AUTODESK UNIVERSITY

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Right First Time Mega Project Delivery

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Learning Objectives

- Challenge mega project delivery approaches using success examples from previous projects
- Implement right first-time project delivery strategies through the alignment of people and process
- Lead the development of delivery strategies which effectively manage interfaces and stakeholders to avoid late surprises
- Evaluate the ongoing success of digital delivery strategies on mega projects

Description

In recent years there has been recurrent calls to increase the volume of investment in infrastructure to boost economic activity and employment. The view of infrastructure however is not universally positive, the delivery of these schemes remains under sustained challenge due to a reputation of late and under value delivery. Right first time is a process to delivery high quality engineering solutions through the development of clear requirements and careful stakeholder management, ultimately avoiding late surprises at delivery. This session will use practical project case studies from the last 10 years to show this process, enabled by digital solutions, has avoided delays and increased costs. As major programmes of work become ever more complex and the expectations from society continue to increase, join us to learn how mega projects such as Tideway and BART Silicon Valley II ensured 82% of delivery packages were accepted first time around and reduced production efforts by 32%.

Speaker

Linkedin

Michael Gaunt is a Principal Information Manager and leads the Information Management account at Mott MacDonald. As a Chartered Civil Engineer by background, he makes use of his practical project experiences to improve project outcomes through better access to the right information. Michael has a strong track record leading Information Management teams on major capital delivery projects both in the UK and North America. Michael's paper "BIM model-based design delivery: Tideway East"

demonstrates his successes in this regard. Michael is passionate about the effective use of Connected Data Environments, particularly the impacts these systems can have on delivery when setup with the right people involved. Leading teams of Designers, Contractors and Clients has provided Michael with a unique blend of expertise which enables him to guide project leadership through the construction sector's digital transformation.

The Mott MacDonald Information Management account provides support and expertise to a diverse range of built environment projects from concept to operation. Michael's team is focused on the effective sharing of successes and lessons learnt to the wider industry in order to drive transformation in response to the ever-increasing demands from society. Michael's passion is the development of effective Connected Data Environments. These provide project teams with the right information to make the right decisions to succeed. Innovations like SafetIbase are excellent examples of CDE approaches which have now been scaled through the industry to realise effective management of data. Michael has a track record of leading award-winning projects; he has won the Bentley Advancements in Project Delivery Award and Mott MacDonald's Digital Delivery Award on multiple occasions.

About Mott MacDonald

Mott MacDonald is a global engineering, management and development consultancy.
Our purpose is to improve society by considering social outcomes in everything we do, relentlessly focusing on excellence and digital innovation, transforming our clients' businesses, our communities and employee opportunities.

Find out more at: www.mottmac.com

Right First Time Mega Project Delivery – Overcoming Complexity and Scale

In recent years, as the American economy adapts to new and evolving challenges, there have been recurrent calls to increase the volume of investment in infrastructure. Infrastructure investment has been proven to significantly boost economic activity and employment. The view of infrastructure however is not universally positive, the delivery of these schemes remains under sustained challenge due to a reputation of late and under value delivery. In addition, societies expectations from these schemes continues to evolve. Enhanced connectivity, reduced disruption during delivery, on demand services during operation are just a few examples of the hopes of the local communities. Hopes that grow because of the increased ability for society to challenge planning, the increased ability to communicate concerns and increased proven capabilities of new infrastructure schemes across the globe that are now setting unprecedented levels of society enhancement and user experience.

It is these projects from across the globe that can be used to demonstrate the benefits from improved methods of delivery and develop the business case for investment into similar methodologies on today's infrastructure schemes. Mega projects are complex, designed to operate for long periods of time and take extensive periods to plan and deliver. These three challenges subsequently mean that large infrastructure projects have a large variety and diversity of stakeholder groups, all of which must be satisfied within an environment of constantly changing priorities. In response to these challenges, how have these projects established long term thinking, taken decisions which balance project delivery against the impact over the long term of the assets and accounted for complexity with an evolving workforce, delivered using constantly evolving tools and processes? These projects have started to realise the benefits from embedding digital solutions at the heart of management. A digital approach is a necessary enabler to manage complexity over the lifetime of an asset. Ultimately achieving right first-time delivery.

Right first time

Right first time means no surprises to stakeholders at the end of the delivery process. Right first time applies to everyone, it means bringing everyone on the delivery journey to provide the appropriate level of awareness for comment and ensures inputs captured along the way are responded to at each delivery milestone. Right first time, as a process, balances short- and long-term requirements to ultimately achieve successful delivery.

What do we mean when we consider right first time in the context of digital? Digital is an enabler to deliver high quality engineering solutions but right first time is an output of a process. A process which begins with a clear scope, a clear understanding of the outputs with aligned expectations across all stakeholders. The key to right first time is that what is delivered is what is expected, no surprises. Digital supports the engineering to achieve this goal and by mapping out the process, mapping out the people involved and the way the information flows through the organization, it forces the need to plan and the approach to manage the plan. Whilst in the US, in contrast to European counterparts, there is no formal mandate for BIM at the national level, from 2020 there has been a significant increase in the adoption and success at the local level. The Los Angeles Community College District (LACCD) most recently required the process to be adopted on major projects recording $12M in construction costs so far. Right first time requires forward planning to build delivery processes which deliver confidence in the output, digital

enables this process to support management, efficiency in production and future re-use of this information. Ultimately enabling high quality engineering services to be delivered without surprise.

Project Challenges

Right first time is sensible and pragmatic and these large infrastructure projects are often setup to deliver this approach through their management and leadership teams however achieving this goal is often restricted by several common challenges:

- **Lack of Progressive Assurance** reducing awareness in the development of the design during, therefore causing late surprises. This challenge is accentuated by volume of change in team members both because of the length of the programmes and the changing skillsets required. These changes produce new inputs to the design, reduced understanding of historic decisions and change which results in delays and unforeseen impacts on these complex projects.
- **Lack of Interface Control** is accentuated on these large, complex projects. Changes made at a micro level can often perpetuate to a macro level impact because of the complexities of the design and the extent of the constraints on the project. For example, a small change in equipment size in an underground room, which sits within the floor plan of a station which has been squeezed to its smallest possible size can quickly render the equipment inaccessible. These decisions can be made without the awareness of the future impacts.
- **Configuration Management** and control across the project. With so many changes occurring on a daily basis with unintended consequences and impacts due to the complexity of the design, ensuring requirements are met during future operations can become a significant problem.
- **Lack of early supply chain engagement** due to insufficient understanding and awareness of the design. Conflicts between procurement programmes, design maturity and design change cause miscommunication and hinder the ability to work together effectively.

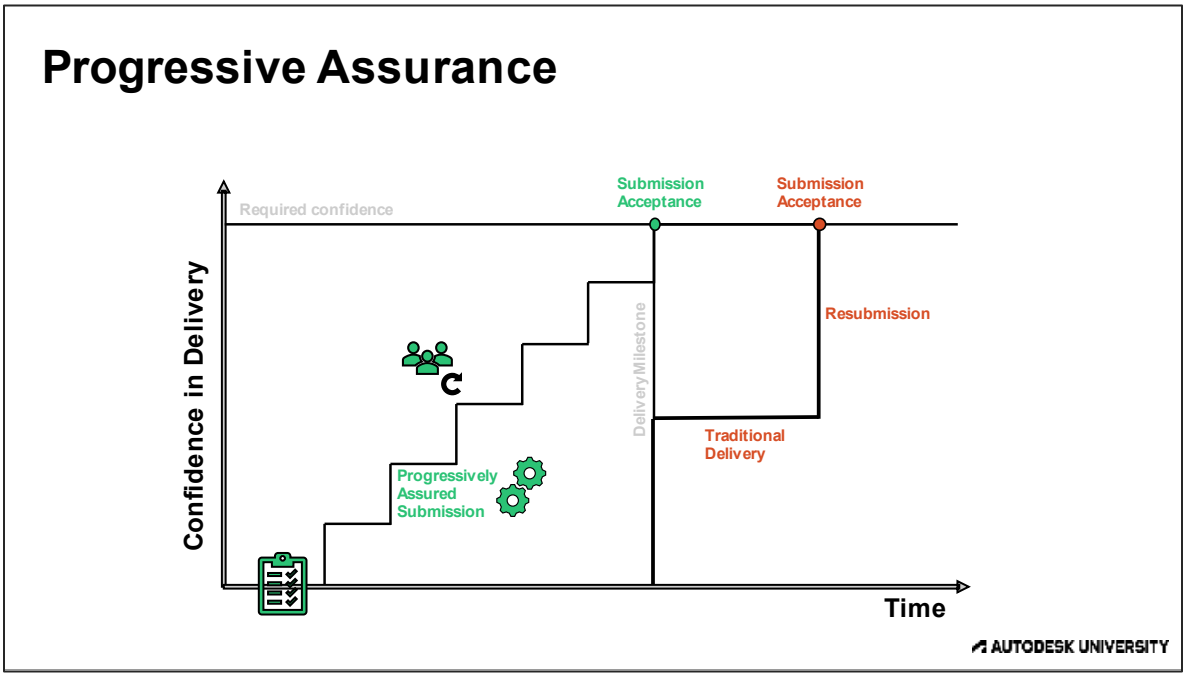
Often, these risks develop in an ‘unforeseen’ manner. Digital solutions and embedding this process in the heart of operating models can help to share and communicate these risks to the right people at the right time therefore enabling effective resolutions and right first time deliver.

The Right First Time Process

The right first time process is focused on:

- **Clear requirements** - Define the information required by the end users at the outset to avoid later dispute. Defining clear requirements, ideally in a machine readable manner, enables automated digital verification and removes any doubt regarding the quality of information to be produced. In many cases, absolute definition is not immediately possible however experience has shown that taking this approach challenges the end users of the information to consider their requirements at the time of production.

- **Progressive Assurance –** Sharing of the right information at the right time to the right people as the design develops to ensure that there are no surprises at the end of the process. Ongoing sharing and review between the right parties develops confidence in the process and certainty in the quality of the final product.



Progressive Assurance Summary

- **Decision capture** – due to the ongoing change of people on mega projects as a consequence of the scale and schedule length, capturing clearly why decisions have been taken is a necessity to avoid repeated challenge and re-opening previous decisions. With the increased scale of stakeholders and often public scrutiny, digital can provide significant assistance to support the capture of decisions.
- **Change Management** – Monitoring micro and macro changes to ensure that a combination of small changes do not impede the ability to meet macro requirements. The combination of many teams working across complex and integrated designs can often result in unintended consequences from independent changes. Again, digital requirements, managed through the model environment can offer significant assistance to support teams in identifying and managing these unforeseen issues.

Right First Time Delivery Strategies

Based on past projects described in the presentation, the following summary is provided as suggestions to take forward to upcoming mega projects:

- Align organisations to enable collaboration **BIM Wednesdays**
- Adopt CDE processes to engage early **No Surprises**
- Define clear requirements to reduce disputes **Component Catalogues**
- Implement strategies appropriate to capabilities and culture – **Tried and Tested**

- Use data to monitor changes, capture decisions and review performance

"Mega projects represent an additional level of scale and complexity. To overcome these challenges, organisations should be appropriately aligned to enable first time delivery of which digital is then an enabler to avoid late surprises and build confidence in quality, on-time delivery"

Recommended Next Steps

Digital has the potential to touch all aspects of a delivery organisation and therefore enabling the delivery of quality engineering solutions requires careful thought and planning. The journey will be different for every project or organization, but it is important that the vision is established, and the journey started. The projects described above have not sought value from this approach immediately however their lessons learnt can be adopted to implement short term wins on the journey to maintain commitment and belief. Digital strategies require targeted approaches and must be focused on the training and development of people. It is people's lives which must become easier because of the tools to gain acceptance and this approach must be supported by top-down leadership. Projects like High Speed 2 and BSVII have managed deployment risks by first adopting tried and tested approaches to obtain the support of the project. Once the project and its people are on board, the approach, maturity and innovation can be accelerated.

Conclusion

As major programmes of work become ever more complex and the expectations from society and local communities continues to increase, the need to deliver right first-time engineering solutions has become even more critical. Past and ongoing projects have shown the opportunity that digital solutions can bring to these projects to mitigate the risks of late or over budget delivery. A track record of projects has now proven the benefits of digital delivery, these benefits are accentuated on large complex projects. As skills continue to develop and the critical user mass is achieved within the delivery community, these approaches are becoming standard within major contractors and consultants. Every project will require a different strategy or plan, one that provides structure and flexibility as well as delivering long term success and short-term wins. Right first time is a process to deliver high quality engineering solutions and digital is an enabler to continued stakeholder input and approval such that the project can be successfully delivered in a transparent and structured manner.