DEAS+

Digitally Enhanced
Advanced Services

Digitally Enhanced Advanced Services (DEAS) NetworkPlus

Thematic Roadmap

1. Introduction

This report sets out the research themes and questions identified by the DEAS NetworkPlus and identifies the areas which remain under-researched to produce a thematic research agenda.

Research agendas were established by the network community (comprising practitioners and academics) for each of four sectors: manufacturing, transportation/mobility, finance and charity/voluntary. Each of the research agendas were developed to be:

— 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
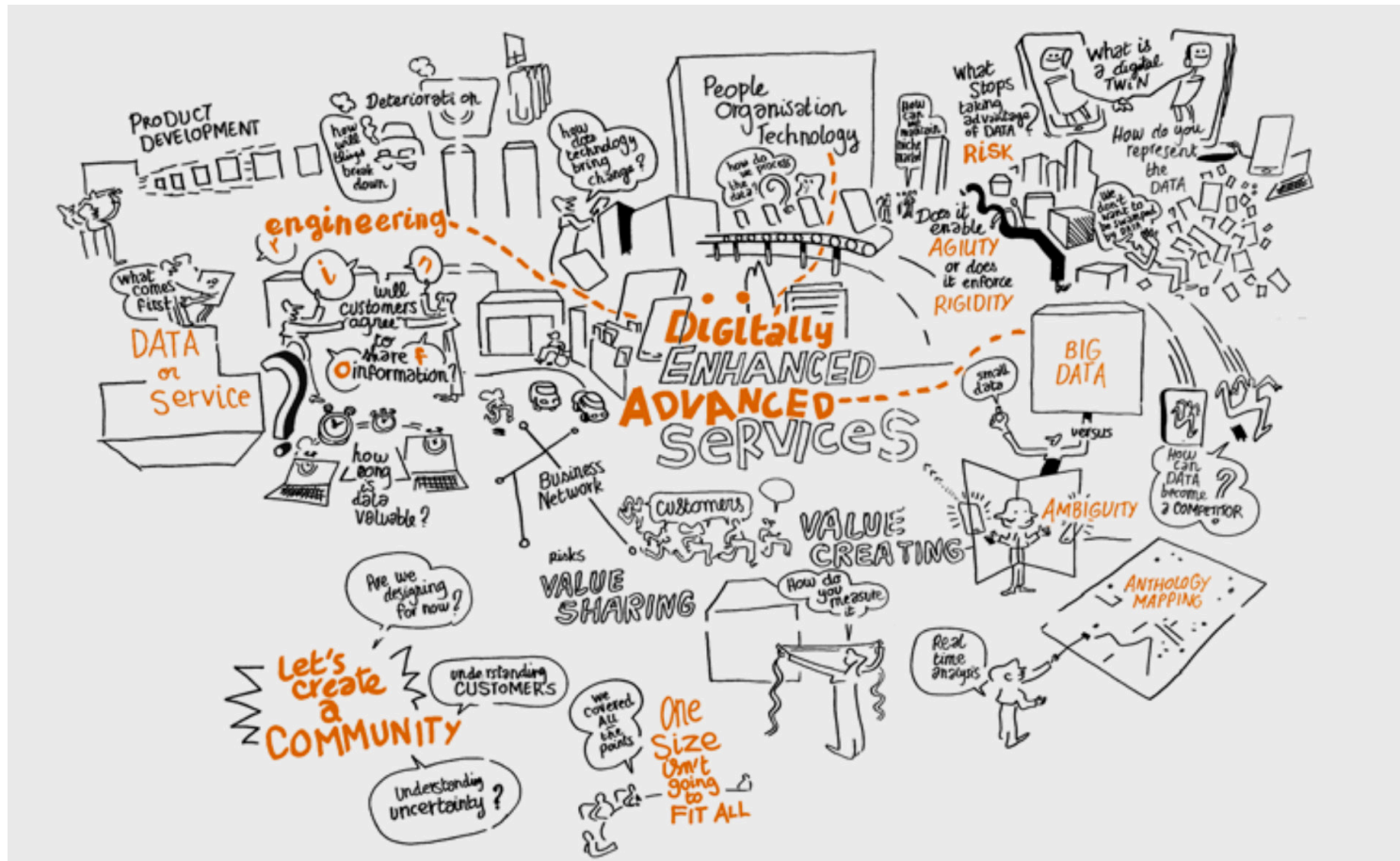— relevant to lead to impact on business and make contribution to knowledge.

The NetworkPlus funded a portfolio of innovative research projects. 24 projects were funded in total with awards varying from £5,000 FEC (Full Economic Cost) to £120,000 FEC. The projects cover 5 sectors and have involved 20 universities, 9 disciplines, at least 45 investigators and at least 14 industry/government partners. For the manufacturing, transportation/mobility and financial services sectors, funding calls were released that looked for projects that would address at least one of the research questions in the associated research agenda(s). The charity and voluntary sector funding call, focused on research that addressed challenges related to Covid-19 with the potential for rapid impact in the sector.

The research themes for each research agenda, and the key questions for each theme, are set out in sections 2 and 3 respectively. Section 4 indicates the coverage achieved by the funded DEAS project for each sector. The report concludes with a brief discussion of the areas which remain under-researched (section 5), which, when combined with the content from the four sector research agendas, produce an overall thematic research agenda (section 6).

More information on the methodology adopted to produce each research agenda can be found in the research agendas themselves. The research agendas, and an overview of the DEAS funded projects, can be accessed at https://www.deas.ac.uk/outputs.

2. Review of Research Agendas

Table 1 outlines the themes that have appeared in the four DEAS research agendas. IDT refers to Innovative Digital Technologies. The order of the columns shows the sequence in which the different sectors were considered (i.e., manufacturing first, charity/voluntary last). As Table 1 illustrates, some research themes were considered relevant to more than one discipline, where some were considered by specific sectors. Following the implementation of the exploratory DEAS funded projects, it became apparent that some of the themes specified in later research agendas (e.g., data ownership, risk models and pricing structures) would also be applicable to other sectors.

	Manufacturing	Transportation/ Mobility	Finance	Charity/ Voluntary
Communication, education and engagement of customers related to DEAS	Y	Y	Y	Y
Communication, education and engagement within [and between] organisation related to DEAS	Y	Y	Y	Y
Enhance value creation, delivery and capture	Y			
Data management and analysis	Y	Y	Y	Y
Business model design and adoption	Y	Y	Y	Y
Increase productivity and growth of UK economy	Y	Y	Y	Y (increase productivity and sustainable value that the UK is able to deliver to society)
Enhance organisation and cultural change	Y	Y	Y	Y
Policy		Y (both local and national)	Y	Y (both local and national)
How can IDT help identify suitable DEAS outcomes		Y	Y	Y (that do not lead to greater inequality)
How can IDT enhance data ownership and sharing to facilitate DEAS		Y		
How IDT can allow DEAS to be delivered across organisations		Y		Y
How can IDT help develop and understand an appropriate risk model for organisations looking to finance or deliver DEAS			Y	
Identifying a suitable pricing structure			Y	
How can DEAS allow charities attract funding in a sustainable manner				Y

Table 1: The key themes that have appeared in the four research agendas

3. Key Question(s) for Each Theme

Table 2 indicates the key question(s) that was listed for each theme.

	Manufacturing	Transportation/Mobility	Finance	Charity/Voluntary
Communication, education and engagement of customers related to DEAS	How to use digital technologies to raise awareness of the benefits of DEAS in all sectors of the economy?	How can digital technologies be used to raise the benefits of DEAS to their customers?	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?	What educational tools could be developed that would enhance knowledge of DEAS and to demonstrate the value of a DEAS offer in terms that both the organisations within the sector, and their funders and beneficiaries, would understand?
Communication, education and engagement within [and between] organisation related to DEAS	How can innovative digital technologies embed a DEAS mentality across the organisation?	How can digital technologies allow organisations to engage their partner organisations and communicate the benefits of adopting DEAS?		
Enhance value creation, delivery and capture	Can innovative digital technologies help organisations share the value generated when DEAS is introduced to an existing value network?			
Data management and analysis	How to extract meaning from the huge volumes of data that are generated by devices connected to deliver a DEAS?	How to extract meaning from the huge volumes of data that are generated by devices connected across a transportation or mobility system to deliver a DEAS?	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?	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 beneficiaries and charity/voluntary organisations?

	Manufacturing	Transportation/Mobility	Finance	Charity/Voluntary
Business model design and adoption	How do you combine digital technologies, engineering and business organisation to deliver value through DEAS?	How do you combine digital technologies, engineering and business organisation to deliver value through DEAS?	How do you combine digital technologies, engineering, financial services and business organisation to deliver value through DEAS?	How do you combine digital technologies, business organisation and digital strategies to deliver value to charity and voluntary organisation stakeholders through DEAS?
Increase productivity and growth of UK economy	How can digital technologies, engineering and management combine to enable companies in the long tail of poorly productive firms to benefit from DEAS?	How can digital technologies and engineering combine to enable transportation and mobility organisations in the long tail of poorly productive firms benefit from DEAS?	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?	How can DEAS business models help charities make more efficient use of resources with a restricted budget to deliver their services and indirectly enhance productivity, resilience, personal wellbeing and sustainable value of the UK economy?
Enhance organisation and cultural change	Can innovative digital technologies enable organisations to assess their own requirements and develop confidence that they are ready for DEAS implementation?	Can we enable organisations so they can assess their own requirements, necessary partners and develop confidence that they are ready for DEAS implementation?	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?	Can we enable organisations within the charity/voluntary sector to 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?

	Manufacturing	Transportation/Mobility	Finance	Charity/Voluntary
Policy		Can local and national government develop and maintain policy and legislation that would facilitate DEAS and keep up with evolving digital technologies?	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?	How can policy and regulation help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS within the charity/voluntary sector? How can innovative digital technologies provide transparency for regulators?
How can IDT help identify suitable DEAS outcomes		How can digital technologies be used to identify the outcomes that a customer wants?	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?	How can innovative digital technologies help providers of DEAS in the charity and voluntary sector understand, identify and create advanced services that truly meet both the beneficiaries and the funders needs? What do the outcomes of these services look like?
How can IDT enhance data ownership and sharing to facilitate DEAS		How to securely share and ethically manage the data needed to facilitate DEAS among customers and organisations?		
How IDT can allow DEAS to be delivered across organisations		How can organisations work together to facilitate DEAS within transportation and mobility networks whilst still maintaining competitiveness?		How can organisations in the charity/voluntary sector work together to facilitate and deliver DEAS and better outcomes for their stakeholders?

	Manufacturing	Transportation/Mobility	Finance	Charity/Voluntary
How can IDT help develop and understand an appropriate risk model for organisations looking to finance or deliver DEAS			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?	
Identifying a suitable pricing structure			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?	
How can DEAS allow charities attract funding in a sustainable manner				How can all relevant risks be identified and priced to allow the charities/voluntary organisations adopting DEAS compete for funding? How can any organisation adopting DEAS determine a suitable pricing and risk structure to create more value for their stakeholders?

Table 2: The key question(s) that was listed for each theme

4.   What Research Questions were Addressed by the Funded Research Projects?

Table 3 shows which questions were addressed by the research projects funded by the DEAS network.

	Manufacturing	Transportation/ Mobility	Finance	Charity/ Voluntary
Communication, education and engagement of customers related to DEAS	Y		Y	Y
Communication, education and engagement within [and between] organisation related to DEAS	Y	Y		
Enhance value creation, delivery and capture	Y	Y		
Data management and analysis	Y			
Business model design and adoption		Y		Y
Increase productivity and growth of UK economy				
Enhance organisation and cultural change	Y	Y	Y	Y
Policy		Y		Y
How can IDT help identify suitable DEAS outcomes		Y	Y	
How can IDT enhance data ownership and sharing to facilitate DEAS			Y	
How IDT can allow DEAS to be delivered across organisations	Y	Y	Y	
How can IDT help develop and understand an appropriate risk model for organisations looking to finance or deliver DEAS			Y	
Identifying a suitable pricing structure				
How can DEAS allow charities attract funding in a sustainable manner				

Table 3: Questions addressed by the funded research projects

5. Topics Not Addressed by the Network

The network is proud of its research achievements. Each of the research themes (set out in Table 1) were covered by at least one of the DEAS funded research projects. As is to be expected in an exploratory network, engaged also in building a new research community in such a wide and under researched area, not all the key questions set out in Table 3 were the focus of a project. We discuss here the questions which still need to be addressed.

— Business Models
— Productivity
— Data
— Risk, pricing and funding

Business Models

There is established literature on business model innovation within and outwith the servitization literature. The network identified that every organisation has a business model, recognised or not, which could be impacted and enhanced by innovative digital technologies. Areas still to be explored include: How many elements of a business model (if a business model is considered as a propose, deliver and capture framework) have to change before there can be agreement that there is a changed business model? Or, should one instead be looking for transition and a sustained transformation? Should one look beyond the traditional revenue model to wider customer outcomes?

Productivity

Productivity, and its growth, is a much wider and longer-term issue, not restricted to servitisation but impacting the whole of UK plc. The network projects suggest that delivering better customer outcomes can increase commercial revenues for all parties and this will impact the numerator of the productivity ratio. They also identified the scope and need for there being customer outcomes beyond the traditional revenue model measurable in narrow financial terms, which should stimulate wider discussions on what are suitable targets (e.g., customer values, sustainability, resilience and vulnerability). Service is about providing holistic support to meet multiple objectives.

Data

A significant research project omission by the community was that of data ownership and sharing. This is an area in which much research, practical and theoretical, is progressing. However, research is needed to understand its application, and relevancy, to servitization.

Changing to a services-oriented model impacts which party carries which risk, pricing models and theory needs to be expanded to better understand the effects when an organisation changes from deriving value from exchange for itself to value from use for itself and its customer. The wider ecosystem in which the servitisation process sits also has to understand that funding, insurance, regulatory and policy products processes and practices need to change accordingly. So, for example, a bank needs different products and services for Original Equipment Manager (OEM), who no longer receive a bullet payment on sale of an asset, but an uncertain, and to an extent uncontrollable, revenue stream so their business model and balance sheets have to change accordingly.

6. A Thematic Research Agenda

Table 4 pulls together the four research agendas, and what has been learnt through the DEAS funded project, to produce an overall thematic DEAS research agenda, which is sector agnostic.

Theme	Key Questions
Communication, education and engagement related to DEAS considering both customers and organisations (internal and external).	What educational tools could be developed that would enhance knowledge of DEAS and to demonstrate the value of a DEAS offer to the different stakeholders in the ecosystem?
Enhance value creation, delivery and capture	Can innovative digital technologies help organisations share the value generated when DEAS is introduced and how does this change the existing value network?
Data management, sharing and analysis	What data is needed to allow the delivery and adoption of DEAS? How can this data be securely shared, ethically managed and analysed to facilitate DEAS among the different stakeholders?
Business model design and adoption	How do you combine digital technologies, business organisation and digital strategies to deliver value to the different stakeholders through DEAS? What are the different components of a DEAS business model and how might they evolve?
Increase productivity and growth of UK economy	How can DEAS business models help organisations make better use of resources to deliver services that enhance productivity, resilience, personal wellbeing and sustainable value of the UK economy?
Enhance organisation and cultural change	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?
Policy	How can local and national policy help us ensure that innovative digital technologies can be used to finance, facilitate or support DEAS as technology, organisation and customer needs continue to evolve?
Identifying suitable DEAS outcomes	How can innovative digital technologies help providers of DEAS understand, identify and create advanced services that truly meet the needs of customers, beneficiaries and themselves?
The delivery of DEAS in an ecosystem	How can organisations work together to deliver DEAS, and better outcomes for their stakeholders, whilst maintaining their competitive advantage?
Development and understanding of appropriate risk models	What is an appropriate risk model for an organisation financing and/or delivering DEAS and how can digital technologies help to identify/ mitigate risks?
Identifying a suitable pricing structure	How can any organisation adopting DEAS determine a suitable pricing and risk structure to create more value for their stakeholders?
Financing DEAS delivery	How can DEAS providers attract funding to finance their delivery of a DEAS solution?

Table 4: An overall thematic research agenda

7. Conclusion

This report sets out the research themes and questions identified at the by the DEAS NetworkPlus and compared the relevancy for the four different sectors of interest (i.e., manufacturing, transportation/mobility, charity/voluntary and financial services). The report concludes with a short discussion on areas which remain under-researched. Bringing all of the research agendas together, and what has been learnt through the DEAS NetworkPlus, an overall thematic research agenda has been produced. We invite the community built by the network to continue research in these areas.

In research terms, more interdisciplinary and cross disciplinary research is needed and there is potentially a need for a more useful analytical and conceptual framework. The multi and cross disciplinary nature of the network will be able to contribute to this.

8. Further information

For more information about the DEAS Network Plus and the outputs from the funded projects, please visit www.deas.ac.uk.

Appendix 1: The DEAS Team

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Research Management Team:
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Dr Ali Bigdeli, Aston University Business School
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Dr Zena Wood, University of Exeter Business School

Support Team:
Project Officers: Charlotte Anning/Fran Lumbers, University of Exeter
Network Co-ordinator: Dr Phil Godsiff, University of Exeter Business School
Industry Liaison Manager: Gill Holmes, Aston University Business School

It is with great sadness that the DEAS Network Plus team lost our much-respected friend and colleague,
Professor Robert John, on 17 February 2020 following a short illness.
We dedicate this agenda for future research to him.

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