Measuring the impact of publicly funded open innovation programmes: the case of DMS Accelerator

Whitepaper - 2021

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This paper discusses current challenges related to the measurement of impact in open innovation programmes. Drawing on our experience from the first two years of the Data Market Services (DMS) Accelerator, we discuss some of the approaches and methods that can help to assess progress towards the specific objectives of publicly funded data incubators in Europe.

Publicly funded data innovation programmes embody a novel form of support for startups and SMEs. While these initiatives share traits in common with traditional accelerators and incubators in terms of the services offered, public funders strive to fulfil a unique set of objectives. In addition to the financial return generated by individual firms, such initiatives have longer-term goals related to the creation of employment and regional development. Another goal particular to big data initiatives is the creation of data value chains by means of interoperable products and services. Ambitions of this kind require specialised resources and training in legal strategy and standardisation. The substantial time and resource investment required from startups to participate in this long-term vision is not always aligned with short-term business goals and profitability. Impact assessments must therefore consider performance at the individual company and ecosystem levels, as well as deriving metrics for ex-ante analysis of wider socio-economic impact.

Based on a review of previous impact assessment approaches, we use a mixed methods framework to evaluate impact along the following dimensions:

- Market
- Funding
- Innovation
- Socio-economic aspects

Our paper provides an initial assessment exercise demonstrating how this framework has been applied in practice at DMS, using methods such as surveys, performance metrics and workshops to obtain monitoring data. Based on insights gathered from startups and programme partners over the first two years of the programme, we derive methodological recommendations and best practices.

The results of our self-assessment highlighted topical challenges that are relevant to other programmes specialising in data. We found that DMS showed rapid development in dimensions related to the market and fundraising, but was less impactful in some aspects of innovation and socio-economic development. Specifically, there was low interest in data standardisation and long-term legal strategy among startups, as well as few opportunities for them to communicate or learn about each other’s inventions. It was therefore difficult to justify our expected impact of improved standardisation and interoperability in the context of cross-sector data applications and technology convergence. We propose that this could be addressed in future by adjusting the startup selection procedure to prioritise companies that have a stronger interest in long-term development and motivation to adopt data standards. Additionally, a more compelling value proposition can be developed to communicate the benefits of standardisation to startups who are not yet aware of opportunities to become part of data value chains. By promoting services related to standardisation and legal strategy among DMS cohorts, we can help them to understand what value these services can bring to their businesses.
Introduction

Many societies across the world are undergoing a transformation through technologies affiliated with AI (Trajtenberg, 2018). This industry promises to revolutionise diverse areas of economic activity, including the provision for energy, mobility, food and healthcare. Machine-driven automation is increasingly being used by businesses to improve the efficiency of processes in logistics, productivity and customer relations. These developments rely on data as a critical asset that contributes to advances in machine learning and AI. Data-driven innovation is therefore becoming a top priority for technology strategists and policy makers in Europe and globally.

Deriving sustainable benefits from data requires a continuous supply of innovative ideas about how best to solve social, economic and environmental challenges. However, radical innovation tends to become increasingly difficult in maturing industries, as established firms guide innovation towards outcomes that have already proven to be effective. On the other hand, startups and SMEs offer the agility required to explore, generate and deploy new radical ideas in the economy. Because smaller and newer ventures are more vulnerable to economic pressures, corporate and public stakeholders are actively directing resources into supporting and monetising the discoveries generated by them.

Support programmes for startups and SMEs have typically taken the form of accelerators and incubators. More recently, open innovation programmes have emerged at the intersection of these two paradigms by leveraging cross-organisational partnerships. In such programmes, public and private stakeholders come together to develop training, mentoring and networking opportunities that strengthen the startups’ competence in creating new products, services and business models. In the specific areas of data and AI, the support network is designed to drive new technical advances and increase productivity within firms, while at the same time helping them to monetise and exchange their data and services with external organisations. In addition to offering strategic business support, data-centred training packages address responsible data governance, standardisation and compliance with regulations.
Together, the offerings of data-centered open innovation programmes help startups to introduce novel products and services into the economy, in addition to improving interoperability and trust in the AI industry more broadly.

In publicly funded programmes, the short-term economic benefits of open innovation programmes are accompanied by longer-term goals related to the creation of employment and regional development. The European Commission has partnered with the Big Data Value Association (BDVA) to build an ecosystem of projects that support the creation of new jobs, products and services related to big data and AI in Europe. Examples of currently running programmes include Data Market Services (DMS), European Data Incubator (EDI), REACH, Media Futures and EUHubs4Data. Programmes of this kind provide startups and SMEs with personalised coaching, training in technical and entrepreneurial skills, fundraising and networking opportunities. They therefore serve as attractive interventions for innovation economies at the European and regional levels.

Given that public funding for these initiatives is limited, effective use of resources requires funders to know the impact of different programmes and be able to identify strategies that create the best pay-offs. The challenge is to assess the link between investing in particular support programmes and the specific socio-economic benefits achieved as a result.

The present paper discusses the question of how impact can be assessed in open innovation programmes related to data and AI. Drawing on our experience of publicly-funded data incubators in Europe, we review previous approaches to impact assessment, their position in the wider economic context and what distinguishes data and AI programmes from other types of accelerators in the European tech scene. We then propose a methodology to assess the impact of one such programme, Data Market Services (DMS), of which we are currently part. The methodology presented here is being used to monitor and adjust the governance of our services based on work done in the first two years of our programme. This paper aims to share our learnings with the wider community, discuss best practices and provide recommendations for policy makers and managers of other similar initiatives.

1https://www.datamarketservices.eu/
2https://edincubator.eu/
3https://www.reach-incubator.eu/
4https://mediafutures.eu/
5https://euhubs4data.eu/
2 Background
Open innovation programmes for startups and SMEs

“Open innovation” is a paradigm that describes the “purposive inflows and outflows of knowledge [between organisations] to accelerate internal innovation and expand the markets for external use of innovation” (Chesbrough, 2012). Instead of keeping the internal development of products and services within a single firm, open innovation draws upon the collaborative capacity and collective expertise of a wider variety of participants.

Applied to the areas of data and AI, open innovation programmes in Europe encourage the transfer of datasets, services and ideas between parties in multiple ways. On one level, knowledge and resources are exchanged between the collaborative arrangement of public and private stakeholders who run these programmes. On another level, these consortia provide guidance on the infrastructures and competencies required by startups to reuse data and integrate data services with external organisations. Startups and SMEs that work with closed and sensitive datasets can benefit from secure access systems and familiarity with GDPR regulations. All kinds of digital innovation can also benefit from standardisation, where common data formats and structures enable interoperability between different data products and services. While the advantages of standardisation and compliance are recognised by the data community, in practice these activities pose a significant challenge to businesses. Startups and SMEs often need access to additional expertise and resources to implement best practices when it comes to data sharing. These kinds of support are typically included in open innovation programmes operating in data and AI.
DMS and its mandate as part of the BDVA ecosystem

DMS is one of the open innovation programmes that has been developed to address the major hurdles faced by startups and SMEs specialising in data. Selected companies are invited to draw upon a service catalogue that helps them with fundraising, acceleration, standards & legal, promotion, and data skills. These services are delivered by a consortium of ten organisations that include European accelerators, dissemination managers, standardisation bodies and universities. Overall, the programme services 150 startups and SMEs over the span of three cohorts, one per year. Unlike other programmes that offer seed funding, the DMS offering consists entirely of services that are delivered free of charge.

DMS is part of a broader ecosystem of projects associated with the Big Data Value Association (BDVA). Since 2014, BDVA has partnered with the European Commission to support the development of jobs, products and services around Big Data in Europe. In addition to regional development, this partnership intends to support data markets and data value chains through the transfer of data. An important source of new marketable solutions and innovations comes from the recombination of existing data sources and the collective visions of different organisations to address previously unforeseen uses. A practical challenge here relates to the collation of data from multiple sources, where interoperability requires compliance with common standards and practices. Improved standardisation and interoperability are also necessary for technology convergence and the creation of new cross-sector applications (e.g. in relation to Cloud, IoT and Privacy Preserving Technologies).

One of the difficulties in achieving these goals is that the economic benefits of standardisation may not be immediate for individual startups. Canhoto & Clear (2020) highlight the trade-off faced by AI companies between pursuing standardisation and compatibility with other platforms versus a better fit and flexibility within their business. Investment in learning and implementing common practices may offer few financial incentives for the business itself, but it reduces the burden of their clients and collaborators. Standardised data formats reduce the time and effort required by an external user to incorporate the resource into their own solution, and associated services (e.g. APIs) make it possible for others to benefit from the solution without having to reinvent the same service. Together, compliance with common data standards adds value to the ecosystem by supporting long-term innovation and interoperability.
Despite the collective benefits of data sharing and standardisation, compliance with interoperability and ethical guidelines impose costs that may reduce the short-term revenue and productivity of individual firms. The full impact of programmes such as DMS must therefore take into account not only the financial success generated by firms who participate in these efforts, but also their actualised and potential impact on the wider entrepreneurial ecosystem. Outcomes such as the creation of jobs, data skills, collaborations, products and reusable data sources lead to economic benefits for other stakeholders that can be monetised at future points in time.

Another aspect of interoperability relates to the creation of common data spaces and common practices for sharing data between different stakeholders. The vision of pan-European data sharing spaces has been supported by the BDVA as a private counterpart of the European Commission in the Big Data Value Public-Private Partnership (BDV PPP) (Lopez de Vallejo, 2019). Their role is to guide public and private investment towards fair, secure and legal governance frameworks such that large-scale data can be connected and valorised. Secure data exchange and the protection of personal data are ensured through legal compliance with GDPR, as well as other European policies and directives. Industrial data platforms are additionally encouraged to adhere to EU values such as democracy, open competition and egalitarian treatment (Lopez de Vallejo, 2019). In order to exploit the analytic and economic value of distributed data assets within the bounds of the regulatory landscape, several innovation programmes have focused on experimentation with new business models. Initiatives such as DataPitch⁶ and EDI entailed “challenges” where startups were matched with corporate data providers to develop data-driven business solutions. Endeavours of this kind have culminated in practical learnings and recommendations, with examples including the Data Sharing Toolkit⁷ and the Legal and Privacy Toolkit⁸, which help to support data collaborations and build trust in industries affiliated with data and AI.

⁶https://datapitch.eu/
⁷https://datapitch.eu/datasharingtoolkit/
⁸https://datapitch.eu/privacytoolkit/
Different funding objectives require different impact metrics

There are various kinds of initiatives whose impact assessment approaches can be drawn upon and compared to identify relevant impact metrics for programmes such as DMS. While open innovation programmes share many characteristics in common with traditional business incubators and accelerators, they also cater to collective objectives that are more aligned with social innovation programmes. Additionally, the “data” aspect of DMS resonates with contests and datathons that have acquired a unique set of evaluation metrics. We discuss these approaches below and identify a collection of pertinent criteria to inform the design of our impact assessment methodology.

The similarity of open innovation programmes to traditional business incubators and accelerators offers an opportunity to explore how the impact of such programmes has been measured in the past. The classification of different programmes and evaluation of their impact is an ongoing challenge that has been identified in the literature (Bone et al, 2019; Galiyeva & Fuschi, 2018). Programmes differ in their business models, sources of funding and service offerings. Accordingly, numerous authors have highlighted the need for impact measures to take into account their varying objectives (Clarysse et al, 2015). Clarysse et al (2015) identified three emerging archetypes in European accelerators: ecosystem builders (publically funded), investors (privately funded) and matchmakers (hybrid funding). The distinction between them is summarised in Table 1.

Sources of funding introduce complexity into the identification of assessment criteria for programmes such as DMS. Traditionally, accelerators were funded by investment from business angels, venture capital funds or corporate venture capital with the intention of capitalising on profitable startups (Clarysse et al, 2019). The return on investment was the main business model that catalysed the growth of such accelerators, and so impact was measured by the return on investment from startups.

The working capital of more recent programmes has relied on shareholders such as investors, corporates and public authorities whose missions are less concerned with short-term financial gain. Instead, these programmes strive to create economic benefits on the wider entrepreneurial ecosystem and in accordance with sustainable development goals.

<table>
<thead>
<tr>
<th>Archetype</th>
<th>Private funding Investor-led</th>
<th>Hybrid funding Matchmaker</th>
<th>Public funding Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic focus</strong></td>
<td>Select attractive investment propositions and turn early–stage projects into profitable businesses.</td>
<td>Typically non-profit orientation. Corporates match startups to their own customers or stakeholders.</td>
<td>Stimulate startup activity within specific regions or technological domains.</td>
</tr>
<tr>
<td><strong>Programme package</strong> (commonly with a fixed programme length)</td>
<td>Mentorship from serial entrepreneurs and business angels; often sector specific.</td>
<td>Coaching and mentorship from internal experts; especially helping startups to navigate corporate customers.</td>
<td>Mentorship from serial entrepreneurs and business developers; most developed curriculum.</td>
</tr>
<tr>
<td><strong>Funding of startups</strong></td>
<td>Seed funding offered in exchange for equity.</td>
<td>Typically no seed funding.</td>
<td>Various funding structures and revenue models.</td>
</tr>
<tr>
<td><strong>Selection process</strong> (commonly open application and cohort-based)</td>
<td>Favour ventures in later stages with a proven track record.</td>
<td>Favour ventures in later stages with a proven track record.</td>
<td>Favour ventures in very early stages.</td>
</tr>
<tr>
<td><strong>Impact assessment</strong></td>
<td>Revenue</td>
<td>No hard KPIs</td>
<td>Employment</td>
</tr>
</tbody>
</table>

Table 1. Key archetypes in accelerators. Adapted from Clarysse et al (2015).

Publicly funded data innovation programmes fit across matchmaking and ecosystem building archetypes.

Examples of past programmes: ODINE, Data Pitch, STARTS, Future Internet (e.g. FINODEX)

Current programmes: DMS, REACH, Media Futures, EUHubs4Data
While previous publicly-funded programmes have nonetheless monitored firm-level financial performance as part of their impact assessment, many have also traced the impact on employment, society and the environment. This has been particularly true of social innovation programmes such as those from the past EU call for “Collective Awareness Platforms for Sustainability and Social Innovation” (CAPS). Within this call, the Impact Assessment for Social Innovation (IA4SI) project defined a mixed methods framework encompassing social, economic, political and environmental impacts (Passani et al, 2016). Although this example offers a comprehensive methodological structure, it would not fully reflect the focal intention of DMS in terms of technological and data-driven entrepreneurship.

Initiatives that have a stronger focus on data innovation offer insight into some of the additional metrics that may prove useful. In particular, hackathons and short innovation contests hosted by platforms such as InnoCentive, TopCoder and Kaggle provide well-defined challenges where data scientists, researchers and developers compete to solve complex problems presented by industry or public stakeholders. Such experiments have contributed to the procurement of novel solutions in fields such as health, criminology and search technology. The impact of innovation contests has been assessed by frameworks such as the ICAPT (Innovation Contests as an Alternative Procurement Tool), which compares the cost of solutions procured through contests relative to the estimated cost of developing an equivalent solution by traditional methods (Paik et al, 2020). This framework also evaluates qualitative benefits such as project awareness and best practices for management. It has been found that contests are cheaper (Calandrelli, 2013), and that their collaborative format enables solutions to be discovered much quicker and through a more diverse range of participants (Bender, 2016). These past findings imply the utility of impact metrics that assess the cost, speed and diversity of innovation contests and research experimentation.

Previous systematic studies into the performance of different accelerator models have relied on metrics such as the funding raised and valuation attained by the companies, revealing that graduates of publicly sponsored programs tend to raise significantly lower sums of capital post-accelerator (Cohen et al, 2019). Clarysse et al (2015) highlight that accelerators financed under the objectives of regional development and employment cannot be profitable in the short or even medium term. These programmes’ selection criteria and success in meeting socio-economic objectives are not aligned to the creation of profit.
The discussion above drew on a range of innovation initiatives whose impact assessment criteria can be relevant to programmes such as DMS. However, we are faced with the challenge of evaluating a programme that sits at the intersection of financial, social and technical objectives. The desire to support the profitability of individual firms is combined here with a vision for sustainable long-term development and technological innovation, requiring a unified impact assessment framework. There are a number of past and current programmes that tackled similar transversal objectives in their impact assessments:

**STARTS** was a residential innovation programme designed to increase the impact of artists in high-tech scientific environments (Henchoz et al, 2019). They committed to deliver a certain number of residencies, a global methodology and tools to promote collaborative work, as well as knowledge to evaluate success factors in future initiatives.

**Future Internet (FI)** encompassed a number of accelerators working in Internet-enabled innovation (FI-Impact, 2014). The project developed analytic methods and tools to perform an ex-ante socio-economic impact analysis. Their framework contained several assessment areas and KPIs including:

- Market - customers, revenue, geographies (footprint in EU economy)
- Socio-economic - direct and indirect consequences in terms of social, scientific and macro-economic impacts (e.g. wider perception of AI)
- Innovation - types of technology solution, intellectual property (IPR)
- Funding - funding requested and quality of financial plan

**DataBench** is currently creating a benchmarking process for organisations that develop Big Data Technologies (BDT) (Ivanov et al, 2019). The framework measures technology development activity against parameters of high business relevance, seeking to demonstrate industrial significance and return on investment.

**Open Data Incubator Europe (ODINE)** was a 6-month incubator for open data entrepreneurs across Europe. The programme reported impact in terms of the number of incubated ideas, return on investment, engagement, jobs and geographic representation.

**Data Pitch** was a programme that matched data providers with startups who worked to address open innovation challenges. Their impact assessment reported on the number of data-driven businesses established, cross-sector and cross-border collaborations, financial impact and the creation of big-data use cases that drive investment (Godel et al, 2019). Following its completion, the programme organisers developed additional resources that could be used by other organisations. For example, the Data Sharing Toolkit helps organisations to generate value by allowing third parties specifically permissioned access to private datasets.

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9 https://opendataincubator.eu/
10 https://datapitch.eu/datasharingtoolkit/
What unites the above programmes is that their impact assessment approaches draw on a variety of metrics to capture financial, social and technological outcomes. Additionally, they present finer methodological considerations in terms of benchmarking and assessing qualitative impacts.

When it comes to quantitative metrics, a number of earlier programmes have been able to conduct rigorous evaluations of impact through counterfactual analysis. For example, Data Pitch compared their outcomes with what would have been achieved by startups in the absence of the programme (Godel et al, 2019). Counterfactual analysis is conceptually similar to benchmarking approaches such as Data Bench, where the impact assessment is based on relative comparisons. However, it is important to consider that not every programme will have the resources necessary to apply counterfactual analysis or existing benchmarking tools. In the present case, we propose the comparison of measurements across multiple cohorts of the same programme as a simpler way to assess impact in terms of temporal improvement and agility.

When evaluating qualitative impacts, previous data innovation programmes were alike in reporting on their methodological contributions. Publicly funded accelerators are characterised by high quality self-assessment and transparent reporting of outcomes, sharing learnings and expertise that have an impact on the wider BDVA ecosystem. Due to the limited duration of publicly-funded programmes (DMS lasts 3 years) it is not usually possible to measure the actualised impacts and value chains that accrue over the longer term. However, resources that have been released into the ecosystem for future use are one of the ways of ensuring lasting impact. We therefore consider methodological contributions as an important component of socio-economic impact. One of the defining qualities of DMS is that it attracts startups based purely on its services, without offering seed funding. The methods that were developed for selecting and onboarding startups who are motivated and engaged by this service proposition could therefore be an impactful resource for other accelerators whose funding model is similar to that of DMS.
Our overview of previous impact assessment approaches highlights some challenges in terms of developing a unified impact assessment methodology. Some past programmes such as Data Pitch were structured in such a way that startups were systematically matched with data providers, making it possible to demonstrate well-defined data experiments and collaborations at the broader socio-technical level. However, because this indicator relied on the specific format of the programme, it would be difficult to replicate the same assessment in another programme such as DMS. Our intention in this paper is to identify a flexible and generalisable framework, which is applicable to DMS but not endogenous to it.

We suggest that the main impact categories defined previously by the FI-Impact project can be used as the basis for such a framework. Specifically, the categories of 1) Market, 2) Funding, 3) Innovation and 4) Socio-economic aspects provide a comprehensive yet generalisable representation of the main areas of impact applicable across programmes. In addition to assessing impact on the entrepreneurial ecosystem in terms of sales and investment, the dimensions also accommodate technical advances related to data and qualitative socio-economic impacts. For the purposes of flexibility, the specific metrics within each impact category can be defined in accordance with the monitoring opportunities of particular programmes. A variety of qualitative and quantitative methods can be combined to assess each impact dimension with depth and precision. In the remainder of this paper, we demonstrate how the four-dimensional impact framework has been implemented in practice at DMS, and the learnings gained from our experience.
Methodology

The DMS programme is unique in its focus on service provision, rather than pre-defined data challenges or collaborations that have characterised other similar programmes in the past. Our methodological framework therefore has an emphasis on the evaluation of services (in terms of engagement and satisfaction), while at the same time incorporating financial successes of firms, new products, collaborations and public awareness metrics. DMS services are already classified into categories (Acceleration, Promotion, Fundraising, Standards & Legal, Data Skills) that lend themselves to the FI-Impact dimensions (Market, Funding, Innovation). Moreover, the expected impacts of the DMS programme that are outlined in the grant agreement also map onto all dimensions, including Socio-Economic impact. These expected impacts are presented in Table 2 (first column).

The four-dimensional impact criteria address the tension between the short-term and long-term economic impacts of data innovation programmes. At DMS, this is achieved through metrics that monitor impact at two levels of analysis 1) the success of companies who complete the programme and 2) impact on the collective ecosystem (the entrepreneurial environment as well as on other open innovation programmes). We evaluate these outcomes using a mixed-methods approach. Quantitative metrics are derived from programme monitoring activities and close-ended survey questions completed by startups when they leave the project. Qualitative approaches were additionally used to gain a more nuanced understanding of these metrics. For example, open-ended survey questions were used to assess the ways, if any, that participation DMS contributed to the successes of startups in specific dimensions. We also conducted workshops with key partners from DMS to examine the collective impact of the programme and observations that were not covered by routinely monitored KPIs.
<table>
<thead>
<tr>
<th>Dimension</th>
<th>Individual company metrics</th>
<th>Collective metrics / KPIs</th>
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<tbody>
<tr>
<td><strong>Market</strong></td>
<td></td>
<td></td>
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<tr>
<td>DMS expected impact:</td>
<td>• Sales capacity</td>
<td>• Number of contacted &amp; recruited companies</td>
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<td></td>
<td>• Revenue</td>
<td>• Companies at different stages of development</td>
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<td></td>
<td>• New clients</td>
<td>• Representation of different industry sectors and countries</td>
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<td></td>
<td></td>
<td>• Engagement in acceleration webinars</td>
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<tr>
<td>DMS additional impact:</td>
<td>• Additional funding gained</td>
<td>• Engagement in fundraising webinars</td>
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<td></td>
<td></td>
<td>• Meetings with investors</td>
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<tr>
<td><strong>Funding</strong></td>
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<tr>
<td>DMS expected impact:</td>
<td>• New products, datasets, services</td>
<td>• Engagement in standards &amp; legal webinars</td>
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<tr>
<td></td>
<td>• Patents</td>
<td>• Mentoring sessions in standards &amp; legal</td>
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<tr>
<td>DMS additional impact:</td>
<td>• Additional funding gained</td>
<td></td>
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<tr>
<td><strong>Innovation</strong></td>
<td></td>
<td></td>
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<tr>
<td>DMS expected impact:</td>
<td>• Offer training on standards and legal issues to 150 companies</td>
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<tr>
<td></td>
<td>• Improved standardisation and interoperability especially in the context of cross-sector applications and technology convergence (data, Cloud, IoT, connectivity)</td>
<td></td>
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<tr>
<td>DMS additional impact:</td>
<td>• Jobs created</td>
<td>• Social media followers</td>
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<td></td>
<td>• Gender composition of teams</td>
<td>• Website visitors</td>
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<td></td>
<td>• Collaborations</td>
<td>• Audience at events</td>
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<td></td>
<td>• Success stories</td>
<td>• Self-organised events</td>
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<td></td>
<td></td>
<td>• Methodology shared with other programmes</td>
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<tr>
<td><strong>Socio-economic</strong></td>
<td></td>
<td></td>
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<tr>
<td>DMS expected impact:</td>
<td>• Success stories as a result of services offered</td>
<td></td>
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<tr>
<td></td>
<td>• Dissemination and exposure of success stories</td>
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<tr>
<td>DMS additional impact:</td>
<td>• At least 200 new jobs requiring data skills will be created in the portfolio of companies</td>
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<tr>
<td></td>
<td>Quantitative: Impact surveys</td>
<td>Quantitative: Programme monitoring metrics</td>
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<tr>
<td></td>
<td>Qualitative: open answers in surveys, supplemented with desk research</td>
<td>Qualitative: Workshops with programme partners</td>
</tr>
</tbody>
</table>

The results presented in this paper consist of programme monitoring metrics, surveys completed by startups and workshops with DMS partners. Each of these approaches is summarised below.

**Routine monitoring metrics** were sourced from records kept throughout the first two years of the programme, where available. For the purposes of brevity, only the most relevant metrics are reported here.

**Survey responses** were gathered using an “Impact Survey” delivered to two cohorts of graduates from the DMS programme. The response rate was 6 from Cohort 1 and 20 from Cohort 2. Results from Cohort 1 were acquired approximately 11 months after the startups left the programme, whereas Cohort 2 was surveyed immediately. Topics covered by the survey included those listed in the middle column of Table 2.

**Workshop outcomes** are based on two workshops conducted with DMS partners. One of these was the Interim workshop in the first year of the programme, attended by 13 participants from 9 partner organisations. The workshop addressed topics related to startup selection, service provision and acceleration, requesting participants to comment on what went well, what could have gone better and what could be done about it. The results of this workshop informed the design of the startup selection and acceleration process in the second year of the programme. In the second year, there was a White Paper workshop with 11 participants from 7 partner organisations. In this workshop, participants were invited to discuss the most and least successful aspects of the programme, and to identify aspects that were not captured by the KPIs. Additionally, we discussed how impact should be defined and assessed, and ways to make the programme more successful in future. The outcomes of this workshop informed the design of the Impact Survey and the content of this paper.
4 Results
Our findings are grouped into sections according to the four dimensions of the impact assessment framework: Market, Funding, Innovation, and Socio-economic aspects. The results for each dimension are a triangulation of the methods described above, in the form of monitoring activities, Impact Surveys completed by startups and workshop participation from programme partners.

**Market**

In the dimension of the market, our methodology sought to measure the footprint created by the DMS programme on the EU economy. As part of this, we examined the diversity of companies serviced by the project, their engagement with entrepreneurial trainings and their own capacity to serve new clients. Our assessment of market impact is summarised in Table 3.

There are a number of ways through which DMS ensures market diversity, and these are part of the routinely monitored KPIs. The first intention is to purposefully accept companies from different stages of development, with 15 scaling, 30 validating & 5 establishing companies selected each year. Between the first and second year of the programme, an increase was achieved in the pool of contacted companies, the number of countries represented in the selected portfolio and the representation of AI, ML and other industry sectors (Figure 1). These findings suggest an improvement in the geographic and industrial coverage of the programme.
Over the span of two years, programme monitoring and workshop activities highlighted a dramatic increase in the level of engagement with promotional and entrepreneurial services. For example, the number of webinar participants increased fivefold from cohort 1 to cohort 2. While it is difficult to assess the extent to which these and other DMS services directly influenced the market success of companies, the results of the Impact Survey from both cohorts indicate that approximately 47% of companies saw an increase in sales capacity, with an average increase of 51% among those who answered. Additionally, 24% of respondents reported gaining new clients directly as a result of DMS. Open-ended survey answers reported that the training and promotional services offered by DMS helped to improve their company image and reach. Workshops with partners reflected these comments and established that one of the main sources of such impact came from professional videos that were created for the start-ups, who were then able to publish them on their own social media or website.

Together, the findings show good progress towards meeting the expected market impacts of the programme, especially in KPIs related to the diversity of the audience and the number of startups served. The target of increasing startups’ sales capacity by 15% has been more difficult to assess due to low survey response rates. Among those who responded, there appears to be a split where half of the companies saw no increase at all, while others reported a 51% increase. This difference in outcomes is consistent with the results observed in other accelerators, whose overall impact can be traced to a much smaller portion of serviced companies that become highly successful (Cohen et al, 2019).

Table 3: Assessment of market impact.

<table>
<thead>
<tr>
<th>Method</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
</tr>
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</table>
| Impact Survey answers from startups | • Sales capacity – 59% reported an increase in sales capacity. The average size of increase was 60%.  
• Revenue – 66.7% reported an increase in revenue. The average size of this increase was 55%.  
• New clients – 33% of respondents acquired potential new clients directly as a result of DMS.  
Open-ended answers indicated that the effect of DMS on market impact was achieved by means of improved public image (e.g. through promotional videos and improved negotiation capacity).| • Sales capacity – 45% reported an increase in sales capacity. The size of increase was 42% on average.  
• Revenue was not included in the survey, as we did not expect an immediate impact.  
• New clients – 15% gained new clients as a result of joining DMS, with 5 new clients on average.  
Open-ended answers mentioned improved company profile and marketing, increased reach and partnerships, improvement in knowledge and selling proposition. |
| Programme Monitoring | Contacted companies: 690  
Company stages: 15 scaling, 30 validating & 5 establishing companies  
Countries represented in portfolio: 16  
31 mentoring sessions for 10 startups | Contacted companies: 1,172  
Company stages: 15 scaling, 30 validating & 5 establishing companies  
Countries represented in portfolio: 20  
61 mentoring sessions (3 external and the rest internal) for 23 startups |
| Participation in entrepreneurial webinars: | | |
| No. of webinars | Participants per webinar | Survey response rate | Average rating (1-5) | No. of webinars | Participants per webinar | Survey response rate | Average rating (1-5) |
| 10 | 5 | | | 11 | 25 | 50% | 4.17 |
| Participation in promotion webinars: | | |
| No. of webinars | Participants per webinar | Survey response rate | Average rating (1-5) | No. of webinars | Participants per webinar | Survey response rate | Average rating (1-5) |
| 2 | 3 | | | 3 | 14 | 50% | 4.15 |
| Workshops with partners | The DMS selection process was successful in attracting a diverse range of companies, representing a strong portion of the EU market. However, the service offering was not communicated clearly in relation to the needs and business models of startups. Low participation in webinars was flagged as an important challenge to address. | Based on feedback after cohort 1, DMS improved its communication of services and onboarding process for startups, leading to increased engagement with all training. More personalised mentoring was provided. The market impact of startups also benefited from corporate videos created by DMS, which they were able to publish on their own social media or website. |
In the dimension of funding, we assessed the amount of funding generated by DMS startups since starting the programme. We were also interested in the ways in which DMS services contributed to this success. Our assessment of funding impact is summarised in Table 4.

While the programme has no concrete KPIs related to fundraising among startups, several desired impacts were included in the grant agreement. Specifically, DMS aimed for its startups to raise new rounds of private capital reaching 5m euros and additional public funds reaching 1m. Capacity for these investments and partnerships was supported by the consortium and Advisory Board of investors.

Impact assessments conducted using surveys suggested that 280K of public and 850K private funding had been raised by 30% of respondents from cohort 2 by the time they left the programme. In cohort 1, 33.3% of respondents had succeeded in securing funding, collectively generating approximately 730K Euro within 11 months. Based on the available data, the proportions of successful DMS graduates seems to be roughly consistent with meta-analyses US accelerators, where 23% of companies were found to be successful in raising significant funds after completing the programme (Cohen et al, 2019).

Due to the low survey response rates, the topic of funding was investigated with additional desk research on cohort 1, which revealed that more than 5M€ in private funding and more than 600.000€ in public funding had been raised overall. When asked about the ways in which DMS contributed to their fundraising activity, survey respondents commented on their improved confidence in pitching and a better understanding of funding opportunities, as well as their improved image developed through the promotional services of DMS. Alongside this, programme monitoring statistics showed a growing engagement with services related to fundraising, where the number of participants in fundraising webinars had tripled in the second year of the programme. Through workshops with DMS partners, we also learnt that programme mentors provided personalised guidance and facilitated additional meetings with investors, which contributed to the acquisition of funds and identification of clear success stories among startups.

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### Table 4: Assessment of funding impact.

<table>
<thead>
<tr>
<th>Method</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact Survey answers from startups</td>
<td>• Additional funding gained – 33.3% gained additional funding, collectively reporting 730K Euro (unclear whether public or private)</td>
<td>• Additional funding gained – 30% gained additional funding, 850K private and 280K public.</td>
</tr>
<tr>
<td></td>
<td>Open-ended answers indicated that startups’ fundraising activities benefited from getting acquainted with the DMS accelerators, learning about IP protection and promotional videos created by DMS.</td>
<td>Open-ended answers indicated that the startups gained confidence in pitching and acquired a better understanding of funding opportunities. The Pitch Day and TNW feature also initiated some introductions for them.</td>
</tr>
<tr>
<td>Programme Monitoring</td>
<td>Meetings facilitated with investors: 40</td>
<td>Meetings facilitated with investors: 41</td>
</tr>
<tr>
<td></td>
<td>Participation in fundraising webinars:</td>
<td>Participation in fundraising webinars:</td>
</tr>
<tr>
<td></td>
<td>No. of webinars</td>
<td>Participants</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Workshops with partners</td>
<td>Investor pitch decks and matchmaking strategies could be more personalised and tailored to the needs of the beneficiaries.</td>
<td>Fundraising went well this year. A high number of meetings with investors was facilitated and clear startup success stories identified by mentors.</td>
</tr>
</tbody>
</table>
In the dimension of innovation, our methodology sought to capture novel technology solutions and intellectual property as indicators of impact. This dimension encompassed the role of data regulations, legal strategy, standardisation and interoperability in supporting data value chains. Our assessment of innovation impact is summarised in Table 5.

DMS fulfilled its expected impact of delivering training on standards and legal issues related to data. Programme monitoring activities showed that engagement with Data Skills courses had doubled in the span of two years. Survey responses from startups also indicated that the portion of startups who developed new products or services had tripled in the second year. These products included web services, mobile and cloud platforms for various sectors, demonstrating potential alignment with the DMS expected impact of fostering cross-sector applications and technology convergence. In their written answers, the survey respondents reported benefiting from DMS services related to compliance with GDPR and product development strategy. This feedback was reflected in the comments shared by DMS partners during workshops, where they reported that mentoring sessions on GDPR and IPR received excellent feedback.

In addition to positive feedback, workshops with partners revealed a number of limitations related to the uptake of standards and legal services. While mentoring in GDPR was in high demand, other DMS partners observed a low commitment and awareness of topics related to standardisation and long-term legal strategy (e.g. intellectual property) among startups. Although services related to standards and legal issues experienced an increase of interest between cohorts, this service category had much lower participation compared to entrepreneurial and fundraising trainings.
In the socio-economic dimension, our methodology sought to measure the direct and indirect consequences of DMS in terms of societal and macro-economic forces. The impacts considered here include employment and the capacity to improve the wider perception of AI among European citizens. Our assessment of socio-economic impact is summarised in Table 6.

Responses to the Impact Survey showed that around half of the serviced companies had created new jobs within the duration of the programme or shortly after. On average, 3 new jobs were created by each positive respondent and these jobs were related mostly to software development and data skills. While this contributes towards the DMS desired goal of creating 200 new jobs requiring data skills, the magnitude of progress towards that number is difficult to assess due to the low survey response rates from startups after completing the programme.

DMS monitors additional social impacts such as the gender composition of startup teams, their collaborations and published success stories. Impact Surveys showed that, compared to the first cohort, each of these areas demonstrated an improvement in the second cohort. The proportion of women in the workforce showed a small increase and 90% of startups pursued new collaborations. These startups reported benefiting from the networking opportunities provided by DMS, but they also requested more personalised support in regards to networking with investors and interacting with other DMS startups. The latter point was also highlighted by DMS partners during workshops, where communication opportunities between startups were identified as a weakness in the current service offering.

At the collective level of analysis, programme monitoring statistics indicated a good promotional campaign, presence at events and a large audience. Through feedback acquired from mentors and Impact Surveys, a number of success stories were identified among startups who benefited from the programme. The dissemination of these stories was increased through the promotional reach of the programme.

In addition to the social impact of DMS in terms of public engagement, we were also interested in assessing its position in relation to other similar programmes. Workshops with DMS partners revealed that there was room to increase our visibility and create closer partnerships with other open innovation programmes in Europe, especially on regional and local levels. In addition to approaching these connections directly, the outputs of the programme could be used to gain exposure. In particular, deliverables such as the startup selection and onboarding procedure in cohort 2 (DMS deliverable D2.3) and this white paper are publicly available, such that other similar programmes can benefit from relevant parts of our methodology.

### Table 6. Assessment of socio-economic impact.

<table>
<thead>
<tr>
<th>Method</th>
<th>Cohort 1</th>
<th>Cohort 2</th>
</tr>
</thead>
</table>
| Impact Survey answers from startups | • Jobs created – 50% of startups reported that their team has grown, with 3 new jobs created on average (1 business developer)  
• Gender composition of teams – 7% reduction in women in one startup  
• Collaborations – 66.7% pursued new collaborations or partnerships, helped by DMS promotion and networking. | • Jobs created – 50% of startups reported that their team has grown, with 3 new jobs created on average (mostly in technical and data roles)  
• Gender composition of teams – 30% reported a change, 55% of which reported an increase in the proportion of women.  
• Collaborations – 90% pursued new collaborations, with DMS having helped to reach new audiences and markets.  
Open-ended answers gave mixed feedback, with comments related to needing more personalised support with connecting to investors and more interaction between startups |
| Programme Monitoring       | Social media followers: 879  
Website visitors per month: 484  
Audience at events: 1,600 (Pixels Camp) & 15,492 (TNW)  
Self-organised events: 11 | [Pending engagement metrics]  
Methodology shared with other programmes:  
• Form for engagement with companies (DMS deliverable D2.3)  
• Impact assessment approach (this paper) |
| Workshops with partners    | Mentoring sessions, bootcamps and events provided opportunities for startups to interact directly with the beneficiaries of the program, and this was positively appreciated on both ends. | Promotional campaign of the programme was good, but few opportunities were available for communication between startups. Visibility of the project across the European ecosystem could also be improved. |
Alignment with startup needs

In the second year of the programme, DMS used a survey to assess the needs of participating startups before they began using the services. As part of this, startups were asked to rank different service categories from those that were most important to the least important. In order to assess the extent to which DMS services aligned with these needs, we included a question in the Impact Survey where startups were asked to rank which of the same business dimensions had benefited most from completing the programme.

Figure 2 shows the outcomes of this analysis. The radar chart on the left shows the distribution of the two most important needs identified by startups in the Needs Survey (N=47). This chart shows which needs were rated as highest (blue) and second highest (red) by each startup, with the axis measuring the total number of participants who valued each dimension. The chart on the right shows the distribution of the areas that had benefited most from participating in DMS according to the Impact Survey respondents (N=20). By looking at these results, we see that startups went into the programme wishing to develop their skills in international markets, promotion and fundraising. However, by the end of the programme, their business acquired a more rounded range of benefits that were distributed more equitably across all areas, including entrepreneurship, IP and data skills.

Figure 2. Radar charts showing the desired (left) and actualised (right) benefits among startups who participated in DMS.
Building on prior literature and impact assessment methods in previous open innovation programmes, this paper presented a unifying methodological framework and applied it in the context DMS. We have demonstrated how dimensions related to the market, fundraising, innovation and socio-economic aspects can be assessed through a combination of qualitative and quantitative methods.

Our results show that DMS showed a positive impact in every evaluated dimension, and that the magnitude of impact was different in each area. The programme was most successful in meeting its expected impacts in relation to the market and fundraising. However, some aspects of innovation and socio-economic impacts were more challenging to assess. We summarise these findings below and suggest ways of improving DMS outcomes for the next cohort.
Areas of greatest impact

In relation to the market, monitoring data showed high diversity in the developmental stages, geographic origins and industry sectors of companies serviced by DMS. The impact of training was demonstrated by high engagement with entrepreneurial services and direct impacts on the sales capacity and client base reported by graduating firms. Together, these findings give confidence that DMS has improved the entrepreneurial capacity of various regions in Europe.

In the dimension of fundraising, DMS was able to demonstrate impressive successes in the number and size of investments generated by graduating firms. Monitoring data from surveys showed that at least some of these successes were attributed directly to the training and guidance that had been acquired by startups through DMS. It is worth noting that despite having objectives that extend beyond financial success, the fundraising abilities of DMS graduates were comparable to those of profit-driven accelerators.

It was more challenging to demonstrate sufficient impact in the areas of innovation and socio-economic development. While startups demonstrated substantial contributions in terms of new products, services, data skills and the creation of jobs, there was low interest in data standardisation and long-term legal strategy. It was therefore difficult to justify our expected impact of improved standardisation and interoperability in the context of cross-sector data applications and technology convergence. This finding was revealed through the evaluation of engagement with different DMS services over time, which will be discussed in more detail in the next section.

Collectively, qualitative monitoring data from survey responses and workshops with DMS partners indicated some interdependence between all four impact dimensions. For example, competencies in the market, innovation and public visibility all contributed to the fundraising abilities of firms.
A major finding observed across all dimensions of our results was the increase in engagement with services in the second cohort. The reasons behind this success were revealed by workshops with DMS partners.

In its first year, DMS had already established a quick and agile selection process that attracted high numbers of applications that met the programme KPIs. Project partners contributed to this success by leveraging their local networks to promote the project in wider events (e.g. "the Next Web" conference). However, a number of challenges were identified during the selection procedure. This included selection criteria that were not directly related to the DMS service offering and a lack of information communicated to startups about the services available. Moreover, startups requested additional personalised support as a way to improve the programme.

In response to these recommendations gathered during the first cohort, the startup selection criteria were refined to better align them with the DMS service offering in the next year (as outlined in DMS deliverable D2.3). Programme management and promotion also provided better communication about the value proposition of DMS and the services on offer. Moreover, the onboarding process included a needs assessment and personal calls that helped to build rapport with individual startups. This was accompanied by additional personalised mentoring for cohort two. Together, these changes led to a significant increase in engagement across all DMS services.

By generating specific insights into engagement metrics and the deeper reasons behind them, the monitoring approach enabled DMS to respond and multiply its impact on startups within one iteration. This positive outcome can be attributed to the combination of multiple monitoring methods and close discussion with programme partners who were directly involved in providing the services.

The specific methods used in our monitoring approach included surveys to startups, programme monitoring metrics and workshops. When used on their own, each of these methods has certain limitations. For instance, the Impact Survey suffered from low response rates among startups, while workshops with partners were limited in representing the subjective viewpoints of the people involved in running the programme. Monitoring methods such as webinar statistics and impact surveys are also likely to have represented different audiences. While any team member could participate and rate webinars, the end-of-year Impact Survey was mostly completed by a single company representative, who may not necessarily be aware of the skills and competencies acquired by all members of personnel who participated in the programme. By triangulating the various pieces of information available to us, we were able to create the in-depth and critical assessment necessary to evaluate and improve the programme.

In addition to methodological triangulation, our findings were classified into four dimensions of impact which made it possible to identify specific areas for improvement as we go into the next year. The observed increase in engagement across the four service dimensions was not equal, with some areas demonstrating significantly higher engagement than others. In particular, services related to the market and fundraising showed fivefold and threefold increases respectively. Engagement with innovation services had also increased, but with a lower magnitude compared to the other dimensions, suggesting that this is the area that would benefit most from further improvement.

Although a large volume of new products and services was generated by startups in the second cohort, programme monitoring and workshops with partners indicated that there was low interest in training related to long-term innovation strategy and standardisation. Other data competencies such as
GDPR and data skills received more interest. The low appeal of standards training complements a separate observation made by programme partners during workshops, where they felt that the “data” aspect of the Data Market Services accelerator is not something that we are sufficiently promoting and showcasing. This was reflected in the needs presented by startups entering the programme, who were most interested in general business competencies such as international mobility, promotion and fundraising. Possible ways of resolving this gap in the future could involve adjustments to the startup selection procedure to prioritise those that have a stronger motivation to adopt data standards. Additionally, it will be important to develop a more compelling value proposition that communicates the benefits of standardisation to startups who may not yet be aware of opportunities for building data value chains. To support active engagement in this area, we can consider another current limitation related to the lack of communication between participants of the programme. Both issues could be solved by establishing “communities of practice” around data innovation and the adoption of standards.

As discussed in the background literature, standardisation can be an arduous and costly process for businesses. The challenges faced by DMS are likely to be shared by other similar programmes that specialise in data. We hope that this white paper will start a discussion about the best ways to monitor and foster the impact of data innovation programmes in Europe.
6

Best practice and recommendations
In the beginning of this paper, we highlighted the diversity of innovation programmes that have proliferated in the European economy. Due to the variety of funding models and specific objectives faced by these programmes, their impact cannot be measured according to the same criteria. While our specific findings may be relevant to other data initiatives, what we wish to share in this paper is the generalisable methodology we have used to derive actionable insights. This methodology can be transferred across a variety of contexts and can be used to self-assess impact even if no other similar programmes are available for comparison. Our recommendations are as follows:

- **Use a variety of methods to measure impact.** Diverse monitoring approaches help to buffer against the limitations of each method. Specifically, there can be limitations of sample size (e.g. low survey response rates), depth of data (quantitative vs. qualitative) and subjective bias (service providers vs. recipients). We suggest that a combination of methods such as surveys, quantitative monitoring tools and workshops can be synthesised to accommodate the perspectives of service recipients as well as providers. Additionally, different methods can be reconciled to capture individual as well as collective outcomes (in terms of the team members, companies and ecosystems served by the programme).

- **Measure impact along multiple dimensions.** By classifying monitoring activities into multiple impact areas (e.g. market, funding, innovation, socio-economic), it is possible to draw comparisons and identify those that are most in need of improvement, so that resources can be targeted efficiently towards those services. For data programmes in particular, we recommend that special attention is required to assess the role of standardisation and legal strategy in fostering innovation through data value chains.

- **Monitor changes in impact over time.** It is expected that the impact of a programme will increase as it assimilates the learnings derived from successive iterations of service delivery. The magnitude of change can serve as an indicator of the agility with which the programme is able to respond to dynamic economic circumstances. Metrics derived as part of routine KPI monitoring activities can be compared between cohorts and interpreted through discussions with programme partners who were involved in service delivery. This can help to identify the actions and strategies that contributed to particular outcomes. In the case of DMS, we learnt that a substantial increase in engagement with services has been achieved, which could be traced back to our self-assessment methodology. Through workshops with partners and surveys completed by startups, DMS was able to identify the precise changes required to improve the selection and onboarding procedures for startups, as well as the services offered to them, such that the companies in the next cohort could benefit maximally from the programme.
References


