

# Digitalisation – Does Construction have the wherewithal to embrace the 4th Industrial Revolution?

25 years after Latham, 20 years after Egan and now 10 years after “Never Waste a Good Crisis”, the industry has to make another decision; and, being fragmented, it is not good at decisions. How should it embrace the 4th Industrial Revolution – a time of digitally inspired change and a world of artificial intelligence, machine learning and robotics. The industry languishes behind others in its take-up of new thinking<sup>1</sup> and arguably in terms of productivity<sup>2</sup>. On the positive side, it has an ingenious record of adapting others’ breakthroughs, resourcefulness and developing solutions. Can it reassess what value is, break down its ageing culture and develop whole life solutions that benefit society?

## What will the industry look like in 2025

Technologically there is no reason why 2025 will not see an integrated, clean and safe construction Industry. There are clear green shoots being demonstrated by early adopters. Laing O’Rourke is targeting to match the motor and aeronautical industries<sup>3</sup>. CA Blackwell has trialled driverless dumper trucks on the A14 highway construction.

Therefore, the vision for 2025 is that above ground activities will be largely concerned with the assembly of prepared units sourced from economically deprived regions. Below ground activities and landscaping will be largely automated. Virtual teams will come together and be rewarded on value which will be defined by user benefits and the performance of the asset. Supply chains will be integrated using digital platforms which will be used to engage key members at the optimum time in the design and planning.

The asset will then become alive, breathing and providing vital signs to overarching systems, end users and managers. Data exchange will allow end users to make informed decisions and managers to employ preventative maintenance.

Catastrophic design and maintenance failures like Big Dig, Genoa Bridge and Grenfell Tower will become a distant memory. The challenge will be to move this radical digital development to embrace terrorism and natural disasters.

## Can we realise that vision?

Indeed, many of the stepping stones are in place and there will be a continual progression to this end point. Digital enhancements and the uptake of good practice are proving effective in developing reliable outcomes. The cloud has created consistency in the way that data is stored and accessed. Teams are working more efficiently through better programming, working smarter, lean techniques to avoid mistakes and even supply chains are being paid on time.

There are pioneers and exemplars that are showing the way. The Chinese have built a 30 storey hotel in 15 days. Cattera in California is showing how a digital company can do construction more efficiently by integrating design, manufacture and assembly. Now Heathrow is implementing its “componentalisation” vision. It is building components around the country and bringing them to west London to assemble. This is also consistent with Keith Waller’s vision<sup>4</sup> of the new world being “sigma many things” including digital integration.

For the committed digital visionary, we shall move to the world of the digital twin which will not be just individual optimised assets but whole integrated intercommunicating systems. The digital twin will allow scenarios to be played as well as intelligent monitoring. With data coming back from the asset, systems will be enhanced and full asset potential realised through maintenance interventions and operational optimisation. The re-galvanised whole life approach is reminiscent of the 1:5:200 90s concept. This was the theoretical ratio between the capital, maintenance and the value of operation. The asset and system become key economic and social enablers and not potential liabilities.

However, the whole life approach hints at the issues that construction has. Apart from DBFO, including the currently maligned PFI model, it does not have a system for rewarding construction teams on the performance of an asset. Large capital contractors do not contain maintenance teams that sit comfortably together. In the former PFI days the construction and maintenance contracts were negotiated separately by different profit centres even if they had the same parent.

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## So it's all about technology?

Technology is the “x – axis” of development and it is relatively easy to predict where the industry might end up by extrapolating our existing technologies. However, this will impact on our way of life, employment profiles, organisations and corporate structures, skill requirements, stress and mental well being and life styles. These “y – axis” components will influence the degree of value that new technology will bring to society. If these factors are not resolved then the technological developments will not be allowed to realise their full potential.

The vision of the future is based on the development of existing technologies. The brake on reaching this new status lies in the culture of the industry which is dogged by inertia, caution and conservatism.

Therefore, to benefit from the new world of technology, commercial arrangements need to progress. Digital is affording a new enterprise model. Best placed individuals combine to deliver a project. They are judged and rewarded on value thus breaking the 3% ceiling on net margin. Greater profits combined with more realistic allocation of risk will allow individuals and employers to realise more scope to invest in research and development. Project 13<sup>5</sup> has been testing this theory. With the supply chain taking greater responsibility for offsite manufacture, design and programming, the roles of the designer and prime contractor are changing. These predominantly white collar teams will need to reassess their roles and how they add value in the new world. Until this step is achieved, there is the hint of asking turkeys to vote for Christmas.

## Can we really change?

20 years ago, Sir John Egan brought out his report “Rethinking Construction”, the industry arguably remains unchanged over the last 20 years.

Certainly, productivity levels are stubbornly reluctant to rise despite greater mechanisation, collaboration and efficiency measures. In 1998, Google was founded, and today is a household name, turning over \$132bn. The construction industry remains cautious and conservative stifled by tight margins and shareholder expectations.

In its periphery vision it knows there is change happening afforded by the latest technology. It also knows that there is political and economic change about to happen. However, as a fragmented industry it prefers to roll with the market rather than rock with new ideas, making incremental changes and so evolving at a pace that leaves it at the bottom of McKinsey's table of digital uptake.

There is a general acceptance of Einstein's maxim that the definition of insanity is doing something over and over again and expecting a different result. However, there is no industry accepted common vision of how to extricate the industry from its Groundhog Day existence. For some the digital revolution is a natural progression of best practice, an efficiency gain that combined with other good initiatives will effect a more positive outcome. For a minority, there is an expanded vision of a transformational and organisational shift afforded by digitalisation. The two are complementary and one will lead to the other in time.

The Times (21 August 19) reported the following from their survey:

- 52% of Innovation Leaders believe AI and machine learning will be part of construction by 2025
- 70% of companies believe that they will not survive if they do not embrace digital
- 62% believe that the sector is behind others
- 89% believe that digitisation will transform the way that they work
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Most industry leaders believe that to do nothing is to fail and go out of business. Industry is prepared to invest but maybe not until the millennials move through will there be a chance of dislodging baby boomer hesitancy.

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## What do we need to do?

Although being nudged by younger employees, baby boomers, who largely dominate the decision making roles, are finding it difficult to commit to a common vision. In a competitive dog eats dog environment there are no points or prizes for mainstream businesses to be horizontally collaborative. Yes, there is progress vertically and this is enhancing the offering and creating differential advantage. However, the horizontal collaboration will bring about quicker and more change for the industry.

Strategic investment, improved training at senior levels and collective leadership will lead to a combined vision. This vision will allow the necessary building blocks to be developed. One of which will be standardisation. For most people the digitalisation equivalent decision between Betamax and VHS is irrelevant but for the development of systems there needs to be agreement on the systems. There also needs to be greater cybersecurity and for many this will be a growing business and this will be coupled with maintaining privacy.

So, looking forwards, the industry needs to standardise its current technologies, demonstrate the benefits to today's leaders, counter the institutional inert culture and in so doing can look to excite and educate its many end users on the benefits. The UK led the world on BIM, it now has the opportunity to do so again in digitalisation.

In looking to achieve this, then the Industry Sector Deal<sup>6</sup> gives the thinking, a readymade boost as it seeks to concentrate minds on three strategic areas – digital, offsite manufacturing and whole life asset performance. If the spirit of the Deal is followed, then there is the opportunity for greater vertical and importantly horizontal integration.

The first Industrial Revolution started in Great Britain, the industry has the opportunity to do the same in construction with the 4th.

**Simon Flint**      **September 19**

*Simon Flint, the author, is chairman of the Leaders Breakfast Meetings which seek to discuss topical construction issues. He has worked with Constructing Excellence and its predecessors since the 90s - looking at pioneering initiatives that improve the efficiency and productivity of the industry. However, the thoughts expressed in this "article" are personal and do not necessarily reflect those of Constructing Excellence or Advance Consultancy.*

<sup>1</sup>Imagining construction's digital future by McKinsey June 2016

<sup>2</sup>(ONS) Construction Manager – June 2016

<sup>3</sup>The Times – 21 August 19 "Transformation based on transparency, technology and talent"

<sup>4</sup>Keith Waller is the Director of the Construction Innovation Hub

<sup>5</sup><http://www.p13.org.uk/>

<sup>6</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/731871/construction-sector-deal-print-single.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/731871/construction-sector-deal-print-single.pdf)

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