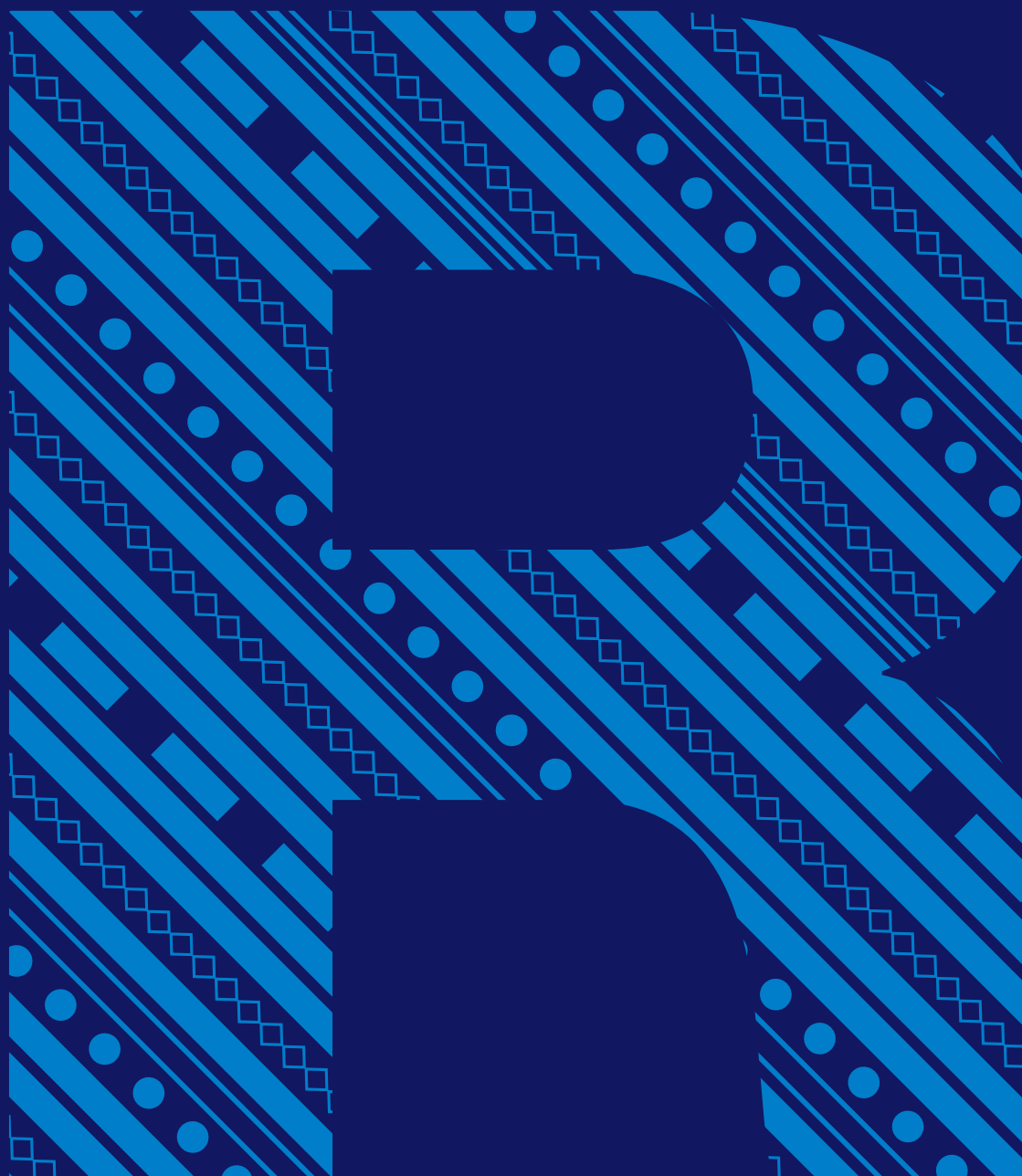




DIGITALLY ENHANCED ADVANCED SERVICES EPSRC NETWORKPLUS

Finance Theme Research Agenda



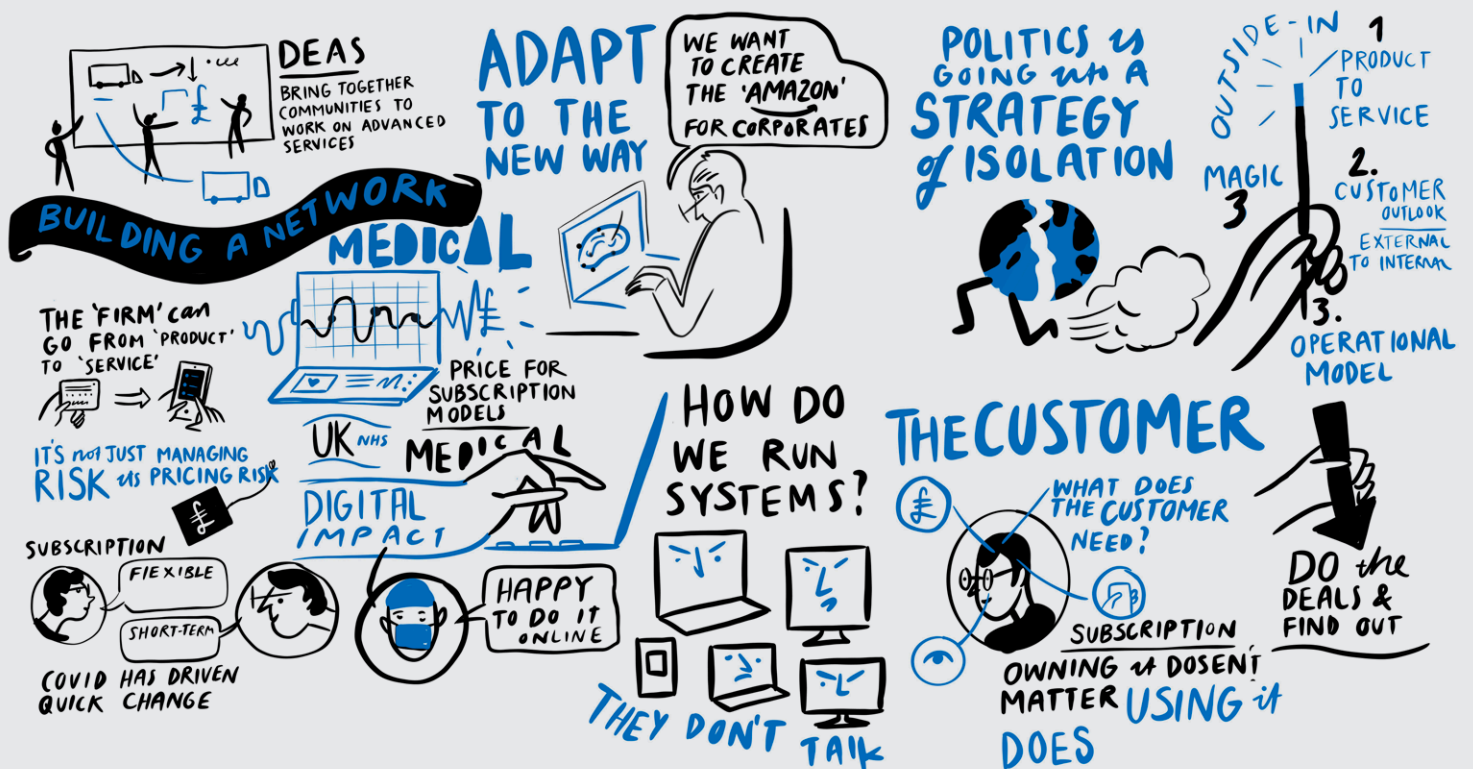
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FINANCE ROUND TABLE

DEAS+



1

EXECUTIVE SUMMARY

The EPSRC-funded DEAS NetworkPlus aims to bring together a vibrant community with the ambition of positioning the UK as the internationally leading research and practice hub for Digitally Enhanced Advanced Services (DEAS). To support this ambition, the EPSRC award will be used to create a network of businesses and researchers to enable a coordinated programme of research to be designed and piloted in four sectors: manufacturing, transportation/mobility, charity/voluntary and financial services.

Rather than focus on the product or service that is delivered, DEAS focus on how the product or service is used, and how innovative digital technologies can facilitate this. This is a major change in how firms earn money and is being enabled by transformative digital technologies that allows, for example, payment per use or payment for availability or outcome.

Research agendas have been developed, and associated pilot projects funded within manufacturing and transportation/mobility. Pilot projects have also been funded in the charity/voluntary sector. The final theme to be considered is financial services and this report contains the related research agenda.

Using the theoretical framework developed from the first two themes, and a similar development methodology which was adapted to work virtually, the team identified nine research topics which will now form the basis for providing research funding through the DEAS NetworkPlus:

- » How can innovative digital technologies enhance communication, education and engagement within and between organisations and customers about DEAS within the financial services sector?
- » How can innovative digital technologies allow us to identify suitable DEAS customer focused outcomes delivered by financial service providers?
- » How can innovative digital technologies enhance business model design, adoption and evaluation to finance or deliver value through DEAS within financial services?
- » How can innovative digital technologies enhance organisation and cultural change for effective adoption of DEAS within and between organisations within the financial services sector and their customers?
- » How can innovative digital technologies help develop and understand an appropriate risk model for organisations looking to finance or deliver DEAS within the financial services sector?
- » How can an organisation financing and/or adopting DEAS determine a suitable pricing structure for its services?
- » How can innovative digital technologies allow the management and analysis of data to finance or facilitate DEAS within the financial services sector?
- » How can policy help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS within the financial services sector?
- » How can innovative digital technologies enhance productivity and growth of the UK economy through DEAS and help manage the impact of COVID-19?

This document will outline these nine topics and the challenges that relate to them. A list of suggested projects is presented for each of the research topics.

2

CONTEXT

2.1 AN INTRODUCTION TO DIGITALLY ENHANCED ADVANCED SERVICES

Digitally Enhanced Advanced Services (DEAS) are high-value business models that focus on the delivery of ‘outcomes’ rather than products. These usually include (i) revenue payments structured around product or service usage and customer outcome; (ii) performance incentives (e.g. penalties for in-use product or service failure); and (iii) long-term contractual agreements between organisations (e.g. spanning five, ten or 15 years) and cost-down commitments¹. Well-known examples of DEAS in the manufacturing sector include Xerox’s Print Management offering¹, which bundles printing-equipment and maintenance-services whereby customers are charged for the use of the product-service-bundle (i.e. per print); or MAN’s Pay-per-Kilometre offering², which bundles truck, maintenance and driver-management services where customers are charged for the extent of the use of the bundle (i.e. distance driven).

Digital technologies such as Artificial Intelligence (AI), deep learning and data analytics play key roles in the development and delivery of DEAS. Within financial services, they can provide monitoring of an individual’s or organisation’s behaviour and usage of physical assets, and analysis of the generated data, which could then be used to personalise insurance or finance offerings. The outcome a customer requires is often very different from the traditional products offered by their financial services provider. For example,

the potential customer wants to move home, not purchase a mortgage; the insured customer wants rapid reimbursement for loss, not the experience of a long, arduous claims process; a manufacturer wants to know that his bank understands the way that risk and cash flows can alter when they are moving to advanced services.

The transformation of organisations within finance to develop, deliver, and ultimately compete through DEAS, and to provide financial services to organisations transforming to DEAS is a challenge to both practitioners and researchers. From a practical perspective, finance providers need to be able to understand DEAS and how they can support organisations moving to advanced services with appropriate financial and insurance products and services, while at the same time considering whether to adopt DEAS themselves. These activities need to be accomplished within a complex regulatory environment. From the research perspective, on the other hand, to understand DEAS and recognise its potential, a transdisciplinary research approach is required that crosses many disciplinary boundaries (for instance computer science, engineering, business and management) to create a holistic approach. When pursuing this approach, there are two critical challenges facing the engaged scholars: (1) critical awareness; an understanding that each discipline has its own philosophy, methods, and processes, and (2) a strong grounding in disciplinary traditions, including familiarity with their language, theoretical and methodological approaches.



2.2 WHY DIGITALLY ENHANCED ADVANCED SERVICES ARE IMPORTANT TO THE UK ECONOMY

In 2017, the Chief Economist of the Bank of England, Andy Haldane, gave a speech to the London School of Economics in which he referenced the 'productivity puzzle'³. Since 2008, UK productivity growth has underperformed consistently, relative to forecasts, and indeed productivity has hardly improved at all in the last ten years. Part of the root of this problem is historical; initiatives to improve productivity have tended to focus on improving the efficiency of 'inputs' (i.e. reducing time and costs), rather than increasing 'outputs' (i.e. increasing value created), and today there is a danger of repeating this mistake with digital technologies.

The value creation potential of digitalisation is immense, with a total estimated global economic impact of £800 billion to £2 trillion per year by 2025⁴. There is, therefore, much excitement around the potential of digital technologies to enhance the efficiency of the organisations that adopt them and to transform all sectors of the economy. Additionally, since 1948 the demand for services has grown exponentially while the proportion of GDP from production and manufacturing has contracted. The importance of services, and servitisation in the UK, is reflected within the 2018 report by the UK Government Chief Scientific Adviser: *Services Transformed: Growth Opportunities for the UK Service Economy*⁵. Within the UK, for example, approximately 80% of GDP now comes from services-based activities. Furthermore, the nature of services is changing; we are in a world where fewer people are buying conventional products and services, and instead more and more are seeking to buy the 'outcomes' that these enable. Quite simply, rather than 'buying an engine' customers want to buy 'thrust', rather than 'buying a car' they want 'mobility', rather than 'buying insurance' they want 'reassurance'. In this way, the world of 'selling things' is giving way to one of 'provision of outcome'. Indeed, a survey published by ServiceMax from GE Digital⁶ found that 77% of respondents (600 IT decision makers and field service management leaders) believed that Generation Z (those born from 1994 onwards) will be the last to experience a product-dominated economy.

¹ Baines, T and Lightfoot, H. 2013, *Made to Serve: How Manufacturers Can Compete Through Servitization and Product – Service Systems*, Wiley, London, UK, available at <https://www.wiley.com>

² Bustinza, O; Bigdeli, A; Baines, T and Elliot, C. 2015, *Servitization and Competitive Advantage: The Importance of Organizational Structure and Value Chain Position*, *Research-Technology Management*, Volume 58, 2015 – Issue 5

³ Haldane, A. 2017, *Productivity Puzzles*, [online] 20 March 2017, London School of Economics, available at: <http://www.bis.org/review/r170322b.pdf>

⁴ World Economic Forum, 2016. *Unlocking Digital Value to Society: building a digital future to serve us all*, available at: <http://reports.weforum.org/digital-transformation/unlocking-digital-value-to-society-building-a-digital-future-to-serve-us-all/>

⁵ Government Office for Science (2018). 'Services Transformed: Growth Opportunities for the UK Service Economy'.

⁶ ServiceMax Press Releases (2018). *Gen Z Will Be the Last Generation to Remember a Product-Based Economy, According To New Global Research*, available at: <https://www.servicemax.com/press-releases/gen-z-will-be-the-last-generation-to-remember-a-product-based-economy>

2.3 THE EPSRC DEAS NETWORKPLUS

Our vision is that the UK should be the internationally leading research hub for the innovation of Digitally Enhanced Advanced Services and that this capability will significantly amplify the productivity, growth and resilience of industry in the UK. The aim of this NetworkPlus is to:

‘Create a cohesive community of researchers and practitioners, working collectively across disciplines (e.g. computer science, engineering and business) and industry sectors, to accelerate the innovation of DEAS and improve UK productivity’.

This Digital Economy NetworkPlus will deliver a vibrant community that will position the UK as the internationally leading research hub for Digitally Enhanced Advanced Services. Rather than focus on the product that is delivered, DEAS focuses on the capability that the product provides. This is a major change in how firms earn money and is being enabled by transformative digital technologies that allow for example, payment per use or availability or outcome. The traditional focus of productivity (outputs/inputs) is on internal efficiency but digital technologies applied to advanced services also transform the value of the output and outcome.

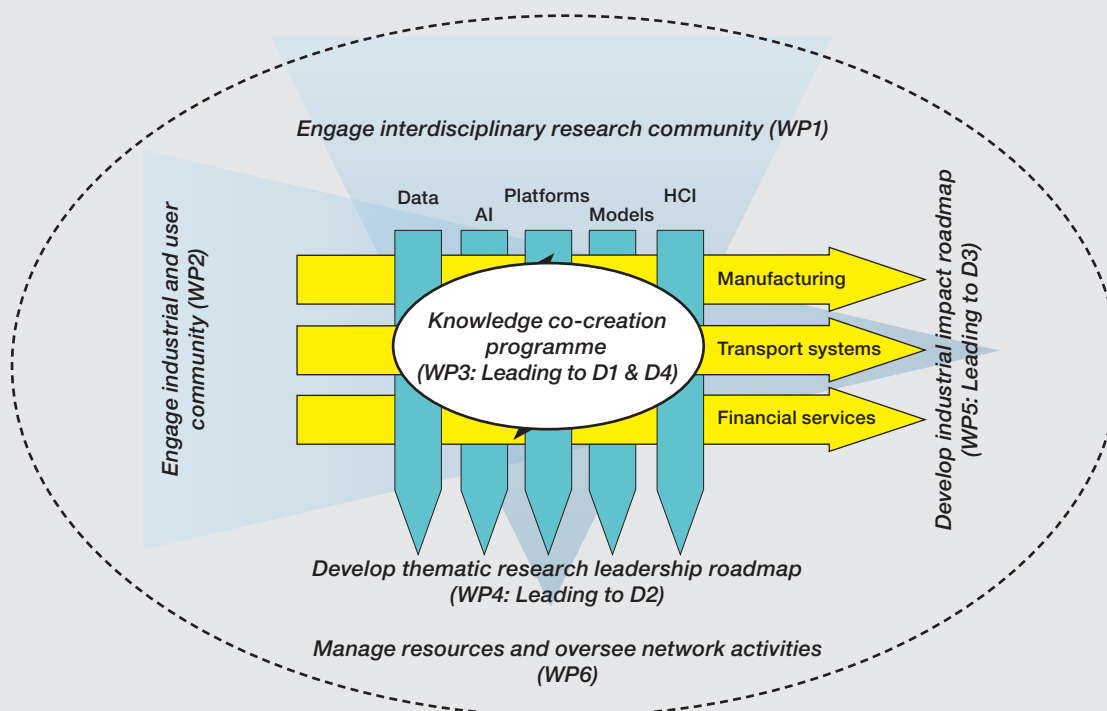
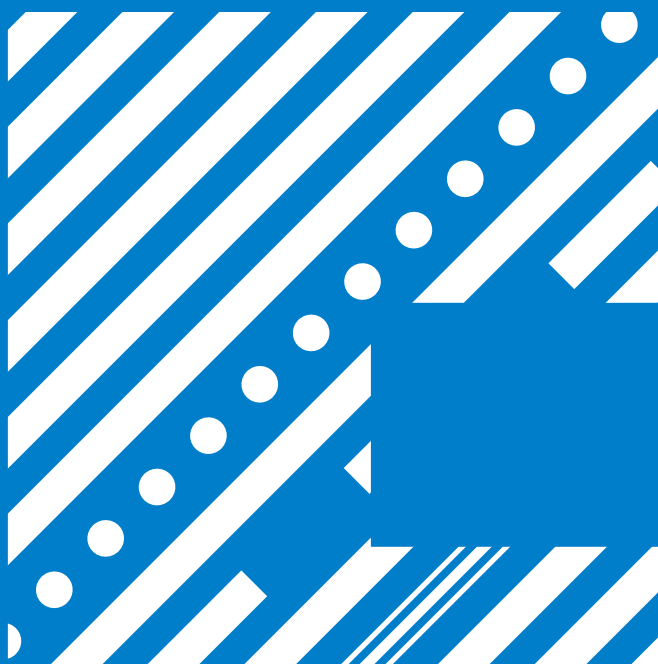


Figure 1: The DEAS NetworkPlus comprises an integrated programme of activities. There are five technical work packages (WP1-5), which run concurrently. WP 1&2 focuses on processes for identifying and attracting researchers and practitioners, WP3 is then a programme of co-creation activities, with WP 4&5 creating roadmaps for research and impact. This programme will be overseen throughout by a management work package (WP6).

THE DEAS NETWORKPLUS WILL DELIVER FOR THE UK:

- (D1) a new, interdisciplinary community progressing the topic of DEAS,
- (D2) a road-map articulating a thematic research agenda and priorities for international leadership in this topic,
- (D3) an equivalent road-map illustrating the opportunity space for maximising impact on different sectors based on their level of maturity e.g. manufacturing, transportation/ mobility and financial services,
- (D4) a portfolio of innovative research projects that will accelerate the impact of DEAS in collaborating companies.

Success will be measured through: (i) the scale and diversity of the community we develop, (ii) the level of activity and participation across this community on publications, events, workshops, and research agenda (iii) the relevance and direct impact on industry.



3

THE FINANCE SECTOR

Financial Services is a key sector for the UK economy; in 2018 the sector contributed £132 billion to the UK economy (6.9% of total economic output), £29 billion in tax and 1.1 million jobs (3.1% of all jobs)⁷.

The finance sector comprises organisations and institutions that provide financial services to retail and commercial customers. Industries included in the sector include banks, insurance, investment and real-estate brokers, and firms offering accountancy and advice. Financial Services is also a heavily regulated sector in order to protect consumers, investors, institutions and the wider economy and society. Since financial services is such a large sector we have decided to restrict this research theme to banking and insurance, two of the largest industries within the sector.

Financial institutions provide the capital that funds investment, innovation and growth, and protection, for both business and personal customers. Intermediation lies at the heart of all financial services: the matching of those who need money

with those that can provide it, sometimes through payments services and sometimes through loans and investment, and those that can take on risk to those who wish to lower risk⁸. This may be an insurable risk, such as a fire, or the risk that a loan will not be repaid.

As more organisations move towards using innovative digital technologies to provide advanced services rather than products, and as customers get more used to consumption based on pay per use or subscription rather than ownership, financial service providers have to do two things. Firstly, they have to consider whether they should adopt an advanced services model for their own organisation and their products and services; and secondly, and just as importantly, they have to consider what they need to do for their customers who are moving to an advanced service model, because many of their existing products and competences will no longer be relevant. They have a key role to play in stimulating the move to advanced services, as part of their function in financing the digital economy.

In traditional make and sell business models, an Original Equipment Manufacturer (OEM) produces an asset for sale to another business who will operate that asset (a physical resource that is critical to the operation of the business). The asset may be a piece of equipment, a vehicle or a building. In order to produce and sell the asset, the OEM needs to ensure that they have sufficient working capital to survive while the asset is being manufactured, which is often a substantial period. This financing is often provided by a bank, or possibly an investor. The sale price of the asset will be determined by the cost of development and any other financial costs; the OEM must make a profit if they wish to continue operating. The OEM will generally sell their asset to an operator who wishes to use it in their own business. The asset purchase price will be financed by the operator's bank. Both the OEM and the operator will need insurance during this process.

The adoption of advanced services by the OEM changes the way that ownership and risk move within this asset and finance chain. The OEM makes the asset and provides the service of that asset to the operator. The OEM's finance provider now needs to provide working capital for a longer period and cover the risk of intermittent cash flows to the OEM from the operator. The operator is now paying for the asset through operating expenditure rather than capital expenditure and needs different funding from his financier. The OEM financier needs to understand technical operating risks of asset to be able to price and match cash flows, and to be able to lay off this risk with an insurer. What is now being insured is likely to be ongoing performance rather than, for example, cash for the asset to be replaced.

The traditional goods model based on financing capital expenditure has been replaced by a service oriented model based more on operating expenditure; and the financial system accordingly needs to move from selling and financing products to providing and financing a service within a new set of ongoing relationships between OEM, operator, end consumer and financial services. This transition is by the model illustrated in figure 2.

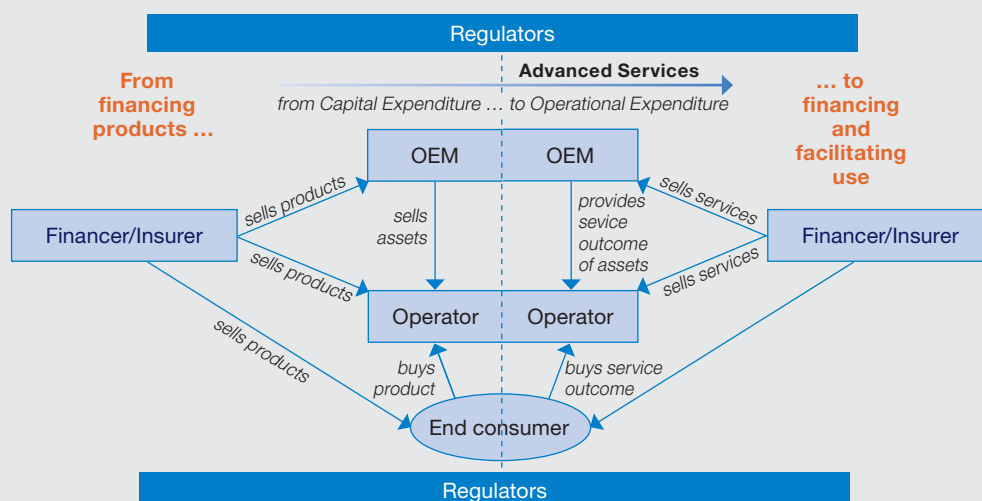


Figure 2: Model to show move from financing products to financing and facilitating use⁹.

⁷ Rhodes, C (2019). Financial services: contribution to the UK economy. Commons Research Briefing SN06193, 31 July 2019, available at: <https://commonslibrary.parliament.uk/research-briefings/sn06193/>.

⁸ Asmundson, I (2020). Financial Services: getting the goods. Finance & Development, available at: <https://www.imf.org/external/pubs/ft/fandd/basics/finserv.htm>

⁹ Godsiff, P. and Wood, Z. (2020). Financing the Digital Economy: From financing products and purchase to financing service and use.

4

DEVELOPMENT PROCESS

4.1 AIM

This report establishes the research agenda for the Digitally Enhanced Advanced Services NetworkPlus in the finance sector with a focus on banking and insurance.

4.2 METHODOLOGY

The DEAS NetworkPlus Team (see Appendix 1) have established the required characteristics of the developed research agenda as being:

- » broad to cover a wide range of related areas including organisational change, digital technology, techniques, and processes;
- » inclusive to look at the challenges from a range of disciplines;
- » balanced in order to be guided by theory to ensure a sensible range of topics;
- » exploratory to be aligned with the overall objectives of DEAS NetworkPlus, and
- » relevant to lead to impact on business and make contribution to knowledge.

For the previous two research agendas (i.e. manufacturing and transportation/mobility), a three-step process was adopted to ensure these characteristics were met: step 1) groundwork to develop a relevant theoretical framework; step 2) hold a physical workshop bringing together academics and industry to help understand the challenges and opportunities faced by organisations who are trying to adopt DEAS; and, step 3) use a Delphi methodology to validate and refine what was captured in step 2.

Due to the restrictions related to COVID-19, namely social distancing, working from home and travel restrictions, the DEAS team needed to adapt this successful methodology. To do this, the strengths of the previous method were identified and ways of replicating them in a virtual environment considered. The theoretical frameworks that had

been developed and adopted for the previous two research agendas (step 1) were deemed necessary to allow the agenda to continue to have the five characteristics outlined above. The Technology–Organization–Environment Framework (figure 3) was also found to be an extremely useful, and an efficient way, of framing the workshops. Step 3 of the original method was also considered a necessary strength.

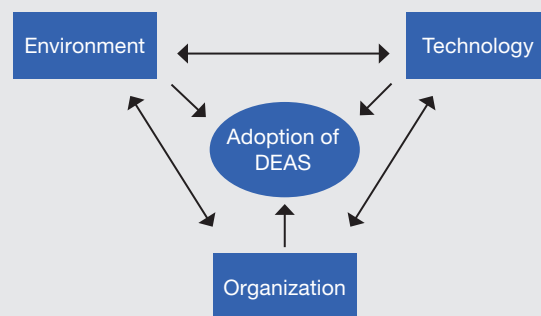


Figure 3: The Technology–Organization–Environment Framework

It was clear that physical meetings would not be possible due to COVID-19 and a virtual alternative would be needed. A virtual environment brings challenges but also opportunities. When taking place physically, workshop attendees can be restricted to the location of the workshop venue (i.e. travel time and accessibility). External factors such as delayed trains and adverse weather can lead to a last-minute reduction in the number of attendees. A virtual meeting involves no travel time. From our own experiences, we also found virtual meetings provided a more intimate and less formal setting if the number of attendees was kept low. Participants appreciated the variation in topic compared to their day-to-day activities and identifying participants who wanted to attend and contribute was not an issue.

Previous physical workshops lasted all day, which is too long for a virtual meeting, and involved many opportunities for “off-line” informal conversations. The DEAS team also recognised the importance for everyone to feel included and, therefore, the need for reduced number of participants. For these reasons, it was decided that more than one virtual event would be necessary. To ensure everyone had the opportunity to speak and feel included in the discussions, each virtual workshop took the format of a roundtable. A short set of introductory presentations would set the scene related to the theme of the session, followed by a set of smaller breakout rooms discussions that allowed the concepts that had arisen in the presentations to be discussed in more detail, and then a final session, which brought the more detailed discussions together. Where breakout rooms were used, there was one breakout room for each speaker (maximum 3). Breakout rooms were not used for workshops that had fewer than 10 participants.

Only one physical workshop was necessary when producing the previous DEAS research agendas. A set of industry representatives could present their challenges in the morning and detailed discussions could take place with academics during the rest of the day. Due to the pandemic restrictions, this was obviously not possible for this finance theme. The DEAS team also recognised the complexity of the ecosystem and the variation in stakeholders. To gain a good understanding of the challenges faced by the different stakeholders, a set of industry only virtual events were held: three for asset finance and three for insurance. These aspects of finance were chosen because they were identified as principal and relevant research areas within the finance theme for financial organisations seeking to move to advanced services or provide financial services to such organisations.

The three insurance sector events were facilitated by the London Market Forums (LMF)¹⁰, a cross-sector platform for collaboration and engagement between insurance professionals. LMF works closely with personnel from Lloyd's of London, the International Underwriting Association and other bodies throughout the London Insurance Market. It is the only central industry group of its type in the sector, where insurance professionals meet, collaborate, learn, network, and understand some of the key issues affecting the insurance sector today, from industry modernisation to the changing regulatory landscape. LMF had gained much experience of running virtual roundtables during the lockdown.

During June 2020, LMF hosted the New World Series which comprised three weekly roundtables with senior insurance industry representatives, which DEAS co-sponsored and co-chaired. The theme of the special series was the changing workplace, the impact of technology, the effect on people, and how this changing environment is affecting decision making and its impact on the UK's digital economy. Each session lasted 90 minutes and had between 18 and 30 senior insurance participants; in total more than 80 individuals attended the three events.

DEAS then hosted three virtual roundtables for representatives in financial services and asset finance (see appendix 2 for a list of participants and contributors).

A final roundtable was held to bring together industry and academia allowing each of the identified disciplines (i.e. computer science, engineering, and management) to listen to, question and discuss with practitioners from industry who have experience of financing, developing and delivering Digitally Enhanced Advanced Services. Not all of the industry representatives from the previous industry-only roundtables could attend the joint workshop. Therefore, an initial presentation presented to the group the results of the previous discussions.



¹⁰ <https://lmforums.com>

A summary of the process used to produce this research agenda, and ensure it met the characteristics of the previous two, is as follows:

Step 1 – The groundwork: to make sure that the research agenda is broad and balanced the DEAS NetworkPlus Team developed a theoretical framework. The foundation of this approach is the Empathise phase of the design thinking methodology. The framework is designed to enable us to (1) capture inclusive viewpoints on the challenges, (2) classify the empirical discussions in a structured way, and (3) synthesise an agenda for future projects.

Step 2 – A series of virtual roundtables: six with industry representatives and one that brought together industry and academia, taking place during June and July 2020. See Appendix 2 for a list of the practitioners and Appendix 3 for the list of researchers.

For each of the roundtables, the overall question that was presented was “How can transformative digital technologies accelerate the financing and adoption of advanced services within financial services?”. Each industrialist was invited to describe their company and its development toward advanced services using the Technology–Organization–Environment Framework as defined by these questions:

- » What is your company and what advanced service offering do you (aspire) to have (or enable)?
- » What organisational challenges do you have/ anticipate in achieving this?
- » What technological challenges do you have/ anticipate in achieving this?
- » What business environment challenges do you have/anticipate in achieving this?

For each of the virtual roundtables, all the discussions were captured in a list of comments and questions which firstly set out a broad portfolio of research and then, from the discipline focussed discussions developed a deeper understanding of where the research issues were located. These discussions were also captured by a visual scribe in a series of colourful mind-maps, synthesising the essential elements of the event into a combination of words and images.

Step 3 – The comments and questions from Step 2 were validated and refined by the researchers using a Delphi methodology to produce the research agenda. This included conversations and validation with other representatives of financial institutions and government agencies.



5

RESEARCH TOPICS

As a result of following the methodology described in Section 3, the researchers have identified nine research questions which are described in detail in the following pages. The nine topics are:

- 5.1 How can innovative digital technologies enhance communication, education and engagement within and between organisations and customers about DEAS within the financial services sector?
- 5.2 How can innovative digital technologies allow us to identify suitable DEAS customer focused outcomes delivered by financial service providers?
- 5.3 How can innovative digital technologies enhance business model design, adoption and evaluation to finance or deliver value through DEAS within financial services?
- 5.4 How can innovative digital technologies enhance organisation and cultural change for effective adoption of DEAS within and between organisations within the financial services sector and their customers?
- 5.5 How can innovative digital technologies help develop and understand an appropriate risk model for organisations looking to finance or deliver DEAS within the financial services sector?
- 5.6 How can an organisation financing and/or adopting DEAS determine a suitable pricing structure?
- 5.7 How can innovative digital technologies allow the management and analysis of data to finance or facilitate DEAS within the financial services sector?
- 5.8 How can policy help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS within the financial services sector?
- 5.9 How can innovative digital technologies enhance productivity and growth of the UK economy through DEAS and help manage the impact of COVID-19?

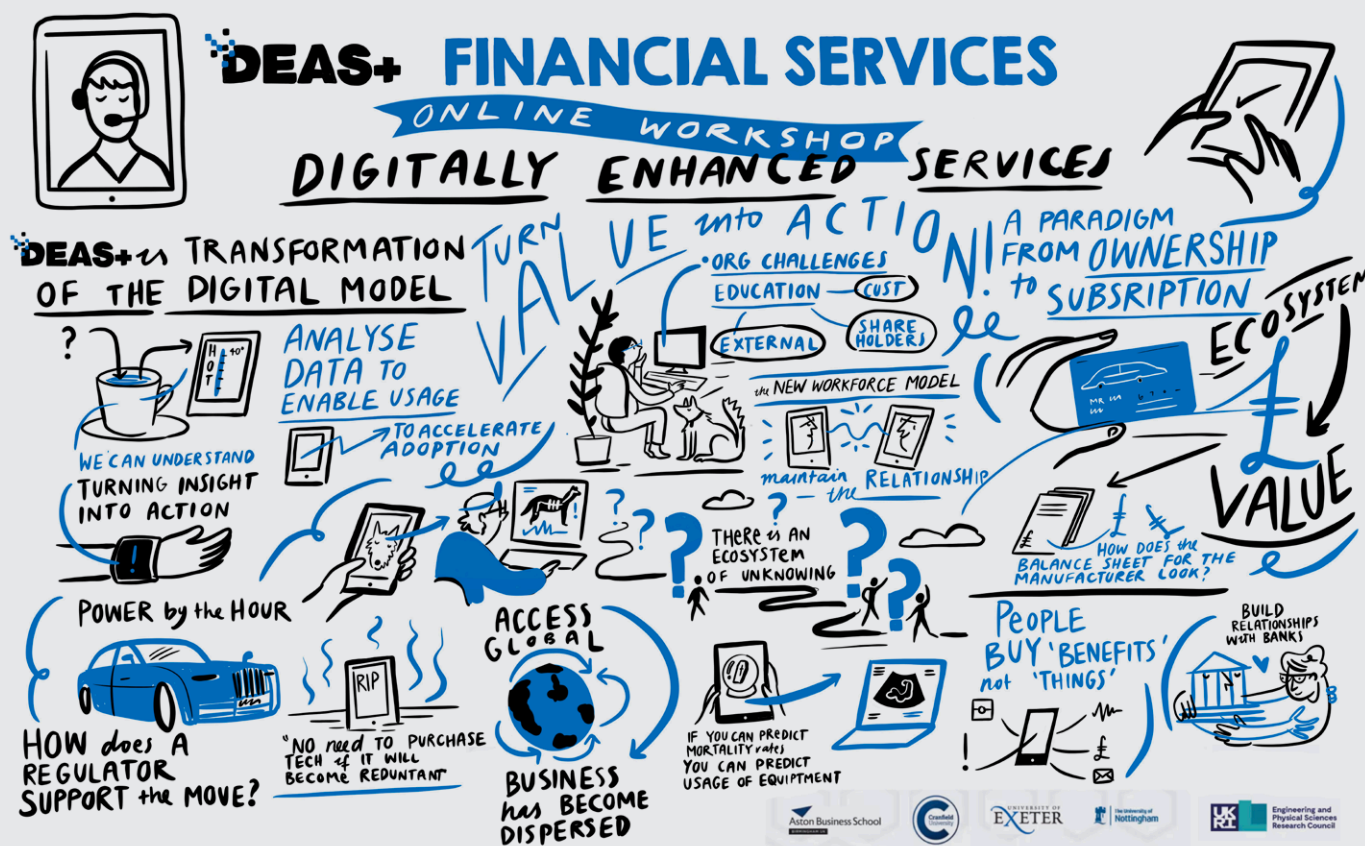
5.1

How can innovative digital technologies enhance communication, education and engagement within and between organisations and customers about DEAS within the financial services sector?

INTRODUCTION

There is a need to raise awareness in the whole financial services ecosystem of what DEAS are and how such services add value in general. Education about the changes in behaviour and perceptions is considered important for all stakeholders: employees, management, customers, regulators, investors and shareholders.

For many of the financial service organisations that we spoke with, only a small portion of their current business involves services – many are still product focused. This is the case for both financial service providers themselves, for organisations looking to move to advanced services, and actors/stakeholders within the wider ecosystem such as regulators and shareholders. The opportunity to sell advanced services occurs when the service provider aligns its offer with the customer's concept of value. It is a huge change to switch the basis of the relationship from the customer buying a product to selling them the outcome provided by that product. This has potential for both business customers of financial services providers looking to adopt advanced services, and for personal customers looking for an outcome, (e.g. moving house) rather than just being sold a product (mortgage). Digital technologies have the potential to help all the actors in the ecosystem customer understand the value of the outcome provided by the product or service and consequently how a DEAS can help them perform their roles better.



KEY QUESTION

What educational tools using innovative digital technologies could be developed for different components of the ecosystem to enhance knowledge of DEAS and to demonstrate the value of a DEAS offer in terms that the finance provider and customer will understand, and that will be meaningful to shareholders, investors and regulators?

CHALLENGES

If a company has not yet developed a DEAS offer, how can it justify the resource and financing implications of developing one to their financial service provider along with the new products and services needed, and to their investors and shareholders? How can any of the stakeholders in the wider ecosystem express their needs if they don't understand the DEAS concept? Could educational tools assist with adoption challenges related to DEAS that were noted within roundtable discussions (e.g. end users/customers reluctant to have technology within their homes that collected data)?

POSSIBLE RESEARCH PROJECTS

- » How can innovative digital technologies (e.g. gamification, Virtual/Augmented Reality) help the different stakeholders understand the value of DEAS and/or their new role in the partnership?
- » Considering new risks associated with the introduction of DEAS, what would assure the different stakeholders?
- » How do you demonstrate the value of DEAS both internally and externally?
- » What new commercial models can digital technologies enable that get different providers to work together for DEAS in financial services that would demonstrate the benefit of DEAS?
- » How should we use technology (e.g. IoT) to improve the visibility of collaboration in a DEAS value network delivering financial services?
- » How to develop a shared vision for DEAS between management, frontline staff and back office staff within organisations and across multiple organisations?

5.2

How can innovative digital technologies allow us to identify suitable DEAS customer focused outcomes delivered by financial service providers?

INTRODUCTION

What outcome does each user require, bearing in mind that financial service providers have both business customers and personal customers? And range from simple payments, savings and insurance to complex multi-party international deals? Business and personal customers can be part of a product or service supply chain, or the end user and consumer. Their needs are very different, ranging from a money transaction service, to a mortgage or savings account; from short term loans to long term asset finance; from home contents insurance to insuring a fleet of aircraft. In developing advanced services, it is vital to put the needs of the customer front and centre in terms of providing them a service-based outcome. The development and maintenance of customer relationships is considered very important with many of the roundtable participants considering the customer as a driving force for innovation. Operators and customers are changing their behaviour and their expectations. The application of DEAS, and the use of innovative digital technologies, could provide a way of responding to evolving customer needs and behaviour. What outcome does each very different user really require? The OEM may require financing and insurance to cover the working life of the asset being used to provide service to the operator. The operator may require finance that better suits a pay per use model which better matches income from his customers. A personal customer does not really want a mortgage, they want to move home which involves a completely different set of services not all of them financially based. Should the provider seek to supply a mixed bundle of services? Could insurers provide a service giving early warning of floods, or even preventing them?

KEY QUESTION

How can innovative digital technologies help providers of finance and providers of DEAS understand, identify and create advanced services that truly meet customers' needs for outcomes?

CHALLENGES

How can a company define a DEAS offer if they do not have input from their customers? How can customers desired outcomes be identified and reflected in service providers offerings? How can providers of DEAS adapt to evolving customers' needs and behaviour?

POSSIBLE RESEARCH PROJECTS

- » How can digital technologies help establish better relationships with the customer?
- » How can changing operator and customer behaviour be identified?
- » How does the OEM, operator and customer view the value of their data created during the use of a DEAS service within financial services?
- » How can customer desired outcomes be identified from data and AI technologies?
- » How can providers of finance and/providers of DEAS identify new potential services offerings that match customer desired outcomes through the use of data and AI technologies?



5.3

How can innovative digital technologies enhance business model design, adoption and evaluation to finance or deliver value through DEAS within financial services?

INTRODUCTION

The change from selling a product to selling the capability that the product provides presents many challenges. Everyone has a vested interest in the existing material and financial value chain. DEAS challenges status quo. The adoption of DEAS requires a change in value proposition. Financing advanced services requires significant changes in both the company adopting advanced services and in its financial provider. A company may need a new business model and new operating model. Once started, it will be a challenge to handle the growth and scale up of operations: to gather the necessary data. There is a new culture emerging where leasing is preferred to ownership, which could have an effect on business models. This is particularly relevant for large physical assets which might be obsolete, or not needed in the near future.

KEY QUESTION

How do you combine digital technologies, engineering, financial services and business organisation to deliver value through DEAS?

CHALLENGES

The existing transaction business model (selling products) is strong so why change? Good R&D is developing new standard products every year. As you start to gather data, you learn new aspects of how your products deliver capability: how to adapt your DEAS as you learn? Once you have insight, you want foresight – how to predict what outcomes customers will want next? How should providers change their business models and behaviours to reflect changing business models and requirements of their customers?

POSSIBLE RESEARCH PROJECTS

- » Can digital technologies build dynamic business models that take account of economic, environmental and personal factors associated with the financing and delivery of DEAS within financial services?
- » Develop an online tool to allow an organisation to build a business case for a switch to DEAS.
- » How can SMEs be aware of/learn what is available and what is the appropriate technology to implement DEAS given limited resources?
- » How must the business model and organisational structure be changed in organisations to support DEAS?
- » How must the business model, organisational and insurance structures be changed in financial service organisations to support DEAS within their own organisations?

IMPACT ON OUR PEOPLE

OUR GREATEST ASSET
DIVERSITY & INCLUSION

WELLBEING
& BELONGING
the 'OFFICE' is DEAD
FEAR of the NEW FLU

FACILITATE
THE NEW NORM
CULTURE

MANAGERS

CONNECT WITH
TALENT

LEADERS

to BRING
POSITIVE
energy!

CONNECT

MOVING BOUNDARIES

IDENTIFY
THE BOUNDARY

IMPACT

NO COMMUTE

SECURITY



SKILL
UP DIGITAL

WHERE ARE
MY CUSTOMERS



CONNECT

NO BREAKS

NEW
SKILLS

NETWORKING
"my eyes are
going funny"

HOW to
COMMUNICATE
WELL
ONLINE

THIS is NOT
OVER

DIFFICULT
CONVERSATIONS
MUST BE HAD

MENTAL HEALTH

WORKING FROM
ONE RANGE
FATIGUE is
SETTING IN

NEW LEADERSHIP
-ROLES-

ZOOM
SATURATION
NEW TOOLS
IN A NEW WORLD



WELLNESS WATCHTOWER
THERE IS AN
ICE BURGL UNDER
THE SURFACE

5.4

How can innovative digital technologies enhance organisation and cultural change for effective adoption of DEAS within and between organisations within the financial services sector and their customers?

INTRODUCTION

Organisations are often reluctant to adopt new methods and systems because they are unsure of their own readiness for the change or they lack the necessary skills or incentive. Companies, including financial service providers who are considering adopting DEAS, not only need to know the requirements and habits of external members of their value networks to be confident, they also need to know they have the internal conditions and personnel in place to achieve operational effectiveness. Moving to a servitisation business model with a focus on customer needs, requires a different mindset and different operating models. It will involve new technical skills that may not currently exist within the organisation, for examples actuaries for equipment usage and life. These models will require new roles and skills, some of which are different to those they would traditionally hire. It is not just technical financial roles that are required. Organisations, including banks, will need individuals who could understand behaviour and the usage of a large asset. This brings in questions of training and identifying a skills pipeline that would satisfy future needs: a new mix of corporate skills and new individual skills with often completely new skill sets (e.g. “technological actuaries”). Financial services will need to move away from financing working capital, and debt based on balance sheets, towards financing models more based on operating expenses, asset performance, and technical as well as financial risk assessment. Organisations seeking to move to advanced services will need different marketing, pricing and communication skills to educate their customers of the benefits of servitisation and to share this with the whole ecosystem.

There will inevitably be a need for partnerships. A single organisation cannot have all the expertise necessary to both finance and deliver DEAS. Existing providers will need to form internal and external partnerships to ensure they have access to all the skills and behaviours to properly finance organisations changing to deliver advanced services. There is a clear need for new hybrid models of financial services covering finance technology and risk. Strategic partners are likely to be required resulting in the boundaries between existing sectors becoming less defined.



KEY QUESTION

Can we enable organisations so they can identify and assess their own requirements and necessary partners and, develop confidence that they are ready to start and optimise DEAS implementation, with the necessary skill sets both now and in the future?

CHALLENGES

The challenge is to develop a reliable understanding of the most important factors affecting uptake and effective adoption of DEAS systems and to develop practical tools that organisations of all types can apply to self-assess their current circumstances and identify what they need to put in place to optimise DEAS implementation. How can future skills be identified in a dynamic environment? How can organisations ensure that they have access to all the skills and behaviours to properly finance organisations changing to deliver advanced services? Are competitive forces alone sufficient to encourage appropriate sharing of data and information between strategic partners for the development and delivery of DEAS services within financial services? How will the need for partnerships along the supply chain help servitise, and regulate across, the supply chain?

POSSIBLE RESEARCH PROJECTS

- » How to develop a shared vision for DEAS between management, frontline staff and back office teams of multiple organisations?
- » What are the key organisational barriers to/enablers for DEAS financing and implementation?
- » How can organisational conditions (environment, culture, etc) be developed for DEAS integration?
- » What hybrid models are needed to allow an organisation within financial services to either finance or adopt DEAS?
- » How can personnel skills be developed using innovative digital technologies to optimise DEAS integration?
- » What does the future skills pipeline look like in relation to DEAS within the financial services sector?
- » How can innovative digital technologies facilitate collaborative partnerships?
- » What new commercial models can digital technologies enable that get different providers to work together for DEAS in financial services?
- » How should we use technology (e.g. IoT) to improve the visibility of collaboration in a DEAS value network delivering services within financial services?
- » What are the implications of cross-sector partnerships involved in the delivery of DEAS for regulation, governance and shareholders?

5.5

How can innovative digital technologies help develop and understand an appropriate risk model for organisations looking to finance or deliver DEAS within the financial services sector?

INTRODUCTION

A key component of the financial services sector is the understanding and management of risk. Traditionally banks want to see a history of funding and a demonstration of profitability to assess risk. However, when considering a servitisation model, many of the risks change and more information and understanding is needed regarding the risks that are involved. This is particularly true when a company is at the beginning of their servitisation journey. Some of these risks involve the lifetime technical performance of machinery which may not be known with any certainty. This new understanding of risk also impacts the finance provider who needs to understand financial risk, technical risk, and how these could be offset through potentially new forms of insurance (e.g. parametric insurance will provide payouts based on the event occurring, with likely loss having been estimated and agreed with the customer beforehand, reducing the need for a lengthy assessment and claims process). This sort of insurance can be operated remotely using sensors, IoT, and other innovative digital technologies. Questions of how risk should be costed and what would be considered fair must be addressed.



KEY QUESTION

What is an appropriate risk model for an organisation financing or delivering DEAS within the financial services sector and how can digital technologies help to identify/mitigate risks?

CHALLENGES

Considering all aspects of DEAS, can all of the risks be identified? What is an appropriate risk model for an organisation adopting and delivering DEAS? Identifying the location and type of risk, how might it be reduced and how it can be communicated to stakeholders? What impact on the risk model will have digital technologies have (e.g. IoT devices in parametric insurance)?

POSSIBLE RESEARCH PROJECTS

- » What risks exist within a servitisation model within the financial services ecosystem and which stakeholders are affected?
- » How can risks within a servitisation model be measured?
- » What factors should be measured when calculating technology performance risk?
- » How can innovative digital technologies help monitor and mitigate risk?
- » How do we represent our level of confidence in the data and its interpretation?
- » Is a homogenous risk model for DEAS possible within the financial services sector?
- » How can insurance providers move to parametric insurance services? What sort of data is required and how can it be collected and analysed?

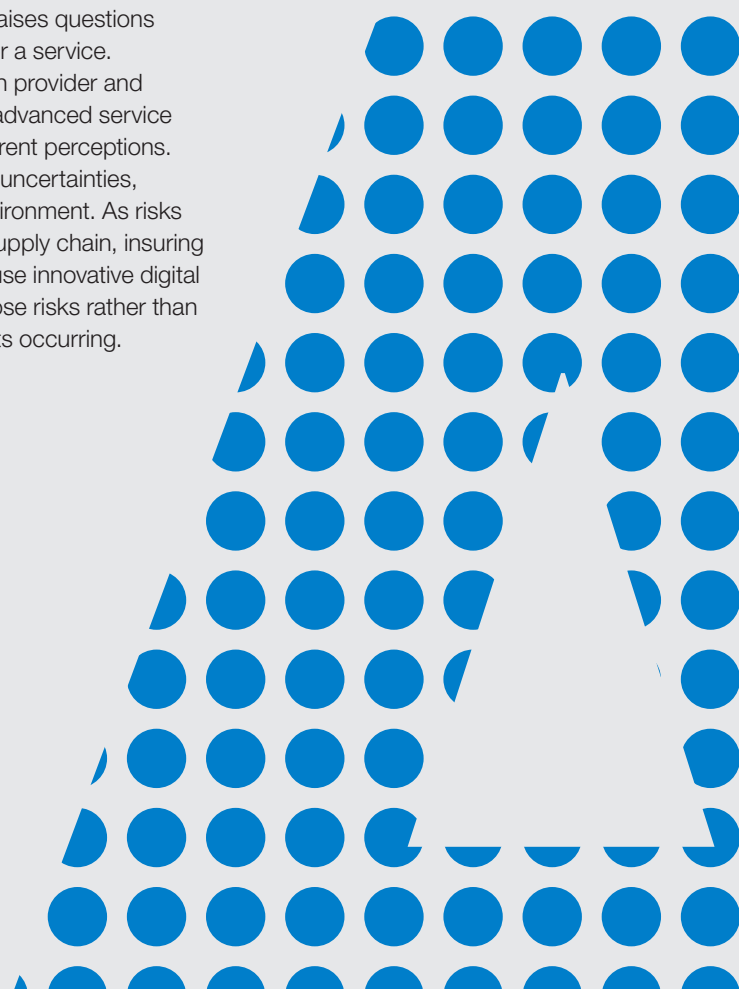
5.6

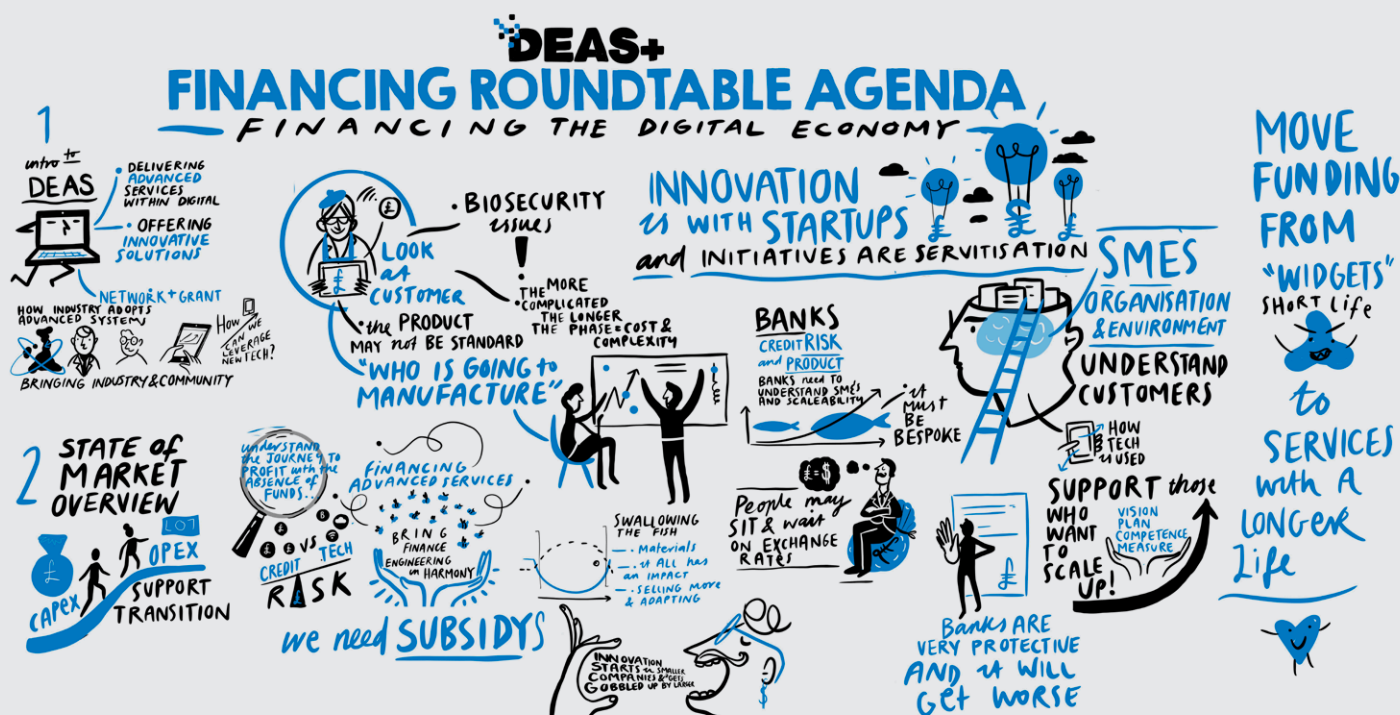
How can an organisation financing and/or adopting DEAS determine a suitable pricing structure?

INTRODUCTION

The move to a servitisation model requires a move from a predominantly capital expenditure (CapEx) model to one that is more longer term, but potentially with smaller and less predictable revenue and cost streams, reliant on e.g. pay per use or availability (i.e. more of an operating expense (OpEx) model). The question of what asset is to be financed, and the benefits to the financier, must be addressed. Any solution must be scalable. It may be difficult to establish a homogeneous model since it is likely to be dependent on the business that is being considered. It is not just about assessing risk but pricing risks, which is not well understood. Questions of how risk should be costed and what would be considered fair must be addressed.

There has been a significant increase in the desire for subscription-based services from business customers during the pandemic due to increased uncertainty and this is something that will continue in the future. However, this raises questions relating to pricing and establishing suitable pricing structures for a service. Identifying the correct and most appropriate price point for both provider and their customer, and for their customer and the end user of the advanced service remains an exploratory process with many unknowns and different perceptions. This also applies to financial service providers who face similar uncertainties, lack of knowledge and expertise, and a rigorous regulatory environment. As risks become less certain, and to be borne in different parts of the supply chain, insuring those risks becomes difficult as well. There are possibilities to use innovative digital technologies and advanced services to reduce and prevent those risks rather than merely price them for recompense in the event of insured events occurring.





KEY QUESTIONS

How can risk be identified and priced to allow an organisation financing DEAS to determine a suitable pricing structure? How can any organisation adopting DEAS determine a suitable pricing and risk structure?

CHALLENGES

How can risks across the ecosystem be identified and priced? How can risks be managed and reduced?

POSSIBLE RESEARCH PROJECTS

- » How can innovative digital technologies be used to identify risk and determine suitable prices for financial products?
- » How can innovative digital technologies be used to price operational and financial risk and determine suitable prices?
- » How can innovative digital technologies be used to reduce emerging risks and new systemic risks?

5.7

How can innovative digital technologies allow the management and analysis of data to finance or facilitate DEAS within the financial services sector?

INTRODUCTION

DEAS are data driven. In a DEAS system, we are likely to need to capture not just data to monitor the system and its components but also data about the activities of customers and providers. What data needs to be collected? Who owns this data? Who needs to access it and use it? The ability to turn data into decisions will be the main source of value. For example, data is captured during a payments transaction that could be used more widely in the system to reduce costs and improve efficiencies. This is an opportunity for innovative digital technologies, employing analytics, blockchain, big data and Artificial Intelligence. What controls need to be in place? There is a battle to control the data and there is a battle to control the direct relationship with the customers. Some data is open, and some is private which introduces lots of ethical questions. Open Banking initiatives have demonstrated how this might be done. There is a public reluctance to share their private information as they are unsure who will have access and what they will use the data for. The way in which the data is analysed, and the insights that the analysis might give, also raise ethical questions. Data security is an ongoing issue.



KEY QUESTION

What data is needed to allow the financing and adoption of DEAS? How can the data be securely shared, ethically managed and analysed to facilitate DEAS among customers and organisations?

CHALLENGES

How to recognise which data is important – not only for today but for the potential new DEAS of the future? How to present that data in a way so that informed decisions can be made? Lots of data can be generated but what needs to be collected? Who owns this data? Who needs to access it and use it? What about users owning their own data? What value does individual data have? How can this data be valued and what is the market for these data streams? What control does/should an individual have over their usage data? What methods would identify the most suitable insights relating to DEAS? How can uncertainties in the data analysis be shown?

POSSIBLE RESEARCH PROJECTS

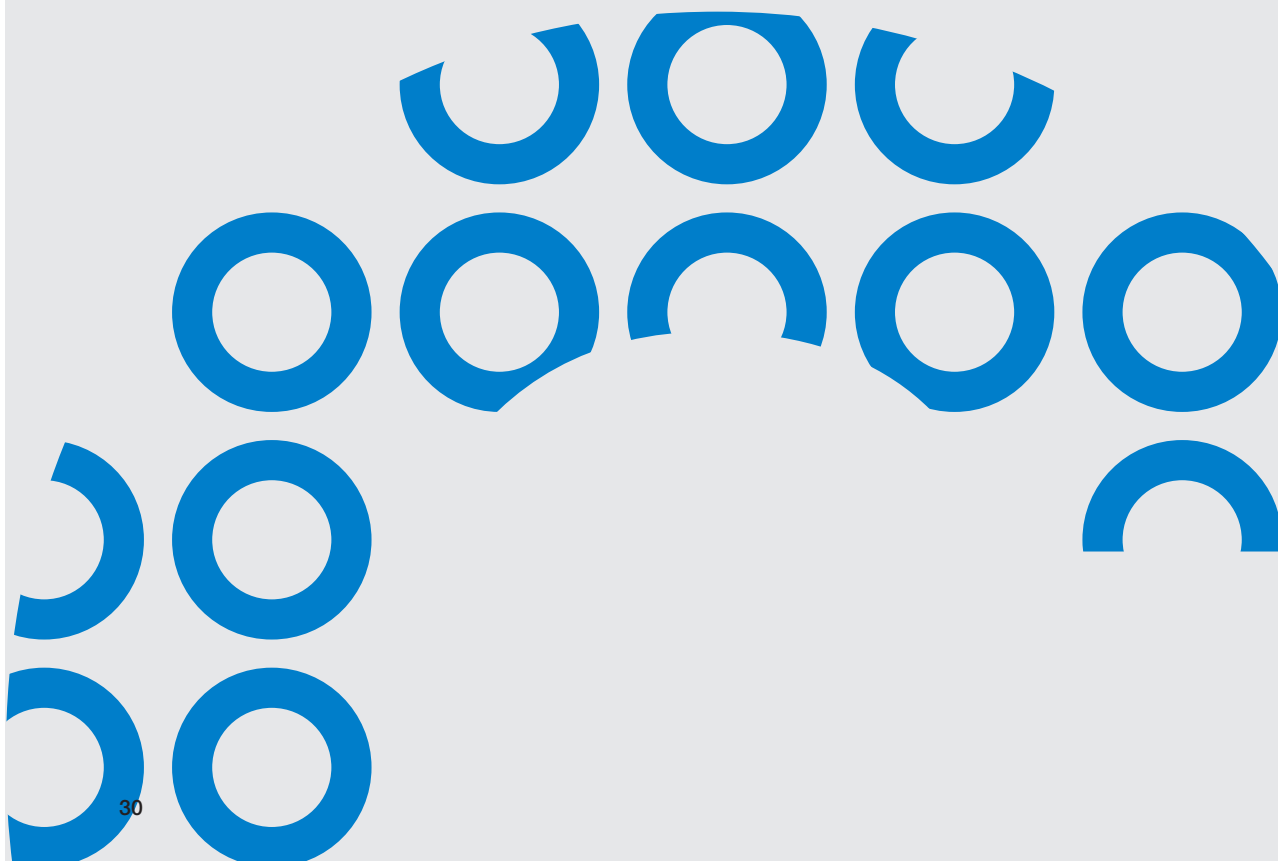
- » What data is really needed to finance, design and operate DEAS within financial services?
- » How do we represent our level of confidence in the data and its interpretation?
- » How do you represent complex datasets from DEAS to the right people in the right way? How can they be adapted for the user of the data?
- » How can data from DEAS value networks be used to identify patterns of use and to identify new services?
- » How can data used in financial service transactions be used in the wider economy to support DEAS?
- » In a connected world, how does the interaction between different organisations work?
- » What are the challenges associated with sharing organisational and customer data with multiple partners delivering a DEAS outcome within financial services?
- » How does the provider view the value of data created during the operation of DEAS?
- » How does the customer, regulator and shareholders view the value of the data created during the operation of DEAS?

5.8

How can policy help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS within the financial services sector?

INTRODUCTION

The financial services sector is heavily regulated in order to protect customers and providers, and the wider economy. However, regulation can be seen as restricting innovation within financial service providers, and a possible barrier to the adoption of DEAS by the providers, restricting their ability or willingness to provide finance to organisations looking to move to advanced services, and to personal customers. Regulation can also act as a barrier to entry for new, more innovative, organisations. Regulation needs to evolve so as not to restrict innovation type activities and potentially the whole regulatory landscape needs to be rethought to reflect the issues raised by advanced services. DEAS require digital technologies, data, associated infrastructure, and data analytics. Each of these components need to be considered in a DEAS regulatory landscape. Financial Services operates under the aegis of a number of different regulators. Regulators need to talk to each other and to become educators as well. Capital providers such as shareholders and investors need to learn how to value servitised firms and their finance providers differently to encourage innovation but still provide access to capital.





KEY QUESTIONS

How can policy help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS within the financial services ecosystem? How should the regulator and other actors use DEAS principles to respond to changing customer behaviour and evolving regulatory requirements?

CHALLENGES

How can regulators and the investment community use innovative digital technologies to understand how advanced services will impact regulation and oversight? How does policy/regulation impact the finance providers? How do we overcome the ethical and moral challenges of monitoring customer behaviour? Who owns the data that is captured and analysed? How can regulation ensure competition with dominant technology providers? How can the body of regulators understand emerging risks and determine how they should be regulated to protect all stakeholders? How can the changing balance and nature of risks arising from DEAS within the wider ecosystem be properly understood and regulated? What data can be captured from the ecosystem to allow the regulation of DEAS?



POSSIBLE RESEARCH PROJECTS

- » What new regulatory models, policies and practices are needed to finance, design and operate DEAS within financial services?
- » What governance and ethical frameworks are required to allow the adoption of DEAS through innovative digital technologies within financial services?
- » What regulatory models are necessary to allow the sharing of data and infrastructure to facilitate the delivery of DEAS?
- » How can regulatory models evolve in a dynamic environment, according to changing customer behaviour, to allow the long-term offering of DEAS?
- » How can we use innovative digital technologies to identify the new skills and behaviours needed from regulation and governance in order to finance and/or facilitate DEAS?
- » How does the regulatory environment need to adapt to changing business models so that all stakeholders are properly protected when DEAS are adopted?

5.9

How can innovative digital technologies enhance productivity and growth of the UK economy through DEAS and help manage the impact of COVID-19?

INTRODUCTION

Andy Haldane (Chief Economist of the Bank of England) in his report on the productivity puzzle (essentially stagnant growth since the financial crash) argues that despite the advent of the digital age and the adoption of digital technologies by some leading companies, there is a very long tail of poorly productive firms across all sectors. In addition, there is a growing preference to purchase services on a subscription basis. Many companies are, however, using all their available resources just to stay in business, and this is even more true as a result of COVID-19. The competitive landscape has got tougher, particularly in light of the pandemic. It is possible that the supply of asset finance/capital will not be as strong as it was. Recovery from disruption, and building back better, may be inhibited by the attitudes of traditional financial service providers to defaults, bad debts and regulatory requirements.

Lower levels of consumption generally and increased uncertainty about the future may encourage the wider use of pay per use models and outcome-based contracts. Many organisations have had to change their operating models with distributed, remote workforces. This also has an impact on business models and an organisation's future ability to adopt DEAS. Going online has allowed some companies to have a wider reach with the possibility of global reach when identifying potential customers. In contrast some organisations now find establishing relationships with new customers challenging thus affecting new business. What can be done by financial services providers to make it easy for companies to transform their business model to adopt DEAS, and how should financial service providers themselves adopt DEAS principles?



THE ROLE AND IMPACT TECHNOLOGY DEAS+ HAS MADE DURING THE PANDEMIC



KEY QUESTION

How can financial services based on DEAS principles enhance productivity and growth of the UK economy by encouraging financial services providers to finance advanced services and organisations to adopt advanced services?

CHALLENGES

The challenge is to provide these firms with tools so that they can explore how the switch to DEAS can provide increased and sustained value to them and their shareholders. This needs to be done quickly and effectively as they will need to divert resources from their current core business in order to establish: what advanced services they can offer; how their products can be adapted to enable DEAS; how their organisation needs to change and how to sell this new concept to their customers.

How to get financial service providers, and the wider group of stakeholders in the ecosystem, financing recovery to use DEAS and sustainability principles rather than inhibiting growth through not changing existing practices? How can financial services providers assist firms to adopt DEAS? What are the implications of the disruption and learning caused by the pandemic on the financing of DEAS? What are the implications of the disruption and learning caused by the pandemic on the adoption, delivery and support of DEAS?

POSSIBLE RESEARCH PROJECTS

- » What impact would DEAS principles and practices have on the type and pace of the recovery of the UK economy?
- » How can financial services based on DEAS principles enhance productivity and growth of the UK economy by encouraging stakeholders to support/invest in, adopt, or finance advanced services?
- » What are the changing attitudes to risk in financial service providers due to the pandemic and how will these changes impact the recovery given the changing nature of risks when organisations adopt DEAS?
- » How would adopting DEAS more widely impact on the wider economy and sustainability?
- » How does the adoption of DEAS based financial services affect recovery compared to a product-based offering?
- » Develop an online tool to allow an organisation to build a business case for a switch to DEAS.
- » What can be done to help smaller companies take the DEAS step? Can larger organisations help?
- » How does an SME identify/assess the appropriate technology for DEAS?
- » How can SMEs be aware of/learn what is available to implement DEAS given less resources?

6

CONCLUDING REMARKS AND NEXT STEPS

This report has presented an overview of Digitally Enhanced Advanced Services and their potential benefit to the UK economy, and the essential role that financial services have to play in their development and growth. In addition, this report has described the process by which the essential research themes have been identified by practitioners in the finance sector and researchers in the fields of computer science, data science, engineering, business and management. Working together across these academic disciplines and alongside practitioners in industry and government, projects based on these research themes will identify tools and techniques to enable small, medium and large businesses across the UK benefit from Digitally Enhanced Advanced Services. We would like to thank all of the practitioners and researchers who have helped us develop this document.

The next steps are to host a commissioning workshop where we will invite bids for research projects based on the nine research questions:

- » How can innovative digital technologies enhance communication, education and engagement within and between organisations and customers about DEAS within the financial services sector?
- » How can innovative digital technologies allow us to identify suitable DEAS customer focused outcomes delivered by financial service providers?
- » How can innovative digital technologies enhance business model design, adoption and evaluation to finance or deliver value through DEAS within financial services?
- » How can innovative digital technologies enhance organisation and cultural change for effective adoption of DEAS within and between organisations within the financial services sector and their customers?
- » How can innovative digital technologies help develop and understand an appropriate risk model for organisations looking to finance and/or deliver DEAS within the financial services sector?
- » How can an organisation financing and/or adopting DEAS determine a suitable pricing structure?
- » How can innovative digital technologies allow the management and analysis of data to finance or facilitate DEAS within the financial services sector?
- » How can policy help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS within the financial services sector?
- » How can innovative digital technologies enhance productivity and growth of the UK economy through DEAS and help manage the impact of COVID-19?

7

FURTHER INFORMATION

For more information about the DEAS NetworkPlus visit www.deas.ac.uk.

To become a member of our Digitally Enhanced Advanced Services NetworkPlus community sign up to our mailing list www.jiscmail.ac.uk/DEAS.

Appendix 1

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¹¹ It is with great sadness that the DEAS NetworkPlus team lost our much respected friend and colleague, Professor Robert John, on 17 February 2020 following a short illness.

Appendix 2

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Appendix 3

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