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Developing policies to promote SME digital adoption: a rapid evidence review

James Phipps and Rob Fuller

November 2022

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Developing policies to promote SME digital adoption: a rapid evidence review

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ABSTRACT

This report is intended to support public officials developing new policies to foster technology adoption by SMEs and to encourage digital transformation. It presents results from a rapid evidence review to identify policy-relevant findings from experimental research into the effectiveness of different policy approaches. It also outlines other ideas that are currently being tested, the challenges that have been faced during implementation, and suggestions for how to approach policy development. The main objective of this report is to provide a basis for generating new ideas on how to design and deliver effective interventions.

Keywords: technology adoption, digital transformation, small and medium-sized enterprises, evidence synthesis.

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Developing policies to promote SME digital adoption :

A rapid evidence review

Innovation Growth Lab

November 2022

Authors
This report has been prepared by James Phipps and Rob Fuller

About the Innovation Growth Lab

The Innovation Growth Lab (IGL) is a global initiative that works to increase the impact of innovation and growth policy, by ensuring that it is informed by new ideas and robust evidence. IGL works at the intersection of research and policy, where it helps organisations become more experimental, test ideas, and learn from each other.

To find out more please visit www.innovationgrowthlab.org

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Introduction

This report is intended to support public officials developing new policies to foster technology adoption by SMEs and to encourage digital transformation. It presents results from a rapid evidence review to identify policy-relevant findings from experimental research into the effectiveness of different policy approaches. It also outlines other ideas that are currently being tested, the challenges that have been faced during implementation, and suggestions for how to approach policy development. The main objective of this report is to provide a basis for generating new ideas on how to design and deliver effective interventions.

Summary

Technology adoption and digital transformation are critical drivers of economic growth. However, concerns that small businesses are often slow to adopt them and progress[1] are longstanding, widely accepted and well evidenced. This has resulted in substantial and widespread investment in public interventions to promote technology adoption amongst SMEs.

Despite the wider interest to promote digital transformation, it is difficult to identify what interventions are most effective, in what contexts and for whom. This is the result of a number of factors:

- **Complex barriers**: Successful adoption depends on a wide range of events and decisions and the barriers encountered by a particular business will depend on complex and changing factors.
- **Difficult to identify true lost potential**: Policymakers and those they work with to deliver support will face their own barriers in determining, like the SMEs and technology suppliers whose behaviours they want to change, also face difficulty identifying when low adoption is truly suboptimal. Not all firms will benefit from a given technology. A firm's lack of adoption and progression might be a rational response to the specific context, costs and benefits facing the individual firm.
- **Lack of credible evaluation**: The vast majority of policy interventions are not evaluated rigorously against a credible counterfactual, with many not being evaluated at all.
- **Large gaps in the evidence picture**: The insights provided by experimental research are spread across a broad canvas of possible policy levers and contexts,

[1] For example, a retailer first adopting digital technology to accept online orders before moving towards a business model based around using data to make customer recommendations and predict consumer trends.

which highly influence the results and are not always generalisable. This leaves vast gaps in knowledge.[2]

Nevertheless, interventions can be successful. In this report we highlight credible findings of impacts from a wide range of policy measures, from shaping market demand and infrastructure to the provision of tailored support for individual businesses.

But not all interventions are found to work. There are many cases in which evaluations have found disappointing results. This can be for a variety of reasons, and on occasion includes a failure in the evaluation itself. A common reason why a policy fails to deliver its expected impact is that the barriers to adoption prove to be more substantial or pervasive than anticipated, leading to issues such as a difficulty to recruit businesses or lack of progression across the different stages of the adoption process.

To avoid these issues, this report looks at the importance of developing a clear understanding of the problem and how some public officials have applied a design approach to understand user needs. Also discussed are the benefits of adopting an experimental approach, helping to identify and respond to challenges and ultimately to develop more robust evidence to inform future decision making.

Approach

In producing this paper we have examined:

- Existing evidence reviews:
    - Alfaro-Serrano et al (2021) "Interventions to promote technology adoption in firms: A systematic review"
    - McKenzie et al (2021) "Training Entrepreneurs"
    - Wu and Broughton (2019) "Business Basics: Nudging firms to improve productivity"
    - What Works Centre for Local Economic Growth (2016) "Evidence Review: Business Advice"
    - Owalla et al (2021) "Mapping SME productivity research: a systematic review of empirical evidence and future research agenda"

- Additional academic papers found within the IGL Trials Database and from our research network

[2] For instance, one common policy approach is to use marketing campaigns and create online resources to raise general awareness, but it is important to note that these approaches are by their nature hard to robustly evaluate.

- Findings from the UK Business Basics Programme and the European Commission's programme supporting tests with new SME support programmes

- Selected examples of how policymakers across the world have approached this challenge

The approach applied for this report has some limitations. We have focused on evidence and examples related to policy interventions that promote the adoption of technologies. We have not sought to assess the types of digital technologies that could be adopted by SMEs,[3] nor do we estimate the potential benefits for individual businesses or the wider economy. We have also not considered what drives the invention of new technology nor made a broader assessment of the factors that drive diffusion.

Problem: What causes slow adoption?

Barriers to adoption can occur within the business, in the markets where they buy and sell, and from overarching factors such as poor regulation and infrastructure.

Using a similar approach to Verhoogen (2021), we divide the potential barriers into three categories based on where they occur in relation to an individual business. We add an overarching set of factors that shape the general business environment.

Input markets	Within the business	Output markets
• Lack of necessary skills amongst potential employees • Technology suppliers face costs finding SMEs who would benefit • Technologies developed for larger businesses with additional costs to adapt to SME needs	• Awareness and ability to find information about what technologies are available • Ability to identify own needs • Absorptive capacity: the ability to process and apply new information to improve outcomes	• Customers are not demanding the use of new technologies • Weak market competition • Shielded from competitors that are using new technology (eg export restrictions) • Regulations restrict the delivery of

[3] One example for this assessment is the Firm-level Adoption of Technology survey used in Brazil (Ciera et al 2021).

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- The minimum viable size for the profitable use of a given technology is beyond the reach of many SMEs[4]
- Limited finance to cover the costs of adoption
- Potential benefits are over-sold by suppliers, leading to lack of confidence on the part of potential adopters

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- Uncertainty about the benefits and therefore unwillingness to cover the costs
- A reluctance to seek or pay for, or lack of trust in, external advice and support
- Availability of complementary assets: workforce skills, tangible assets (eg computing equipment) and intangible assets (eg customer data)
- Business objectives: eg not ran as profit maximisers and potential benefits are overlooked as deemed incompatible with leaders' objectives or social mission

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goods and services that apply new technologies

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Environment

- Limited infrastructure - eg lack of connectivity
- Lack of common standards that can make it difficult for technologies to connect and raise concerns about being tied to one supplier losing independence and flexibility
- Regulation that shapes market operations - eg data privacy, infrastructure, overseas trade and intellectual property.

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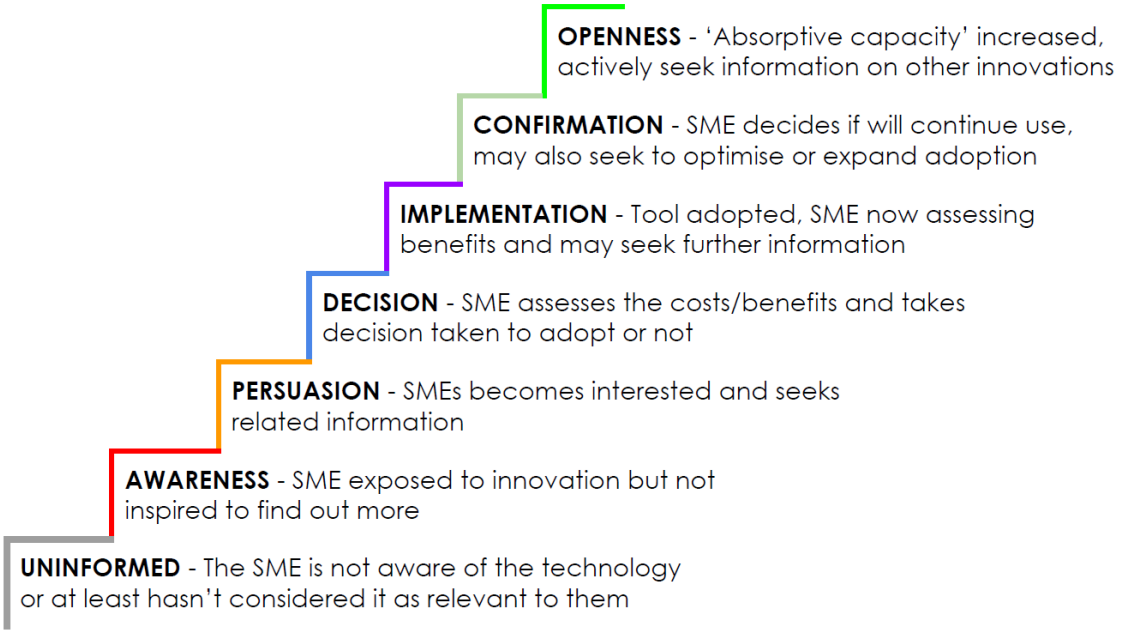
[4] This is not a market failure in itself, but could stem from business model failures on the part of the vendor (eg knowledge of how to segment customers) or could represent a coordination failure or unrealised market (eg SMEs could pool resources and share costs of technology).

Ideally we would identify a specific barrier, develop and deliver a targeted solution that unlocks latent demand for a given technology amongst the target population

Barrier	Solution		Output		Short-term outcomes		Long-term outcomes
Lack of awareness	Provide information	→	SMEs access information	→	SMEs adopt technology Successful implementation within their business model	→	Improve business growth and productivity

However, in reality the challenge facing policymakers is much more complicated: Firstly, adoption is a process that requires progression through a series of stages…

In order to adopt a new technology, an SME will need to progress through a number of different stages. For instance, those furthest from adoption will not yet be aware that the technology is available to them. Once they are aware they would then progress through seeking information; taking a decision to adopt; embedding the technology into their operations and determining if they wish to continue its use. Finally, they may emerge as more informed and equipped for further technological improvements. The following is how this process was conceptualised by IGL and the UK Department for Business, Energy and Industrial Strategy (BEIS) for the Business Basics Programme.



Source: BEIS, developed from Rogers (1995)

Secondly, the diversity of both the business population and technology applications creates huge complexity in when and how barriers will be encountered...

The categorisation "small and medium-sized enterprise" covers a very broad range of organisations and potential applications for technology. Needs and requirements will vary significantly across different industries and market segments. For instance, an SME could be led by someone in pursuit of growth and profit maximisation or as a way to maintain a chosen lifestyle. The operational structure, decision-making processes and resources available in a micro- enterprise with one decision maker will be very different to a business with 240 employees over multiple locations. Whilst even the same organisation could face very different barriers when it comes to adopting one technology compared to another – switching to cloud accounting software will require a very different set of skills and employee involvement to introducing robots into production processes.

Thirdly, progression is the result of decisions taken by individuals within the business, and their choices will be influenced by their own traits, behaviours and ambitions.

If we consider that adoption occurs as a result of a series of decisions and judgements made by individuals, then the importance of considering behavioural factors becomes clearer. The Behavioural Insights Team undertook a review of the behavioural factors that could be used for "nudging firms to improve productivity" (Wu and Broughton 2019). They outline a number of behavioural barriers that will affect whether an SME will adopt proven management practices and technologies. These include:

- **Overconfidence** about how they compare with others.
- **Expectation errors:** mistakes in how they assess potential costs and benefits. These can include **present bias,** placing too little emphasis on future or uncertain gains.
- **Mindsets unconducive to growth**: Low ambition and harmful beliefs. Other research has looked at how mindsets are shaped and may result in people not associating themselves with running a growth-orientated or technological driven business (Theodorakopoulos et al 2015).
- **Scarce mental resources**: Complex decision making based on imperfect information with limited time to process.
- **Loss aversion**: Overweighting the risks of the costs and likelihood of innovations failing to prove effective.
- **Groupthink**: A desire to conform and maintain harmony may lead to a reluctance to challenge judgements and implement organisational change.

The review also identifies a number of "enablers" that can support positive change. For example, it is important to recognise the importance of moments of change: an SME can

be more responsive (or reluctant) to change at some points, such as a change of leadership or a new market entrant. Other enablers such as peers and networks could also provide exposure to new ideas and sources of positive encouragement and support.

Finally, as an SME progresses through the stages of adoption, new barriers can occur, which may not have been identified until that point.

Research in the UK by Be the Business and McKinsey (Be the Business 2020) looked at the barriers SMEs face during different stages of adoption. They find that it can often be a long and painful process. Particular pain points occur with finding the right solution, knowing how to integrate a chosen solution, and efforts to progress further being hampered by the disruption that would be caused by switching to another provider. Of the SMEs that were interviewed, the majority had made previous unsuccessful attempts to adopt technology – with adoption failing for a wide variety of reasons.

Potential policy measures: What can be done?

A broad range of measures can be applied, with numerous decisions for how to combine, design and implement support

Potential policy measures that can be used to encourage technology adoption

Market shaping and creating	Demand: Government procurement and wider support Tax systems: Treatment of investments in technology Coordination: Bringing together large organisations Regulation: Setting standards (eg data protection) Competition: Actions to protect or expose laggards to more productive rivals Funding to technology suppliers to create incentives for the development of products that will better meet the need of targeted SMEs
Infrastructure and institutions	Investments to increase the availability and access to technologies Creation of institutions to coordinate investments and knowledge sharing (eg business to business and/or research to business)
Workforce skills	Develop skills of current and future employees. Develop skills of current and future employees Subsidise employee training Offer advice on how to obtain external expertise
Non-financial business support	Openly available: Eg information on websites, campaigns to raise awareness and encourage action Directed at individual businesses: Eg the provision of consultancy advice, in-person or group training
Financial Support	Targeted subsidies (eg vouchers) for the procurement of technology Targeted subsidies for businesses to seek external support to identify and successfully implement new technology Provision of investment capital (loans, mezzanine or venture capital)

What does this mean for policymakers?

Policymakers should diagnose their own challenge in as much detail as possible, using existing data or any available resources, otherwise the intervention proposed may not fit the real needs of the businesses. For instance, managers often assume that there is a simple problem of an information gap. However, as we have seen, there are other complex barriers, and providing information on the types of technology available will not work if SMEs already have this information and are instead uncertain about the costs and benefits for their own operations. Sometimes policies may still work even if we get the diagnosis incorrect but the solution may not be the most cost effective. For instance, marketing a funding programme will also raise awareness of the technology, but it is possible that the marketing by itself is sufficient to encourage adoption.

Trying to address all potential barriers through a "one-stop shop" package of measures, if even possible given resource constraints, may not be cost-effective (there may be an oversupply of support), and may be too difficult for targeted SMEs to understand and navigate.

Once the problem has been identified, it is crucial to consider the "theory of change" that would explain how the activities to be undertaken through a given policy measure are understood to produce a series of results that contribute to achieving the final intended impacts. A logic model can be developed from a theory of change, setting out the causal roadmap by which policy objectives will be achieved, connecting inputs to activities, outputs and outcomes.

In the following section, we have summarised evidence on a wide range of interventions to encourage SME technology adoption. It is important to consider why it worked (or did not work) as this will allow policymakers to better predict whether a similar approach will work in their own context. It is also important to remember that approaches that proved successful in one context may not achieve the same impact in another. For example, funding programmes are likely to be more effective in areas where credit constraints are more binding due to underdeveloped financial systems or where the supported SMEs lack collateral.

Evidence on the effectiveness of interventions

This section examines evidence of the effectiveness of different approaches to promote SME technology adoption. We have focused on research that provides a credible basis for assessing the additionality of support, primarily involving the application of randomised controlled trials (RCTs). Unfortunately, only a few examples directly consider the question of digital technologies and business models. We therefore broadened this to include research assessing impacts on SMEs' adoption of other technologies and management practices. To illustrate what other approaches could be applied, we have also included descriptions of a number of ongoing trials and interesting policy examples.

Can government interventions drive adoption by influencing the incentives created by market demand?

The public sector can have a substantial impact on how markets operate through the way that it delivers and procures services. Can this market power be harnessed to encourage technology adoption?

Higgins (2020) examines the impact of the Mexican government's rollout of one million debit cards to poor households from 2009 to 2012, which significantly increased the number of customers demanding non-cash purchasing options. This government-induced change in the output market led to many SMEs adopting POS terminals. These businesses were then able to increase their sales and profits, by continuing to meet demand from poor households while also increasing their sales to wealthier customers.

It is also possible that governments can influence technology adoption through innovations and requirements in how they directly interact with SMEs. For example, the UK government's drive towards "making tax digital" is expected to push many SMEs to adopt digital accounting systems, helping them to improve cash flow, improve financial information and save time that can be used elsewhere. However, these impacts are yet to be proven.

By helping to establish common standards, as discussed in Blind (2013), public policy can aid the development and diffusion of technologies. One way this is achieved is by reducing uncertainty and risks that different technologies will be compatible. This could be important for SMEs looking to adopt digital technologies: as previously mentioned, Be the Business (2021) found that switching providers was a key cause of concern for SMEs. However, we have not identified any specific studies that directly test the impact on SME adoption from establishing technological standards.

Can improving access to infrastructure encourage technology adoption?

The public sector can play a key role in determining the speed and location of infrastructure investments, including communications and broadband access. Several studies (Fabling and Grimes 2021, DeStefano et al 2018, DeStefano et al 2019) have shown how broadband improvements can lead to digital adoption and productivity gains for SMEs who benefit from connectivity improvements.

Policy measures can also be taken to facilitate smaller businesses' access to technologies that would be beyond their individual means, by overcoming barriers to coordination and investment. For example, the UK network of catapult centres, including a Digital Catapult, provide SMEs with access to facilities such as laboratories, testbeds and factories, as well as technical expertise. However, we are not aware of any robust estimates of how this activity affects technology adoption amongst individual businesses.

Can we use campaigns and online information to drive awareness and promote the benefits of technology?

Two potential causes of slow adoption are a lack of awareness about technologies and a difficulty finding information about the options available. A common policy approach is therefore to undertake marketing campaigns and provide basic information through websites and online training, sometimes working in partnership with technology suppliers. These can be characterised as "public good" interventions in that the results of the campaign and online information provided is open to everyone, regardless of how many come forward.

Although this approach is widely used there is limited evidence of its effectiveness, at least in part because these approaches are by their nature very difficult to evaluate.[5]

One possibility is to test whether information can deliver benefits, if SMEs are encouraged to use it. A trial funded through the Business Basics Programme will be based on an online resource for SMEs seeking information and advice on digital adoption. The results will examine the impact of providing and encouraging SMEs to access the resource, and the additional benefits from supporting this with encouragement from a trusted contact.

[5] One approach might be to combine a randomised encouragement design RCT with the data approaches discussed in Ruiz and McKenzie (2017).

Intuitively, there may seem to be straightforward benefits from providing access to information. However, there are concerns that providing too much information and at the wrong times could deliver outcomes counter to policy objectives. For instance, Breinlich et al (2017), conducted a trial in which a sample of SMEs were provided with information from the UK's export promotion agency on the benefits and costs of exporting. The impact they observed for those already exporting was as one might expect, an improvement in attitudes towards exporting and sales. In contrast, non-exporters became more negative about the benefits of exporting and pessimistic about the barriers, which fed through to lower sales. One explanation for this is that the information made exporting appear too complicated, that they avoided opportunities to export when they arose. Perhaps the situation would have been better had it been possible to time the provision of information after such opportunities had arisen.

Wu and Broughton (2019) discuss the potential behavioural barriers and enablers across the adoption process. Broughton et al (2019) provide further ideas for how policy makers can utilise behavioural insights to improve take-up and engagement amongst firms, following the "EAST" framework, providing cues that are easy, attractive, social and timely. For policymakers these can lead to simple experiments that ease programme delivery and create the foundations for further and more substantial experimentation.

In a recent experiment, Kneller et al (2022), apply a low cost intervention to provide businesses with information on how the performance of their website compares to their peers with significant success according to the emerging findings. Within a month there was evidence that those who received the information were more likely to have implemented changes that improved their website performance. One factor that made this "call to action" effective may have been how salient the information was, being based on direct observations of technology for the individual business, rather than on generic messages. New data sources and methods could make this approach more widely applicable.

What are the benefits of developing online resources through structured learning?

Online platforms provide a highly scalable way of delivering a structured training program. Projects carried out under the UK Business Basics Programme have used self-guided online programmes for delivering training on topics ranging from cyber security to career coaching for employees (Lucy et al 2019). These projects have had mixed experiences with participation and completion rates: many have seen only modest numbers beginning the programme and rapid drop-off in participation after the first session or first module. This may be partly due to weaknesses in the course material or the delivery platforms, and it is likely that some participants sign up to assess what is

available without having made a definite decision to complete the whole programme. Even among participants who intend to complete the training, if there are no time constraints on when they follow the training, this may tend to be perpetually deprioritised. In contrast, a scheduled meeting or online session with a facilitator and/or other participants involves making a social commitment to attend, which is less likely to be deferred or cancelled when conflicting priorities arise.

One Business Basics project which had more success in this respect was an online self-guided programme for SME managers on using coaching behaviours at work (Tinelli & Ashley-Timms 2022). The programme consisted of 20 modules, intended to be followed at one-week intervals. More than two thirds of participants completed the first four modules, and a third completed all 20 modules of the program. These comparatively high participation rates are probably explained by a combination of the participants seeing value in the training material and to it being delivered in an engaging way. It is also worth noting that, unusually for a trial of a business-support intervention, employers were asked to pay a fee for their managers to participate – something which may have led to participants being more committed to getting value from the program.

In any case, the economics of online training means that it may be cost-effective to make this kind of programme widely available even if participation and competition rates are low.

Will the offer of online tools or expert advice help SMEs to diagnose their needs and motivate them to act?

Several projects in the Business Basics Programme have piloted the use of diagnostic tools or benchmarking. These have generally been received positively by SMEs, and there is anecdotal evidence that this has led to an increase in openness to use digital technologies (e.g EDGE Digital Manufacturing Limited 2021, Food Forward Ltd 2020, Yagro Ltd 2020). However, we do not have experimental evidence on these interventions.

Sebrae in Brazil uses a substantial diagnostic questionnaire and follow-up report to encourage SMEs to sign up for consulting services. In a recent study, only 13% of SMEs were found to take up these services without further encouragement. However, the application of behavioural insights led to substantially higher take-up of up to 45%. The interventions tested involved converting the standard long reports into a more salient one-page benchmarking summary; identifying and setting out specific steps for improvement; highlighting the potential for business failure; and automatically enrolling businesses in the consulting services (Piza and Bruhn 2019).

As previously outlined, Kneller et al (2022) created benchmarks of website performance to provide information to SMEs on how they might improve their use of technology. Survey evidence suggested that the information provided some with knowledge about the potential for improvements and acted as a reminder for those that were already aware. Going forward the researchers intend to explore what sort of information is most effective and also the extent to which the information should be combined with additional support, such as business training.

The UK's Growth Vouchers Programme tested the use of a basic online diagnostic tool against offering businesses access to a personal advisor to help them diagnose and select their support needs. The programme offered a voucher to subsidise the use of strategic advice within five business areas, including how to make the most of digital technology. The thought was that time with a personal advisor may help businesses to better understand their needs for support and make it more likely they go on to procure and benefit from further advice. However, this intuition hadn't been tested and the provision of the personal advice carries much greater cost. Full results are still to be published but initial findings suggest that the personal diagnostic, whilst garnering more positive feedback on its helpfulness, had very little impact on the choices and outcomes (Adams et al 2016). Having to book a time slot with an advisor created a moment of friction and a barrier that many did not pass beyond. The online diagnostic was easier to complete, but those assigned to this treatment were then less likely to use the voucher once it was assigned.[6] If this finding is confirmed, then one explanation is that the session with the personal advisor was too short to make a difference – for almost 40% it lasted less than 30 minutes, and there was found to be a positive correlation between length of the session and subsequent outcomes.

Should you consider subsidising the costs of the technologies that are to be adopted?

Even if someone is aware of the technologies that are available, they may remain uncertain or unable to gauge the full potential impacts on their business's profitability. The costs they will be considering go beyond the direct costs of applying a specific tool – such as the opportunity cost of the time required to embed the tool, the risk of unexpected problems, and the risk of being tied to a particular product or provider. It is also possible that the potential benefits may only become apparent once the technology is in use. Many technologies could therefore be considered as "experience goods", with businesses only being able to evaluate the costs and benefits to them once the system

[6] That is, for both arms there was a similar proportion of uncommitted participants, so the difference in diagnostic method simply changed the point at which they dropped out from the programme.

has been adopted. In such circumstances it can be beneficial to subsidise at least the initial costs of adoption.

Tan (2009) analysed the impact of a range of SME support programmes in Chile using panel data for the period 1992–2006. One of the programmes considered, the Fondos de Asistencia Técnica, provided subsidies to SMEs to address problems in marketing, product design, production processes, information systems and pollution control. No data on technology adoption was available, but the programme was found to increase revenue and output by around 20%, and labour productivity by 16%.

Chudnovsky et al (2006) examined the impact of matching grants for large-scale innovation initiatives awarded to businesses in Argentina between 2001 and 2005. The grant size averaged approximately US$104,000 in 2001.[7] Quasi-experimental analysis suggests that the grants had their intended effect of increasing expenditure on innovation, but that there was little additionality: firms that were awarded grants did not devote more of their own funds to innovation than they would have done anyway. There was no evidence of an impact from the funding on sales or labour productivity at the firm level.

The projects under the UK Business Basics Programme that offered to subsidise the adoption of specific digital technologies met with little demand from SMEs. For example, Devon County Council offered rural microbusinesses a grant to offer a trial period with a new technology, but found that takeup was only 5%. However, this may have been partly because the application process was seen as complicated when compared to the size of the grant available (Burchell and Wallis 2021). The Greater London Authority provided SMEs with vouchers to subsidise the adoption of basic AI tools for their websites, but found that none of the vouchers were used. In this case, the lack of takeup is likely to be because businesses did not see the particular technologies on offer as suitable for their businesses (Riom et al 2022).

Is there potential to realise digital tech adoption by getting SMEs to engage with external support?

Anderson and McKenzie (2021) undertook an experiment to compare the effectiveness of different approaches to providing SMEs with support in finance, marketing and sales. They compared outcomes from four different approaches to providing support (training, consulting, and either insourcing or outsourcing expertise from a business service

[7] The grants were smaller in dollar terms in subsequent years, due to the devaluation of the Argentine peso.

marketplace) against a control group.[8] They found that facilitating access to expertise through the marketplace (whether they provide support from outside or inside the business) is more effective than training, and offers similar results to consulting but at half the cost. The researchers note that some of the strongest impacts were seen in the adoption of digital marketing, which was not a direct target of support but an apparent byproduct of getting businesses to work with external experts.

The UK's Growth Vouchers Programme provided a subsidy of up to £2000, giving businesses a 50% reduction in the cost of taking strategic advice across one of five business areas, including how to make the most of digital technology. Early findings indicate that those offered a voucher were more likely to say they had increased their skills in the six months after completing their application (41% compared to 12%) (Adams et al 2016). For those who had sought a voucher for advice on "making the most of digital technology", those offered a voucher were more likely to have taken steps to optimise the ability of customers to find their business through web searches and to explore the costs of new hardware and software. Differences in four other subcategories were not statistically significant, and there was also no evidence of impact on business performance. Publication of the full results is pending.

Coville et al (2020) are undertaking an experiment in Georgia to evaluate the impacts of a training programme designed to encourage SMEs to adopt broadband connections and support them (with training and consulting) to establish their online presence and how to export their goods and services. The researchers have used the baseline survey for research on the barriers and constraints to online participation by SMEs in Georgia (Apedo-Amah et al 2020), and we await findings from the policy experiment itself.

Other studies show benefits of engagement with external advice, but do not have a direct connection to digital technology. For example, Bruhn et al (2018) provided intensive consulting services to randomly-selected SMEs in Puebla, Mexico over a one-year period. The firms offered consulting saw increased productivity and profitability in the short term, and appear to have achieved a new growth trajectory: employment in these firms increased at a much faster rate than those in the control group over the subsequent five years. The actual channels through which these improvements occurred varied for each business.

Incorporating some form of business mentoring, facilitating access to someone who can establish a professional, development-oriented relationship with an experienced mentor, is one way to support small enterprise growth. Czibor (2019a, 2019b) outlines some of the evidence that links mentoring with improved business performance, as well as some

[8] In the case of "insourcing", the subsidy was for human resources support to help the business recruit an appropriate specialist.

of the practical issues and design details of such programmes.

To what extent should the costs of adoption be subsidised? (How should business support be priced?)

As outlined above, there have been a number of experiments that have tested the impact of subsidising the costs of technology adoption or the use of support. However, there has been less research into the extent to which costs should be covered and how subsidies should be structured. Offering too high a subsidy may maximise initial adoption but could also harm the cost-effectiveness of the intervention through poor selection (since SMEs that will only marginally benefit will access the support) and poor commitment (since without any financial commitment they may not dedicate the necessary time and resources to the programme).

Maffioli et al (2019, 2020) conducted an experiment on the impact of setting different prices for the provision of business training in Jamaica. They find that the majority would pay something towards the advice they will receive, but setting higher prices can have a dramatic effect on which businesses take part. Higher prices screen out less wealthy owners, the more risk-averse business owners, and those who expect the fewest benefits. Charging more than a nominal fee does cause those who buy the course to attend more of the classes.

Is training a way to encourage basic users of digital technologies to progress towards the frontier?

As already established, adoption is not achieved through a single step or by overcoming a single barrier. One concern is that having adopted, many SMEs will fail to make full use of the technology and progress towards the potential frontier.

Jin and Sun (2021) developed a business training programme available to new entrants on a large e-commerce platform in China, and randomised which sellers would have access. Although only a minority took up this offer (24% began at least one of the training tasks, and 13% completed at least one task), those that did were able to attract more visitors to their sites. This led to them increasing their revenues by around 7% overall. Consumers also benefited, since the training made it easier for them to find promising new sellers on the platform.

Azzolini (2021) describes the results of an RCT carried out across seven European countries, in which SMEs that provide products or services with a digital interface were introduced to design thinking. In the course of intensive, week-long “design sprints” (which were carried out fully online, during the COVID-19 pandemic), the SMEs worked

together with teams of design professionals, students and recent graduates, to develop and test approaches to improving the user experience of one of their products. This intervention led to an increase in SME participants' knowledge and "know-how" about the design sprint process, and possibly (though less clearly) to more positive attitudes towards design thinking. However, the sample size is too limited to establish whether participants were more likely than the control group to apply design thinking in the future.

Are there innovative ways to address a lack of capacity/time amongst SMEs?

Providing or encouraging SMEs to make use of experienced or professional experts is not the only approach to building a business's capacity to adopt new technologies and practices.

One approach that we have now seen across several programmes is to use students to help build the capacity and commitment to change within SMEs.

Anderson et al (2021) tasked university students with supporting small retail businesses in Mexico City with modernising their business processes or marketing, with sizable positive impacts on turnover.

Canada's new Digital Adoption Program (launched in 2022) plans to support up to 160,000 SMEs with interventions including funding and advice. This includes micro-grants to help SMEs with the costs of adoption but also to provide them with additional capacity by also creating training and work opportunities for up to 28,000 young people.

Two projects within the Business Basics Programme have also been testing the benefits for SME tech adoption of interventions that included students working with SMEs on projects to assess the potential impact of new technologies. Coates and Cottam (2019) present results from a pilot project in which groups of university students worked for several weeks on a specific project with a particular SME. The Techknowledgey Transfer project (for which results are not yet published) applied a similar concept, arranging placements within SMEs for further education students (that is, those in post-16 but non-university education).

The solutions may deliver further benefits, if they can encourage SMEs to collaborate more closely with education and research institutions and equip students with beneficial experiences.

Instead of creating additional capacity within the supported businesses, policy measures could be taken to reduce the burden or transfer it to outside the business.

Technology providers do not always make their products accessible to busy business owners, which may create an important supply-side barrier to adoption. In Kenya, Dalton et al (2018) provided information about a new digital payment system to randomly-selected restaurants and pharmacies, as well as offering them practical assistance in registering to use the system. The assistance offered included completing the registration documents and visiting the service provider to activate the account – something that would normally take a considerable amount of effort and so represents a significant cost for a small business. In a follow-up survey 16 months later, usage of the technology in the treatment group was around 7 percentage points higher than in the control group. (However, the treatment had no impact on adoption among businesses that have concerns about the visibility of their business transactions, an important constraint in a context in which many businesses are unregistered and run informally.)

Can interventions be made more effective by involving peers in the development or implementation?

Many studies have shown the benefits of establishing and utilising peer networks within business support, or basing the training material on information gathered from successful peer enterprises.

- Cai and Szeidel (2018) randomly selected managers of recently-established Chinese SMEs to participate in monthly meetings with their peers. The SME managers themselves organised the meetings, which usually took the form of visits to one of the businesses and in-depth discussion of business challenges. These meetings led to improved management practices, larger networks of suppliers and customers, and increased innovation and productivity. After one year, sales among participant businesses were 10% higher than in the control group.
- Dalton et al (2019) compiled a handbook of the best business practices found among small retail stores in Jakarta. Distributing the handbook alone to other retail store owners had little or no impact. In contrast, when the handbook was complemented either with a documentary video featuring successful store owners or with two short visits to help with implementing some of the best practices, significant numbers of the store owners improved their record-keeping and other business practices. However, the video alone (unlike the visits) did not clearly lead to improvements in efficiency or profitability in a follow-up survey carried out 18 months later.

- Brooks et al (2018) provided a randomly-selected group of young, inexperienced microenterprise owners in Kenya with one-to-one mentoring from a successful business owner from their industry who was also based in their local area. Those who received the mentoring were found to be getting local, market-specific information from their mentors, leading to an increase in profits of 20% on average, over a 17-month period. (In contrast, similar microenterprise owners who were allocated to a conventional business training programme did not increase their profits as a result.) However, the benefits from mentoring were found to fade away after the mentoring relationships dissolved.
- Roche et al (2022) undertook an experiment within a co-working hub in the United States. Having randomly assigned locations they show that close proximity leads to knowledge spillovers.

Delivering training through peer groups could also be a way to reduce the cost of support compared to the cost of more tailored individual training.

- Iacovone et al (2021) investigated whether group-based learning could be used to improve cost effectiveness when delivering consulting support to auto-parts firms in Colombia. Companies that participated in 408 hours of consulting in a group of three to eight firms were found to make improvements in management practices at a similar rate to those that were provided with 500 hours of individual consulting, but at a third of the cost. After three to four years, the companies that received group-based consulting had seen their sales, output, employment and profitability increase considerably, whereas the impacts among those that received individual consulting were smaller and less clear. It appears, then, that the value of the interactions with peers outweighed the value of receiving individualised attention from a consultant.

Interaction with peers was a key element of some of the business training programmes tested under the UK Business Basics Programme. In particular, two of the projects compared the provision of facilitated online training workshops which included a high level of peer-to-peer interaction with providing the training materials for self-study. In one case this led to a marked increase in participants' confidence in using digital technologies and in their intention to adopt these technologies (Jibril et al 2022); the other project also showed signs of positive impact, at least in prompting participants to complete the programme (Phipps and Fuller 2022). In neither case is it possible to isolate the impact of the peer interaction from the impact of the training workshops overall. However, in both projects qualitative feedback from the participants particularly highlighted the value of interacting with other SMEs during these sessions.

Would training on effective decision-making help SMEs determine if and how best to use digital technology?

One of the concerns regarding technology adoption is that businesses are making poor decisions based on incomplete information or false assumptions. One way to improve outcomes could be to provide training for businesses on how to make better decisions so that, in a range of contexts, are able to identify the information required and how to use it to make optimal decisions.

In a series of RCTs in Italy and the UK, Camuffo et al (2021) trained entrepreneurs in using a "scientific" approach to strategic decision-making. Entrepreneurs were encouraged to formulate clear theories and hypotheses about their business model and then to gather evidence to test those hypotheses, allowing them to improve the quality of their decisions and thereby the performance of their businesses. When compared to a control group that participated in a more conventional business-training program, participants were found to be more likely to make a single strategic pivot in their business model (as opposed to not pivoting or making multiple pivots) or to completely close their business. As a result, they also generated considerably greater revenue than the control group. This approach is now being tested in a further large-scale RCT, conducted across six countries (China, India, Italy, the Netherlands, Tanzania and the UK), and is also available as a free online training course.

McKenzie et al (2021) discuss research into the benefits of training that focuses on heuristic guidelines or rule-of-thumb decision making. However, they note that this training is only likely to be relevant to a few areas of business.

How to support digitisation and technology adoption within the agriculture sector?

Alfaro-Serrano et al (2021) review many examples of the adoption of technology and improved farming practices among smallholder farmers, but not at the level of agricultural SMEs. Recent years have seen increasing adoption of digital technologies by agribusinesses (eg see Chege and Wang 2019, Barrios et al 2020), but we have yet to find any experimental or quasi-experimental studies of the impacts of these technologies. Two proof-of-concept projects in the Business Basics Programme sought to promote technology adoption among agribusinesses in the UK using a combination of diagnostic surveys, vendor workshops and one-to-one advice from experts (Yagro Ltd 2020, Food Forward Ltd 2020). Despite some promising initial findings from both, robust evidence on their impacts is not available.

Is adoption held back by individual characteristics and traits that training could address?

Another way to support businesses could be to address the underlying causes that hold them back from adopting new technologies or accessing external information and support (Czibor 2019c).

Businesses could be overly fearful about the risks of digital technologies, for example concerned about how to protect themselves and their customers' data. Would training on cybersecurity, as was provided through one of the Business Basics trials, help to mitigate these worries or prove counterproductive by actually heightening concerns?

Concerns have been raised that some business leaders could have a deep reluctance or fear about potential business growth or are not able to relate themselves to running a technologically advancing business. Addressing this was one of the motivating factors behind the "personal and business" support intervention that was investigated by Burchell and Wallis (2021) alongside a more traditional business support programme focused on technology.

Psychology-based training programmes have also looked at changing the way entrepreneurs think about their business and the development of "soft skills" that are connected with successful entrepreneurship. Campos et al (2017) tested the effect of psychology-based personal initiative training in Togo, and found that personal initiative training increased firm profits by 30% more than a traditional business training programme. Ubfal et al (2019a, 2019b) undertook an experiment on the impact of soft-skills training for microentrepreneurs in Jamaica. They compared the effects of two 40-hour training courses: the first focused on soft-skills, with classes on personal initiative and perseverance, while the second course combined classes on personal initiative with more traditional business practices. In contrast to Campos et al, they only find positive impacts on business outcomes in the short term. They suggest that this may indicate a need to complement the training with a longer term intervention such as mentoring. A similar intervention is currently being tested in a randomised trial with agribusinesses in Nigeria (Papineni et al 2020).

Reflections on policy approaches and challenges

Running experiments testing a range of approaches to fostering SME adoption has revealed a number common challenges

Over recent years, the IGL team has supported more than 40 policy experiments that involve interventions to encourage SMEs to make better use of technologies and to adopt good management practices. From this we have identified three commons challenges to project delivery:

1. Finding and encouraging the SMEs expected to benefit from support is often much harder than expected
2. Support is not used in the way that was intended, often with SMEs making limited use of what is available
3. Progress is made towards adoption but then is halted

For policy officials to understand whether they are likely to encounter similar issues it would be useful to consider the following questions:

- How sure are we that we can identify and reach SMEs that we have identified as needing the intervention?
- How confident are we that SMEs will take or receive the intervention?
- Do we know whether using the support will encourage adoption?
- How confident can we be that adoption does drive productivity, for who, when and why?
- How closely do the objectives and motivations of business leaders align with policy objectives such as productivity?[9]

Challenges with recruitment – having an impact depends on engaging the hard to reach

We might expect that SMEs that have the potential to gain from adopting new technologies would welcome initiatives to support them in adoption. However, in practice SMEs with low current adoption can be the least likely to put themselves forward to engage with programmes, often for similar reasons: they tend not to be connected to existing support networks, and are likely to be overloaded with day-to-day concerns.

For most of the trials that IGL has supported, recruitment has proven much more difficult than originally thought, even before the onset of the COVID-19 pandemic. Promoting

[9] Not all businesses can be considered as profit maximisers. Motivations can include more social and economic goals, but ambitions can also be constrained by lifestyle choices or shaped by personal experience and mindsets.

programmes in email newsletters, for example, typically generated very little interest, although there is the potential to improve impacts by applying behavioural insights.

The effectiveness of recruitment strategies is often highly dependent on the strength of the organisation's existing network. Organisations that have had success in recruitment have often done so through making direct, one-to-one contact with SMEs.

Recruitment can therefore become time consuming and expensive. This can be reduced by leveraging existing networks and contacts with SMEs. One particularly interesting approach was taken by Devon County Council in England, who asked their trading standards officers – officials who routinely work with SMEs in a particular local area – to visit SMEs to promote the "Engaging Rural Micros" project (Burchell and Wallis 2021).

People are more likely to respond when the information and advice is tailored to their circumstances and when the benefits can be made salient. As previously discussed, whilst there are clear macroeconomic benefits of technology diffusion the benefits become much more uncertain when considered at the level of an individual business. Policymakers will rarely be able to provide guarantees about how an individual business will benefit from technology adoption but steps can nevertheless be taken to try to target those most likely to benefit and target the messages provided.

Novel data sources and methods may have the potential to help policymakers to identify potential beneficiaries in a way that isn't possible through traditional survey measures. This approach was explored through a proof-of-concept study funded through the Business Basics Programme, using a mixture of administrative data and information scraped from businesses' websites to try to motivate low productivity businesses and reach them through tailored messages (Leeds City Region Enterprise Partnership 2019). Kneller et al (2022) demonstrate an even more direct approach to identify and provide individual SMEs with information on how their technology use compares to others. Kim (2021) shows the benefits of providing small business owners with information on the practices of their competitors, in that instance pricing.

Once a business has expressed an interest, it may still be necessary to encourage them to sign up and take part in the programme. We have seen that lengthy registration procedures or long time delays before the programme starts have both resulted in large drops in engagement.

Challenges to design and implement support that is then used as intended

Even after having recruited businesses to an intervention, many projects have found that the level of engagement from those businesses may not meet expectations. Many SMEs

that sign up to a programme then go on to make only limited use of the support available to them.

This could be a rational response by the business as they learn more about the objectives and requirements of the support. For example, they may determine that the support will not help them to develop or that the particular technology is not appropriate for them after all. This can be the result of a lack of alignment between what the support can provide and what is required by a participant. Providers could have overestimated the knowledge and capabilities of participants – eg early-stage businesses offered recommendations where they cannot afford the significant investments required. In other cases, the recommendations can be seen as too generic and basic, with more capable businesses being likely to need more advanced and tailored information.

In these circumstances the question is whether this outcome could have been achieved more efficiently. For example, could additional information have been provided before registration, so that the business or the support provider could more quickly identify that the benefits would be limited?

However, this low uptake of support could indicate an issue with the design or implementation of support, meaning that it does not work for many of those that need it. This needs to be addressed to maximise the benefits of policy action.

Challenges with support failing to move people to the stage of competent adopters

Many projects found that having helped people they would see them become stuck at further stages along the adoption process.

In some circumstances the lack of progression can be viewed as a positive outcome: the support may have provided information that removed uncertainty, allowing the business to identify that the technology was not right for them at that point. However, these later barriers can also be caused by other factors that policy measures would ideally address – eg uncertainty about how to introduce wider changes to operations or difficulties accessing external finance to fund further investment.

Policy development and approaches

Experimental approach

Public innovation actors are responsible for the focus, design and delivery mechanisms for much of the technology adoption support programmes provided for SMEs. The many choices they make will in large part determine the economic impact of the actions. 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? How would they ever know? Answering these questions is difficult.

Policymakers are being asked to address new challenges. These require imaginative solutions and encourage policymakers to become more agile and continuously search for new ideas. This was never more true than during the COVID-19 pandemic, where technology was a crucial element. New tools are being developed but are too rarely applied with the intention of learning what works – at least not in a structured and rigorous way.

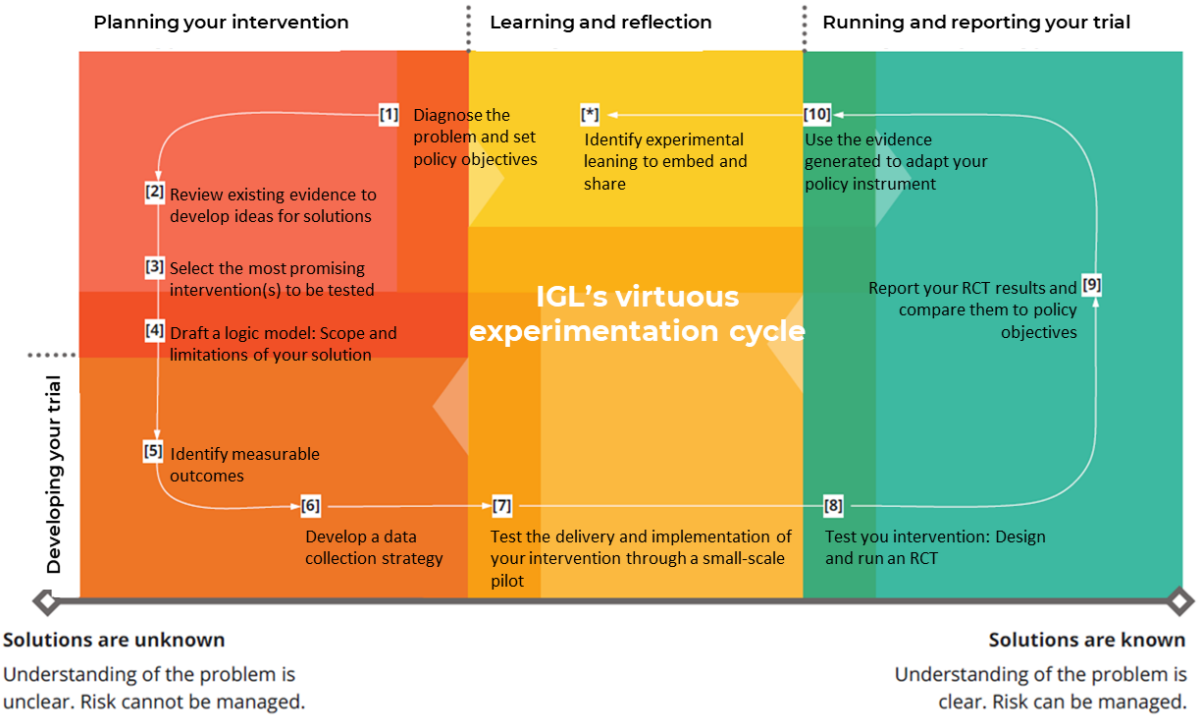
Unfortunately, there is a lack of evidence to guide policy decisions. This is a longstanding issue. A review of the evidence on the effectiveness of innovation policy interventions (Edler et al 2016) and the UK's What Works Centre for Local Economic Growth (2016) both reached similar conclusions about the lack of robust evidence. Whilst full of useful insights, few evaluations provided evidence that was sufficiently robust about the causal impact of programmes to change minds.

This is not to say that we should aspire or expect all innovation policies to be evaluated in the same way. There are many relevant questions that counterfactual evaluation methods cannot answer, and many important effects that cannot be easily quantified. However, there is undoubtedly much more that can be done to rigorously measure the impact of interventions. Ultimately, a lack of this evidence leads to using scarce resources on policies that are less effective (or potentially even counter-productive). These two issues can be addressed jointly through a more experimental approach to policymaking: putting in place robust systems to learn when to scale, iterate or move on.

Policymakers are often compelled to act before they have all the answers, but by building a structured and rigorous approach into their plans they can create an evidence base to inform their decisions. Their findings can then be shared more widely, to inform the decisions of others who find themselves in a similar situation.

It can be useful to consider a continuum of experimentation, across which individual experiments might be focused either on exploration and discovery (understanding how the world works) or framed around evaluation (finding out what works). At the very early stages approaches like design thinking and prototyping can help improve our understanding of the barriers to be addressed and what interventions could be tried. Other methods, such as RCTS, become more prominent when making iterative improvements to design and evaluating impacts.

IGL represents this dynamic process to find, develop and test new ideas in the following diagram:



RCTs represent the most robust methodology for evaluating the causal impacts of an intervention, but there are many reasons why it may not be possible to apply this approach in practice.

Firstly, not all interventions are suitable. For example, the approach requires the ability to allocate participants to different arms of a trial and to control what intervention each will receive. It would be possible to use an RCT to evaluate the impact of sending letters to businesses encouraging them to take support but this wouldn't be possible with a national media advertising campaign. Secondly, a range of analytical requirements also need to be met that can depend on the characteristics of outcome measures and the achievable sample size. Finally, there can be issues from the type of policy question that needs to be answered. RCTs are very good at answering specific questions about impact

("if we give x to these SMEs are they more likely to achieve y"), but can only contribute part of the response to broader questions such as whether business support should be the responsibility of national or local government.

Interventions best suited to test through RCTs are those in which:

- The implementing organisation is confident about how to deliver at the required scale
- Participants have been identified
- It is possible to control who receives which intervention
- There is clarity on how and why the intervention is expected to work (enabling them to develop a logic model for the intervention)
- It is clear which outcomes are expected
- Understanding of context
- Impacts are expected within a reasonable time frame

Whether it will then be possible and valuable to run an RCT depends on a number of factors including:

- The total number of (eligible) participants (the sample)
- Whether participants can be recruited
- Whether participants can be randomised into groups
- Whether data can be collected on the outcomes of interest
- Whether the minimum effect that the evaluation will be able to detect is large enough to be of consequence for policy decisions

A more detailed discussion of different methodologies for running experiments can be found in Nesta's "Experimenter's Inventory" (Hopkins et al 2020).

Design approach and segmentation

Using design principles could help to develop effective policies, in particular the importance of thoroughly understanding the problem and who the end beneficiaries will be.

Why is it important to understand user needs?

- Go beyond anecdotal evidence and "gut feelings"
- Problems vs symptoms
- Services designed around users and their needs:
    - are more likely to be used
    - help more people get the right outcome for them

    - cost less to operate by reducing time and money spent on resolving problems
- Improves team composition

Things to ask yourself when thinking about your users:

- Who are your users and what are they trying to do?
- How are they currently tackling that need (for example, what services or channels are they using)?
- What are the problems or frustrations they experience?
- What do users need from your service to achieve their goal?

Some tools for gathering data on user needs:

- Reviewing existing evidence
- Observing actual behaviour
- Speaking to people who interact directly with your users

Examples:

As part of the Business Basics Programme, the UK's Department for Business, Energy and Industrial Strategy (BEIS) commissioned research involving 40 in-depth interviews with SMEs, to better understand barriers and enablers to adopting best practice and to develop typologies to inform communications with SMEs. Five "typologies" of business were established, based on their openness to innovation and how long they have been in the role (BEIS 2019).

For the Australian Small Business Digital Taskforce (2018), user research was undertaken leading to the creation of eight "personas" to represent groups of small business decision-makers with similar characteristics and experiences related to adopting digital technologies. These were used to inform policy development, for example looking at what stage of the adoption process each persona was most likely to halt progress.

Annex A: Summary of Studies

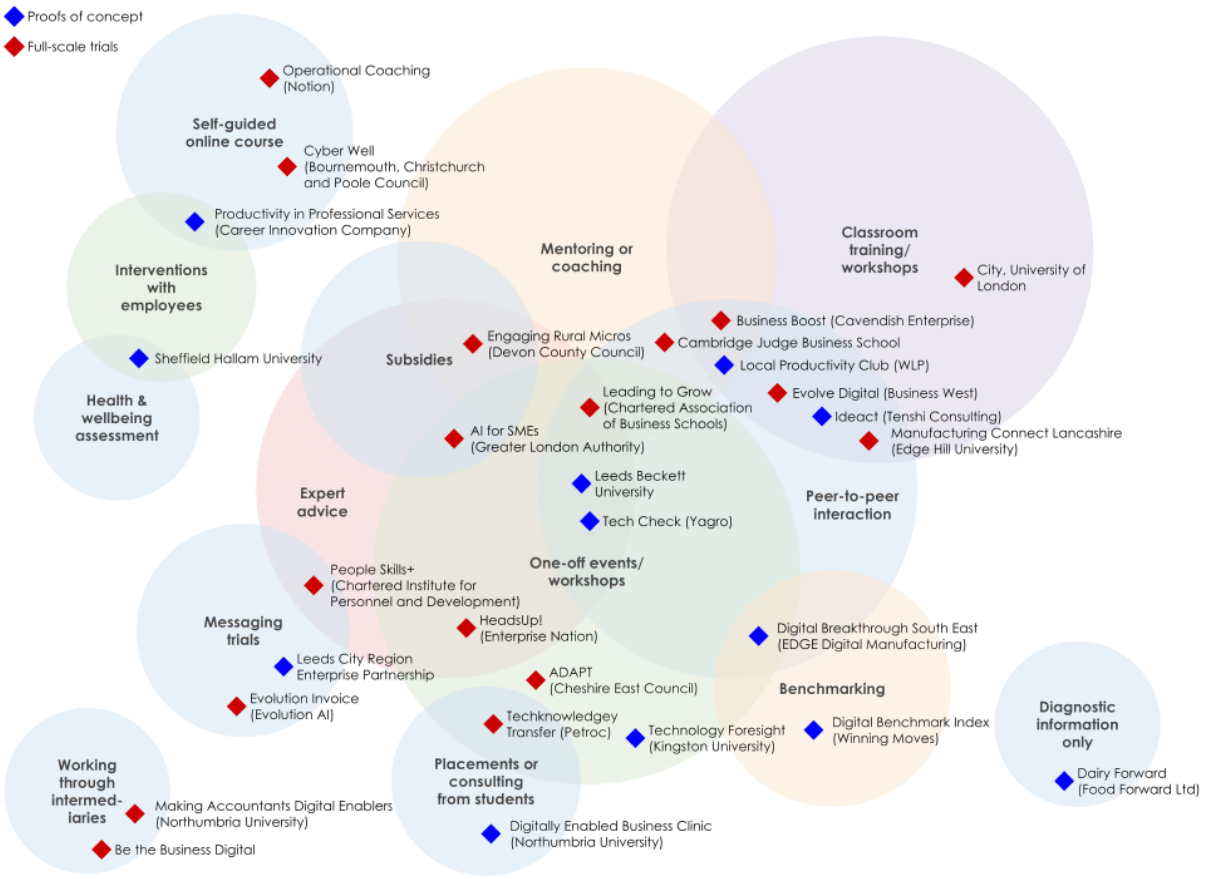
Evidence reviews

Review	Covers	Findings
Alfaro-Serrano et al (2021) "Interventions to promote technology adoption in firms: A systematic review"	Experimental and quasi-experimental studies of the effects of interventions promoting technology adoption. Broad definition of 'technology': relationship between inputs and outputs. Covers all countries and all firm sizes (including microenterprises/individuals).	Positive effect on technology adoption from a range of interventions, including direct financial support or providing the technology free of charge, or providing training or consulting. But more than 40% of the studies had null results. Recommended that "policymakers should pay attention to how programmes can be improved and better tailored to particular environments, to achieve better outcomes".
McKenzie et al (2021) "Training entrepreneurs"	Experimental studies of the effects of entrepreneurship training interventions. Covers all lower and middle-income countries and all firm sizes.	Classroom-based training remains the most popular method and meta-analysis shows modestly positive effects. More recent innovations in training approaches also show promise, such as personal initiative training. Individual consulting has positive effects but is expensive. Important to have matched training provision with the right type of enterprise. There are several seemingly promising approaches where current evidence is limited.
Wu and Broughton (2019) "Business Basics: Nudging firms	A rapid literature review into the behavioural factors	Behavioural factors can affect a business's decisions through four stages of adoption -

to improve productivity"	that can cause slow adoption of proven technologies and management practices and how to utilise behavioural insights and enables to nudge firms to take action	recognising a need, identifying options, deciding on one, and acting to adopt. Most is known about how to frame messages to prompt action with much less known about how to optimise other aspects such as mode and messenger. With little research to connect changes to adoption and productivity.
What Works Centre for Local Economic Growth (2016) "Evidence review: business advice"	This evidence review looks at the effectiveness of interventions to provide SMEs with access to external advice. They reviewed evidence from across the OECD.	Finding only 23 robust impact evaluations from a sample of almost 700. 14 found positive programme impacts on at least one business outcome, 4 had mixed results and for 5 found no statistically significant impacts. Given the lack of studies across a broad topic area and mixed results, it was deemed difficult to reach any firm conclusions about relative effectiveness of different approaches.
Owalla et al (2021) "Mapping SME productivity research: a systematic review of empirical evidence and future research agenda"	Observational studies of factors affecting productivity in SMEs. Covers Western Europe, the US, Canada, Australia and New Zealand only.	Observations about technology adoption: - Digital technology is identified as a driver of productivity in several recent studies. - Importance of complementary assets and/or organisation change to reap benefits of a technology. - Participating in networks/alliances/collaborations is associated with tech adoption.

UK policy experimentation: Business Basics Programme

Figure: An illustration of the range of interventions covered by projects funded through the UK's Business Basics Programme



A brief summary of each of the interventions tested under and a link to the evaluation reports (where available) are given in the tables below. A summary of the key findings from the Business Basics Programme is available on the IGL website (Phipps & Fuller, 2022). The final report of the Business Basics Programme is to be published in 2023.

Full-scale randomised trials

Project name	Lead organisation	Intervention	Report
Business Boost	Cavendish Enterprise	Business training programme with peer-to-peer interaction and follow-up mentoring	Roper et al (2020)

Project name	Lead organisation	Intervention	Report
HeadsUp!	Enterprise Nation	Training on specific digital tools, delivered one-to-one online or at workshops	Publication pending
Scientific entrepreneurship training	City, University of London	Training programme on using a scientific approach to decision-making	Novelli and Spina (2021)
AI for SMEs	Greater London Authority	Information sessions on AI tools, one-to-one technical advice and a subsidy for adoption	Publication pending
People Skills+	Chartered Institute for Personnel and Development	One-to-one consulting on human resources and people management	Publication pending
Cyber Well	Bournemouth, Christchurch and Poole Council	Self-guided online training programme on cyber security	Publication pending
Leading to Grow	Chartered Association of Business Schools	Mentoring and advice from experienced entrepreneurs, during COVID-19 pandemic	Publication pending
Developing management system to boost productivity	Cambridge Judge Business School	Self-guided online business training programme, with peer-to-peer interaction and mentoring	Publication pending
Engaging Rural Micros	Devon County Council	One-to-one mentoring, technical advice on digital adoption and a subsidy for digital adoption	Burchell and Wallis (2021)
Operational Coaching	Notion Ltd	Self-guided online training programme on using coaching behaviours in the workplace	Tinelli & Ashley-Timms (2022)
Making Accountants Digital Enablers	Northumbria University	Training accountants to support to SME clients in digital adoption	Publication pending
Be the Business Digital	Be the Business	Website with information on digital adoption, support from bank staff in using it	Publication pending
Manufacturing Connect Lancashire	Edge Hill University	Training on technology adoption in manufacturing, with peer-to- peer interaction	Publication pending
Evolve Digital	Business West	Training programme on digital adoption, with peer-to-peer interaction and design sprints	Jibril et al (2022)

Project name	Lead organisation	Intervention	Report
Techknowledgey Transfer	Petroc	Support on technology adoption from further education students	Publication pending
Adoption of Digitally Automated Accounting and Payment Technologies (ADAPT)	Cheshire East Council	Online exposure events with a provider of digital payment technologies	Publication pending
Evolution Invoice	Evolution AI	Behavioural nudges towards adoption of invoice processing software	Publication pending

Pilots/proof of concept projects

Project name	Lead organisation	Intervention	Report
Local Productivity Club	WLP	Business training programme with peer-to-peer interaction and follow-up mentoring	Palmer et al (2019)
Digitally Enabled Business Clinic	Northumbria University	Consulting from teams of university students	Coates and Cottam (2019)
Cloud Accounting	Locality	One-to-one support in adoption of digital accounting systems for voluntary sector organisations	Jones (2019)
Dairy Forward	Food Forward Ltd	Information on the business's efficiency in resource use, and about technologies that could improve this	Food Forward Ltd (2020)
Productivity in Professional Services	Career Innovation Company Ltd	Self-guided online career coaching programme for employees of professional services firms	Lucy et al (2019)
Data-led approach to improving productivity via tailored messaging	West Yorkshire Combined Authority / Leeds City Region Enterprise Partnership	Using big data to identify low-productivity SMEs and target them with offer of support	Leeds City Region Enterprise Partnership (2019)
Technology Foresight	Kingston University	Technology foresight process	Vecchiato et al (2020)
Digital Breakthrough South East	EDGE Digital Manufacturing Ltd	Technology benchmarking process	EDGE Digital Manufacturing Ltd (2021)
Developing performance	Leeds Beckett University	Programme of training on performance management,	Publication pending

Project name	Lead organisation	Intervention	Report
management capability		including peer-to-peer interaction and one-to-one support	
Lifestyle behaviour change interventions for employee health and SME productivity	Sheffield Hallam University	Health and wellbeing assessment for employees	Publication pending
Ideact	Tenshi Consulting	Programme of training on design thinking, including peer-to-peer interaction and one-to-one support	Tenshi Consulting Ltd (n.d.)
Digital Benchmark Index	Winning Moves Ltd	Looking at the impact of a Digital Benchmark Index as a way to motivate SMEs to adopt digital technologies	Publication pending
Tech Check	Yagro Ltd	Technology diagnostic, informational workshops and one-to-one advice for agricultural SMEs	Yagro Ltd (2020)

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