge. This is the best estimate of impact, though the data, once taking account of uncertainty, are consistent with an impact ranging from 0.3 to 1.8 points. The treatment group also scored 0.8 points more on average than the control group on the 10-point scale for knowledge about implementation of design sprints, with a range from 0.1 to 1.4 points.[20] (There was no indication of an impact on self-assessed general knowledge about design.) There was also some indication that there may have been a positive effect on attitudes towards the use of design techniques: those in the intervention group scored on average 0.4 points higher than those in the control group (again on a 10-point scale), though the range of results consistent with the data ranges from a negative effect of -0.5 points to a positive effect of up to 1.3 points.

There is no indication of an impact from the intervention on aspirations or expectations of the adoption of the design techniques in participants' companies, with the difference between the treatment and control groups in these respects being close to zero. However, the small sample size of this trial limits the potential to identify such an impact. For example, the data are compatible with changes in expectations about adoption ranging from a decrease of 0.7 points to an increase of 0.6 points (again when considered on a 10-point scale).
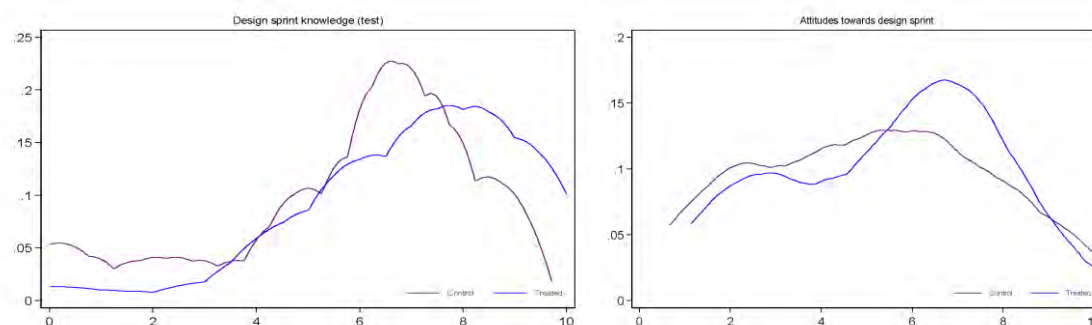
Figure 11: Distributions of two of the six outcome measures, by treatment/control group

5.5.6. Potential for further testing or scale up

The evaluation has provided support for the initial steps in the project's logic model: participation in the UX Challenge led to significantly increased knowledge and 'know-how' about the design sprint method, and possibly (though less clearly) to improved attitudes towards design thinking. Because of both the limited sample size and the limited time frame of this experiment, it is not yet known whether the UX Challenge will result in greater adoption of design thinking and user-centred design techniques within participants' businesses, or whether this will also lead to a more general increase in SMEs' capacity to absorb and apply knowledge from outside the organisation. The link between adoption of design thinking and improvements in SMEs' innovation capacity, competitiveness and growth also remains to be

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[20] These estimates are taken from Table AIII.2 in Appendix III of Deliverable 4.4 for the 200SMEchallenge project: IGL believes that the estimates in the appendix are more accurate than those presented in the main body of the report, though they are very similar in magnitude.

tested.[21] We would therefore encourage the project team to seek opportunities to test the UX Challenge at a larger scale, doing follow-up data collection after sufficient time has elapsed to observe whether companies have begun to use design techniques. Collecting more than one round of follow-up data would increase the power of the experiment, and also create the potential to track longer-term outcomes, such as the adoption of design thinking and any impacts on business performance. Hub Innovazione Trentino (HIT) is already taking an important step in this direction by working with researchers to collect data on longer-term outcomes from businesses it has supported over the past several years, under the 200SMEchallenge as well as other projects.

A consortium led by HIT has also recently been awarded Horizon Europe funding to adapt the UX Challenge to support digital innovation among social innovation organisations in three countries. The POSITIVE project will promote better understanding of social innovation and social entrepreneurship among actors in the technology innovation ecosystem, while also running an Open Innovation Challenge to enable social entrepreneurs to digitise their products and services.

It is important to note that the way in which the UX Challenge events were implemented under the 200SMEchallenge project were altered considerably from the original plan, as a result of the COVID-19 pandemic. It is possible that switching back from online to in-person events and to the original format of a two-day workshop would result in a more impactful learning experience. A future test should ideally be conducted once it is possible to resume in-person events at the right scale. It may even be of interest to test the impacts of online delivery against in-person delivery of the intervention.

Finally, the 200SMEchallenge project sought to evaluate the impact specifically on the SMEs themselves; it would be of interest in future replications to assess the impacts on the design professionals and on the students and recent graduates who also participated in the design sprints.

5.5.7. Wider learning

Survey attrition

The response rate to the follow-up survey among the control group, at 63%, was higher than in some other trials of business-support programmes (particularly among a control group that was not receiving any form of support), but even so it represents the weakest point of the 200SMEchallenge evaluation. One interesting approach adopted in this project was to invite participants (including the control group) to join a final knowledge-sharing event in return for completing the follow-up survey. However, it is not clear that access to this event was a significant motivation: the number of respondents who completed the survey after being sent a reminder of this opportunity was small.

Policy application

For agencies wishing to experiment with a similar intervention, the project team produced a playbook with detailed guidance for running the UX Challenge. As noted above, this trial represents an extension of other work by Hub Innovazione Trentino on supporting SME

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[21] A study in the UK found that businesses that had received support from the Design Council between 2005 and 2015 had higher survival rates and experienced higher growth in turnover and employment, compared to a matched control group (Bonner, K., Hart, M., Heery, L. (2017) 'Design Council Support and Business Survival and Growth'). However, given the limitations of an observational study like this one, these findings cannot be treated as definitive.

innovation through design thinking, user-centred design and open innovation. Innovation agencies considering creating innovation support schemes for SMEs based on the open innovation paradigm may benefit from the actionable guide delivered by the INNOSUP-05 funded INNOCHALLENGE project (coordinated by Hub Innovazione Trentino). The guide builds on reasoning and data developed during the peer-learning activity, and also forms the basis of a recently published peer-reviewed research study.[22]

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[22] Doppio, N., Väinämö, S., Haukipuro, L., (2021). Design elements of innovation contests supporting Open Innovation in SMEs – An action research study. Journal of Innovation Management 8(4):26-56. https://doi.org/10.24840/2183-0606_008.004_0003

5.6. SIM Crowd: Social Innovation Matched Crowdfunding

5.6.1. Key Details

SIM Crowd: Key details	
Research question	Does mention of funding from FFG for social crowdfunding projects influence potential contributors to those crowdfunding campaigns in comparison to only mentioning the projects themselves?
Innovation agencies	Austrian Research Promotion Agency (FFG) (Austria)
Tested intervention	Different ways of framing FFG support in communications to potential investors
Current status	Completed
Key deliverables to date	An Experimental Evaluation of Gender Differences in Responses to Major-Donor Funding Schemes for Crowdfunded Social Ventures Trial registration
Further information	Social Innovation Matched Crowdfunding (SIM Crowd) | SIM Crowd Project | Fact Sheet | H2020 | CORDIS | European Commission Landon and Hochreiter (2022) 'Randomised Controlled Trials and other experimental approach in the Austrian Research Promotion Agency (FFG) - Experience learning and outlook' Bapna S and Burtch G (2021). 'An Experimental Evaluation of Major Donor Funding Schemes for Crowdfunded Social Ventures'

5.6.2. Rationale and project logic

FFG sees crowdfunding – in which new ventures raise capital from large numbers of individuals, each investing small amounts – as a potentially valuable source of finance for SMEs. Under FFG's 'Social Crowdfunding' initiative, SMEs are supported in crowdfunding while also receiving grant funds. However, securing sufficient numbers of crowdfunders is often a challenge. Little is known about how best to motivate members of the public to invest in early ventures. In particular, it is not known whether making potential crowdfunders aware that a venture is being supported from public funds would encourage them to invest themselves.

The SIM Crowd experiment tested whether ventures could attract greater funding by (a) informing potential funders that the project had already received support from public funds (i.e. seed funding), or (b) informing potential funders that public funds would be used to top up the funding available, if the crowdfunding target is reached (i.e. matched funding). Either of these approaches could send a positive signal about the quality of the venture to potential crowdfunders, given that FFG's commitment of its own funds demonstrates that it believes the venture to be viable. On the other hand, the seed funding message could create a perception among potential crowdfunders that the venture is less in need of additional funding.
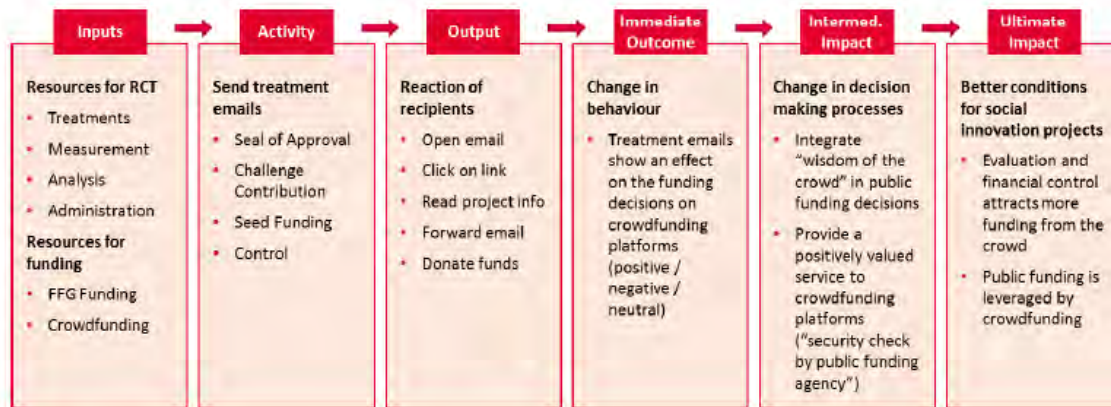
Figure 12: Logic model for the SIM Crowd project

5.6.3. Intervention

FFG sent two rounds of emails to nearly 20,000 individuals from their CRM database, highlighting two social ventures that had been selected to participate in the organisation's Social Crowdfunding initiative. Three different versions of the emails were sent:

Control version, with no mention that FFG was also providing funding to the ventures

Seed funding version, stating that FFG had funded the first 50% for each venture, and that the remaining 50% was to be raised through crowdfunding

Matched funding version, stating that if the crowdfunding campaigns were to raise 50% of the required funding, FFG would fund the remaining 50%.

The emails encouraged recipients to contribute to each of the two ventures by clicking on links to visit their crowdfunding campaigns on the website Startnext.

5.6.4. Evaluation design

The SIM Crowd experiment was set up as an RCT with a strong design.

The 20,000 email addressees were randomly allocated to one of the three versions of the email: the control version, the seed funding version, or the matched funding version. Randomisation was stratified by gender, since the project team believed that there may be important gender differences in the response to these messages. The randomisation was also constrained to jointly enforce balance between the three groups in terms of several other characteristics, including the frequency of interaction with FFG, location, and type of organisation.

The primary outcome considered in the experiment was email recipients' interest in contributing to the crowdfunding campaigns, as evidenced by their clicking on at least one of the two links to take them to the crowdfunding website. It was not possible to collect data on actual contributions to the crowdfunding campaigns.

Emails were sent to respondents twice, in April 2021 and again in June 2021, with the analysis carried out separately for each round.[23] The projects seeking funding that were featured in the second set of emails were different to those in the first, but the allocation of recipients between the three versions of the emails was kept the same.

The analysis in the report does not take into account the potential for spurious results to be produced by chance, given that large numbers of statistical tests were carried out.[24] However, the findings discussed below for the primary outcome measure are large enough that they would be likely to be observed even if the analysis had taken this into account.

Between the two rounds of emails featuring projects seeking crowdfunding, the recipients were also asked to respond to a survey about their opinions on how FFG's involvement changes their perceptions of the risk involved in the two projects – specifically, the risk that the projects would not meet their funding goals, and the risk that they would not achieve their project goals (even if they met their funding goals). A total of 357 individuals responded to this survey, at least in part. The analysis is carried out using data only from respondents who passed an attention test, confirming that they were aware of FFG's financial contribution to the projects (for those who received the 'seed funding' or 'matched funding' versions of the email) or confirming that they were not aware of FFG's contribution (for those who received the control version of the email). Unfortunately the low response rate means that the survey findings are unlikely to be representative of the broader population of email respondents. There is also potential for any comparisons in the survey responses between the three groups of respondents to be biased, given that decisions about whether to respond to the survey could have been affected by the content of the original email, and that whether respondents passed the attention test may also have depended on the version of the email they received.

The team undertaking the evaluation followed best practice by publicly registering the trial design prior to launch. The decision to disaggregate the results by gender of the email recipient is not highlighted in the openly available outline of the pre-registered trial that was pre-registered publicly. However, the fact that the randomisation was stratified by gender and that outcome data was also collected by gender[25] demonstrates that this was the evaluators' intention,[26] adding credibility to the corresponding findings.

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[23] There had been an earlier round of emails but this had to be dropped from the study due to an issue with data collection. Highlighting the benefits of piloting even rapid-fire experiments where implementation and data collection may seem relatively straightforward.

[24] There are arguably 54 hypotheses being tested for the primary outcome measure alone, given that the three experimental conditions were each being compared with each other, that the analysis was carried out for the sample as a whole and disaggregated by gender, that three versions of the outcome measure were considered (interest in contributing overall, and interest in contributing to each of the two crowdfunding campaign considered in isolation), and that the experiment was run twice.

[25] Restrictions on data access meant that the team did not have direct access to the microdata on participants and outcomes. Instead, they had to identify the subgroups for which they would be provided averages of each outcome measure.

[26] It also builds on earlier research by FFG's research partner: Bapna and Ganco (2020) 'Gender Gaps in Equity Crowdfunding: Evidence from a Randomized Field Experiment'
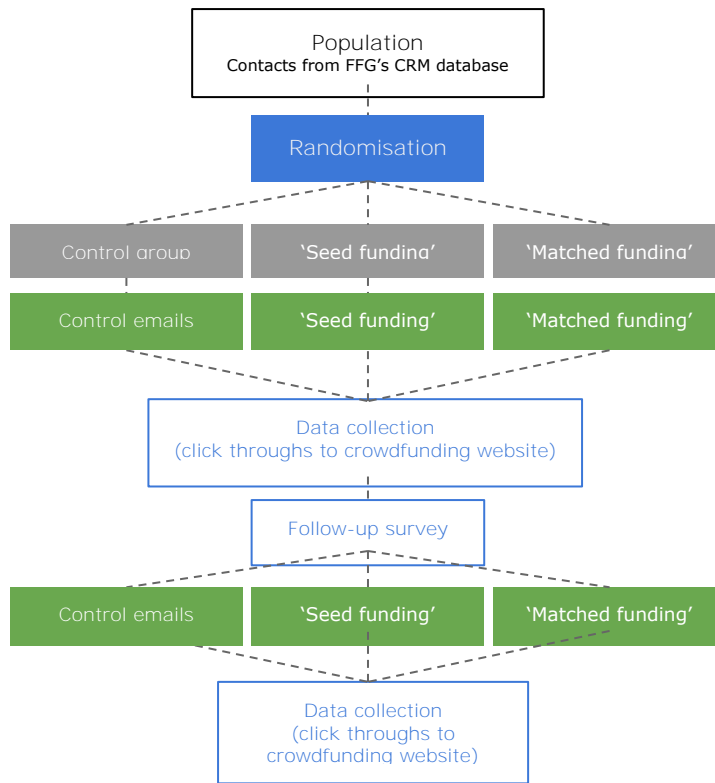
Figure 13: Trial diagram for the SIM Crowd project

5.6.5. Impacts

In response to the first set of emails (in April 2021), 5% of the recipients showed interest in contributing to the crowdfunding campaigns by clicking on one or both of the links. There was no indication of any difference in this indicator between the three versions of the email. That is, the information about seed funding or matched funding being available from FFG did not appear to have any effect on the average recipient's interest in contributing.

On the other hand, there is an important gender difference in the results: women were considerably more likely to show interest in contributing when they received the 'seed funding' version of the email. Women who received the 'seed funding' email were 2.4 percentage points more likely to show interest than those who received the control version, and 2.0 percentage points more likely than men who received the 'seed funding' version. The evaluators believe that this may be because women tend to be more risk averse than men in investing in opportunities like this.
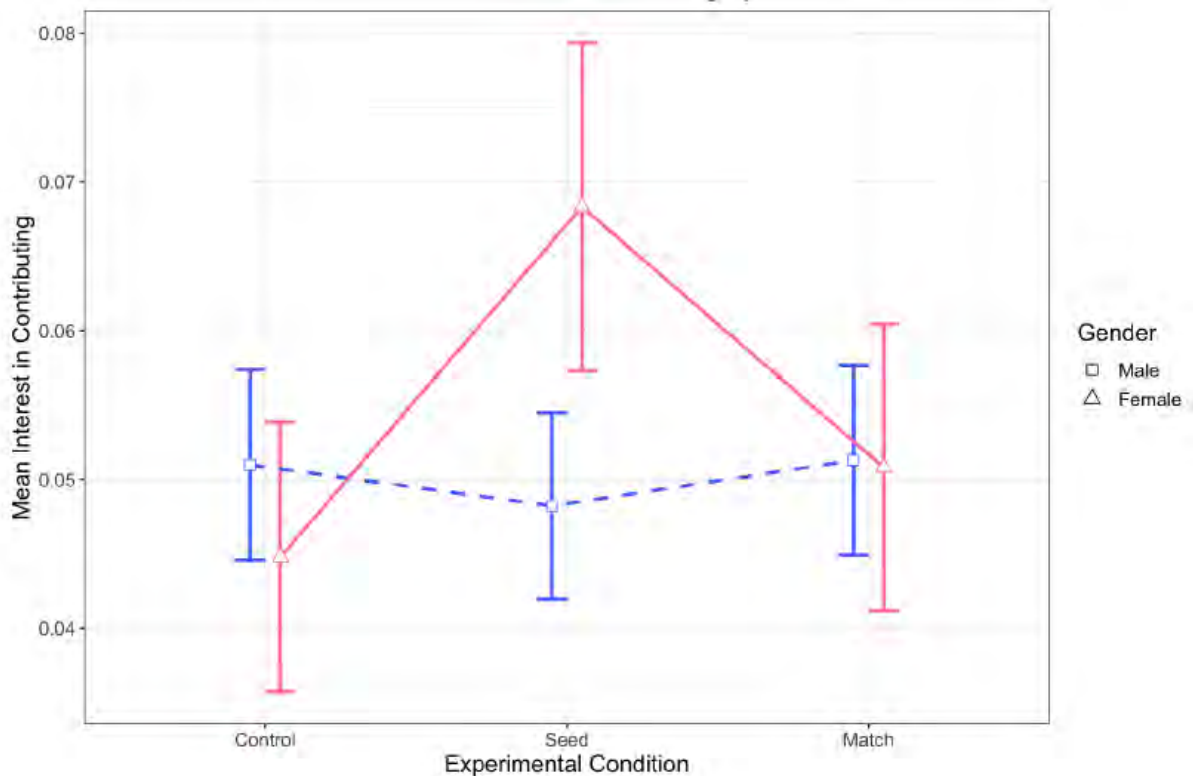
Figure 14: Email recipients interest in contributing to the crowdfunding campaigns, by experimental condition and gender

Among those who responded to the follow-up survey (and passed the attention test), there is little evidence of any difference between the three groups in respondents' perceptions of the risks to the projects. There are some indications of gender differences in risk perceptions: for example, women who received the 'seed funding' version of the email may perceive the project risks as lower than women who received the other versions of the email. However, given the caveats involved in interpreting this survey data, this result should not be taken as definitive.

When the second set of emails were sent (in June 2021), women no longer appeared to be more inclined to contribute if they received the 'seed funding' version of the email. However, women were overall much more inclined to contribute than were men in response to this second set of emails.

5.6.6. Potential for further testing or scale up

The first phase of this experiment produced a potentially interesting finding with a clear policy implication, that the 'seed funding' message may be effective in encouraging women to contribute to crowdfunding campaigns. However, the fact that this pattern was not replicated when the second round of emails were sent in June 2021 calls this into question. We would want to see this tested further before recommending that organisations switch to using 'seed funding' messaging when targeting crowdfunding campaigns.

In any case, the fact that messaging about FFG's support to the ventures (whether presented as seed funding or matched funding) did not reduce interest in contributing to the crowdfunding campaigns is reassuring in itself.

The SIM Crowd project has been a valuable demonstration of how RCTs can be used to probe operational questions facing organisations, using relatively simple experiments and outcomes that can be measured in the short term. We would encourage FFG and other innovation agencies to continue to find opportunities like this to optimise their processes.

5.7. DIHnamic: Digital Innovation Hubs: dynamic facilitation and thrust from regional innovation agencies

5.7.1. Key Details

DIHnamic: Key details	
Research question	Does 80 hours of specialised, tailored consultancy support (including an experimentation activity covering at least one digital solution) lead to greater investment in digitisation among SMEs that have already expressed an interest in adopting cybersecurity, industry 4.0 or internet of things (IoT) technologies, compared to receiving only 20 hours of specialised, tailored consultancy support?
Innovation agencies	Instituto de Competitividad Empresarial (ICE), Junta de Castilla y León (Spain)
Tested intervention	Specialised support scheme provided by Digital Innovation Hubs
Current status	Completed
Key deliverables to date	D2.1 – RCT protocol
Further information	Digital Innovation Hubs: dynamic facilitation and thrust from regional innovation agencies | Fact Sheet | H2020 | CORDIS | European Commission Report on the RTC outcome baseline analysis

5.7.2. Rationale and project logic

Growing pressure on public budgets demands that support schemes become more innovative, effective, efficient, and evidence-based, and that scarce resources are allocated to schemes with the greatest impact. This project aims to assess what level of support to SMEs is optimal for promoting the digitisation of their processes, products and assets. The aim of the project was to improve efficiency for the Digital Innovation Hubs (DIHs) and improve value for client SMEs, while managing risk and helping businesses discover new opportunities for generating income.

A key focus of the project is whether businesses need to 'test before they invest'. Practical use of technologies may help businesses make a more informed decision about whether to invest in specific technologies. Providing support at the testing stage is more costly, but this could prove cost-effective if businesses thereby become more likely to adopt technologies that will boost their productivity.
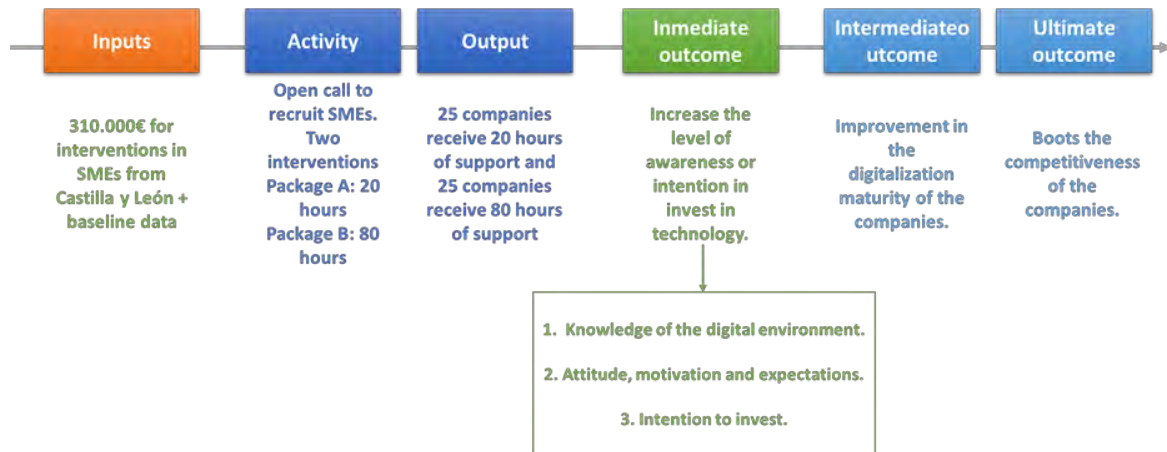
Figure 15: Logic model for the DIHnamic project

5.7.3. Intervention

Digital Innovation Hubs (DIHs) are non-profit organisations, supported by the European Union, which exist to support businesses in adopting digital technologies. They provide technical advice on technology options, as well as support in testing technologies, obtaining funding, and staff training and development. DIHs are organised thematically, with different DIHs specialising on the adoption of specific technologies.

The DIHnamic project involved comparing two different levels of support provided to SMEs by DIHs in Castilla y León:

- Service A: 20 hours of specialised, individualised consulting on technology adoption, provided over a period of one month, at a cost to ICE of approximately €2,000. The advice covered diagnosis of the business's digital maturity and analysis of its weaknesses, identification of existing technological solutions and options for developing new solutions, business planning and potential funding sources, and analysis of the regulatory framework.

- Service B: 80 hours of specialised, individualised consulting on technology adoption, provided over a period of one month, at a cost to ICE of approximately €10,000. The advice covered the same themes as under service A. In addition, businesses were given support in testing a specific digital solution, service, process or technology, using the 'test before invest' concept.

Businesses in both groups were informed about the cost of the support provided to them.

ICE published a call for proposals from SMEs, which detailed the DIHs from which SMEs could choose to receive support. A total of 120 SMEs submitted proposals, which were assessed by ICE against a standard set of criteria. A total of 47 SMEs were selected to take part in the project, of which 45 took up the offer. Of these, 18 elected to receive support from the DIH that specialises in Industry 4.0 (DIHBU), 14 from the Cybersecurity Innovation Hub (CyberDIH), and the remaining 10 from a variety of other DIHs. The delivery of support to these SMEs was carried out directly by the DIHs, following a standardised structure defined for the DIHnamic project.

5.7.4. Evaluation design

The DIHnamic project was set up as an RCT to compare the effectiveness of the two versions of the service.

The 47 SMEs that were selected for participation in the project were randomly allocated (on an approximately 50/50 basis) to be offered service A or service B. This randomisation was stratified by the DIH that the company selected at the proposal stage, to ensure an approximately equal split in those participating in service A and service B within each DIH.

The outcomes assessed in the evaluation included participant SMEs' digital literacy and knowledge of the digital environment, their attitudes, motivations and expectations towards innovation and digital transformation in companies, and their intentions to invest in innovation and digital transformation.

Baseline data on the various outcome measures was collected from participant SMEs after randomisation. This timing is not ideal, as the knowledge of the treatment group to which the business had been allocated could have influenced responses to the survey (e.g. those that are aware they were to receive more consulting support may have felt more positive about the potential to achieve their goals with technology), but was unavoidable for administrative reasons. 45 of the original 47 SMEs completed the baseline survey, and 42 completed the final survey - a very high response rate. The response rate was higher among those that received service A (22 of the 23 companies originally allocated to the service) than those that received service B (20 of the 24 originally allocated to the service).

The small numbers of SMEs involved in the project mean that the statistical power available for detecting differences in outcomes is limited. The minimum detectable effect size from the evaluation is approximately 0.9 standard deviations – meaning that the difference between those that received service A and those that received service B would need to be very large for the evaluation to be reasonably (80%) confident of being able to detect it. Another challenge is that the evaluation involved a large number of different statistical tests being run – for each of the three outcome measures, the more specific measures underlying them, and for the subgroups that joined each DIH – which means that there is a probability of false positive results being obtained. Taking account of this 'multiple comparisons' problem would increase the minimum detectable effect size even further. However, given that the cost to ICE of implementing service B was five times that of service A, a large minimum detectable effect seems reasonable - the impact of service B would have to far exceed that of service A in order to make it cost-effective.

Another limitation was the short time-frame of the evaluation. The follow-up data was collected immediately after implementation of the support – that is, approximately one month after the collection of the baseline data. This allowed only for immediate impacts of the support to be assessed.
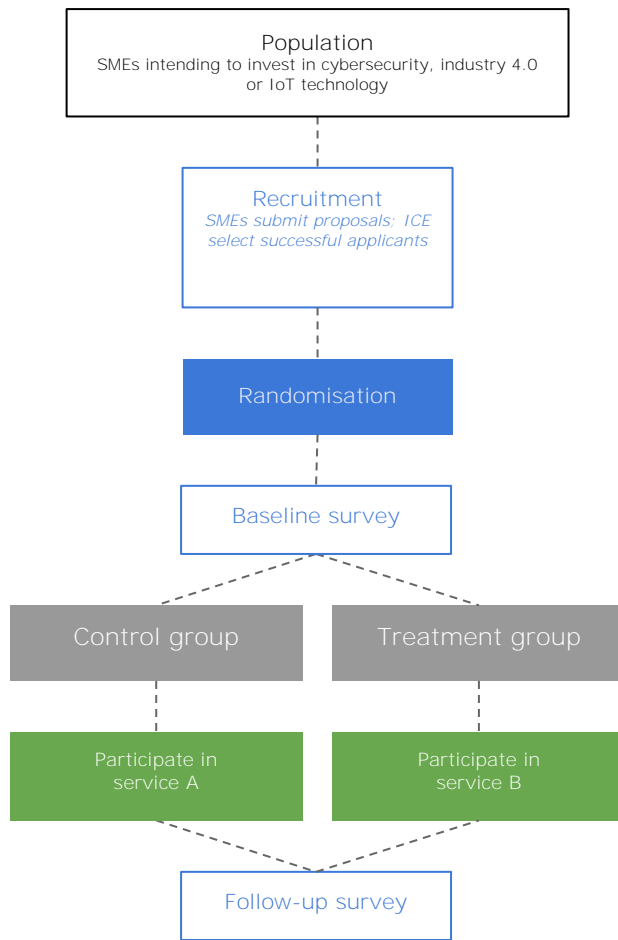
Figure 16: Trial diagram for the DIHnamic project

5.7.5. Impacts

In the final survey, businesses that participated in the DIHnamic project were found to have improved in terms of their knowledge of the technology environment since the baseline survey, and to have higher intentions to invest in new technologies. It is less clear that there were improvements in attitudes, motivations and expectations of technology, but baseline values on this measure were already high.

Despite the increases in outcome measures among the project participants as a whole, there are no clear differences in the outcomes between the two versions of the service.[27] However, as discussed above, any differences in outcomes would have to be very large in order for them to be detectable in the evaluation.

5.7.6. Potential for further testing or scale up

The increase in knowledge about technology and intentions to make investments immediately after the implementation of the consulting support is a promising sign about the success of this intervention. However, longer-term follow-up will be needed to assess whether these differences are maintained over time and whether they translate into actual investments in

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[27] Although the evaluation report finds some evidence of a difference in one of the indicators examined, the fact that no adjustment has been made for multiple comparisons and that the corresponding difference is well below the minimum detectable effect size from the evaluation implies that this cannot be treated with any confidence as a result of the evaluation.

technology. To this end, the DIHnamic team are hoping to be able to carry out further surveys of the businesses that participated in the project.

The small number of businesses involved in the project means that the RCT was not able to identify any differences in outcomes between the two versions of the support delivered. Given that the cost to deliver service B was approximately five times higher than service A, the lack of any indication that the impacts from service B were substantially higher suggests that, at least on cost-effectiveness grounds, service A should be preferred as the delivery mechanism in the future. Further research – such as qualitative interviews with some of the businesses that participated in the project – may help to gain deeper insights about the relative merits of the two forms of the delivery.

5.7.1. Wider Learning

Complementary evaluation approaches

RCTs provide a strong approach for drawing conclusions about the impact of interventions – but only if they are conducted at a scale sufficient to detect policy-relevant impacts. In this case it was clear from the design stage that the minimum detectable effect size of the evaluation would be large. Budgetary considerations prevented the trial from being conducted at a larger scale, but the evaluation would have been strengthened by considering alternative approaches alongside or as an alternative to the RCT design. In particular, for an evaluation at this scale, collecting detailed qualitative data from each of the participant companies could have been feasible, and may have been more revealing than the quantitative analysis.

5.8. D3T: Data Driven Digital Transformation

5.8.1. Key Details

D3T: Key details	
Research question	Does offering a data driven approach to the Digital Transformation support services improve SMEs' readiness and the timeliness of the DT implementation?
Innovation agencies	Torino Wireless Foundation (TOWL) (Italy)
Tested intervention	Data-driven approach to delivery of digital transformation support services
Current status	Completed
Key deliverables to date	D2.2 – Trial protocol D4.3 – Paper on the implementation of RCT in the D3T Project
Further information	D3T Homepage D3T final event Data_Driven_Digital_Transformation_|_D3T_Project_|_H2020_|_CORDIS_|_European Commission

5.8.2. Rationale and project logic

The D3T project was prompted by the recognition that many companies are not taking full advantage of the advanced technologies or the innovative business models offered by the digital economy. Digital transformation offers new business opportunities for SMEs and can fundamentally change business models, but it affects the whole value chain from product development to sales and therefore is challenging for companies to apply it successfully. The process is very demanding for the agency as well, as the support provided to achieve the digital transformation is intense and ambitious.

TOWL aims to deliver data transformation support using a different approach from their traditional service scheme. In particular, by implementing a data-driven approach to exploit the value that information and knowledge can generate, it makes innovation services more effective and the support process more efficient. At the same time, small businesses would benefit from an online and data-driven approach without demanding so many resources from the agency. The idea underpinning the D3T project is to test the capability of a data-driven approach in providing more effective support to companies and delivering services more efficiently as it reduces the resources demanded to deliver the support.

5.8.3. Intervention

The Digital Transformation Support Service provides a first assessment phase, where companies evaluate their digital readiness levels. This is followed by a planning phase where companies are provided with information on the actions needed to implement the roadmap, technology partners and providers, investment, and funding opportunities, as well as expected

changes at organisational and business levels. The treatment group received an online and data-driven version of the service through the D3 platform. They autonomously assess their digital level through the platform and have access to external data sets, where the scouting range for providers and opportunities can be enlarged out of the existing TOWL network.
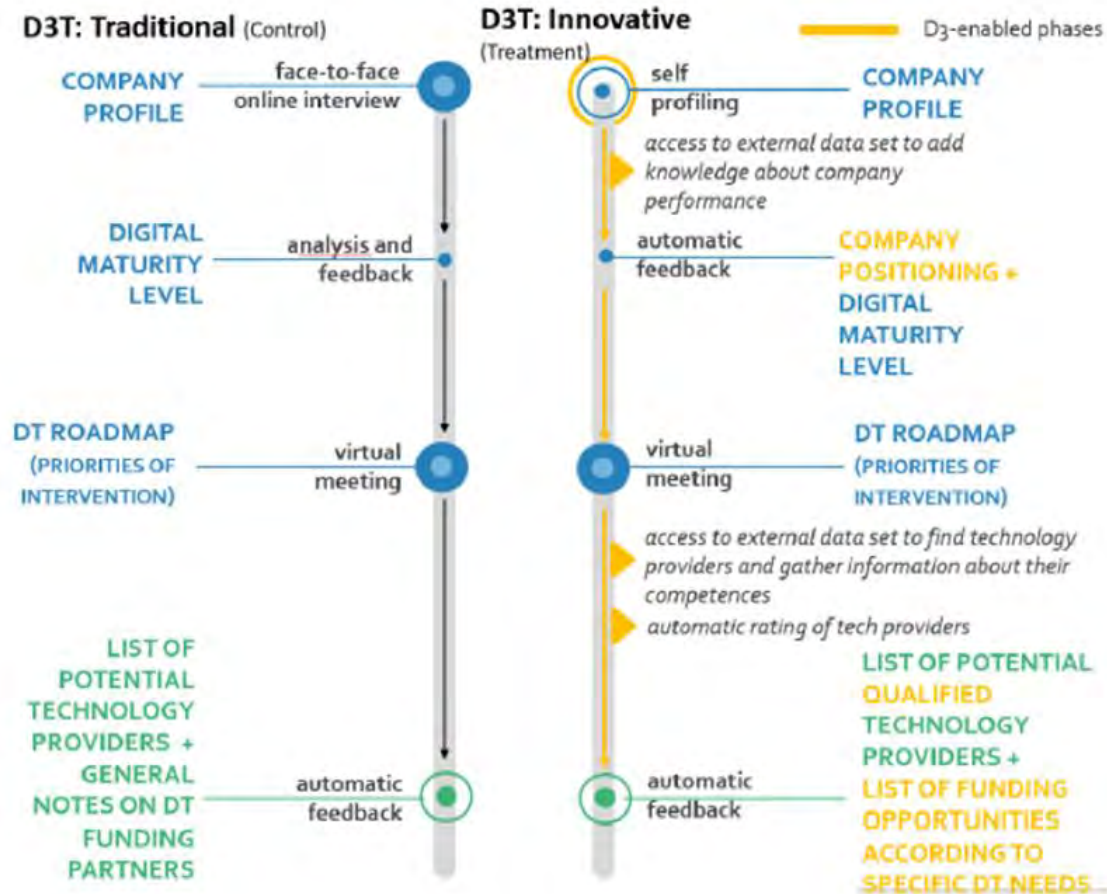
Figure 17: D3T traditional and innovative delivery

5.8.4. Evaluation design

The original policy question that motivated the policy experiment was: 'Does offering a data-driven approach to the Digital Transformation Support Services improve SMEs' readiness and timeliness to implement digital transformation?'

Recruitment of small businesses located in the Piedmont region (Italy) was carried out through an open call published online and using direct contact with companies that were part of the local network of TOWL. Those recruited were already aware of their need for digital transformation but were seeking support to help them assess if and how their business would benefit.

To perform the evaluation, TOWL ran a small-scale pilot based on the principles of an RCT approach. 26 companies were randomly allocated into two groups: The treatment group received the D3 online data-driven version of the support service, while the control group received the traditional support service provided by TOWL. A set of primary and secondary outcome measures were selected to assess the feasibility and effectiveness of the support provided, such as readiness or time reduction in digital transformation implementation as well

as number of collaborations and levels of adoption of the solutions provided. In addition to the main outcomes, TOWL also gathered some monitoring information and qualitative feedback based on measures of time demand on analysts providing the service and the companies involved.

Baseline and follow-up surveys collected the information from both groups enabling comparisons of progress. However, it is not possible to draw robust conclusions about the impacts of the D3 intervention. Firstly, due to logistical problems, treatment and control groups received the support services at different points in time. This delay in treatment creates some complications for comparisons, as differences in the wait to receive support, gap between support use and outcome surveys, and any changes in the economic context when it is delivered, could influence the effectiveness of the intervention alongside any difference caused by the D3 element itself. Secondly, this was a small pilot meaning that groups were not fully comparable after randomisation and it was not possible to generate sufficient statistical power to provide confidence in the findings. Nevertheless, through the additional analysis, the evaluation provided useful information about the feasibility of the D3 intervention.

5.8.5. Impacts

While the project did not produce robust evidence about the impact of the D3 data-driven support service, there seems to be a positive evolution in the willingness of companies to invest more in the adoption of digital technologies after receiving the service for both the treatment and control groups. Feedback provided by the companies revealed that most of them found the services very useful (77%). Including other insights from qualitative research, the data-driven support seemed to have some positive effects on readiness to implement digital technologies. Results indicate that potential benefits may include greater awareness of new opportunities, as well as increased willingness to invest more in digital technologies. However, the effects for the data-driven approach were unclear with regards to generating new collaborations and improving the time to reach data transformation.

A relevant variable to consider seems to be the companies' self-awareness of their needs, and their openness to adopting new solutions and ways of thinking. In this intervention, companies who were more aware of their needs and more open, were better able to receive support. Nevertheless, the intervention seemed to be more effective for companies that did not have much technological knowledge, as they are in greater need of an assessment and matching of solutions (and therefore found the support service more useful). Some companies also reported that the roadmap including solutions and potential suppliers was particularly helpful. Therefore, companies who face a lack of time and the resources to carry out the analysis of potential solutions could also benefit from the support provided.

In addition to the main results, monitoring information and qualitative feedback suggested that the intervention had a strong effect on reducing the amount of time spent by TOWL supporting each company compared to the control group. Support through the traditional format demanded around two and half times as much input from the analysts, and companies receiving the digital support also spent less time using the support. If the D3 online version requires less resources and time, then it would only need to deliver comparable outcomes to the traditional support to be preferable - i.e. would be more efficient even if not more effective.

As above it is difficult to draw clear conclusions about the relative effectiveness of support. Based on the full range of evidence collected, the project team felt that a complete digitisation of support would not be effective. The experience of those in the treatment group indicates that additional personalised support would be required at the stages of understanding needs and prioritising actions.

5.8.6. Potential for further testing or scale up

This project has functioned as a useful proof of concept where TOWL provided two different approaches to delivery of the support scheme. The data-driven approach is a trend that innovation agencies can take advantage of to create value and enhance their operations, from the optimisation of the support services provided to the creation of more efficient plans for their members and networks. However, TOWL learned that the data-driven support offer is generic and not very personalised, and is therefore appreciated more by companies with low digital maturity. Companies that are at the beginning of their digitalisation processes and not directly related to the ICT sector may benefit more. TOWL has taken this into consideration as they design the support service that will be provided in the future.

From the analyst's feedback, a mix of both services would provide the best support for the assessment and planning phase of digital transformation support services. The digitalisation of the full service is not as efficient as they first thought, as the human element is really appreciated and makes a significant difference in some stages of the support provided, for instance not only in the interaction with the companies but also in the decision making and analysis processes. Therefore, TOWL used these lessons to develop a new service, merging elements from both groups.

TOWL used their experience on D3T to contribute to the digital maturity assessment tool of a new funded project (ReStartSMEs) focused on digitalisation of manufacturing companies. The D3T online assessment was included in the benchmark of different existing assessment models.

5.9. InReady: Designing a service to improve start-ups' investor readiness

5.9.1. Key Details

InReady: Key details	
Research question	Does the use of the InReady tool improve the quality (or success rate) of entrepreneurs' pitches to venture capital investors?
Innovation agencies	The Lithuanian Innovation Centre, Foundation for Research and Technology Hellas, Agenzia per la Promozione della Ricerca Europea (Lithuania, Greece, Italy)
Tested intervention	Online tool and expert support to prepare pitches for funding
Current status	Completed
Key deliverables to date	D1.1 – User needs, service portfolio and future plans D5.1 – Final report, including assessment of project results and impacts
Further information	InReady homepage Designing the Service to Improve the Investor Readiness of Start-ups | InReady Project | H2020 | CORDIS | European Commission

5.9.2. Rationale and project logic

For small and innovative businesses, growth can often be constrained by difficulties accessing suitable finance. Many interventions seek to address concerns about the limited supply of finance, leading to for example, decisions to establish 'hybrid' venture capital schemes where public investments are used to draw private finance into the equity gap. However, effective policy solutions are also needed on the demand side with evidence that the growth of innovative small businesses can be constrained by a reluctance to seek external finance or difficulties in developing opportunities to a stage that can readily attract outside funding.

The InReady project was prompted by the observation that many SME founders are unable to deliver effective pitches to potential investors. When seeking venture capital or participating in competitive funding processes – such as the EIC Accelerator – a convincing pitch can make a significant difference to the outcome. By providing founders with support in preparing an effective pitch, the InReady tool aims to ensure that more funding is directed to start-ups with the best business ideas and the greatest potential for growing into successful businesses.

5.9.3. Intervention

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5.9.4. Evaluation design

27 businesses were recruited into the trial across the three countries. The businesses were at various stages of development, but most were providers of a new technology or an online service. These businesses were randomly allocated into a treatment group and control group, stratified by country. All participants were initially invited to present their pitch to a group of experts, who then provided feedback on areas for improvement. The treatment group were subsequently given access to the InReady tool, which they used to generate a slide deck and a 'state of play', and were also provided with more detailed comments by the experts. The treatment group were then given a second opportunity to pitch to the group of experts. The participants and the experts completed feedback forms at the end of the process, asking how useful they found the InReady tool and the expert support, as well as about any suggestions for improvement.

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┌─────────────────────────────────┐
│            Population            │
│        Small businesses that are │
│       seeking external investment│
└─────────────────────────────────┘
              │
┌─────────────────────────────────┐
│           Recruitment            │
│       SMEs invited to apply for  │
│         online investment        │
│        readiness training        │
└─────────────────────────────────┘
              │
┌─────────────────────────────────┐
│          Randomisation           │
└─────────────────────────────────┘
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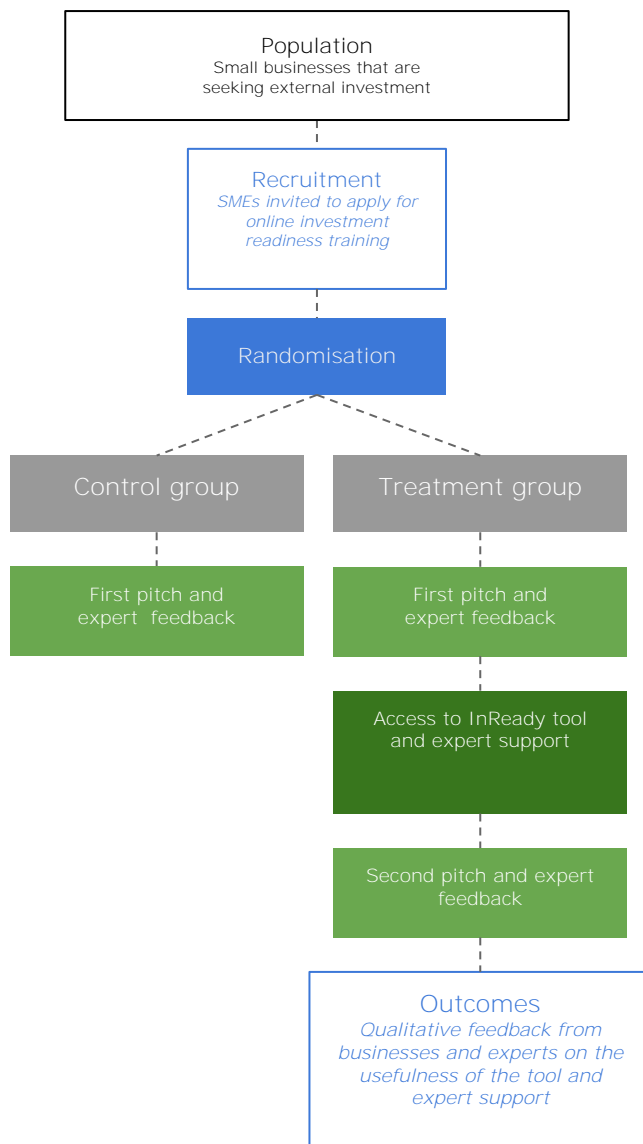
Figure 18: Diagram of the evaluation of the InReady project

It is not possible to assess the effects of the InReady intervention by comparing the experience of the treatment and control groups for two reasons. Firstly, the treatment group were given two opportunities to pitch, and could naturally be expected to improve with more preparation time and more practice, whereas the control group were given only one opportunity. In effect, with outcomes only measured after both pitches, this extra opportunity to practise a pitch and receive feedback also forms part of the intervention provided to the treatment group. Secondly, there was no data collected on outcomes that would have enabled a comparison to be made between the two groups. For these reasons, the evaluation relies on the perceptions of the treatment group and the experts about how the InReady tool enabled them to improve over time.

Had these two issues been addressed it would have provided richer information on how the new tool affected the outcomes of participants. Nevertheless, it still would not have made it possible to draw confident conclusions about the tool's causal impacts on outcomes as the sample size in this small pilot was not sufficient to generate the necessary statistical power.

5.9.5. Impacts

While the project did not produce robust evidence about the impact of the InReady tool and the associated support, feedback received from participants was highly positive. Users commented that the InReady online tool enabled them to improve the structure and focus of their pitches, with the market and financial analysis being identified by several participants as particularly valuable. The support from the experts was appreciated for guiding users through the use of the tool. The experts themselves also saw value in the InReady tool, though they noted that in its current state it is particularly useful to start-ups with little or no experience in pitching: additional content would be required to add value for more advanced users.

5.9.6. Potential for further testing or scale up

This project has functioned as a useful proof of concept: the project team have demonstrated that it is possible to develop an automated tool that (in conjunction with guidance from experts) SMEs find valuable in preparing pitches. Recognising the limitations of the existing InReady tool, the project team are seeking funding to develop it further, to add additional features (such as benchmarking) and to make it available in languages other than English. If such amendments can be made, IGL would then recommend another phase of testing the tool, to understand how much value it adds to start-ups' pitches before deciding whether to invest in rolling it out more widely. Such a test could follow the approach adopted in this project of inviting start-ups to practise pitching to a panel of experts, but with a random subset of the start-ups being provided with access to InReady in advance of the pitch session, and with the experts being asked to rate the quality of the pitches without knowing which of the companies had received access to InReady. To assess the scalability of the intervention, it would also be interesting to test whether the expert review and detailed feedback is a necessary component of the system (and if so, whether this can continue to be delivered online or is more effective if delivered in person), or whether the automated outputs alone are of value to start-ups.

Those seeking to replicate the approach or to conduct their own experiment with training to make SMEs may be interested in the findings from an earlier randomised experiment undertaken in the Western Balkans.[28] Here, the treatment intervention provided a combination of training, mentoring, master classes, and networking, with the control group receiving an online package. The more intensive combination of support led to an improvement in the judges' assessment of investment readiness and some evidence of later benefits to their ability to attract media and investor interest. An interesting question for further exploration is whether an online tool such as InReady can be as powerful, or at least as cost effective, as intensive and less scalable training.

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[28] McKenzie, D., Cusolito, A. P., Dautovic, E. (2018). 'Can Government Intervention make firms more investment-ready? A randomized experiment in the Western Balkans'. World Bank Policy Research Working Paper.

5.10. Create4value: Creative collaboration to provide value for first time innovators – effective engagement of stakeholders and users in co-creation processes in SMEs

5.10.1. Key Details

Create4value: Key details	
Research question	For SMEs that are not active innovators, does providing them with access to a sophisticated process of co-creation – rather than only a workshop about use of the Business Model Canvas – lead them to unlock their innovation potential?
Innovation agencies	Poznan Science and Technology Park (PPNT) (Poland)
Tested intervention	Co-creation workshops to unlock innovation potential of SMEs
Current status	Completed
Key deliverables to date	D1.4 – Revised methodology and toolbox for co-creation service for SMEs
Further information	Create4value homepage Creative collaboration to provide value for first time innovators - effective engagement of stakeholders and users in co-creation processes in SMEs. | Create4value Project | H2020 | CORDIS | European Commission

5.10.2. Rationale and project logic

The Create4value project sought to prompt innovation among SMEs that have the necessary resources but little or no previous experience of introducing innovative processes. The hypothesis behind the project was that working closely with selected SMEs in a co-creation process could help to unlock their innovation potential. Through the co-creation workshops, the SMEs would be learning hands-on how to involve users in the process of developing new and improved products, as opposed to the more theoretical approach with only the Business Model Canvas training.

This project builds on the 'Innovators2B' project carried out under INNOSUP-05, in which PPNT and a number of other agencies used a user-centred design approach to develop ideas for how to encourage SMEs to become first-time innovators. The concept that emerged from this process formed the basis of the Create4value project.

A secondary aim of the Create4value project was for PPNT to test how to engage potential customers of the SMEs at two stages of the co-creation process: firstly, through interviews to identify user needs, and secondly through participating in the co-creation workshops alongside the businesses themselves.

5.10.3. Intervention

Under Create4value, selected SMEs in the Wielkopolska region participated in a sequence of four workshops with PPNT staff, lasting around 20 hours in total. The workshops were designed as a process of co-creation, using design thinking and Living Lab approaches. As well as key personnel from the companies themselves and PPNT staff, some of the workshops also involved customers or end users of the companies' services. The participants were guided through the process of diagnosing the challenge the company was facing, identifying user needs, proposing solutions, and creating and testing prototypes. The participants also received guidance in using the Business Model Canvas or Value Proposition Canvas to define customer segments and value propositions.

A control group of businesses participated in a single workshop with PPNT, learning how to use the Business Model Canvas.
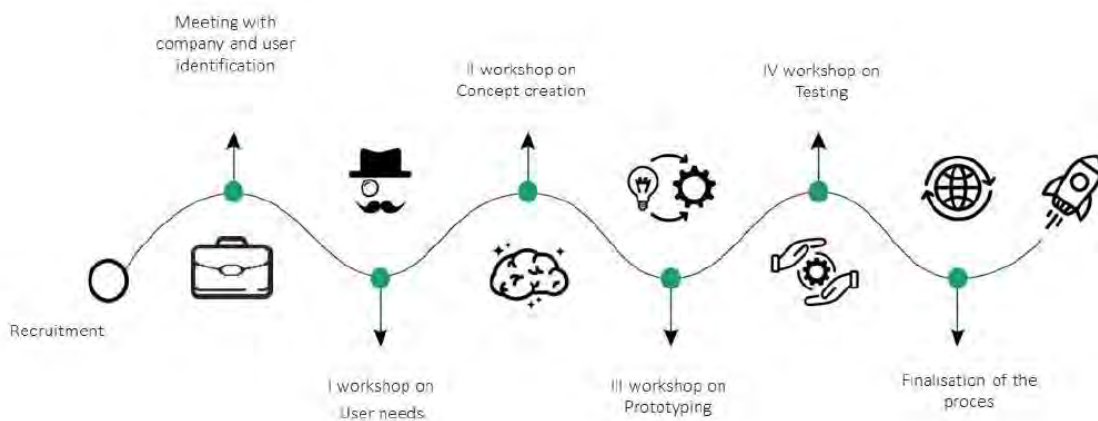
Figure 19: Outline of the Create4Value co-creation process

5.10.4. Evaluation design

SMEs were recruited through an open call for SMEs that were seeking to introduce a new product or service or improve an existing offering, but had not previously received support in doing so from an innovation agency. Applicants were asked to submit information about the product or service they wished to launch or improve. They were rated based on the maturity and feasibility of these plans and the skills of their team. In total, 11 SMEs applied for the project, of which six were selected. Three of the six were randomly allocated to the treatment group, and three to the control group.

Information was collected from all six companies before and after the project interventions on their innovation-related practices and processes. Open-ended qualitative interviews were also carried out by PPNT staff with the three companies in the treatment group at the end of the project.

5.10.5. Impacts

The baseline survey data showed that the businesses had not been aware of the idea of co-creation, and had not previously engaged external users or customers in the development of new products or services. This changed for all three of the businesses that went through the Create4value process - in the follow-up survey and interviews, they reported that they now

saw value in including end users or customers, and felt able to identify them and understand their needs. They said that they planned to use the tools they learned at the workshops to improve their products and to solicit feedback from customers. (At the time of writing, one of the three businesses was said to be about to introduce a new product as a result.) However, they also noted that they would not normally have the time or resources to manage the whole process internally, so would still require external support.

Among the control group businesses, use of the Business Model Canvas (BMC) was seen as valuable in enabling them to focus on key issues for the business. However, PPNT believe that the BMC alone only led companies to improve their internal processes, and did not encourage innovation in their products and services.

5.10.6. Potential for further testing or scale up

The Create4value project has shown the promise and viability of the idea that emerged from the earlier Innovators2B project. The project was successful in demonstrating that SMEs with no prior experience could be guided through a co-creation process to come up with innovations in their product or service offerings. The ideal would now be to carry out an experiment to test the approach at a larger scale and generate more robust evidence about its impact.

PPNT reports that Create4value has confirmed their belief that a high level of support from an innovation agency is necessary for the process to be successful. This clearly implies a significant barrier to scaling the intervention. Consideration could be given to how to streamline the process, reducing the burden on the facilitating agency while preserving as much as possible of the impact for the business. Alternatively, if it is essential that this be a high-touch intervention that can only be provided to small numbers of businesses, targeting it to those that have the most potential to benefit will be crucial to its successful application in the future.

Experimentation could also be used to refine the approach. Under the Create4value project, the planned approach was adapted to the needs of the participating businesses, but also had to be adapted to the constraints posed by the COVID-19 pandemic. This tailoring of approach would be more challenging if the programme was to be delivered at scale, as it may require additional time and expertise to implement. The costs and benefits of a more tailored approach or a standardised approach could be something to investigate further.

5.10.7. Wider Learning

Engagement of customers/users in the design process

Customer engagement is vital to the co-creation approach used in Create4Value. PPNT was able to explore how different approaches could be used to engage users. The team had most success with relying on intrinsic motivations – pointing to the opportunity to learn and be involved in exciting new experiences – rather than on incentives or rewards. Feedback from participants shows that they felt fully engaged in the workshops and that they had made a valuable contribution. The project team felt that particular groups, such as those in the education sector or early-stage entrepreneurs, found the sessions of most interest.

This aspect of the project could be developed further through evaluation. There is potential to learn from more rigorous testing of the approaches used to engage users, as well as from analysis of how different users contribute to the co-creation process and what the benefits are to the users themselves.

5.11. InDemandRCT: Demand-driven and business co-creation for a new innovation business model

5.11.1. Key Details

InDemandRCT: Key details	
Research question	Would providing SMEs with the opportunity to co-create innovative solutions and receive additional business support develop into better and more innovative products for business customers?
Innovation agencies	Institute for Development of the Murcia Region (Spain)
Tested intervention	Co-creation and business support service scheme to develop innovative solutions
Current status	Intervention delivery
Key deliverables to date	
Further information	InDemand-RCT Homepage Demand-driven and business co-creation for a new innovation business model	inDemand-RCT Project	H2020	CORDIS	European Commission Funder call management - March 2022	inDemand-RCT Project	H2020	CORDIS	European Commission

5.11.2. Rationale and project logi

The Regional Development Agency of the Region of Murcia in Spain aims to explore and test a new demand-driven business model based on co-creation patterns between business customers and SMEs. The co-creation model will include customer input on the technology solutions provided by the SMEs, to jointly find innovative solutions to meet customer business challenges.

The intervention is based on providing business support and co-creation opportunities with larger businesses to SMEs. The aim is for this to provide valuable information to improve the quality and usefulness of their products. The co-creation element could provide relevant insights that could improve products and services. The project objective is to demonstrate that the new business innovation model offers better results for businesses than traditional models.

5.11.3. Intervention

SMEs that submitted successful applications would select a challenge and be randomly allocated into one of the following groups that would determine how they would work on the challenge:

- Treatment group: SMEs receive a subsidy and develop innovative solutions through co-creating with the large business involved and receiving business support from INFO.

- Control group: SMEs receive a subsidy and develop innovative solutions without the co-creation element and without additional business support from INFO.

5.11.4. Revised Evaluation design

The INFO team worked for several months on the specific research design that would follow the essential elements of an RCT, including randomisation and comparison of mean outcomes.

To work with large businesses that would present some challenges, INFO carried out two webinars and email campaigns for more than 500 companies. They prepared and carried out a telemarketing campaign to recruit the companies who wished to present their challenges to SMEs. 14 challenges of 12 large businesses were selected.

Due to budgetary constraints, the original sample size was limited to 40 SMEs. The call to recruit was open for two months, but this was extended due to limited interest from SMEs. In the end, 16 SMEs showed interest, with a final sample of 13 SMEs selected. SMEs were given a chance to decide what challenge they preferred to confront. To use challenges as stratification for the randomisation process, ideally, every challenge would have to include at least two SMEs; to allow for randomisation among the same challenge. The INFO team held an open ceremony to carry out the randomisation process through a lottery, which was recorded and broadcast live.

Given that the final number of SMEs participating was significantly lower than expected, for those challenges where only one SME showed interest, it was decided that they would automatically go into the treatment group, removing them from the experimental comparison. This was intended to increase the number of SMEs receiving the best available support, even if they would not necessarily be part of the analysis. In the end, 8 challenges were selected for SMEs to confront, which addressed issues regarding agricultural efficiency, energy and health, among others.

Given the study's limitations, the INFO team is trying to provide some additional qualitative insights that would give them valuable lessons on the implementation process. The limited sample size, as well as other problems in the design, would make it impossible to capture quantitative impacts. However, due to internal challenges, INFO had to postpone and extend the delivery of the interventions currently underway.

5.12. FeedS First: Feedback for Small Companies and First timers

5.12.1. Key Details

FeedS: Key details	
Research question	What type of feedback from the evaluation assessment (the intervention) – 'absolute' vs 'relative' feedback – to firms that successfully applied for grant funding (the population) is most helpful to improve on their project delivery and eventual outcomes (the outcome)?
Innovation agencies	Austrian Research Promotion Agency (FFG)
Tested intervention	Variations in feedback provided to grant applicants
Current status	Outcome data collection
Key deliverables to date	Trial Registration
Further information	Feedback for Small Companies and Firsttimers (FeedS First)	FeedS First Project	H2020	CORDIS	European Commission Landon and Hochreiter (2022) 'Randomised Controlled Trials and other experimental approach in the Austrian Research Promotion Agency (FFG) - Experience learning and outlook'

5.12.2. Rationale and project logic

The process of applying and selecting whom to provide with innovation funding can take up a large amount of time within innovation agencies and for those applying. The process often involves appointed experts undertaking critical assessments of innovation proposals. Evidence from studies with other organisations suggests that receiving feedback on proposals can be helpful to businesses planning innovative projects.[29] This has led FFG to consider providing feedback to SMEs and first-time applicants who are funded.[30] However, it is not clear what the feedback should focus on, in terms of content or format. This trial seeks to assess whether businesses are more likely to make improvements to their projects when they are given information about how their proposal compares to others.

5.12.3. Intervention

Businesses that submitted successful bids for innovation funding under FFG's 'general programme' between November 2020 and December 2021 were randomly allocated to receive feedback in one of two forms:

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[29] See, for example, Wagner, R. A., 'Wagner, Rodrigo Andres, How Does Feedback Impact New Ventures? Fundraising in a Randomized Field Experiment' (2017), https://dx.doi.org/10.2139/ssrn.2766566

[30] Applicants who are not funded already received individualised written feedback.

- Control group: Written feedback about the project application, divided into four categories: feasibility, project quality, utilisation of project outcomes and sustainability

- Treatment group: Written feedback about the project application in the same format as for the control group, as well as a breakdown of how their proposal compared quantitatively (in each of the four categories) to other businesses whose proposals were funded.

5.12.4. Evaluation design

Businesses that were awarded innovation funding during the period of the trial were randomised on a roughly equal basis between the treatment and control groups.[31] Randomisation was stratified by firm size (between startups, SMEs and larger companies). FFG expected to include approximately 200-250 firms in the trial, although in practice the number was only 164 businesses. This sample implies that the trial has power to detect a moderate difference in the primary outcomes between the control and treatment group.[32]

Two primary outcome measures were assessed in the trial: how successfully the funded project was implemented, and whether any deviations were made to the project plans. Both measures are generated by FFG's project evaluators, following a standard procedure at the close of each project. In addition, FFG surveyed funded businesses about their perceptions of the usefulness of the feedback they received.

The trial will be complete by April 2023, once the data on the performance of all the funded projects is complete and has been analysed. FFG has the potential to continue tracking outcomes over the longer term.

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[31] There were 84 firms assigned to treatment and 80 to control. As although the achieved sample size is an even number (164) the randomisation was implemented with stratification on a semi-rolling basis as firms entered the programme
[32] If the primary outcome data can be collected from all 164 businesses in the sample, the trial will have 80% power to detect a difference of 0.44 standard deviations between the treatment and control group, a medium-sized difference. Power for the secondary outcome measure is likely to be lower, but will depend on the response rate to the firm-level survey.

5.13. InnoCAP: Innovation Capacity Building in SMEs

5.13.1. Key Details

5.13. InnoCAP: Key details	
Research question	Do easily scalable support measures (peer-learning workshops and mentoring via online platform) for SME applicants to the Impact Innovation programme positively affect the project execution and the project outcomes?
Innovation agencies	Austrian Research Promotion Agency (FFG)
Tested intervention	Access to online innovation tools and mentoring
Current status	Outcome data collection
Key deliverables to date	Trial Registration
Further information	Innovation Capacity Building in SMEs (InnoCAP)	InnoCAP Project	H2020	CORDIS	European Commission Landon and Hochreiter (2022) 'Randomised Controlled Trials and other experimental approach in the Austrian Research Promotion Agency (FFG) - Experience learning and outlook'

5.13.2. Rationale and project logic

FFG's 'Impact Innovation' funding scheme supports start-ups and SMEs in carrying out non-technical innovation projects, particularly those that involve collaboration with users of a product or service. This programme was itself a novel policy intervention for FFG, with the first pilot launched in 2017 and extending funding support beyond the more traditional R&D-led innovation projects and thereby reaching a population of less established innovators.

Despite having good project plans, many businesses that have received funding under this scheme have struggled with implementation. Officials delivering the programme and an internal evaluation attributed this to a lack of understanding of innovation methods.

The projects that are funded are required to define a relevant and unresolved problem. However, with little experience in undertaking innovation projects it was found that many lack the awareness or capabilities to adopt innovation management methodologies. For example, they are not sufficiently problem-orientated, are not using iteration loops or are not sufficiently involving users and experts throughout the process, if at all. This trial seeks to test two approaches to building firms' capacity in managing non-technical innovation processes.

5.13.3. Original Intervention

The project originally targeted businesses that had been funded through Impact Innovation which were still planning projects or in the early stages of intervention. FFG settled on the need to both build the awareness and knowledge of how to undertake innovation projects, and also provide access to innovation management tools to structure their approaches.

Having considered a range of potential interventions, and having piloted a workshop for potential applicants to no perceived effect, it was decided to test the application of digital support tools. Offering more substantial support than was currently available in the form of general guidance, it is an approach that could be more easily scaled than alternatives such as in-person consultancy.

The intervention[33] combined two elements. SMEs were offered a voucher for an online mentoring platform, encouraging the SMEs to select advice and support from a range of experts. In addition, they were also offered a discount for the purchase of innovation management software to better structure processes.

A trial was designed consisting of two arms: An intervention group would be offered a combination of both digital support measures, and a control group would not receive any additional tools. The planned evaluation would have measured impacts on the innovation methods used, the successful execution of the project (whether goals are achieved and within planned timescales), and finally project outcomes (whether products/services are faster to market).

Once delivery was underway, it quickly became evident that those assigned to the treatment group were not taking up the support being offered. The project team applied a number of approaches to investigate the reasons why. Amongst those that provided feedback around half were not convinced that they needed help at that time, and the remainder recognised the need, but despite seeming positive about the support, were not going on to use it. Even with continued efforts to encourage uptake, it remained low.

The project team concluded that there remained a need to provide support but there was a significant misalignment between the digital support on offer and what the SMEs were willing and able to utilise. A decision was therefore taken to pivot their approach.

5.13.4. Updated Intervention

The new approach was to focus on the use of workshops as a means to raise awareness and knowledge of innovation processes. Delivering support without the reliance on the targeted SMEs being sufficiently motivated to select a mentor or software tool and determine how to build this into their plans. For the updated intervention, the project team also shifted their targeted population from those that had been funded to include those who are still in the process of applying or considering whether to do so.

For the redeveloped experiment, businesses that enrolled in the project were randomly allocated to receive one of two interventions:

- A training workshop on the innovation process, including guidance from FFG staff and sharing of experience by businesses that have received Impact Innovation funding in the past.

- Written guidance on the innovation process (matching the content of the workshop), along with a voucher to receive one-to-one expert advice on an online platform, Clarity.

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[33] The project team would have also liked to test each element separately and in combination but lacked the necessary sample size.

5.13.5. Revised Evaluation design

Recruitment was carried out by approaching businesses who had an account on FFG's funding portal and those in the networks of incubators, business associations or larger businesses that are already associated with FFG. For the original experiment the project team expected to recruit approximately 300 businesses. For the revised trial a total of 446 SMEs were invited to take part, from which only 61 expressed an interest in joining the workshops and completed a baseline survey.

The 61 businesses were randomly allocated between the two interventions. Randomisation was stratified by whether they received funding under the Impact Innovation programme in the past.

The project team sought to assess the relative impacts of the two interventions on three primary outcomes – attitudes towards innovation, perceived ability to manage the innovation process, and knowledge of the innovation process – as well as actual engagement in innovation activities.

Take-up of the two interventions offered to the 61 businesses did not meet expectations. A follow-up survey was carried out six months after the interventions, but only 11 of the 61 businesses responded. In combination with the low levels of take-up, the low survey response rate has reduced the potential for learning from the survey data. The project team has instead commissioned qualitative interviews of participants, which is ongoing at the time of writing. The final results are expected to be available by April 2023. Initial feedback has been positive but with uptake still low the project team are already considering what other forms of interventions could be applied. One idea under consideration is to make using external expert support a requirement of funding. This would render it even more important that the support provide benefit to all participants, and therefore, FFG are considering the possibility of providing one-to-one consultancy support. This would be a move away from the more scalable interventions tried to date, to a more intensive approach that can be tailored to individual business needs. In addition, FFG are exploring the wider application of peer-learning and knowledge exchange given the positive reception to these at the workshops.

5.13.6. Wider Learning

This experiment illustrates the risk of trying to resolve uncertainty around the ability to deliver a new intervention at the same time as undertaking a robust evaluation of its impact.

Through the experiment the project team has learnt that their original idea of providing digital support tools would not be a successful approach for supporting the targeted group of SME innovators. However, this finding was acquired through observing the immediate responses of participants, and not via the randomised controlled trial that they had taken time to craft. The team have been successful in pivoting their approach to formulate and test a new approach for delivering support. Responses to the new workshop have been more positive but these still lack the level of engagement to be considered the final iteration of how support is to be delivered.

This project illustrates why an experimental approach for developing a new intervention is best seen as a process rather than something achieved through a single trial or pilot - a point discussed in greater detail in section 4. With the team themselves recognising that in future it would be better to conduct a series of smaller pilots to refine the intervention before then proceeding to a full scale impact evaluation.

6. Findings and policy recommendations to improve innovation provision

In this section we look at some of the ideas and findings that other agencies could consider adopting or adapting as they seek to improve their own schemes. We also highlight findings and recommendations for how other agencies can apply an experimental approach themselves, to help determine if any changes they make do indeed improve outcomes.

As outlined in the previous section, however, many of the experiments were unable to robustly evaluate impacts. Even when they have, it is important to recognise that like all empirical evidence there is uncertainty as to whether the findings would be replicated if the experiment were repeated in today's business conditions, or whether they are transferable across contexts. Those looking to use findings to inform their own decisions will want to further investigate the setting for the experiments and draw in the knowledge of their own setting to judge whether the presented ideas are likely to work in their context.

6.1. Overall findings on what should be tried within SME innovation support

When implementing interventions to help SMEs to improve practices and technology usage, there remains a need to experiment?

- Given the opportunity to experiment with new forms of SME innovation support the participating agencies focused on interventions within four policy objectives:

- Building the innovative capabilities of SMEs (How to innovate)

- Helping SMEs develop new innovations (What to innovate)

- Encouraging SMEs to adopt or better use technology

- SMEs' access to innovation funding

Perhaps with the exception of SIM Crowd, each intervention involved offering some form of assistance for SMEs to improve their management practices or to adopt new technologies. 200SMEchallenge found positive results on raising awareness and knowledge of design approaches but many of the other projects, despite positive feedback, encountered challenges when implementing their interventions. This is not unexpected. The reasons why smaller businesses are typically slow to adopt and successfully implement new innovations are complex and multifaceted. To tackle them policymakers have to make a large number of choices in their approach. Systematic evidence reviews have found little robust evidence to guide decision making in Europe[34] but there is a growing body of research that can help. For example, the UK's Business Basics Programme, which IGL helped to deliver, has supported a wide range of policy experiments. [Emerging findings][35] includes the benefits of introducing peer learning into training and also from training to help SMEs to apply a more scientific approach to decision making. However, the majority of these experiments also revealed weaknesses in the design and implementation of interventions. Policymakers should also be

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[34] For example, Alfaro-Serrano et al (2021) 'Interventions to promote technology adoption in firms: A systematic review'
[35] Fuller and Phipps (2022) 'Four years of the UK's Business Basics Programme – what have we learned?', https://www.innovationgrowthlab.org/blog/four-years-uk%E2%80%99s-business-basics-programme-%E2%80%93-what-have-we-learned

prepared to iterate interventions that they intend to deliver, ideally using experimental approaches to guide their decisions.

Where is there potential to improve outcomes by using existing resources or by making small changes in approach?

Many agencies will use innovation audit tools to help businesses understand where they might have unmet potential for innovation or missing capabilities. The DepoSIt project found promising results from adapting such a tool to raise awareness of social innovation.

The findings from SIM Crowd suggests that a relatively small change in how public funding is applied to support innovators raising crowdfunding might affect the types of inventors who would be interested in investing. Both this finding and the overall approach for quickly gathering feedback on policy design warrants further exploration.

The intervention tested in the FeedS First project made use of a by-product of a mainstay activity for innovation agencies, the expert assessment of applications for innovation funding. As FeedS First is still to complete we are yet to see whether there are benefits from providing feedback along with information on how they compare to their peers. As mentioned in our summary of this project, the potential benefits from providing feedback has already been shown by other research.[36] The provision of feedback is just one aspect of what agencies could consider for improving the effectiveness, efficiency and equity of funding processes; further examples and ideas can be found in the 'experimental research funder's handbook'.

Can a 'learning by doing' approach be used to encourage SMEs to use design approaches to become new and better innovators?

Encouraging SMEs to make use of design approaches was a core feature of three projects. Each had a different area of focus but all involved an element of 'learning by doing' – i.e. raising knowledge and capabilities to apply the approach was demonstrated through practical support to each participant and not through training on the general concept and theory.

The 200SMEchallenge experiment was able to demonstrate how getting SMEs to participate in an actual 'design sprint' centred on the design of digital user interfaces led to significantly increased knowledge and 'know-how' about the method. The approach shows significant promise and it would be great to see further experimentation that can track the longer term impacts on business growth and the benefits to other participants such as students. There is also potential for experimenting with the delivery format or the application to other design challenges.

Both Create4value and DCS-iSMEs also combined a mixture of general training on design thinking approaches with support for more practical applications. For Create4value there was a particular focus on the use of co-creation, while participants in DCS-iSMEs received coaching on where and how to apply design thinking within their business. Neither project was of sufficient scale to robustly demonstrate impacts, but the experiments helped to refine the approaches and the theories of change.

Are there benefits from directly involving third parties in the delivery of support?

A typical support programme might involve the agency providing an SME with support themselves or by directly connecting them to an external organisation who might provide expertise or funding.

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[36] See, for example, Wagner, R. A., 'Wagner, Rodrigo Andres, How Does Feedback Impact New Ventures? Fundraising in a Randomized Field Experiment' (2017), https://dx.doi.org/10.2139/ssrn.2766566

For 200SMEchallenge, Create4value and InDemand-RCT the interventions have been designed to include interactions with third parties. For 200SMEChallenge, the SMEs receive inputs from design professionals but the team also includes students and recent graduates. For Create4value the agency had recruited potential customers and end users of the companies' services to the co-creation workshops. Finally, for InDemand-RCT the intervention also involved co-creation workshops but this time with the involvement of large businesses that might be potential customers for the participating SMEs.

This is something that other agencies may also want to consider and test. None of the experiments were designed to identify the specific impact of involving these third parties, but with positive feedback from the SMEs of being able to engage with a wider set of stakeholders, this seems an approach that should be explored through further experiments.

6.2. Implementation challenges to be considered when introducing new SME support:

Proceeding too fast with a novel intervention

Many of the most critical challenges faced by project teams were the result of finding that assumptions about the delivery and early outputs from their intervention did not hold once the intervention was being delivered - e.g. how easy it would be to recruit participants and how readily they would then use and respond to the support offered. While these issues often became apparent quickly, due to the way project plans were structured and resourced, it was often already too late to make changes. Sometimes even small differences in design can make a substantial difference to programme outcomes.

With a new programme there is always a risk of failure but small scale pilots make it possible to 'fail early and learn fast' by helping to identify immediate issues with intervention design and implementation, whilst also providing an opportunity to refine theory of change and evaluation plans. Larger scale experiments can then be used to evaluate impacts once an agency is confident an intervention can be delivered to plan.

Never underestimate the challenge of recruiting and then retaining the right type and number of SMEs

Almost all of the project teams found that recruitment of SME participants was a much greater challenge than expected and often that, once signed up for support, levels of uptake were also low.

The COVID-19 pandemic certainly contributed by making recruitment and delivery harder for several projects. For example, the RCT4Manu recruitment period coincided with a national lock down which had lifted by the time delivery had started so at both times potential participants were dealing with dramatic changes in market conditions. The impact of these events on the project design and delivery are explained in more detail in their project story in Annex B: 'Innovate UK & Innovate UK KTN: A series of unexpected events'.

The pandemic, however, was only a contributory factor. Many of the assumptions that project teams had made about their ability to find and recruit participants proved to be too optimistic when put to the test. It is also not a problem that is unique to these thirteen projects, being

one of most common implementation and recruitment challenges faced by those delivering[37] new forms of SME support.

Agencies who are introducing new interventions should therefore consider how they can resolve uncertainties about the ability to engage participants at an early stage, such as running smaller pilots or involving potential users within the design process itself. Evidence can then be collected to determine how accurately the need for support has been identified and what obstacles may be faced when trying to engage and deliver support to the targeted population. These early stages of testing may point to the need for relatively minor changes, such as speeding up the time between application and delivery which could have proved beneficial for RCT4Manu, or that a more fundamental iteration of the support offered is required, as was found to be necessary within the InnoCAP experiment.

How adequate is the type of training to the needs of those businesses who will be supported

Difficulties to recruit and retain participants may stem from weaknesses in the chosen engagement strategy but could also be indicative of issues in the intervention itself such as a lack of alignment between user needs and what support is offered. For RCT4Manu many of the participants felt that recommendations from the workshops were not applicable to their business. In some cases this was because they were early-stage (or even pre-revenue) businesses and could not afford to make significant investments. In other cases, the recommendations that came out of the workshops were seen as too generic, and not adapted enough to their need for more advanced and tailored information. There was similar learning for D3T, since the data-driven support offer was not very personalised, it was mainly appreciated by companies with low digital maturity.

Again this demonstrates the value in piloting interventions at a small scale, to allow the initiative to be adapted and tested again or dropped altogether.

6.3. What agencies have learnt about applying experimental approaches to innovation policy

Beneficiaries of INNOSUP-06-2018 report that they now better understand how an experimental approach can offer a robust method to think through and then test the logic underpinning their support schemes.

Through conversations with the agencies we collated findings about the enabling conditions for experimentation within two factors: openness to experiment and capabilities to experiment.

Openness to experiment

An agency's openness to experiment refers to its willingness to learn, being open about uncertainty and the use of randomised experimentation as a form of policy design and evaluation. Agencies with high degrees of openness have a tolerance for risk-taking and recognise that failure can be inevitable when exploring new ideas.

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[37] These challenges are not limited to occasions when trials are being conducted but the introduction of uncertainty to what participants will receive due to randomisation and demands for data collection can add additional hurdles that will need to be managed.

Capabilities to experiment

An agency will require access to the specific skills and resources to conduct experiments. Capabilities to undertake quantitative evaluation (e.g. knowledge of econometrics and data analysis) but to also embed research plans as they design, implement and monitor programmes.

Recommendations for running policy experiments

Based on the experience of project teams we also brought together a set of recommendations for running innovation policy experiments.

Firstly, we presented a spiral that seeks to describe the experimentation process, showing how to develop a policy experiment and avoid the risk of moving too soon.
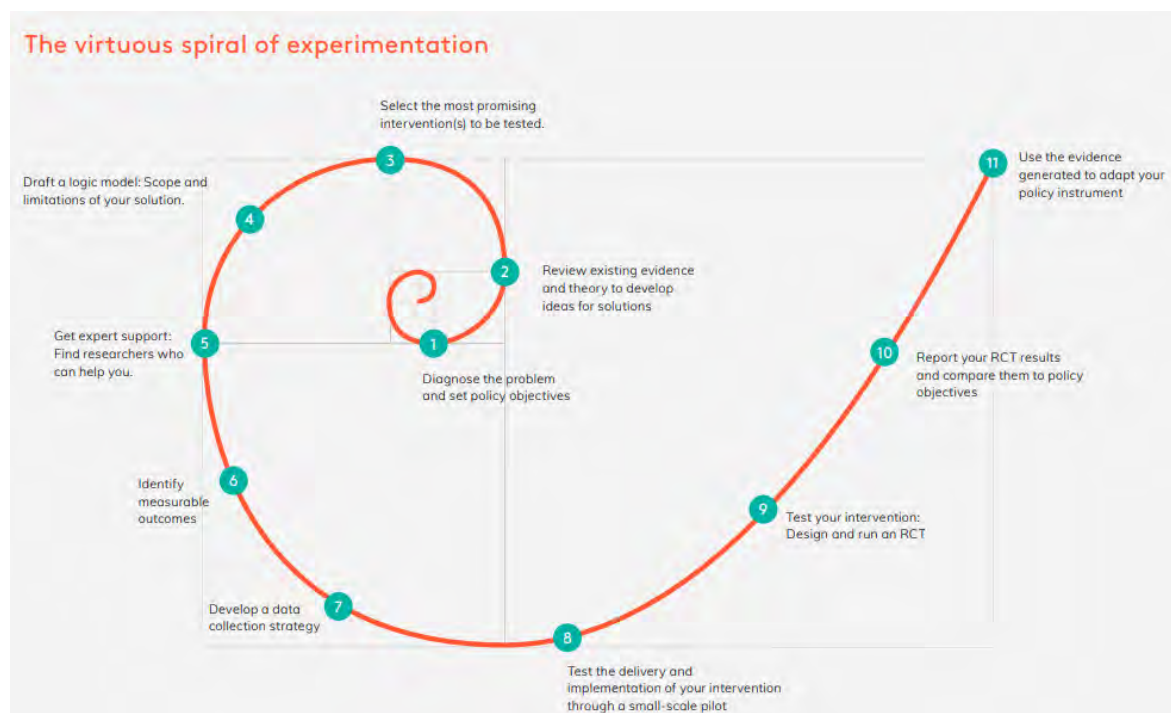
Figure 20: The virtuous spiral of experimentation

As reality is often more complex, a project team may find themselves going back and forth along the spiral. This is an expected part of the innovation process - not all new ideas will work first time and each iteration can bring benefits. Therefore alongside the spiral we set out the challenges, anticipated and otherwise, that the innovation agencies involved in INNOSUP-06 faced when designing and running their experiments, and for which IGL has provided them with support.

From these we made fourteen recommendations for other agencies that seek to replicate the approaches or run their own trials:

4. Allocate sufficient time and resources for trial design

5. Take time to craft the question if you want a useful answer

6. Find outcomes that are meaningful and observable

7. Consider when to measure as well as what

8. Get comfortable with power

9. Plan the recruitment and randomisation journey

10. Keep delivery consistent

11. Check interactions with wider innovation support

12. Don't assume that just because you built it they will come

13. Don't assume just because they come they will use it

14. Expect the unexpected

15. Invest to optimise survey response and data collection

16. Plan your analysis early and try to keep it simple

17. Pilot, as there is no substitute for experience

Finally, we recommend that anyone developing a RCT uses a trial protocol to capture the trial design and ensure all parties know how it will be delivered. This will then be supported with a statistical analysis plan so that analysis is fully planned in advance to build credibility and ensure that all of the required data will be collected.

Please see our earlier findings report[38] for a more detailed discussion on openness, capabilities, the experimentation spiral, and recommendations for running experiments. Templates for both a trial protocol and Statistical Analysis Plan can be found in Annex A of this report.

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[38]https://op.europa.eu/en/publication-detail/-/publication/ee94d850-2fb9-11ec-bd8e-01aa75ed71a1/language-en/format-PDF/source-265306657

7. Recommendations for replications and scaling up programmes

INNOSUP-06 programmes are a set of small-scale experiments that innovation agencies run using rigorous methods, mainly for the first time. As has been pointed out, the challenges of experimentation have influenced the ability of some projects to draw significant results; however, this is a natural learning process that takes time and should not be considered a one-time activity, as highlighted in Nesta's Standards of Evidence.

Experimentation should not end when the first experiment is finished. It is a recurrent and continuous learning and development process that includes additional steps once the experiment is completed. Some critical questions remain unanswered: Would the impact be the same if we ran the experiment again? Is the impact size strong enough to consider an expansion of the programme? Would it work similarly for other types of SMEs? Would it be cost-effective to scale it up? Can the intervention be delivered in the same way?

Introducing experimentation as a core function of the policy design process should also include opportunities and information for innovation policymakers to decide how and when to replicate and scale up programmes. In this context, just a single experiment should not be enough to make big and significant decisions about how suitable a programme is, mainly when the experiment has been limited in drawing substantial conclusions about the programme's impact due to lack of power or implementation issues.

Promoting iterative and incremental changes and continuous testing would provide valuable insights to gain the best results. Therefore, it is crucial for innovation agencies to create opportunities to replicate programmes and test additional elements before thinking about expanding the programme to a broader audience. Promoting replications among other agencies would also be highly beneficial, as other agencies could test the same programme and observe if it has different levels of impact on different settings.

To begin the process of successful replications, project implementers need to be as transparent and straightforward as possible about how the intervention was designed and delivered. This could include, for example, providing guidelines and detailed explanations of how and why the programme aimed to test the intervention, and what happened during the implementation process. This way, if another innovation agency is interested in the programme and aims to test it, it would be easier to follow the intervention design and delivery guidelines.

Replication is a crucial step before scaling up, and would be of enormous help when agencies consider expanding the programme afterwards. There are several elements to consider when scaling up a programme that has been previously tested. This is important because even if the experiment yields positive and significant results, it does not necessarily mean that the programme is scalable, as explained in The Voltage Effect. Some programmes work better at a smaller scale than at a larger scale. This means that ensuring that the programme can be expanded is essential for its success. Some of the elements to consider are:

1. Feasibility and fidelity

When scaling up a programme, adherence to the original intervention is vital, as it would reflect the integrity of the original programme. However, some interventions are designed in a way that can only be delivered at a small scale, making it infeasible to run at a larger scale. For instance, a pivotal point in most interventions is the degree of intensity (is the intervention using a light-touch or a hand-holding approach?) More intensive levels of support are usually more impactful, but they come at higher costs. Can the scaled-up programme keep the same level of personalisation? How many human resources would it require?

Project managers must consider the feasibility of expanding the programme and keeping the same level of intensity. Other elements could also influence the feasibility of an intervention on a larger scale, for instance, the delivery mechanisms: Can the organisation cope with a programme of that scale? Supporting this process is essential for developing measures of fidelity and fidelity recovery plans to make sure the integrity of the original intervention is maintained.

2. Interest and target group

When testing an intervention at a smaller scale, it is common to have very motivated individuals willing to participate and who have the time to do so. It is helpful to know if it works for them, but it does not necessarily mean that the rest of the SMEs would benefit as much as they do or even show the same interest in participating in the programme. Recruitment is always a challenge in entrepreneurship and business support programmes; hence, when expanding the reach of an intervention, it is essential to clarify that there is enough interest to participate and that those participating would likely benefit as well.

It is easy to confuse the 'usual suspects' participating in programmes with the genuine interest of the rest of the SME population. Before scaling up, it is essential to question how representative the portion of the SME population is that took part in the experiment, and collect data to observe potential differences and similarities with the rest of the target population.

3. Cost-effectiveness

One of the biggest challenges during the scaling-up process is to consider how costly the intervention would be on a bigger scale. While many programmes may be able to benefit from economies of scale, this is not always the case. Sometimes, an intervention could become too costly when reaching new audiences, making the programme no longer an option for the agency to consider. It is likely to happen when the intervention is highly intensive, as making a more personalised approach could be feasible but too costly.

Sometimes to make the intervention more attractive, managers include incentives and additional support elements that would help reach more people during the experimental stage. However, providing such incentives may not be affordable when the programme is implemented at a larger scale, and dropping those elements could affect the fidelity and the level of interest in the intervention.

4. Heterogeneous effects

Scaling up a programme requires running it with new participants, who may not be similar to those who have taken part in the experiment. Sometimes successfully scaled programmes show significantly lower effect sizes due to treatment effect heterogeneity at the level of individuals, as well as across space and time (what worked there and then will not necessarily work here and now).

To observe this potential impact on effect sizes, agencies should include more qualitative insights and additional analyses of outliers in outcomes to identify relevant data before the intervention, and factors explaining differences in outcomes afterwards.

5. Spillover effects

Sometimes programmes have wider impacts that had not originally been anticipated. For instance, providing training to some SMEs could negatively impact access to markets among those that did not participate - i.e. gains are purely a zero sum game with no tangible benefits

to overall productivity and growth. Sometimes these effects are difficult (although not impossible) to observe in a small-scale experimental setting.

These challenges in going to scale are highly interconnected.[39] Therefore, there are trade-offs to consider: Sometimes, scaling up means that the impact of the intervention decreases or the cost increases. Whereas in other programmes, scaling up with fixed costs can have net benefits as it increases the returns when the unit cost goes down. In this regard, there are several questions that programme managers should consider when scaling: Is the right programme to give at scale, or is it going to change significantly? Do we have enough evidence to consider who will benefit from this programme and how? Is it feasible and cost-effective to deliver it, and would businesses be interested?

Aside from those implementation challenges, other ethical implications should also be considered, e.g. collecting additional sensitive data to target interventions more effectively, implementing interventions that are beneficial on average but detrimental to some, and personalising interventions along lines that could be perceived as unfair.

Small-scale interventions should be designed to acknowledge that the programme's main elements are scalable. For example, if a training programme uses high-level expert trainers from a university, it would be ideal to consider if the centre has enough of those experts when expanding its reach and enough resources to fund them. If, for instance, the training needs to rely on other types of experts, or a single expert dramatically increases the number of SMEs they train, it may affect the outcome as it changes one of the programme's core elements.

However, before thinking about scaling up, it is essential to consider if the evidence for the programme's success is there in the first place. Interpret the findings of your experiment correctly and run replications.

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[39] To learn more see, for example, List, John et al., (2019) 'The science of using science: Towards an understanding of the threats to scaling experiments'

8. Conclusions: Achievements and challenges of INNOSUP-06

INNOSUP-06-2018 has clearly shown how a dedicated funding call can encourage innovation agencies to undertake policy experiments. By providing funding for both the intervention and evaluation in exchange for rigorous experimentation, the programme empowered internal champions in agencies to build support and find ways through the apparent barriers. It created a space for agencies to take risks with bold and innovative ideas, and subject the most promising ones to robust evaluation, with results made accessible to wider policymakers regardless of their success.

For most innovation agencies, INNOSUP-06 was a rare opportunity to apply an experimental approach to policy development and learn 'hands on' about the use of RCTs. There are many factors for agencies to consider as they determine if, when and how to run an RCT. This requires a change in the way most agencies undertake evaluation - the evaluation having to be planned in detail at the outset of the project, with a specific research question in mind and integrated into programme delivery.

The response of agencies to INNOSUP-06 was therefore a success - many agencies embraced RCTs for the first time and thirteen promising projects were supported. However, it is also important to recognise that too few projects have been able to provide clear conclusions on the causal impacts of their interventions. The disruption caused by the Covid-19 pandemic was a major factor but this often only added to existing issues with the design and implementation of the experiments. Specifically, some interventions had not been piloted previously and therefore still faced many implementation issues that needed to be resolved before they would be ready to be tested at the required scale for a trial. Others were too small from the outset and did not have the necessary statistical power to reach conclusive results.

There can be a tension between the aim of bringing forward very novel policy solutions and seeking the quick delivery of robust evidence on the causal impacts of interventions. Prior to setting up a large-scale field experiment that provides reliable causal evidence of impact, it is important to ensure first that the intervention is feasible and can be delivered as planned. Otherwise, any trials may only show that the intervention was pushed forward too soon and is not yet capable of being delivered in a way that could hope to generate the expected impacts. Yet focusing only on 'proven' interventions risks excluding truly fresh ideas, which take longer to be ready for large scale testing (hence the importance of staging funding over different time periods depending on the type of project).

IGL's initial project reviews and engagement with the teams led to a number of changes in approach but often this was too late to make a substantial difference to the outcome of the trial. It may therefore be beneficial for any future participants to join more intensive workshops to test and refine their ideas before they submit their applications and the selection process starts. This could further improve the range and quality of projects coming forward. Being fully aware of the demands for running an RCT (e.g. sample size demands) will also ensure that project proposals take into account sufficient time and resources for trial development, including the need for external evaluation partners.

Results from the experiments should, however, still prompt future work for these and other innovation agencies in Europe. Innovation and business support is becoming more complex and agencies need the opportunity to expand some of the policy lessons that have been acquired, for instance considering the potential to improve outcomes by using existing resources, applying the 'learning by doing' approach or involving third-parties in the delivery of support.

There is also scope to learn more about the conditions for creating effective programmes. Improving recruitment strategies, data collection or delivery plans is crucial to enhance the

impact of future programmes and INNOSUP-06 projects provide a base to work on programme design and development. This is highly important as well when thinking about replications and scaling-up processes.

Becoming an experimental agency does not happen overnight; it may take time, but just beginning the journey can provide valuable lessons to make visible improvements. New programmes often fail to achieve the expected outcomes, so learning what works early saves public money and maximises the impact of the support provided.

With more innovation agencies willing to engage in policy experimentation, it is vital to provide agencies with the resources and opportunities to run more experiments. If successful, the support provided will become more effective, helping European SMEs to overcome the challenges of the 21st Century.

9. Annex A: Tools and resources

9.1. IGL Trial Protocol Template

The following is a suggested template for trial protocols for those who are intending to run a full Randomised Controlled Trial.

This Trial Protocol is based on the SPIRIT statement,[40] that sets out the items essential for study conduct, review, reporting, and interpretation of trials. The SPIRIT checklist includes scientific items that closely mirror the latest version of the CONSORT statement.[41]

Each section contains suggestions of required content in both the boxes and footnotes.[42] Further guidance is available in IGL's guide to running RCTs or by contacting the IGL Team (innovationgrowthlab@nesta.org.uk).

The structure of the IGL template follows our approach for evaluating trial designs. Should issues arise in a section it is likely that these would need to be resolved by adapting plans in that section or earlier in the protocol. Therefore, we would recommend that you complete and discuss each section in turn rather than waiting until you have completed the whole template before seeking feedback.

1. INTRODUCTION

1.1 Complete project title	*Descriptive title identifying the study design, population and intervention.*
1.2 Trial registration	*Trial identifier and registry name. (It is now accepted best practice that all trials are pre-registered, we would suggest using AEA).*
1.3 Protocol version	*Date and version identifier* *Record any changes made to the trial design*
1.4 Roles and Responsibilities	*Names, affiliations, and roles of trial personnel*

2. MOTIVATION AND SETTING

2.1 Rationale	*Policy and research background and justification for undertaking the trial. For example, what evidence gap has been identified and what policy decisions are to be informed.*
2.2 Main Research Question[43]	*PICO Approach. Write down your research question that your RCT has been designed to answer, being clear about:*

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[40] Standard Protocol Items: Recommendations for Interventional Trials (SPIRIT).
[41] Consolidated Standards of Reporting Trials (CONSORT). Please visit this link for examples: http://www.consort-statement.org/examples/sample
[42] These can be deleted as you complete those sections.
[43] Avoid setting too many primary questions to answer. Trials are typically powered to detect changes in a single primary outcome. Multiple primary outcomes require larger samples (or an analytical correction). Example: For SMEs (the population), does offering access to 30 hours of free business coaching alongside a grant (the intervention) lead to faster sales growth (the outcome) than offering the grant alone (the control)?

	Population - who are being compared Intervention/Control - what (and to whom) you are comparing Outcome – what do you want to see change
2.3 Setting	*Where will this study be taking place?* *For example, will the study be confined to a specific geographic area or as part of an existing business support programme.*

3. PARTICIPANTS, INTERVENTIONS AND OUTCOMES

3.1 Participants	*Description of who is eligible and how they will be identified; description of exclusion criteria for participants if applicable.*
3.2 Interventions	*Details of the interventions for each group with sufficient detail to allow replication.*
3.3 Outcomes[44] [45]	*Clear definition of primary and secondary outcomes, including the specific measurement variable, analysis metric which corresponds to the format of the outcome data that will be used from each trial participant for analysis (e.g. change from baseline, final value, time to event), method of aggregation which refers to the summary measure format for each study group (e.g. mean, the proportion with score > 2), and time point of interest for analysis for each outcome.*

4. LOGIC MODEL

4.1 Logic Model
Setting out the underlying logic or theory of change and a set of assumptions about how an intervention works.[46]

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[44] If some of your measurement instruments (including composite scores) will be constructed, e.g. 'attitude to new technology', please provide a description of how the outcome will be constructed from the main variables.

[45] As projects typically face sample and time constraints, we often recommend that projects identify proximate outcome measures that are key determinants of success - e.g. have SMEs advanced through different stages of adoption or delivered changes within their businesses that are expected to deliver positive impacts on productivity.

[46] A logic model will help to see the intended mechanism for change for each programme or policy and should also underpin what data needs to be collected for each evaluation. This can be helpful to identify the proximate outcome measures that can provide more timely measures than measures such as SME productivity. Logic models should also help to identify risks or contingency factors which may mean outcomes are not as envisaged.

Your theory of change

Challenge hypothesis	Inputs	Outputs	Short-term outcomes	Long-term outcomes
Write out your "if... then..." statement	What will you need to contribute to achieve this change?	What will be the immediate outputs?	What are the short-term changes or results you expect to see?	What are the long-term changes or results you expect to see? What's their magnitude?

5. TRIAL DESIGN

5.1 Description	*Description of trial design (such as parallel, factorial) including the number of trial arms, unit of randomisation (e.g. individual or another unit such as startup, SME, class, school), the point(s) of randomisation and allocation ratio.*

5.2 Trial Diagram
Add a simple representation of the trial design. Below you can find an illustration of how this would look.

Population
Firms between 0 and 50 employees who feel they are lagging behind others but unsure what new technology is available or what benefits might be.

Recruitment

Eligibility checks conducted
Criteria: 1. firm size, 2. Genuine challenges in assessing technology needs

Sample
Eligible firms

Baseline data collection

Randomisation

Control group
Eligible firms

Treatment group
Eligible firms

Randomisation

Workshop only group

Workshop + coaching group

Follow up data collection
Main outcomes: Awareness of new technology; Explored new investments; Have adopted new technology; Business growth and productivity

6. RANDOMISATION AND ASSIGNMENT

6.1 Allocation Sequence	*Description of randomisation methods used to generate the allocation sequence* - *pure* - *stratified/blocked (please specify strata) - recommended* - *paired* - *cluster (please specify)*

6.2 Allocation Mechanism and Implementation	*How will you implement the allocation sequence - ie process by which assign participants to different arms of the trial.*
	Who will be involved in this process?
	Will randomisation occur before or after baseline data collection and eligibility checks?[47]

7. STATISTICAL ANALYSIS

7.1 Intended comparisons	*Please specify all the different comparisons to be carried out, e.g.* - *comparison of treatment groups along different outcome measures* - *comparison of different groups (e.g. treatment vs control, treatment 1 vs treatment 2 etc.)* - *comparison of different subgroups (e.g. male- vs female-owned businesses)*
7.2 Statistical methods	*Description of the statistical methods to be used to compare the groups on the primary and secondary outcome measures:* - *statistical test (e.g. t-test, chi2-test, linear regression with covariates etc.)[48]* - *treatment of standard errors*
7.3 Additional analysis	*Description of methods for any additional analysis (e.g. subgroup and adjusted analyses or mediation analysis).[49]*

8. POWER AND SAMPLE SIZE

8.1 Sample Size[50]
Description of estimated number of participants needed to achieve study objectives and how sample size is determined, including assumptions supporting any sample size calculations alongside the minimum detectable effect size for main outcomes. *(Please see Table 1 below for examples of assumptions to consider.)*

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[47] We would almost always recommend afterwards unless there is a very good reason why this cannot be done.

[48] We typically encourage the use of two-sided tests for comparisons - if a one-tailed test is to be used, we ask that justification be provided.

[49] Please ensure that the analysis plan addresses all research objectives set out in the 'Objectives' sections above.

[50] There are a number of factors involved in estimating the sample size, including:

Type and structure of the trial and research question; Effect size - 'Minimum Detectable Effect Size (MDES); The 'noise in the outcome variable' (i.e. unexplained variance).

Two approaches to estimation:

Fixed Sample: What is the smallest true impact that I can be confident of detecting given a sample of this size?

Target Impact: What sample size do I need to be confident of detecting an impact of this scale?

It is important to highlight that statistical significance is not the same as policy significance. What scale of impacts would inform your policy decision? For example, how much want to increase the proportion of SMEs who adopt technology x; % change in productivity or the ratio of net economic benefit to programme cost.

Ideally, want to align the Minimum Detectable Effect Size in the trial with policy significant outcome. So able to say with confidence whether impacts exceed or fall short of decision thresholds.

Table 1: Potential assumptions relevant to sample size calculations [51]

8.2 Assumptions to consider	Value/Details
Criterion for statistical significance (probability level; typically 0.05)	
Power against alternative hypothesis (conventionally 80%)	
Allocation ratio, i.e. proportion of randomisation units assigned to treatment (e.g. 50% of the total sample assigned to treatment in a two-arm trial)	
Treatment compliance - participants switching treatment groups - participants in the treatment group deciding not to take up the offered program - participants dropping out of the experiment entirely (such that we no longer collect their data)	
Number of individuals per randomisation unit (applicable to cluster randomised trials)	
Intra-class correlation (ICC) coefficient (rho) (applicable to cluster randomised trials)	
Proportion of variance in the outcome explained by covariates (R-squared) - if applicable	
Correction for multiple comparisons	
Software used for Minimum Detectable Effect Size calculations.	

Note: if the required sample size (or minimum detectable effect) is unrealistically large, i.e. the trial is unable to detect economically meaningful effects, we recommend reducing the number of comparisons (by dropping a treatment arm, or restricting subgroup analyses) and/or reducing the noise in the outcome measure (by using stratified randomisation, more precise outcome measures or repeated measurements).

9. RECRUITMENT AND DATA COLLECTION

9.1 Recruitment	*How do you intend to recruit sufficient numbers to deliver the trial as designed and achieve your target sample size?*
9.2 Assessment of data collection	*Plans for assessment and collection of baseline, outcome and other trial data (incl. how and when - ie timeline for data collection and when data will be available).*

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[51] Please use Table 1 to provide a summary of the key assumptions you have made, detailing and fully justifying your choices in the text below - where have the assumptions come from and why have you decided to use these (including why something is not relevant).

	Have you considered any unintended effects of the intervention (these will be specific to each programme and should be thought through alongside the logic model/theory of change).
9.3 Data collection instruments	*Description of data collection instruments (e.g. questionnaire, test, scale, rating, or tool) along with their reliability and validity, if known.*
9.4 Business retention plan	*Plans to maximise participation in data collection (e.g. survey response rates) including how data could be collected for businesses who drop out of programmes (if applicable).*
9.5 Cost-effectiveness analysis	*Are you intending to undertake an analysis of cost-effectiveness? If so, how will costs be estimated?*

10. IMPLEMENTATION AND PROCESS EVALUATION

10.1 Process evaluation and implementation: questions and purpose[52]	*Specify any implementation questions to be addressed by a process evaluation.* *How will the process evaluation complement the overall evaluation?*
10.2 Process evaluation: methods and data collection	*Description of methods used in the data collection (incl. why, how and when).* *This could include:* *- A summary of the methods you will use to assess programme fidelity so a 'non-compliance' analysis can be carried out.* *- The variable(s) used to estimate dosage and/ or compliance (e.g. how many workshops are attended), clarifying the level at which compliance is defined (e.g., individual participant, business, hub).* *- A summary of the methods you will use to assess usual practice at baseline and endpoint of the trial in treatment and control settings*
10.3 Wider Impact evaluation	*What other approaches are being used to assess and understand impacts, for example:* ● Additional comparison groups or other quasi-experimental approaches for estimating impacts in addition to the main trial ● *Externality benefits or disbenefits (eg economic displacement)* ● *Wider social benefits - eg individual well-being or inclusion*

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[52] Process evaluation can be crucial for understanding the effects and exploring potential causal mechanisms of complex interventions or for assessing programme fidelity.

11. ETHICS

11.1 Ethical concerns	*Any ethical concerns, for example, could there be any harm caused to the businesses who receive the intervention, or to a comparison group who do not receive the intervention and how these will be mitigated. Please see the <u>IGL trials toolkit pre-trial preparation section</u> for information on ethical issues.* *If applicable, please explain the process for obtaining ethical approval, including timelines and responsible parties.*
11.2 Consent or assent for participation in the trial	*Describe the procedures for obtaining agreement to participate in the trial.*
11.3 Confidentiality	*Processes for ensuring data confidentiality - how will personal or otherwise identifiable information about potential and enrolled participants/businesses be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial?*
11.4 Data Protection	*Include a data protection statement relevant to the project.* *- If processing special categories of personal data, clearly describe the special data and the rationale for processing them with reference to the evaluation design.* *- Will you need to process special categories of personal data, provide a clear rationale for the legal bases selected for personal and special data, with reference to your organisational policies and the design of the specific evaluation project.*
11.5 Declaration of interest	*Any competing interests of evaluators should be declared.*

12. RISKS

Description of risks to the trial and how they might be addressed.

Trial risk register with examples:

Risk	Assessment	Countermeasures and contingencies
Venture attrition	Likelihood: moderate Impact: moderate	Clear information / initial meeting with the Providers explaining the principles of the trial and expectations. Both 'intention to treat' and 'on-treatment' analysis will be used. Attrition will be monitored and reported according to CONSORT guidelines.
Interventions are not implemented well	Likelihood: low Impact: moderate	Clear information / initial meeting with the Providers explaining the principles of the trial and expectations. Both 'intention to treat' and 'on-treatment' analysis will be used. Process evaluation will monitor this.
Spillovers/ contamination	Likelihood: Low Impact: Moderate	Recruit firms operating in different markets who are not part of the same business networks and are unlikely to share information/resources with each other

| Failure in recruiting ventures | Likelihood: low

Impact: high | Project team will make use of their research operations unit at their organisation to recruit more businesses. Timescale could be revised. |
| The Provider does not follow trial protocols | Likelihood: moderate

Impact: high | Meetings with the Providers at the start of the project. Provision of clear guidance describing protocols for distribution to all Providers. |

13. TIMELINE

Phase[53]	Time period
Phase 1: Trial design and preparation (trial protocol, survey design, etc.)	e.g. Sept. 2019 - Nov. 2019
Phase 2: Recruitment (engagement, baseline, randomisation, etc.)	e.g. Dec. 2019 - Jan.2020
Phase 3: Intervention Delivery (treatment period)	e.g. Feb. 2020 - Nov. 2020
Phase 4: Data Collection and analysis (final follow-up survey, qualitative data, etc)	e.g. Decl. 2019 - Jan. 2021
Phase 5: Reporting (concluding analysis and evaluation report)	e.g. Feb. 2021

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[53] Although this is the most common time structure for trials, not all projects follow this clear path. Feel free to change the phases if necessary.

9.2. IGL Statistical Analysis Plan Template for RCTs

This template is recommended by IGL for pre-specifying the details of the statistical analysis that will be used to assess the outcomes from randomised trials. Using a pre-specified statistical analysis plan adds greatly to the credibility of the findings of a trial, by demonstrating that the researcher has not engaged (even unconsciously) in specification search. The statistical analysis plan will also enable the evaluator or researcher to carry out key analysis rapidly once the outcome data becomes available, so that the key findings from the trial can be made available in a timely fashion.

The statistical analysis plan should be completed and registered online **before the collection of outcome data takes place**. Preparing the statistical analysis plan provides an opportunity to revise the outcome measures that were defined in the trial protocol, based on learning about the measurement approaches from the baseline data and/or on changes in the project team's expectations of the outcomes that may be affected by the treatment(s). It is important to **review the outcome measures with the project implementation or delivery team** before completing the statistical analysis plan, so that any changes in expectations about the most appropriate outcome measures are reflected in this plan.

Sections 4, 6 and 7 of this template include recommendations on approaches that are suitable for the majority of trials supported by IGL. These recommendations are in line with the guidance set out in IGL's Guide to Quantitative Analysis of RCT Data. However, since trials vary in their design and context, there may be good reasons for diverging from these recommendations in particular cases.

1. INTRODUCTION

1.1 Project title	*Descriptive title identifying the study design, population and intervention.*
1.2 Trial protocol	*Reference to version number and date of trial protocol (include a link if trial protocol is available online)*
1.3 Trial registration	*Link to trial registration (e.g. on https://www.socialscienceregistry.org/)*
1.4 Author(s) of statistical analysis plan	*Name and affiliation of the author(s) of this document*

DOCUMENT HISTORY

Version number	Date	Significant changes made

3. LOGIC MODEL

Has the project's logic model (setting out the underlying logic or theory of change and a set of assumptions about how an intervention works) changed since the trial protocol was completed? If yes, insert an updated version of the logic model and a brief description of the changes below.	*Yes/No*

4. PRELIMINARY CHECKS

Describe the checks that will be carried out before beginning data analysis. This will normally include a check that the treatment and control groups are balanced in their baseline (pre-intervention) characteristics, as a confirmation that the randomisation worked as expected and that there has not been significant attrition bias.

In most cases it is also useful to revise the power calculations set out in the trial protocol, to establish the minimum detectable effect size that can be estimated from the data available. If the minimum detectable effect size is larger than the minimum policy-relevant effect size, the findings of the trial may not be useful for informing future policy decisions: if so, a change in evaluation approach may be required.

	Default approach (IGL recommendation)	Approach to be used
Balance checks	*Produce a table showing the means of the baseline characteristics in each of the treatment and control groups.* *Carry out an F-test for joint significance of these characteristics in predicting treatment status. (More information here.)* *Carry out the steps above twice: once for the sample as originally randomised, and once for the sample as analysed.*	
Power calculations	*Revise the power calculations set out in the trial protocol, calculating the ex-post minimum detectable effect size with the sample available for analysis and with estimates of the standard deviations and (if relevant) intra-cluster correlations from the baseline data or from the control group in the final dataset. (More information here.)*	

5. CONSTRUCTION OF KEY VARIABLES

5.1 OUTCOME MEASURES

For each of the primary and secondary outcome measures, describe exactly how the measures will be constructed from the raw data. Enough detail should be included to allow your analysis to be replicated exactly. Annexing a file with the code that will be used to do this in your statistical software is ideal.

In the right-hand column, note any changes in the outcome measures that have been made since the trial protocol was finalised. This may include changes in the definition of the outcome measures or in whether each are to be considered as primary or secondary measures.

Primary or secondary outcome?	Description of variable	Detailed definition (referring to question numbers from survey instruments, if applicable)	Any significant changes made since the trial protocol

5.2 CONTROL VARIABLES

Describe the construction of each of the variables that will be used as control variables/covariates in your main analysis, if any.

Description of variable	Detailed definition (referring to question numbers from survey instruments, if applicable)

6. DATA CLEANING

Describe any steps that you intend to take to prepare the data for analysis, including whether any observations will be excluded from the analysis and how you will deal with missing data.

	Default approach (IGL recommendation)	Primary approach to be used	Any alternative approaches to be used as robustness checks
Handling of missing data in outcome measures	*Either exclude observations with missing values from the analysis (if there is limited missing data or evidence that it is missing at random) or calculate Manski bounds (if the outcome measure is binary or discrete and attrition is low).*		
Handling of missing data in covariates	*If less than 10% of observations have missing data, replace with the unconditional mean of the variable in the non-missing observations. Otherwise, replace the missing values with zero and create an additional variable indicating missingness, to be included as an additional covariate.*		
Criteria to be used to exclude observations from the analysis	*None*		
Any additional data cleaning	*None*		

7. MAIN ANALYSIS

Describe in detail how you will carry out the main analysis of outcomes in your trial.

The information below should apply to the analysis of both primary and secondary outcome measures. If a different approach is being used for the analysis of secondary outcomes, then this should be noted.

	Default approach (IGL recommendation)	Primary approach to be used	Any alternative approaches to be used as robustness checks
Type of treatment effect to be estimated	*Intention to treat (ITT)*		
Treatment groups to be compared	*If the trial has two arms: treatment group against control group.* *If the trial has more than two arms, specify which comparisons you expect to have sufficient statistical power for, and adjust for multiple comparisons in your inference (see below).*		
Type of statistical test	*First step: unadjusted t-test (for continuous variables) or chi-squared test (for binary variables)* *Second step: estimate linear regression/linear probability model using ordinary least squares (for continuous or binary variables)*		
Covariates	*First step: no covariate adjustment* *Second step: adjust for (i) stratification variables, (ii) baseline values of outcome variables, (iii) any other variables that are strongly predictive of the outcome in the baseline data.*		
Weighting of observations	*Weight observations equally unless there is a reason for an alternative weighting.*		
Accounting for clustering in sampling or random- isation	*(Applies only if using a clustered design.) If there are at least 50 clusters, calculate cluster-robust standard errors. If there are fewer than 50 clusters, calculate randomisation inference-based standard errors, or use a cluster-aggregated approach.*		
Subgroup analysis	*None, or (if statistical power allows) only carry out subgroup analysis among groups that were used for stratification.*		
Correction for multiple comparisons	*(Applies if there is more than one primary outcome measure, or more than two trial arms, or if any subgroup analysis is being carried out.) Calculate the family-wise error rate, using Bonferroni correction or an alternative method.*		
Statistics to be reported	*Point estimates, 95% confidence intervals and continuous p-values*		

8. SUPPLEMENTARY ANALYSIS

Describe any additional analysis that you are planning to carry out with the trial data. This may include:

- Estimation of alternative types of treatment effect (e.g. estimate of the local average treatment effect, LATE, among those who complied with the treatment)
- Estimation of treatment effects on additional outcome measures
- Estimation of treatment effects among additional subgroups

Evaluators are free to conduct any additional exploratory analysis once the data is available. However, specifying in advance the analysis that will be carried out adds credibility to the findings, by reducing the potential for specification search.

Type of analysis	Details

10. Annex B: Project stories - The experiences of beneficiaries

IGL has produced a number of blogs that capture the experiences of INNOSUP-06-2018 beneficiaries, giving other agencies who want to follow their approaches some of the inside stories of a team's motivations, challenges and learning from their experiments.

These project stories have been published as blogs on the IGL website. These blogs have been taken from the site, and reproduced below.

10.1. KEPA: A tale of piloting, exploring and scaling

In 2018, the European Commission introduced a new EU Horizon 2020 programme - INNOSUP-06-2018 - to encourage innovation agencies across Europe to experiment with their policy programmes. Here at the Innovation Growth Lab, we have been supporting both the EU and innovation agencies to succeed. This piece explores the journey of Anna Koktsidou, a member of Greece's Business and Cultural Development Centre (KEPA) team, who are currently partaking in the INNOSUP programme.

Anna has worked for KEPA for over a year, and for her, their EU funded project 'Design Customised Support for Innovative SMEs' has the potential to demonstrate the famous adage: teach a man to fish and you feed him for a lifetime. She sees imparting the concept of design thinking - a human-centred approach to innovation - as a way of granting businesses the opportunity to intrinsically shift their approach and consistently yield greater long-term positive outcomes.

As the INNOSUP-06 programme began, KEPA was launching the Hellenic Design Centre in Thessaloniki as part of wider efforts to promote the use of design thinking in both the public and private sector.

Design thinking allows organisations to approach problems in a human-centric way, researching and defining their users' needs, challenging assumptions and creating innovative solutions as a result. KEPA hopes to grow the use of this methodology within Greece, in order to enhance the competitiveness of Greek SMEs with the production of innovative products and the creation of high-quality services.

An earlier H2020 project, Design Shots, allowed the team to explore a light-touch design diagnostic for SMEs. Later, the INNOSUP-06-2018 programme afforded KEPA with an exciting opportunity to create a more substantial policy intervention that would target an apparent gap in the support available to SMEs after they had drawn down innovation funding. (You can read more about the intervention they have developed here).

Running the pilot as an experiment to demonstrate the effectiveness of design thinking was an idea with strong buy-in from leading government figures in Greece, as the majority of their information on the impact of design thinking was derived from other countries and large corporations. For Greek officials, there was a demand for more evidence which was based on the specifics of their environment, factoring in the smaller nature of some Greek organisations and their idiosyncrasies.

Though KEPA had previously been unfamiliar with experimentation in general, and typically planned evaluations once programmes were underway, they now aimed to test the impacts of design thinking by using a small-scale pilot with some participants randomly selected to receive the full 'Design Customised Support' programme. In doing so, the team's objective was to build their own capacity to run experiments and help embed this approach across innovation policy.

The unforeseen impacts

Anna's own experimental journey with KEPA began as the project was just beginning, and it saw her covering implementation, recruiting and attracting SMEs to take part, but also developing KEPA's evaluation plan.

This was not the first time Anna had come across this human-centred approach; she had worked in a communications position for the Joint Secretariat team of Interreg prior (an organisation helping regional and local governments across Europe to develop and deliver better policies). Anna has since realised that a large part of her previous work centring on an audience's behaviors falls into what she now considers to be design thinking.

A number of challenges were encountered as KEPA began refining the details while developing their planned experiment. As an entirely new intervention and with support to be tailored to business needs, it proved difficult to know in advance how best to define outcomes measures and collect data in a way that would enable statistical comparisons across the two arms of the trial. With ten SMEs able to participate in the actual pilot, however, the achievable sample would always have been too small to provide reliable estimates of the programme's impacts. The team therefore had to adapt plans, shifting the focus to more qualitative assessments of how SMEs would benefit from the programme and creating the basis for future quantitative evaluation.

Initially when the call opened, optimism was high within the team; there was a significant level of SME interest, with numerous organisations seeking more information. However, soon after launching this phase of recruitment, KEPA's experience was put to the test by the unprecedented spread of the Covid-19 pandemic within Europe. As a result, it was unclear not just as to when was best to resume activities, but whether proceeding at all would be viable.

The call had to be relaunched, and this time around, interest was - as expected - not as high. KEPA's offer was no longer as appealing to companies dealing with the devastating impacts of Covid-19, who were primarily concerned with staying afloat.

They had hoped to try and capture information from a much larger sample of interested SMEs and then select ten core participants from within this group to receive access to their 'Design Customised Support' programme. The small sample size and unusual timing of the call limited the team's ability to be selective with who entered the pilot and to draw insights on wider demand. There was also a need to overhaul the approach to delivering the intervention - moving to an entirely digital route.

Outcomes and next steps

At the very outset, Anna was hesitant about the benefits of experimentation. She had never seen an experimental, scientific approach applied to social sciences, and the thought of it was somewhat intriguing yet novel. Through running the experiment, however, Anna has admittedly shifted her initial stance rather drastically, having learned some valuable lessons in both what works and what does not when it comes to policy experimentation.

More broadly, Anna attributes part of her learning journey to her participation in the activities organised as part of INNOSUP-06 by IGL. 'I have to say that the peer learning sessions were very helpful', Anna notes, 'especially being guided through the difficulties of implementing the project'. Learning from the experience of others undertaking experiments similar to theirs was incredibly beneficial for KEPA in knowing how best to approach their project.

Though KEPA did not get to explore their hypothesis to its fullest extent given the wider context, Anna can now better recognise the potential of experimentation. The full benefits of running an RCT would come at the next stage of the intervention's development - at a larger scale and with proven measures. However, with hindsight Anna believes that their pilot could have

yielded more valuable evidence if they were able to be more discerning about who took part, selecting SMEs of a similar size, sector and particularly ones facing similar problems.

KEPA has navigated and overcome the challenges faced, and the fact that this was a small-scale pilot has provided them space to develop their approach and learn not only about taking an experimental approach, but also how businesses would use and benefit from the Design support. The pilot granted Anna and her colleagues direct engagement with the businesses and the ability to observe benefits of the more tailored support, gaining greater insight and understanding of the underlying mechanisms and how one could create more quantitative outcome measures to assess outcomes from a larger project.

'The fact that this was a small-scale pilot has provided them space to develop their approach and learn not only about taking an experimental approach, but also how businesses would use and benefit from the Design support.'

With the feedback and support of IGL in designing a survey, Anna is keen to begin this next stage of the project, organising interviews with SMEs involved.

Anna hopes the SMEs' feedback will be beneficial enough to advocate for the design thinking methods used, as she herself is a convert to experimentation. She is keen for experimental methodology to be considered in future funding opportunities and programmes, and has even specifically advocated for its use on a separate project that she is currently working on. The key learning KEPA hopes to take forward for future pilots is to avoid vague parameters and unclear indicators, and instead to be more specific with what they test, using more scientific methods to draw significant conclusions and robust information.

Running a pilot before proceeding to the full trial has been game-changing for KEPA, as this preparation allows for more time-efficient, well-prepared activities later down the line; they have a better sense of best practice and how to avoid potential pitfalls. For the team, the unforeseen barriers to experimental success have only served as further proof of what is potentially possible: this is just the beginning of their experimentation journey.

10.2. Innovate UK & Innovate UK KTN: A series of unexpected events

In 2018, the European Commission introduced a new EU Horizon 2020 programme - INNOSUP-06-2018 - to encourage innovation agencies across Europe to experiment with their policy programmes. Here at the Innovation Growth Lab, we have been supporting both the EU and innovation agencies to succeed. This piece explores the journey of a representative from Innovate UK's Economic and Insights team, who is currently partaking in the INNOSUP programme.

We recently sat down with a representative from Innovate UK's Economics and Insights team, and discussed their EU funded project 'RCT4MANU: Testing an innovative support scheme for manufacturing SMEs and accelerating the use of RCTs in innovation agencies'. Innovate UK co-designed this trial with Innovate UK KTN, with the aim of evaluating the effectiveness and impact of the 4Manufacturing® tool - an innovative support programme designed by Innovate UK KTN, based on diagnosis and one-to-one consultant advice, which aims to accelerate the adoption of industrial digital technologies for manufacturing SMEs.

The need for more evidence

The intervention sounds straightforward: Manufacturing businesses interested in understanding the potential of digital technologies through one-to-one business support from an Innovate UK KTN advisor were to sign up for a 1-2 day session. In this session, the advisor

would use the 4Manufacturing® framework to help the business identify the challenges they face and how best to start tackling them, or whether to take a step back and address an entirely different but more pressing issue. The advisor would then recommend technology areas to explore.

With a treatment group receiving the intervention first, and a control group receiving the same intervention a year later, the team were hoping to see SMEs adopt new technologies that would lead to either greater productivity or environmental sustainability. As a member of the project team explained, though experimentation has been an ambition of Innovate UK, historically, evaluations were planned as an afterthought, making it difficult to draw robust conclusions. 'You're under constant pressure to deliver things faster and better', they explained, 'there isn't really the appetite to do experimentation because it adds costs.' The INNOSUP programme, however, gave the RCT4MANU project team an opportunity to be deliberate about their expectations and outcome measures from the outset.

Now!	By 11 Dec	Early Jan	Late Jan	Feb-Apr	Aug-Oct	Jan 2022
Register your interest in receiving 4Manufacturing® support	Complete our 4Manufacturing® survey	We randomly allocate places to those who have completed the survey	Advisor contacts you to arrange introductory call	4Manufacturing® support commences (calls, workshop, follow-up)	Progress review	Capturing success – second 4Manufacturing® survey

From theory to practice

Starting work in September 2019, the team embraced the importance of upfront planning and dedicated many months to perfecting the intervention and planning the design of the trial in detail, considering what options to test and whether to perhaps test more than one type of intervention. Despite their careful, thought-out approach, they still encountered later issues; some of these were due to unprecedented circumstances and others were roadblocks the team may have hit regardless - the theory may have been sound but the policy plumbing had not been tested.

Dealing with the unexpected: Covid-19 strikes

With six months upfront planning up their sleeve, the project team were ready to launch in March 2020, and unfortunately, they hit their first unexpected wall: the onset of the Covid-19 pandemic. As a result, the team faced their first tough decision: Was it worth continuing as planned or delaying the intervention until the impacts of the pandemic became clearer? With so many businesses having to suspend activity at the time, the decision was made to pause the intervention for six months to wait and see what would happen. The team tentatively picked back up where they had left off in the autumn of 2020. Recruitment began in November in the hope that they would have around 350 sign ups by late December and could begin implementation in early January 2021.

Unfortunately, yet again, things did not run as smoothly as planned. With the Covid pandemic escalating, and with regional lockdowns in the UK shifting towards a full national lockdown, the project team did not manage to recruit as many businesses as they had initially hoped. As a member of the project team explained, their ability to sign up only 90 businesses was not just down to Covid, but also partly to do with some of their assumptions when approaching

recruitment. They initially felt confident in relying heavily upon their existing contact list and then only extended their approach later when the results of this tactic were disappointing. Looking back now, the Innovate UK representative acknowledges that this overestimation of how readily the targeted businesses would respond to their offer was a part of the problem.

Navigating the unexpected

As a result of all these issues combined, including changes coming for many of their targeted manufacturers as a result of Brexit, the team had to go out to different populations in order to get more businesses to register their interest, and had to keep their baseline survey open for longer than expected as businesses were not readily completing this part of the process. Additionally, they realised with a new research partner on board that they needed further ethics approval; this meant that they had to retroactively ask businesses for their consent, again fuelling further drop outs. The outcome of these changes was that the team faced their second big hurdle. Since they were waiting until recruitment was complete to begin implementing the programme: the longer they extended their recruitment process, the more of those that had already signed up dropped out. The catch-22 of extending recruitment can be that by drawing out the time spent trying to bring in new sign-ups, you lose the attention and the interest of those who joined at the start.

The team realised that they faced a constant trade off between how they wanted to achieve the best research results possible that demanded a larger sample, and what was practically achievable. In the end, they stuck by their original plans not to keep recruitment open any longer and get ready to start delivering support between January and April 2021. They hoped that in doing so, they would be able to prioritise and hold on to their initial sign ups, and not delay the treatment group's support too much. At this point, there was one final negative impact from Covid: while the post-lockdown recovery was good news for their recruited businesses, many of them were now too busy to take up support.

The effects of Covid, however, were not all negative. Initially, with RCT4MANU being a versatile framework, the team had expected to scale up the project through other parties (e.g. Local Enterprise Partnerships and those with business support knowledge). However, due to the lower than expected sample size, Innovate UK KTN ended up delivering the intervention entirely in-house. Though they were not able to test the scalability of the framework in the same way, this gave them greater fidelity and consistency of delivery, and ultimately more control over how it was delivered. This also allowed them to develop a detailed understanding of implementation that is useful when they talk to other parties interested in adopting the 4Manufacturing® framework.

What can be learned?

Ultimately, the onset of Covid meant that despite the team's considered trial design, many aspects of this intervention could not be planned for, and many tough decisions had to be made when it came to prioritisation and holding on to recruited businesses.

It is hard to draw a fixed line, however, between impacts caused by Covid, and those which may have cropped up regardless. As an Innovate UK team member points out, some of the challenges that the Innovate UK and Innovate UK KTN team faced were around recruitment and the oversight they had that businesses do not always want to wait around too long for support - an assumption which formulated the basis of their trial design. Whilst Covid certainly contributed to the willingness of businesses to sign up for support, as they faced graver issues at the time, it certainly was not the only reason that the team faced recruitment challenges. Ultimately, those working on the RCT4MANU project learned a similar lesson to those in the KEPA team: piloting is always a good idea in order to test out the weaker parts of your trial design and implementation plans before you scale up.

Despite these challenges, the team representative that we spoke to was a proponent of the overall experimentation journey.

'What we've learned through the process has been really valuable', they shared, as for one, 'there are so many elements of the RCT development that you can apply outside of an RCT context to properly evaluate your programmes'.

Overall though, they remain keen on continuing with an experimental approach but note that using an RCT may not always be the ideal approach, as they added that 'a well run RCT [can be] the gold standard, not a poorly run one'. By instilling best practice from the beginning, and adopting a rigorous evaluative mindset to the way you make experimental decisions, you are not only less likely to run into hurdles along the way, but you may be better prepared to navigate the unforeseen circumstances which may crop up.

10.3. Demonstrating the impact of a policy to support SMEs in designing more competitive products and services

The promise of user-centred design

One of the key competitive factors for businesses is the capability to develop **more valuable products and services.** In traditional businesses, this is normally done through R&D, engineering, marketing, as well as industrial design, which are well established practices.

With the digitisation of products and services, methods and practices for **developing products and services** in companies have drastically changed. Research and development processes have become less structured, and time to market has decreased substantially. More recently, personalisation and mass customisation of products have become a must.

New methodologies and practices have emerged to cope with such industry and market transformations: prototyping has become less expensive and new, and **less structured product development methods** have emerged (e.g. Agile). Understanding the needs of customers and end users, as well as their capability to use ever more complex products and systems (e.g. software programs), has become increasingly critical.

The usability, acceptability and appeal of a digital product – which together can be referred to as **'user experience'** – is currently a key factor in determining customer choice, and therefore product market profitability. However, good user experience stems from good design. And, given the high level of interactiveness of digital products and services, good design is not only required for the product materiality itself, but also for the ways in which the users interact with the product and manage to use its functionalities to pursue given goals. For these reasons, good design for digital products requires having good **'interaction designers'.**

In order to maximise usability, interaction designers utilise **user-centred design** methods and techniques during the early stages of the development of a new product. One of these is the **'Design Sprint'**, a practical method developed by Google Ventures that applies design thinking principles (such as customer interviews and user testing) to support digital startups in finding solutions to product design problems.

Methods such as the Design Sprint have been shown to substantially improve the quality and outcome of digital product design. However, **SMEs are often not aware** of the added value of these techniques and are not equipped to adopt them.

The User Experience Challenge **(UX Challenge)** is an open innovation initiative that allows SMEs to learn the benefits and feasibility of using user-centred design methods such as the Design Sprint during the development of a new product. The UX Challenge is structured as a **competition between teams of young designers** (typically, university students specialising in human-computer interaction) that team up and collaborate for one week to find a solution to

a design problem regarding a digital product presented by one SME. The teams carry out a full Design Sprint (including user testing), with the purpose of delivering a **validated prototype solution** to a user experience design problem. Examples of solutions include redesigned user interface mockups, user flow wireframes, and interactive interface prototypes. Human-computer interaction researchers and UX design professionals also take part as team mentors.

Until recently, it was not known whether UX Challenges are effective at increasing SMEs' readiness to adopt user-centred design methods. This is exactly the point where the 200SMEchallenge project kicked in.

The 200SMEchallenge experimentation

The 200SMEchallenge project involved carrying out a UX Challenge and using a randomised controlled trial to evaluate its effects on SMEs' readiness to implement user-centred design methods. This project was one of 13 funded by the European Commission under the Horizon 2020 programme, INNOSUP-06-2018.

The project builds on the longstanding experience of Hub Innovazione Trentino, which has run five editions of the UX Challenge in Italy since 2017. The 200SMEchallenge was replicated in six other European countries (Germany, Finland, Lithuania, Spain, Estonia and Denmark). Nearly 200 SMEs were recruited, of which 60 received access to the UX Challenge and the others served as a control group. Because the access to the UX Challenge was strictly dependent on randomisation, the two groups of companies were, on average, equivalent and hence comparable.
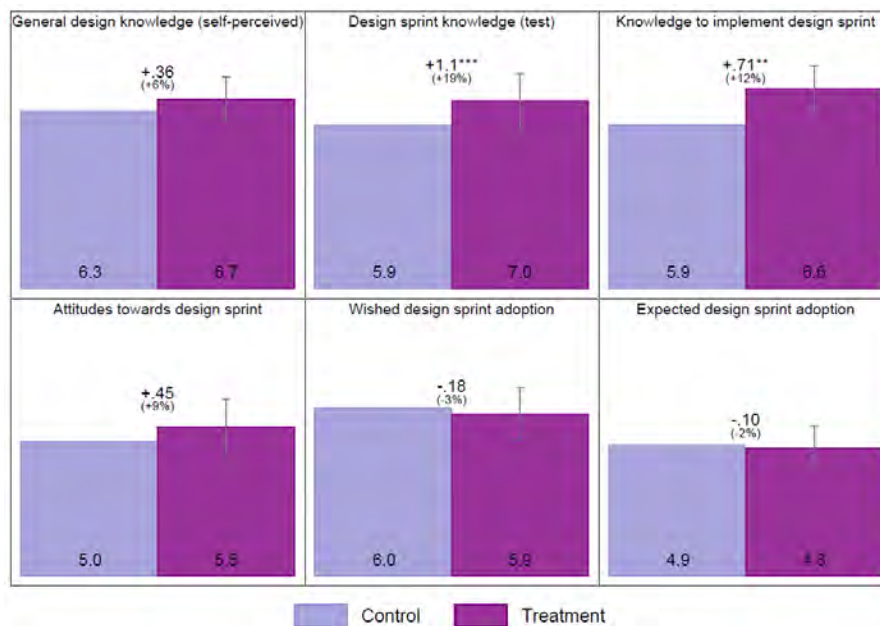
Main results

Three weeks after the UX Challenge events, participating SMEs were asked to fill out an online survey, including a selection of questions about their digital design readiness and awareness.

In line with the expectations, treatment group participants showed a 19% higher knowledge of Design Sprints than the control group, and a 12% higher knowledge of how to implement digital design. The treatment group also had a 6% higher self-perceived general knowledge about methodologies such as user centred design, design thinking and Design Sprint – although this difference was not statistically significant.

There are also indications that the UX Challenge also had positive impacts on participants' attitudes toward digital design (i.e., the extent to which they believe that their companies would benefit from applying the Design Sprint). However, this difference is again not statistically significant.

No effects were detected on UX Challenge participants' aspirations and expectations that their companies will invest in digital design and/or adopt digital design techniques in the next 6 to 12 months.

The effects of the intervention

General design knowledge (self-perceived)	Design sprint knowledge (test)	Knowledge to implement design sprint
+.36 (+6%)	+1.1*** (+19%)	+.71** (+12%)
6.3 — 6.7	5.9 — 7.0	5.9 — 6.6

Attitudes towards design sprint	Wished design sprint adoption	Expected design sprint adoption
+.45 (+9%)	-.18 (-3%)	-.10 (-2%)
5.0 — 5.5	6.0 — 5.9	4.9 — 4.8

Control   Treatment

Lessons learned and next steps

To the best of our knowledge, this is the first and only experimental study on the impact of an innovation contest on user-centred design offered as a service to digital companies with the aim of increasing digital design readiness and awareness.

The results of this randomised controlled trial suggest that the UX Challenge is a promising way to improve participants' objective and practical knowledge about a Design Sprint and digital design.

The evaluation also suggests that the discrepancy between the largely positive impacts on knowledge (and the tentative positive impacts on attitudes) and the zero impacts on aspirations and expectations to adopt a Design Sprint could be explained by some organisational and financial constraints faced by the companies.

Future studies are needed to consolidate these findings in at least three ways. First, more research is needed to understand whether (and under which circumstances) the increased knowledge about digital design leads to concrete, tangible changes in companies' approaches to digital design. Second, this study suffered from a small sample size and from a differential response rate in the online survey between the treatment and the control group. A number of statistical checks and a range of different impact estimation approaches have been performed, and these provide further support to the above presented findings. However, future studies in this field should assign highest priority to experiment designs or incentives mechanisms aimed at increasing the number of participating companies. Third, replication studies would be useful to test the intervention in other contexts beyond those analysed in this study and in times that are not heavily affected by the disruption induced by the pandemic.

Info on the project

To find out more about the project: https://www.200smechallenge.eu/

The study was preregistered at the AEA RCT Registry: https://doi.org/10.1257/rct.6246-1.0

10.4. How can we promote social innovation among SMEs? The promise of innovation audits

The DepoSIt project – carried out under the European Commission's INNOSUP-06-2018 programme – involved developing and testing a new support service scheme aimed at increasing the capability of SMEs across Europe to generate business out of social challenges. The support scheme designed by the DepoSIt partners is an innovation audit tool that includes several questions assessing the social innovation potential of companies. A trained intermediary from an innovation agency supports the company's top management in carrying out the audit and in understanding its outputs, including charts, a SWOT analysis and a set of tailored recommendations.

What do we mean by social innovation?

Social innovation can be understood in a variety of different ways. For the purposes of the DepoSIt project, we defined social innovation to mean delivering impactful new solutions that meet societal needs, resulting in new social relationships (including beneficiaries) through new products, processes and models. This includes a number of elements:

- New practice: Social innovation is not necessarily a novel concept, but it must be new to the context.

- Response to societal needs: The social innovation must primarily aim to meet a societal need, thereby differentiating itself from innovations with societal impacts. An example of an innovation with societal impacts – but not a social innovation – is the introduction of mechanised industrial production, which primarily increased factory profits and labour productivity, but also resulted in safer and higher-paying jobs.

- Openness to involving diverse actors: Social innovation engages a variety of actors in developing or governing the initiative. New actors can participate, either directly or through a trusted intermediary, to facilitate ownership and alignment of the innovation with their needs. This can also result in shifting roles and relationships and new collaboration models.

- Social in its ends and means: Social innovation is dedicated to delivering a societal impact in a socially impactful manner.

    Our experience shows that there is great potential to support companies (especially SMEs) in understanding the opportunities that social innovation could bring about, in identifying gaps, and in allocating resources to develop social innovation initiatives.

About the DepoSIt project and policy experimentation

The aim of the DepoSIt project was to understand whether an innovation audit tool which incorporates questions on the social dimension of innovation potential will stimulate business-driven social innovation. This was tested in a randomised controlled trial (RCT) with a cohort of 72 companies in six countries around Europe.

The innovation audit consisted of a three-step methodology which included: (i) an interview with a member of management from the SME, using a standardised questionnaire, (ii) a follow-up interview to present the first results and to develop a SWOT analysis and (iii) a report. The agency used the first two stages results to prepare a report for the company, rating their performance on various areas of innovation and providing analysis and tailored recommendations. The report and recommendations were then discussed in a follow-up meeting with selected companies, held within a month of the initial interview.

In order to evaluate the success of the tool, companies were surveyed three times, before and after the innovation audit process. Six months after the audits were carried out, companies that went through the process were found to have a greater level of awareness of the business potential of social innovation than did those in a control group that had not participated in the audits. There was no evidence of an impact on participants' knowledge about social innovation, nor on their intention to pursue social innovation projects – although the small sample size meant that the experiment had relatively low statistical power to detect impacts on these indicators.

As well as these survey-based measures, we also examined companies' websites and social-media accounts to see whether they were talking about social innovation. We found that those who had participated in the audits published an average of 6.2 posts on themes relating to social innovation over the course of a year, compared to 1.8 posts in the control group. This adds weight to the conclusion that the innovation audits had a positive impact on companies' awareness of social innovation opportunities.

Pros and cons of experimentation

What have we learned from this experience? Here are some key takeaways that might be of interest to other organisations interested in replicating the experiment:

Positive aspects

+ The experiment generated valuable evidence about the promise of the DepoSIt innovation audit tool in promoting awareness of social innovation, something to build on as the tool is further developed in the future.

+ Companies showed themselves willing to participate in the experiment and respond to our surveys – thanks largely to the efforts of the implementing partners to stay in direct contact with companies and motivate them. This led to higher response rates than have been achieved in many other experiments with SMEs (an 89% response rate in the first post-intervention survey, and 82% response rate in the six-month follow-up).

+ The six agencies involved in the implementation coordinated well, making decisions jointly and making sure that the innovation audits and data collection were implemented in a consistent way across countries.

+ Qualitative exchanges before and during the testing of the DepoSIt innovation audit tool allowed innovation agencies to learn from each other's experience.

+ No independent information sources were available on companies' approaches to social innovation. The search for keywords on companies' websites and social media channels was quite complicated to design and implement. However, this data added credibility to the findings and helped the innovation agencies understand the importance of combining and comparing different data sources to achieve reliable results.

Shortcomings

– Designing and carrying out an RCT proved to be more complex than expected, and required skills and know-how that innovation agencies do not normally have in house. In particular, an academic researcher was brought on board to provide additional support in data analysis.

– An RCT requires the intervention to be implemented with an adequate size of cohort in order for the results to be reliable and significant. In this experiment, the sample size of 72 (of which 30 were randomly selected to participate in the innovation audits) was only just sufficient to provide robust results.

– There were challenges with keeping companies motivated to respond to our surveys – in particular in the control group, who did not receive any treatment. If the value to them is not clear, companies are understandably reluctant to spend time providing data for an experiment.

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