Construction Leadership Forum Digital and Data Strategy

Summary Report

May 2021

Contents

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Introduction

An initial exploration, via a series of three workshops, aimed to inform the digital and data strategies for construction by identifying challenges and key areas of opportunity. In particular the workshops explored the following key questions:

- What is the current landscape of digital and data in the construction industry?

- What are the opportunities for digital and data in construction in the future?

- What are the current barriers to greater application of data and digital in the current construction environment?

- If these barriers were overcome what could be the opportunity for the construction sector?

Fundamentally the strategies aim to address the issue of **how better use of data and application of digital capabilities can help enable, accelerate and enhance recovery and renewal in the construction sector,** and what needs to be in place to support implementation, with a particular focus on SMEs within the sector.

To get the widest involvement from across the sector, participation in the workshops included, manufacturers, digital service providers, contractors, consultants, skills providers, commissioners, policy makers, academics and researchers.

Prior to the workshops participants were surveyed to garner a snapshot of current digital and data practice, and to understand sector representation.

Pre-work Feedback

Analysis of an initial survey responses were grouped into four key areas for the digital and data strategies to address. These were:

- **Data Sharing & Making Data Usable**
- **Innovative Capability**
- **Digital and Data Capability**
- **External drivers and influences**

Workshops 1 & 2

Over two workshops the issues and opportunities for each area were openly debated and explored, with key elements from the discussion captured. The four areas generated the following key questions:

Data Sharing & Making Data Usable
How can we make valuable data visible and useable to the advantage of everyone in the value chain? How can we avoid siloed and hidden data that is already being generated that could have real benefit, especially to SMEs? How can we ensure that data can be exchanged and utilised across the value chain?

Digital and Data Capability
How do we define, store, share and collaborate around data? How can we ensure trust in information? How can we support industry to make the right choices about digital and data capability? How can we support stakeholders who don't know where to start?

Innovative Capability
What are the technologies SMEs currently invest in and to what benefit? We need to understand what we can collect versus what is actually useful. Those in the value chain with the knowledge and skills can help to educate SMEs. What value will digital and data bring to a company? Lack of awareness is a big barrier constraining innovation in digital and data. There are a lack of digital and data skills in Scotland.

External drivers and influences
Sustainability and climate agenda will drive change. How do other industries use digital and data? Expert systems and AI can lead to development of more sophisticated decision support and also automated design and assistive planning. Could asset management play a role in driving change? Infrastructure change such as 5G will open up opportunities.

Drivers of change

Following analysis of the
discussions across the
groups in both workshops
1 & 2 (as seen in appendix
1) the key drivers of
change were highlighted.

Digital & Data - what is driving change?

What are the trends, influencers, and changes that are catalysts
for innovation in digital and data?

5G

VR

AI

IoT

Technology
Developments

Digital
Infrastructure

Cyber
Security

GDPR

Scottish
Timber

Securing
Local
Supply
Chains

Circular
Economy

What is driving
change?

BIM
Protocols

ISO19650

Composition

Material
Innovation

Provenance

Climate
Agenda

Waste
Management

Lower
Emissions
Targets

Carbon
Rating

Investment
Streams

Scottish National
Investment Bank
mandate towards
all things green

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Workshop 1 & 2: Analysis

Further analysis of the key issues and opportunities for digital and data under the four key themes led to the development of seven themes that a strategy would need to address. In a third workshop we asked what key questions need to be answered and what are the key issues and opportunities under these seven themes, and crucially who would need to be involved in driving change.

The seven themes were:

- Leadership and Drive
- Data exchange and quality
- Technological innovation
- Education and information
- Understanding value and impact
- Skills and people
- Collaboration

Digital & Data - Themes
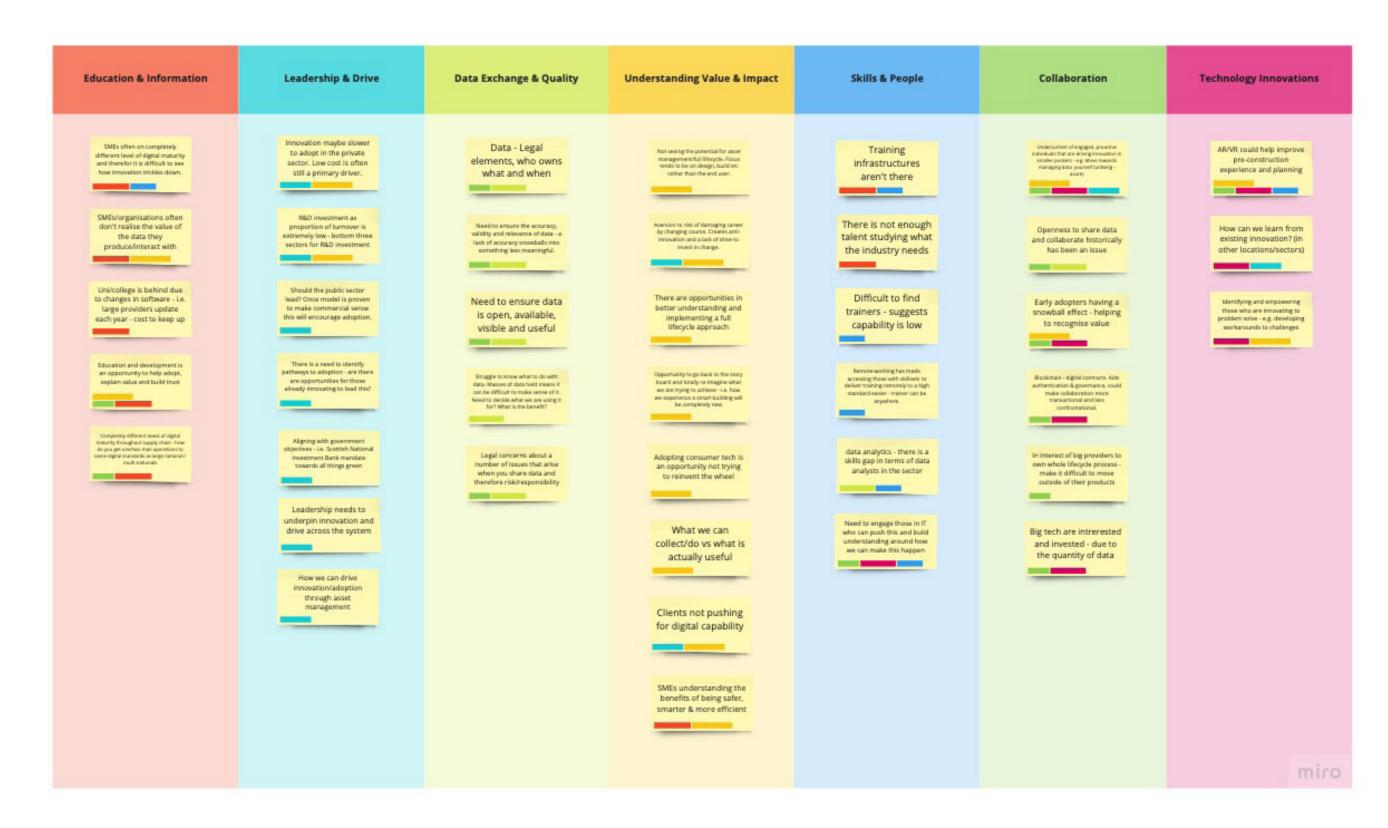
What are the key areas for innovation that came up in workshops one and two? What are the priorities and why?

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Education & Information	Leadership & Drive	Data Exchange & Quality	Understanding Value & Impact	Skills & People	Collaboration	Technology Innovations
SMEs often on completely different level of digital maturity and therefore it is difficult to see how innovation trickles down.	Innovation maybe slower to adopt in the private sector. Low cost is often still a primary driver.	Data - Legal elements, who owns what and when	Not seeing the potential for asset management/full lifecycle. Focus tends to be on design, build etc rather than the end user.	Training infrastructures aren't there	Undercurrent of engaged, proactive individuals that are driving innovation in smaller pockets - e.g. More towards managing data yourself (utilising azure)	AR/VR could help improve pre-construction experience and planning
SMEs/organisations often don't realise the value of the data they produce/interact with	R&D investment as proportion of turnover is extremely low - bottom three sectors for R&D investment	Need to ensure the accuracy, validity and relevance of data - a lack of accuracy snowballs into something less meaningful.	Aversion to risk of damaging career by changing course. Creates anti-innovation and a lack of drive to invest in change.	There is not enough talent studying what the industry needs	Openness to share data and collaborate historically has been an issue	How can we learn from existing innovation? (in other locations/sectors)
Uni/college is behind due to changes in software - i.e. large providers update each year - cost to keep up	Should the public sector lead? Once model is proven to make commercial sense this will encourage adoption.	Need to ensure data is open, available, visible and useful	There are opportunities in better understanding and implementing a full lifecycle approach	Difficult to find trainers - suggests capability is low	Early adopters having a snowball effect - helping to recognise value	Identifying and empowering those who are innovating to problem solve - e.g. developing workarounds to challenges
Education and development is an opportunity to help adopt, explain value and build trust	There is a need to identify pathways to adoption - are there are opportunities for those already innovating to lead this?	Struggle to know what to do with data. Masses of data held means it can be difficult to make sense of it. Need to decide what we are using it for? What is the benefit?	Opportunity to go back to the story board and totally re-imagine what we are trying to achieve - i.e. how we experience a smart building will be completely new	Remote working has made accessing those with skillsets to deliver training remotely to a high standard easier - trainer can be anywhere.	Blockchain - digital contracts. Aids authentication & governance, could make collaboration more transactional and less confrontational.	
Completely different levels of digital maturity throughout supply chain - how do you get a seamless main operations to same digital standards as large nationals/multi-nationals	Aligning with government objectives - i.e. Scottish National Investment Bank mandate towards all things green	Legal concerns about a number of issues that arise when you share data and therefore risk/responsibility	Adopting consumer tech is an opportunity not trying to reinvent the wheel	data analytics - there is a skills gap in terms of data analysts in the sector	In interest of big providers to own whole lifecycle process - make it difficult to move outside of their products	
	Leadership needs to underpin innovation and drive across the system		What we can collect/do vs what is actually useful	Need to engage those in IT who can push this and build understanding around how we can make this happen	Big tech are interested and invested - due to the quantity of data	
	How we can drive innovation/adoption through asset management		Clients not pushing for digital capability			
			SMEs understanding the benefits of being safer, smarter & more efficient			

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Workshop 3

In workshop 3 the combined group discussed the drivers and the seven key themes, and drew out inital prioritiy areas for the strategy (i.e. these are all important but some elements need to come first).

The result of discussion in the third workshop was three significant areas for focus for the strategy, the key questions, challenges and opportunities and key stakeholders for each. It should be noted that time constrained debate on all the seven key themes and so only the most salient issues were discussed. This in itself gave an opportunity for prioritisation of where a strategy should initially focus its efforts.

The key areas for focus were mapped on a strategic matrix, highlighting whether they addressed industry understanding, industry capability or industry drive (all of which are needed for long term change) and if this change was at the individual, the group or system scale. The matrix aimed to highlight gaps in focus areas for further investigation where change was not being addressed, for example looking at areas that address system level understanding.

Priority Themes:

- Reaching, supporting and educating SMEs.

- Leadership & Creating the right conditions – the visibility and connectivity of support for IT and digital.

- Industry drivers that encourage digital capability.

Reaching, supporting and educating SMEs

Key Questions

The key questions that came up in discussion focused on:

- Firstly, building a better understanding of the different scales of capability and understanding what good looks like, in order to better support adoption of digital and data.

- Secondly, what is the best way of communicating the value of digital and data to encourage investment? Part of the suggestion here was how could a bank of case studies be compiled? Highlighting the effective use of data and digital in enabling SMEs to work smarter, safer and more efficiently.

Ultimately, the overarching question was "how could it be made easier and more manageable to take the first steps?" The group highlighted that it would be key to understand the range of capabilities and tailor offerings to support the individuals and organisations to reach the next level, regardless of their starting point. The group agreed other important questions that needed to be answered to support this would be:

- How could access to tools, support and solutions be made easier?

- How could we ensure a better understanding of where investment gave the best benefits/returns (at both an individual and organisation level) and in what aspects of digital and data?

- How could it be ensured that support is continual and flexible to diverse and changing needs?

Who needs to be involved?

A further discussion explored who needed to be involved and why – do they have the knowledge and expertise? Are they integral to delivery? Or, do they have influence?

Trade Federations: The group agreed engaging with relevant trade federations was important in addressing reaching and connecting with and between SMEs/ Organisations in the system. It was also highlighted that this would be helpful in gathering and understanding the needs of SMEs.

Colleges/Education Providers: Helps on a group level to build knowledge.

Third Sector: Can champion and provide training.

Early Adopters: The group highlighted that there were a number of individuals/ organisations that were engaged and already taking promising steps into utilising data and digital. This is a theme that has come up throughout engagement and it appears there are opportunities for those already innovating to lead, whether this be as case studies, through collaboration or influence.

Other Sectors/Locations: The group suggested there were opportunities to source interesting relevant case studies out-with the industry or in other locations either globally or nationally i.e. what can we learn from others.

Tier One Contractors: An opportunity was highlighted for Tier One Contractors to collect examples of how data and digital benefits the wider system/supply chain, and that this could be useful in helping illustrate the value to SMEs.

Challenges & Opportunities

The group discussed challenges and opportunities in these themes:

- There is a danger that in a recovery the digital data gap could intensify – SMEs or smaller companies not working with tier one contractors would need the most focus and support. Tier one contractors already have advanced digital and data solutions that tend to cascade to their partners.

- There is an opportunity to learn about and celebrate those that are innovating and disseminate this throughout the industry.

- It is complex to reach everyone, although it was suggested that trade federations could help with this.

- It is best to start small and overcome pain points - Break it down into different sections - i.e. partner with trade organsiations to reach SMEs and ensure continual support.

- There is a cultural shift required to overcome fears.

- Not all companies are at the same stage in the journey, so there is an opportunity to catagorise and group capabilities in order to understand needs. A suggested asset here was the Digital Maturity Survey.

- An opportunity in helping SMEs to identify quick, easy things to adopt.

- A challenge around clients and authorities not pushing for digital capability.

- A need to help SMEs understand the benefits of data/digital in being safer, smarter and more efficient.

Digital & Data - Key Themes

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Reaching, supporting and educating SMEs

Key Questions

- How could it be more manageable to take the first step?
- How could it be easier to access tools/solutions?
- How do we understand what good looks like?
- How could we build a bank of case studies to showcase benefits? - (Smarter, safer, more efficient)
- SMEs are on varying levels of digital capability - How could we tailor offerings to support reaching the next level?
- How do we ensure that this is continual and flexible to needs?
- How do we understand scales of capability and classify in strategy?
- what linkages could we make to other business support?
- how can we show SMEs the value of digital and data?
- How can we build an understanding of where to invest?

Who needs to be Involved?
(Why - knowledge/expertise, delivery or influence)

- Trade federations - can address the connection between SMEs and gather needs.
- Colleges - help on a group level to build knowledge
- Third sector - champion and provide training, provided with grant funding
- Digital maturity survey will provide the knowledge
- Crediting organisations
- Early Adopters - Those who are innovating can influence
- Other Sectors/ Locations - Variety of case studies
- Business gateway
- CSIC
- Tier 1 Contractors - collect examples of benefits to supply chain

Challenges/Opportunities

- In recovery sense - SME (smaller companies not working with tier 1's) effort needs most focus. Tier 1 already have advanced digital and data solutions. This will be cascaded to their partners
- Celebrate those that are innovating and disseminate this out
- Complex to reach out to everyone
- Could also capture public information - client is driver so this could help diversify understanding
- SMEs - Lack of awareness, understanding or uncertain where to invest
- Difficult to say who is going to lead due to the scale - from capability to link into websites / mailing lists to people already collaborating on a higher level
- Starting small to overcome painpoints
- Chunk down into different sections - i.e. trade organisations funnel into and continually support
- Ability to prove quality
- Cultural shift - overcomes fear of loss of control
- Grouping capabilities - i.e. if you can do a, b & c in. group 1 etc. Helps identify digital maturity
- Ease of adoption - help SMEs identify the quick, easy things to adopt
- Clients/authorities not pushing for digital capability
- SMEs understanding the benefits of being safer, smarter & more efficient
- Create a bank of case studies that shows the benefits

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Leadership & Creating the right conditions – the visibility and connectivity of support for IT and digital.

Key Questions

The key questions that came up in discussion focused on:

- Firstly, how as a system could those already innovating be highlighted and assist in transferring innovation into practice? How is information transferred throughout the system?

- Building on this the group discussed how the visibility of both technological improvements and the support to implement them could be more visible and accessible?

In order to kickstart this, key questions are:

- Could there be industry wide incentives to champion innovation?

- Do we need to engage more SMEs on the tech side - i.e. not your usual construction suspects?

- How could those already innovating with ways to problem solve or develop workarounds be empowered?

- How can we go about changing the culture to support embedding digital and data into what we do as a system?

- Who leads, the public or private sector (or a mix of both)? – Once it is proven to make commercial sense more will follow.

Who needs to be involved?

A further discussion explored who needed to be involved and why – do they have the knowledge and expertise? Are they integral to delivery? Or, do they have influence?

- **Universities & Researchers:** Group agreed that educational institutions help to drive innovation and can be helpful in producing case studies. A challenge here was around transferring innovation into general practice and there was a need to for better connections between institutions and industry.

- **Partners between industry and academia:** Innovation centres/labs acting as connectors and facilitators of collaboration.

- **Umbrella Organisations:** supporting individual members to understand and communicate back to wider system.

- **IT/Digital SMEs:** To help build understanding around how we can make this happen.

- **Membership Organisations (Built Environment Scotland)**

- **Funding Centres**

- **Accreditation Providers**

- **Working Groups:** To champion and help take this forward without becoming myopic.

Challenges & Opportunities

- Leadership challenge around consistency and joined up approach.

- Checks and balances required that make sure innovation is truly collaborative and doesn't lead to more siloed working.

- Opportunity to put in place grants or awards that celebrate what is working.

- Historically there have been barriers between University knowledge exchange from researcher to industry.

- Challenge around mainstreaming the innovation, there are lot of pilots that never reach wider use. It is key to understand how we move ideas into actions and at scale. In terms of research funding, it was suggested that academics are mostly incentivised to research rather than translate into industry and there was a need for an intermediary that could support transferral of innovation.

- Opportunities around highlighting case studies and stories of success. The group agreed this would help inspire and educate.

- Leadership needs early focus in order to empower education, information etc.

- Public sector should not necessarily be the leader and a feeling that learning was also required within public sector.

- Opportunity to create a platform for everyone who is doing it to stand up and share/collaborate, whether these are innovators and or those who are early adopters.

Digital & Data - Key Themes

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Leadership & Creating the right conditions - the visibility and connectivity of support for IT and Digital.

Key Questions

How as a system do we highlight those making waves and innovating?

Whoever is leading there needs to be transferred info and reach those throughout?

How do we translate innovation into industry practice and reach those who can utilise?

Change the cultural functionality to embed digital and data into what we do/

How can we create a method of communication - community of like minded individuals to lead? - innovators and adopters

How could we create an industry wide incentive to champion innovation?

How do we engage SMEs on the tech side rather than the bricks and mortar side?

how do we improve the visibility of support?

how do we ensure these technological improvements are visible?

Should the public sector lead? Once model is proven to make commercial sense this will encourage adoption.

How do we identify and empower those who are innovating to problem solve - e.g. developing workarounds to challenges

identify the key players / innovators and supporting and enabling them is key?

Who needs to be Involved?
(Why - knowledge/expertise, delivery or influence)

Working groups - innovation groups

Need wider groups to take this forward to avoid being myopic

Govt. funded innovation labs

Universities helping drive innovation and producing case studies

Innovation centres - being able to join up between industry and academia

Partner between industry and academia

Funding centres - driving towards innovating for industry

Innovation centres bringing people together

Built enviroment scotland - membership organisations

Accreditation providers - education providers in the built environment

Umbrella organisations supporting individual members to understand and communicate back to wider system

Need to engage those in IT who can push this and build understanding around how we can make this happen

A mediator between groups and public sector to navigate bureaucracy

public sector role to enable and incentivise

Challenges/Opportunities

Leadership challenge around consistency and joined up approach

Checks and balances that make sure we don't allow innovation to make more siloed

Led by grants, award and celebrating what is working

University knowledge exchange from researcher to industry - almost sales role

Roots for adoption - i.e. govt funded innovation labs

Working between public, knowledge and industry

Challenge around mainstreaming the innovation

A lot of pilots not reaching wider use

How do you move along from ideas into actions

Public sector to follow rather than lead to be driven by the need of the industry

Academics mostly incentivised to research rather than translate into industry

Avoid it becoming top down

Still takes alot of work to take this into actuality

Capture the best way for SMEs etc to adopt this - signposting successful case studies

Showing opportunities to bring everyone along

case studies keep coming up. stories of success. will inspire and educate

we need the market or other organisation to deliver rapid change - we must avoid the bureaucracy - slows down the process of digital change

leadership will be vital for driving change and supporting industry adoption of digital

Being to individualistic confining to individual focuses

encourage to be involved and understand who can implement them

Thought for how you take this into business as usual - make it common practice

a platform for everyone who is doing it to stand up and share / collaborate - innovators and adopters

Challenge to translating innovation to industry - understanding of the researcher

A need to incentivise pushing research into actuality

Enablement infrastructure - how technology is created to meet needs

Improving viability and adoption of digital support that is available

Leadership needs early focus in order to empower education, information etc

Public sector also needing the education

Public sector barrier could be bureaucracy

we need the market or other organisation to deliver rapid change - we must avoid the bureaucracy - slows down the process of digital change

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Industry drivers that encourage digital capability

Key Questions

The key questions that came up in discussion focused on:

- Firstly, how can we demonstrate the value of embracing digital capability in the industry, especially within SMEs? How can we 'de-risk' the transition for companies who want to make the change and ensure adopting digital and data meets individual needs.

- The group also discussed how there is a shortage of skills and attracting the next generation of talent will be key to driving the transition to digital. Building on this the group asked who in the current industry can drive change and what different roles can they play.

There was also discussion about how other nations have made the transition to digital, asking what can be learned from outside of Scotland.

- What are the needs of SMEs in terms of digital and data? What is it they need to do better / improve for themselves?

- Is it easier to take a risk with someone's else's money rather than from SMEs?

- How can we attract the next generation of talent in digital and data?

- Who needs to be 'targeted' as the people who can drive change? Senior manager? Middle manager?

- Is there a difference between public and private sector managements? Large companies versus small companies?

- What have they done to drive change in other parts of the world?

- What is the benefit of an employer having someone in the business with the digital and data skills? How can we show the value of transition to digital?

Who needs to be involved?

A further discussion explored who needed to be involved and why – do they have the knowledge and expertise? Are they integral to delivery? Or, do they have influence?

- **Trade bodies:** federation of master builders, Scottish building federation specialist engineering contractors group SELECT

- **Professional bodies:** Scottish property federation, COSLA

- **Educators:** Teachers and educators in schools, Skills development Scotland, FE, training colleges, education

- **Suppliers** (helping the customers to buy), Supply chain school

- **Infrastructure:** SCOTS transport office, roads infrastructure

Challenges & Opportunities

- Finding the right people to mandate and drive change. Is there still a role for senior management to mandate change? Currently there are not those external policy drivers making data and digital a must.

- Levers to stimulate the transition to digital. Local authorities mandated asset management in digital will drive construction to adopt. Funding for SMEs will be key. It will need support to ensure SMEs aren't burdened by the transition. There is no great demand for SMEs to digitise. Planning, building regulations are a strong driver to adoption.

- Developing and attracting the right talent. There is a duty to attract the best of the new generation in data to the industry - the skills are there they need to be harnessed. We need to change the image of the sector - what are the opportunities, roles, and jobs? Climate is a big topic for discussion - it's appealing to younger generation in terms of attracting talent. Working with training institutions FE etc to make the industry option visible to graduates, and ensuring they are equipped with the right skills.

- Ensuring capability is matching need. Clarifying what these companies are going to need. The 'ripple effect' could take a long time. Think about the different requirements and drivers for different players.

- Showing the benefits of data and digital. Digital makes asset management more efficient. There are safety and profitability drivers.

- The 'bigger picture' affecting society. Digital and data are crucial to address issues of circular economy, carbon reduction, climate change. This is a big driver and we will need digital and data. Should, we be making the links between digital and data and the climate agenda, circular economy, carbon reduction?

- Data exchange issues and data ownership issue. Ensuring visibility and usability of data. Trust in data will be key.

Digital & Data - Key Themes

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Industry drivers that encourage digital capability

Key Questions

In terms fo SMEs - what are the needs of the SME in terms of digital and data - or what is it they need to do better / improve for themselves?	what is the benefit of an employer having someone in the business wiht the digital and data skills?	Is it easier to take a risk with someone's else's money rather than from SMEs own pocket - for example?	could asset management being a mandatory digital approach a key driver?
how can we attract the next generation of talent in digital and data?	who needs to be 'targeted' as the people who can drive change?senior manager? middle manager? is there a difference between public and private sector management?large companies versus small companies versus small operators?	other parts of world with less resource are still ahead of Scotland? what have they done to drive change? look outside Scotland.	could asset management being a mandatory digital approach a key driver?
how can we show the value of transition to digital?			

Who needs to be Involved?
(Why - knowledge/expertise, delivery or influence)

Is there a federation of asset managers??	Trade bodies - federation of master builders - gordon nelson, scottish building federation (wide range of clients), specialist engineering contractors group SELECT	Supplier development	Scottish property federation, COSLA
Teachers and educators in schools	Supply chain school	Professional bodies	Skills development Scotland
Suppliers (helping the customers to buy)	FE, training colleges, education	SCOTS transport office - roads infrastructure	

Challenges/Opportunities

there is still a role for senior management to mandate change	project insurance? is it being implemented?	clarifying what these companies are going to need	funding for SMEs will be key. it will need support to ensure SMEs aren't burdened by the transition	Currently there are not those external policy drivers making data and digital a must	Local authorities mandated asset management is digital will drive construction to adopt?
climate a big topic for discussion - it's appealing to younger generation in terms of attracting talent. it requires joined up working big data and digital. it needs ongoing monitoring and performance data and this data needs to be shared to be effective and it's something everyone agrees is a good thing. so key leverage point	put the effort into the middle management - the next generation	data exchange issues and data ownership issue	duty to attract the best of the new generation in data to the industry - the skills are there they need to be harnessed	the is no great demand for SMEs to digitise	digital and data are crucial to address these issues (CE, CR, climate) this is a big driver, i.e. we will need digital and data
Digital makes asset management more efficient	safety and profitability drivers	the ripple effect could take a long time. think about the different requirements / drivers for different players	should, we be making the links between digital and data and the climate agenda, circular economy, carbon reduction?	Local authorities mandated asset management is digital will drive construction to adopt	Planning, building regulations are a strong driver to adoption
working with training institutions FE etc to make the industry option visible to graduates	institutions need to broaden their mind a little bit in terms fo what are valuable skills	Planning, building regulations are a strong driver to adoption	the climate agenda and carbon reduction is a big driver just now - this is especially true for the younger generation for example	inspiring and influencing the next generation for the industry	we need to change the image of the sector - what are the opportunities.the roles, the jobs, the skills
Digital makes asset management more efficient	Currently there are not those external policy drivers making data and digital a must	the is no great demand for SMEs to digitise			

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Digital & Data Matrix

The priority areas were mapped onto the strategy matrix, to highlight gaps in delivery. This indicates areas for further attention in the startegy around individual drive and a wider system understanding.

This exploration process has highlighted some key questions for the strategy to address and some opportunities on how to take this forward.

Digital & Data - Matrix

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industry drivers that encourage digital capability will be key

Leadership & Creating the right conditions - the visibility and connectivity of support for IT & digital.

leadership should come first - creating the right conditions will be key

Reaching, supporting and educating SMEs

READINESS

DRIVE

CAPABILITY

UNDERSTANDING

INDIVIDUAL GROUP SYSTEM

WHO/WHERE

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Appendix.

Figure 1: Workshop 1 & 2 Feedback

Workshop One
Group One

Data Sharing - Making Data Useable

What data is currently shared within construction?

Innovation Capability

How is data and digital driving innovation in the industry?
Where within the industry is innovation likely to occur currently?
What is the ambition for the future?
Why aren't we there yet?

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Future Ambition

Current State

Innovation Capability

how do they know where to start?

sandbox projects looking at bringing together different data sources

data is an asset and change in mindset aboutthis

what can we collect and why are we collecting it

SMes / the industry maybe don;t know where to invest and what to invest in

cyber security and a lack of education in the industry

quality of data is key, provenance and reliability of data is key

data is business critical

what are the cases of best practice for data and digital

can be a barrier to things moving forward

more of an industry wide standard for digital and data

longer term outcome/ performance reporting

companies understadning how 'innovation ady' they are

capability is there to automate many processes

education piece about the value of data and how you woler seht data

where would investment have the most impact?

Measurements of value

Outdated processes

perception of cost versus value for digital

What we can collect/do vs what is actually useful

Limited understanding of capability

don;t automate for aurtomate sake

experts systems / AI processes

Info available but not managed

Skills / knowledge development

automate the years of experience in the industry into the digital

Lack of digital / data investment in SMEs

Skills shortage in Scotland and the rest of the UK

Uptake limited to larger organisations

Lack of investment in smaller scale projects

Unwillingness of senior management to make decisions that are risky

what questions are we trying to answer with digital and data?

Key Themes

✓ ✓ ✓ ✓

Opportunities   Barriers   Notes

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Digital & Data Capability

What is the current digital and data capability?
What is the ambition for the future?
Why aren't we there yet?

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Future

Current State

Digital & Data Capability

External drivers

External drivers

External drivers

External drivers

External drivers

Hearts and minds big overarching theme

Clients not pushing for digital capability

Adverse to risk damaging career by changing course

Creates anti-innovation

We get bogged down by bureaucracy, barriers etc

No "this is what we have always done to overcome"

Pace of change slowed by this

Usually whoever financially leading

More expensive to build in the UK

R&D investment as proportion of turnover is low

Not enough drive to invest in change

On individually scale creating solutions that will make better but clients not investing in it

No incentive to share and collaborate - expected to innovate individually

Globally (mozambique, vietnam) ahead just using

BIM dictating to industry - whos in power to make decisions?

Key Q - What role does procurement values impact on this?

BIM - conversation moving towards digital twins

Immovate UK provides but it doesn't often find it's way through

Winning over hearts and minds

Common theme in BIM PM absent - lifecycle approaches for operations within lifecycle (20/30 years)

Fear of embracing in scotland more so than

Value too often seen asd lowest price

Not so clear about requirements from industry - what is the most important things

Not seeing the potential for asset management

Carbon options and whole life

Lifecycle and end user focus for d&d

Need better connection with industry partners from a research perspective

How you insure sharing of data?

Improve pre construction expereince

Meet end user needs better

Managing at later stages often low tech

BIM level 3

Realtime data sets

Open data

Ownership of data - what is ownership? different data and big data resources

Legal elements, who owns what and when

Legal work underway

Asset management - throughout the lifecycle

Digital twinning

5G network

Data standards - data exchange formats

Proprietary format british standards trying to emuluate

Who owns what and who is liable

AR / VR

IOT

Allow 3rd party API to exchange data between

Adoption, who mandates and who regulates it

5G required for positional tech

BIM level 2

lack of visibility and traceability of data

Cyber physical systems link to IOT and digital training

Adoption an how do you get started - to onboard end users and SME's

5G

Asset mapping

so-built digital master - to manage maintenance, changes and subsequent demolitions

Enterprise systems (e.g. Oracle, SAP)

Digital imagery

Maturity of understanding and ability to be enthused

Middle to senior management - innovation actively discouraged

Kit/collateral - data doesn't get filter down and similar mistakes made, trying to see who could knock down barriers

Identify pathways to be able to adopt

3D design tools

Photos

Digital mapping

Procurement onboard at top level

SME very hard to relate this to their level - hard to se any of this filtering down

How does this trickle down and who champions this knocks down walls

Blockchain - digital contracts

Drone imagery

Perception and understanding

Design uses topographical surveys and laser scans of the shotcreting building

Standards - big players drive against collaboration

Force to dumb down

Open letter from architecture firms globally

BIM future ambition

Currently aspirations way off where this discussion

Aids authen. & governance

Point cloud

Machine Learning

They want full lifecycle

Autodesk use data formats asd walled garden

Make more transactional and less confrontational

Common Data Environment (CDE)

CAD/Revit

Real challenges about where datas is stored

Barrier to collaboration across process

Currently using cloud in a similar way

Performance management dashboard

Clash detection

Push to developing own CAD like systems to get around

Adopting consumer tech is an opportunity not trying to reinvent the wheel

Social Media (marketing)

Move towards managing yourself

Bently - nvidia and epic games - games engine formats openess

Unreal engine

No/smaller learning curve

Digital twins investment

Epic games Fortnite tec - digital city scale

Digital twins

Opportunities

Barriers

Notes

miro

External Influencers & Drivers

What are the external influencers that are driving digital and data innovation?
How does this impact the future ambition?
Why aren't we there yet?

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Future Ambition

Current State

External influencers / drivers

Identifying all forthcoming projects

5G roll out

full life cycle modelling

BREEAM

Needs to be in process rather than just design

First Q is do we need or modify something we already have

BIM Stage 3

Scottish national investment bank mandate towards all things green

Should drive alot of activity

British standardss on lifecycle

Very sluggish to move through

circular economy

material and energy efficiency

ISO19650

Govt. protocols

BIM protocols

Innovate UK - VR/AR

Attitude of snr management - don't win medals for innovation - seen as risk

Granville - discussion on BIM route - decision no one else is so why would we - reluctance to step out from the crowd

To be included- Operam

No Scottish BIM mandate

No construction minister in Scotland

Sustainability

Digital Twins

Top down incentivisation possible the biggest driver

No incentivisation for BIM level 2

Carbon modelling

Lifecycle modelling

Incentivisation - genera

Make sure that everyne in supply chain is aligned

Sustainable products / materials in construction

Cross rail - best example - contractors chip into pot

Spawned innovation bodies funding innovative activity

Circular Economy

Build virtual once then - businesscase is easy enough to make

Govt funded projects had to have a certain level of innovation funding

Organisations want to maintain commercial advantage of their software so have little incentive to agree common data formats

Propensity to do things to be differewnt

Example - Gatwick built digital models early on - employeer saw value

Hearts and minds and buy in is barrier

Medium of screen share and making it as immersive as possible

Trainer can be anywhere

Carbon

CITB trying to fund

PAS 2080 - carbon management

Skill sets and training

Difficult to find trainers - suggests capability is low

Scotgov funding

Uni/college is behind due to changes in software

Accessing those with skillsets to deliver troiaring remotely to a high standard

To become default standard

Training infrastructures aren't there

Building a step past the proprietary tool anbd to the dataset

External players - google bought sketch-up - boygth by trimble) Epic

Big tech are interessted and invested - due to the quantity of data

Who will try host and own access to data and sell as a service

Eg. insurance interested to understand premiums

Help understand how people live work travel

Key Themes

Opportunities

Barriers

Notes

miro

Data Sharing - Making Data Useable

What data is currently generated in construction?
How and why is this shared?
What is the ambition for the future?
Why aren't we there yet?

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internal
data
analytics

what data and knowledge have we embedded in our own organisations and what benefit?

lots of terms for data and analytics roles - can be confusing

open data sets - for example LIDAR - help with education and development - need data available to users

changes the perspective of the young talent

gamification of data sets and analytics

Future Ambi...

there's data within this to de-risk

what is meant by 'performance'?

do SME's and 'others' have sight of this data? it could be hugely benficial

this data is not necessarily visible to those who can benefit

performance benchmark data - missing

that of awareness of how to implement and to optimise investment in data

everyone has a role in data - creating and sharing

recruiting the young talent with the varied skills set into construction

clients don't always think it that wider context

Performance data

Current State

design data usually released in a 2D Adobe Acrobat or 2D AutoCAD format

education for all = better collaboration

what is the purpose of data for the main contractor?

there are not enough talent studying what the industry needs

the information at the very start has to be correct

education for clients

Point cloud

Value data

content retained by the originator

2D file formats often difficult to reverse engineer

What we can collect/do vs what is actually useful?

education for digital in construction - the skills in data analytics are in adjacent industries

education for all - better education for data science in construction

understanding what their requirements are

cross sector perspective

Structured data

BMS and SCADA data

D&C data

Data Sharing - making data useable

Interoperability

Useful formats?

Open data

FE / university are maybe not as advanced / up to date as they could be with digital and data

improve the information exchange

what are the boundaries to 'digital and data?'

CAFM data

EAMS data

differing levels of uptake within supply chain

people taking responsibility for the data - risky and issues of liability

Common data exchange formats

conversely some over share the amount of data (revit files e.g.) when only what is needed at that time is valuable

informed decision making

data is extremely valuable

ERP data

POE data

Siloed / unconnected

think about the wider context

Semantic data

leads to issues of quality of data that is shared

used extensively to test

full life cycle

other industry

cost data

quality and completeness of data

Key Themes

collective responsibility for data

...ties

Barriers

Notes

NIC report

not necessarily using data to change the way business is done

what information do we need on this building?

issues of extracting information from data

opportunity with SMEs as the agile actors

FDM - data integration

can SMEs play role in driving change?

miro

Innovation Capability

How is data and digital driving innovation in the industry?
Where within the industry is innovation likely to occur currently?
What is the ambition for the future?
Why aren't we there yet?

Digital & Data Capability

What is the current digital and data capability?
What is the ambition for the future?
Why aren't we there yet?

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Future Ambition

Current State

Digital & Data Capability

BIM level 3

Open data

Improve pre construction experience

Digital twinning

Currently aspirations (for SMEs) isn't at level of other part s of industry - current / future state?

What we can do vs what is useful?

Howe do we get trust?

e.g. Blockchain

Once we define drivers, national priorities - data can be aligned

Trying to keep simple

AR / VR

5G required for positional tech

BIM level 2

Asset mapping

Digital imagery

Whats industry current state often is still aspirational

SG digital strategy - this should be aligned

SMEs

Open protocol

5G

as built digital model - to manage maintenance, changes and subsequent demolition.

Enterprise systems (e.g. Oracle, SAP)

Photos

Digital mapping

Fits national framework

external influencers

3D design tools

Digital & Data Capability

Design uses topographical surveys and laser scans of the shoresiding building

Drone imagery

Fluid top to bottom interoperability

Chunk down into areas you can build out around

Scottish futures trust whole life framework

external influencers

Blockchain - digital contracts

Point cloud

Common Data Environment (CDE)

Machine Learning

Understand how they impact netzero and circular economy - chunk it down

Scot STGs - UN STGs

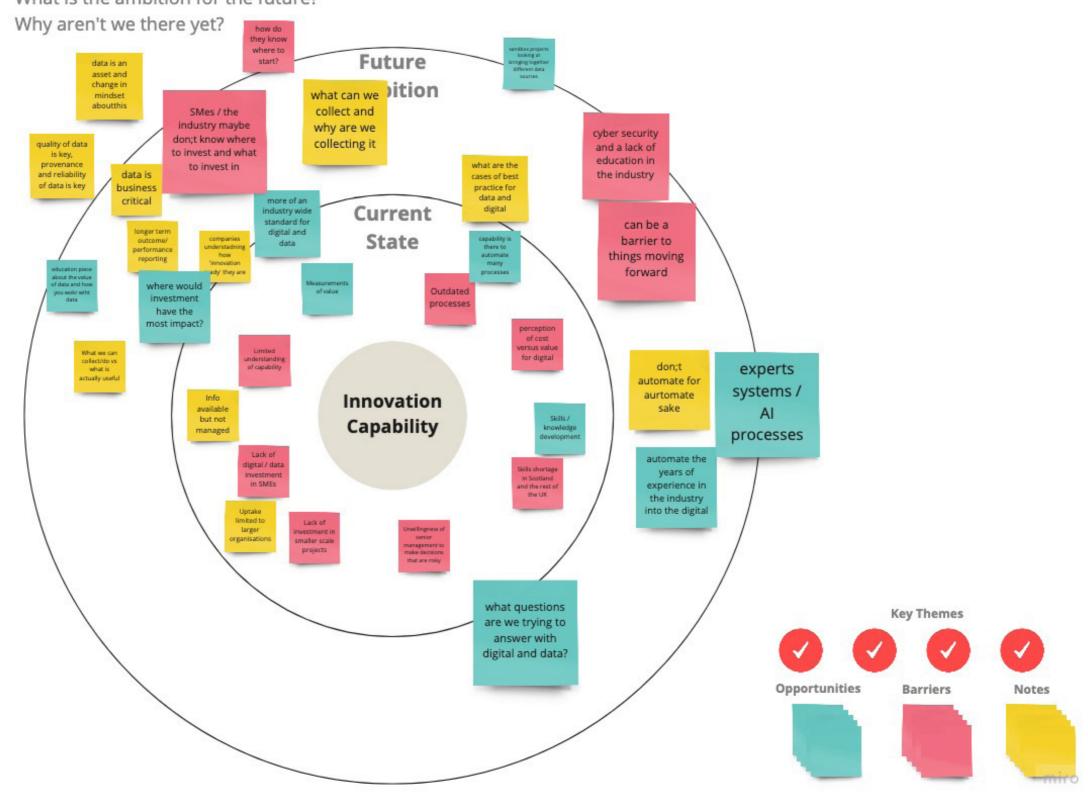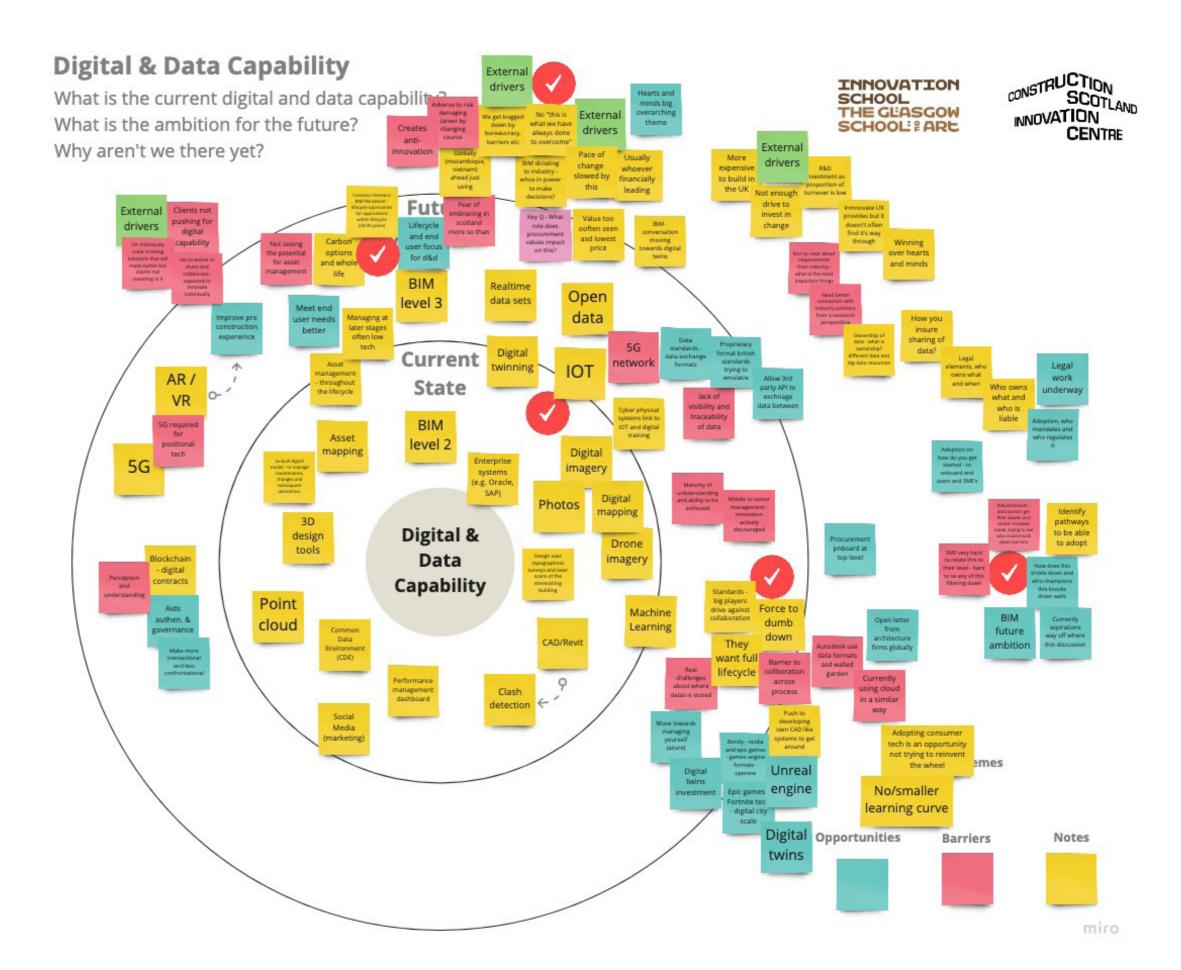Performance management dashboard

CAD/Revit

Whole life contextualisation

How does social capital relate to environmental conditions and so on

Work to creat an international model that can all follow

Social Media (marketing)

Clash detection

challenge will be to standardise both approach and consistency of delivery of all digital techniques.

What it is going to be used for?

Performance to standardisation

Something specific in terms of performance and standardisation

Tech stack and capabilities

BCIS - building cost information

Howes it going to be useful for all of us

SMEs don't know that they are carrying data and using it

Have all the info - unaware of what they can do with it

How do you embrace and begin to (check audio)

Diverse range of what we class as data

Vast subject matter

Tech big data want to know how people behave -

Key Themes

How do we define, store, share and collaborate

What do we actually use it for?

Opportunities

Barriers

Notes

BIM masses of info - struggling to know what we do with that

Becoming a data dump

Need someway of understanding what we are using it for

Collated in a way that useful for everyone

Use Common data environment (CDE)

Boil the ocean angle of trying

Lots of stuff thrown together

Bottom currently - hows it going to be utilised?

ISO angle

Supporting overall objectives of national govt

Clear policies around health, poverty, utility bills etc

To design and construct better schools/unis

Impact knowledge economy and impact global

What we do should impact and question how we support that

What is the info for? the value

How are you going to make sure data isn't duplicated

How are you going to ensure validity

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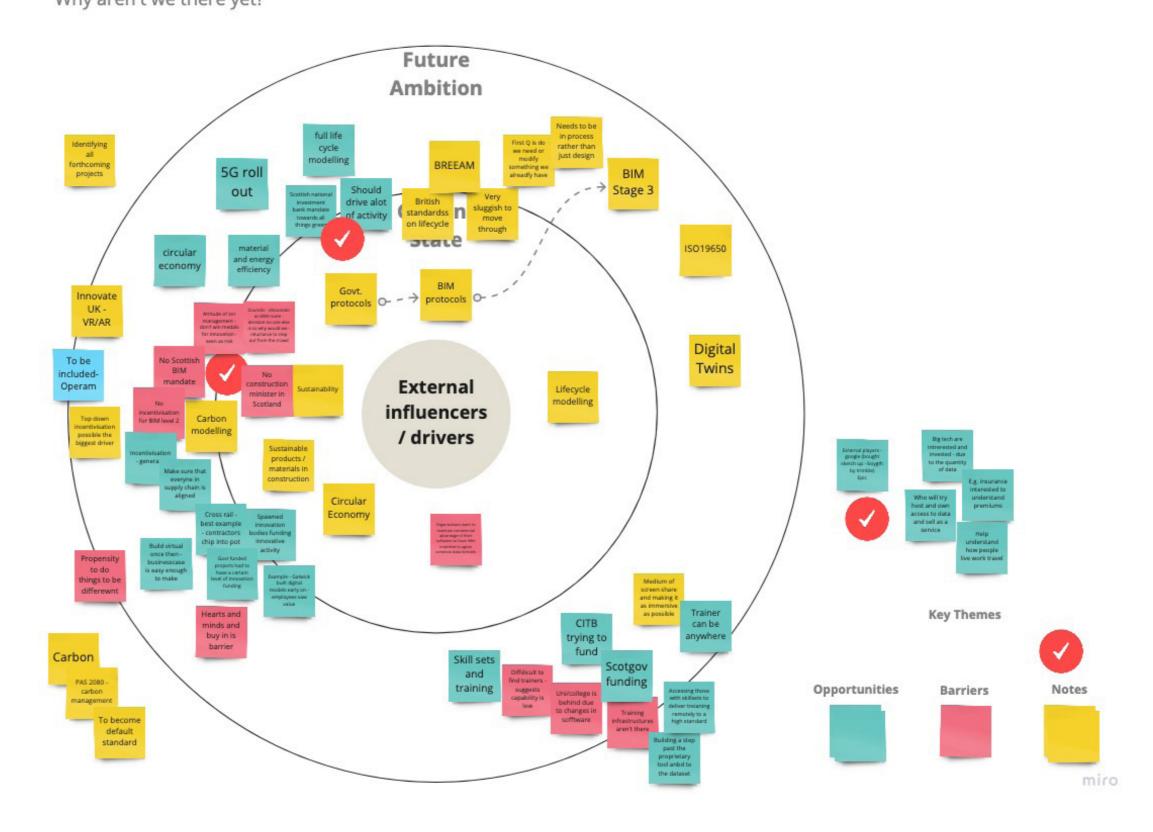
External Influencers & Drivers

What are the external influencers that are driving digital and data innovation?
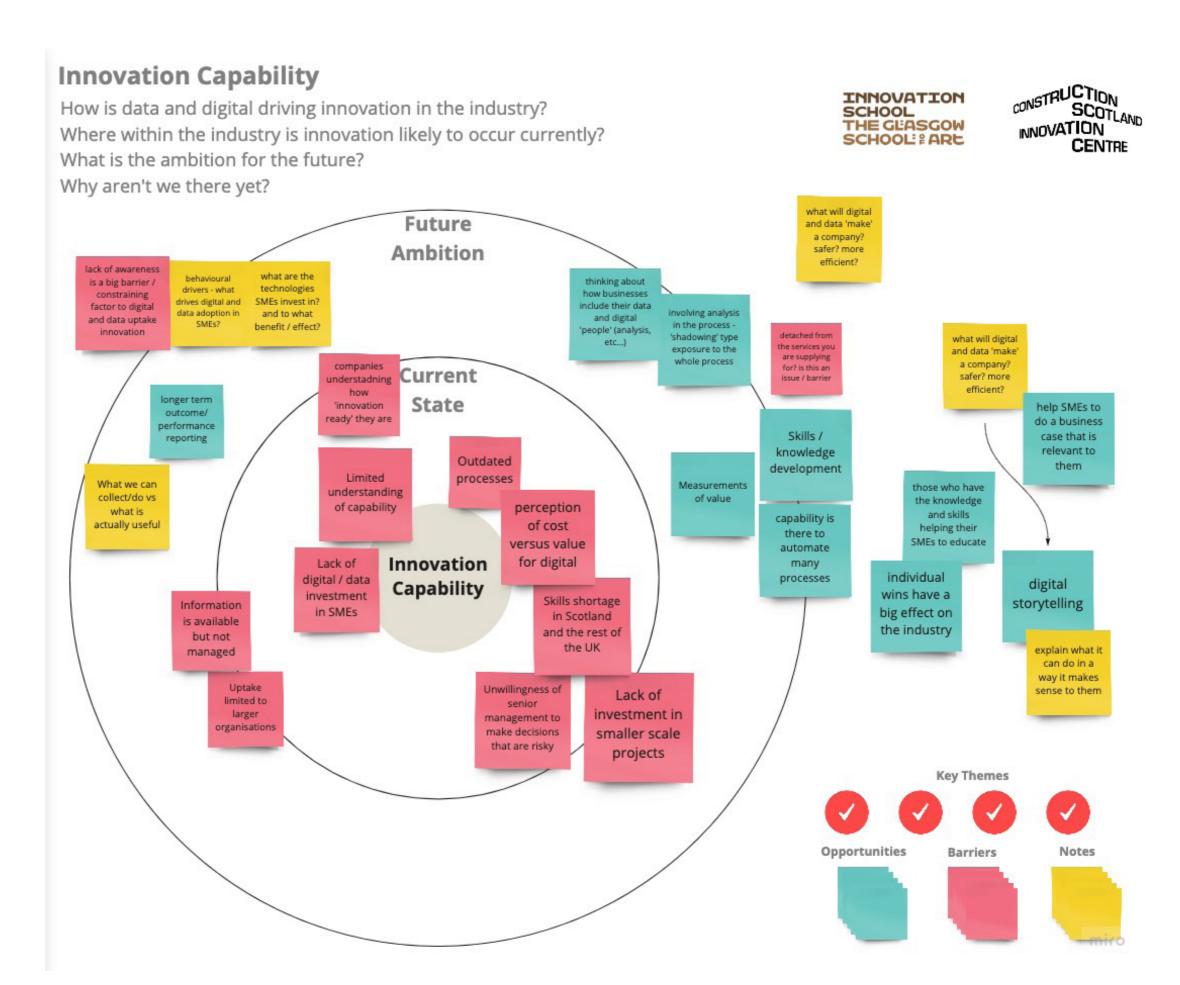How does this impact the future ambition?
Why are...

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Future Ambition

Current State

External influencers / drivers

Need sharing culture

Openness to share data - historically that has been an issue

No specific reason we aren't doing anything differently

Process of validation - easy to share something that is there or thereabouts

Accuracy of data - snowballs into something less meaningless

Loss of value

Next gen tech savvy

Caveat - what tech?

opportunity

How do you get a whole ecosystem working in that way?

CDM - data model aligns

Mapping right data and shared environments / standards

Single overview of process

Review audio

Data going in clean - trust and integrity - makes easier

Scotland benefits in terms of scale

Takes us to connect before machines

Cultural change

Culture - trying to evolve model but need to re-imagine

Current model not designed to embrace the capabilities we now have

Transformative capability within data

Barrier: skills?

Proper and sustainable attractive industry

Culture - strong realtion between culture and skills

Storytelling - what does the data tell you

Skills and learning

Education and development to help adopt and explain value - build trust

Create an evidence base - need the story anecdotes behind this

Energy sector has faced this similarly

Barrier in amount of capability around data analytics

Early adopters having a snowball effect - recognise value

Challenge is getting over that first hurdle

Culture?

Wave of grads driven by data driven approach

Resistance from top that aren't comfortable with these methods

Skeptical to trust decision making

Risk aversion

Where can we learn from existing innovation?

existing examples / assets

Scale is barrier

Where can you learn from others

Best practice learning

Identify leaders to follow

Consider global BP - finland

Consider rural smart villages smart communities

Not a need to reinvent every wheel - can copy apply and adjust

Is this at level of accuracy that it should be

How do we validate data coming in to ensure quality down the line?

Data owners - maintaing and guarantee

Responsibility - managing responsibility

Define what is good enough

Make sure the you have infrastructure to ensure gaurantee

QC

Connectivity barrier - global connection

5G roll out

full life cycle modelling

circular economy

material and energy efficiency

Need to re-position the vision to fully realise

what does this look like - tell clear story and develop clear roadmap

Foundation isn't bricks and mortar anymore but data

Whole life - societal impact / role

Govt. protocols

BIM protocols

BIM protocols

No incentivisation / formal protocols for BIM level 2 (in Scotland?)

Different to GB protocols

Sustainability

Carbon modelling

Sustainable products / materials in construction

Circular Economy

Lifecycle modelling

Organisations want to maintain commercial advantage of their software so have little incentive to agree common data formats

Autodesk

Evolution of how we build in this country that recognises tech environment

Not making use of what we have available

Continue to work in a way we always have

Need to understatnd what the benefits are?

Interested in how other sectors use digital

Digital based development grant - allows business to develop digital capability

How can we target to sectors?

Complexity is barrier?

Govt making bold moves to evolve - driver

To do needs to agree on data models - standardisation

Driven by construction leadership forum to deliver

Does the model in prevent mistakes commercial sense then private sector will be engaged

Differences between private and public sector procures and works with supply chains

Does this need to be mandated?

Industry no where near to implement

Moving to a point where low cost isn't necessary way to procure

BIM Stage 3

Pharma compared to M&S very different in terms of embracing strategy plans - best practice

Takes on that doesn't make contemporary commercial sense but will in future and methods - future looking

Data centres - security issues - need to house locally

Balance open data with security

Prefabricators as disruptors

Move to big tech sensing value

ISO19650

Digital Twins

Key Themes

Opportunities

Barriers

Notes

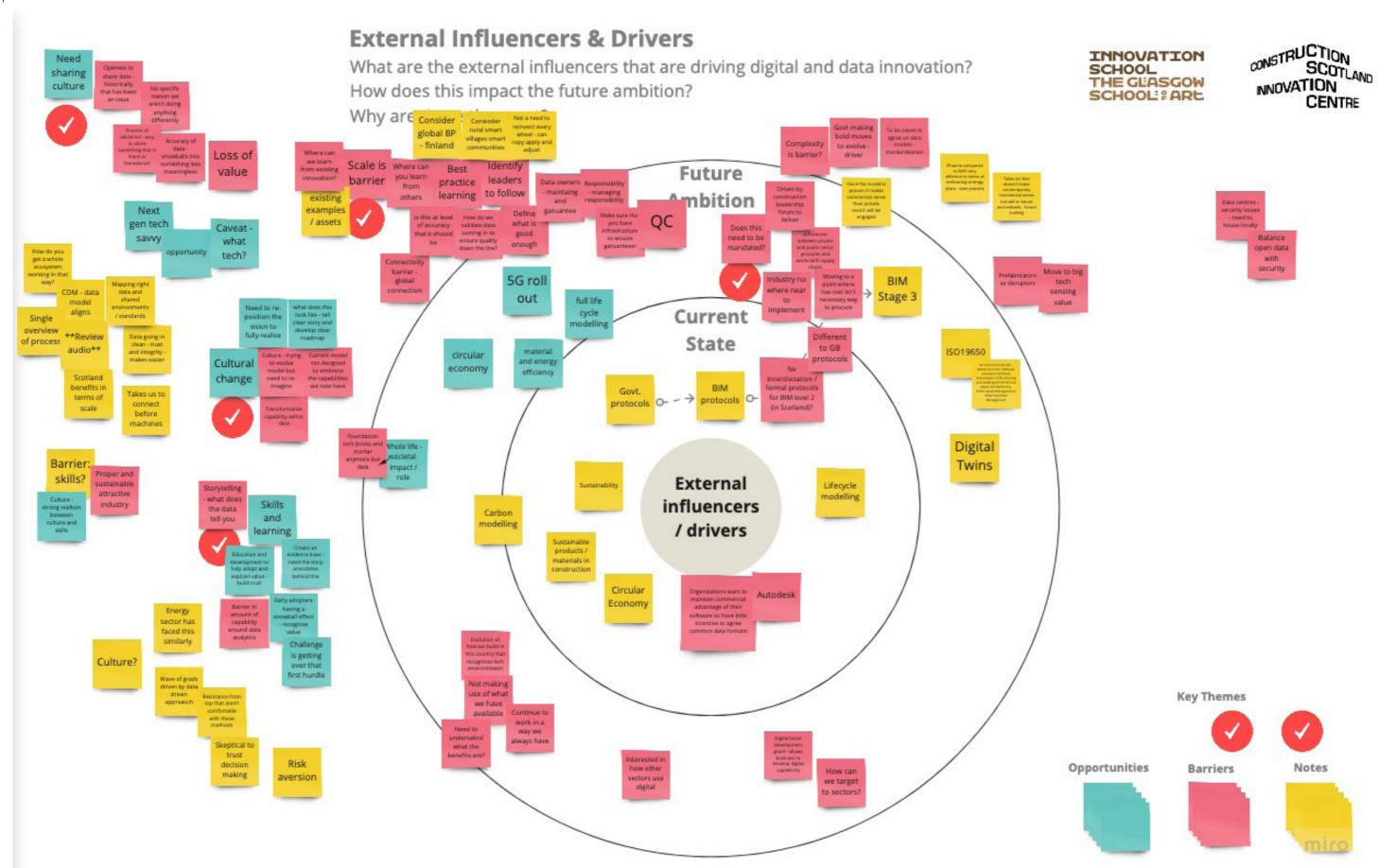miro

Pre-work Survey Feedback

Where and how do you see digital being used currently in the construction sector?

- Structural design

- Fabrication

- Digital Building Information Management

- Planning, finances, design and the whole life needs

- Slowly moving towards the full life cycle

- Marketing

- Progress Monitoring

- Defect / Snagging Reporting

- Site Management Software

- Mobile Project Management Tools

- Used on major civils and government contracts or larger private contracts

- Used during the design, mid construction phases and in the handover processes depending upon the size of the contract or the client

- Asset maintenance

- Virtual reality simulations have been used to provide users with improved experience pre-construction

- Moving into areas such as quality control verification; sustainability and low carbon thermal modelling

What kind of data is used currently?

- Customer relationship information

- Businesses produce data in the raw form but don't manage it thereafter

- Compliance

- Collaboration

- Workflow

- Geospacial/Land survey data

- Planning/Schedules

- Finance

- Whole of Life

- Energy/Sustainable

- Safety

- Waste

- Digital design data for fabrication

- Laser scanning or drone derived imagery or point clouds

- Asset mapping

Comments

- Implementation and integration of digital construction isn't always linked so the benefits of the digital process are lost

- The larger the project the more likely a digital process will be implemented

- Smaller scale projects like housing etc see much less digital process due to either perceived cost or lack of skills or knowledge

- A large amount of digital content exists for many projects but is retained by the originator stakeholder and not shared with others for the benefit of the project

- Data being gathered tends to fall in line with the design and specification information gathered on a project by project basis

- Data should facilitate greater collaboration on a project within a controlled and managed source of accurate and verifiable information

- One use which is still to take-off is Augmented Reality. Ability to see the design superimposed on the real world could be the next revolution in construction

- Issues with data being siloed, and questions around the quality and completeness of what is being stored

- Much more could be achieved if we had a more purpose driven focus for data

- Businesses produce data in the raw form but don't manage it thereafter

- Challenges in the industry associated with the lack of visibility, traceability, and certainty in Building Information Management