PERSPECTIVE

2018

FUELING OUR INDUSTRY THROUGH CONVERGENCE

PROCURE FOR BETTER VALUE

PLANNING FOR HEALTH FUTURE HEALTHCARE TRENDS & USING THE PROJECT PROCESS TO AFFECT HEALTH OUTCOMES

ADAPTING CONVENTION CENTERS FOR THE DIGITAL ERA

FINANCIAL MODELING FOR PROJECT MANAGERS

THE HIDDEN COSTS OF STADIUM AND ARENA RENOVATION

BUILDING SUPPORT FOR SAFER SCHOOL BUILDINGS

MODERN WORKSPACE TRENDS

A Rider Levett Bucknall Publication

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More than meets the eye
The hidden costs of stadium and arena renovation

Building support for safer school buildings
Achieving extreme resiliency

WELCOME

Welcome to Rider Levett Bucknall's 2018 Perspective Magazine, a compilation of insights from my Rider Levett Bucknall colleagues across the globe.

In this edition, Perspective addresses a range of industry related topics from the hidden costs of stadium and arena renovations and building in the Caribbean to retail trends and achieving resiliency in schools. Along with other research reports produced, this magazine is another way that we embrace our brand essence 'A better tomorrow through flawless execution today'.

At RLB we are dedicated to full involvement in the built environment and our communities, beyond our work. We place an emphasis on being at the forefront of trends, challenges, advancements and innovation to better serve our clients and provide insight to our industry colleagues that will help their projects succeed. We are proud to have a passionate team across the globe dedicated to these principles and contributing significantly to the evolving landscapes and skylines to help bring imagination to life.

We hope that you find these articles insightful and applicable to the projects you help bring to fruition.

Best Wishes,

JULIAN ANDERSON
RLB GLOBAL CHAIRMAN

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Perspective
is the global magazine of
Rider Levett Bucknall

Enquiries
Cathy Sewell
cathy.sewell@us.rlb.com

Designer
Taryn Harbert
taryn.harbert@us.rlb.com

With a network that covers the globe and a heritage spanning over two centuries, Rider Levett Bucknall is a leading independent organization in cost management and quantity surveying, project management and advisory services. Our innovative thinking, global reach, and flawless execution push the boundaries. Taking ambitious projects from an idea to reality.

RLB Rider Levett Bucknall

CONTRIBUTORS

1. Julian Anderson, FRICS
President, North America,
Global Chairman
julian.anderson@us.rlb.com

2. Ann Bentley
Global Board Director,
United Kingdom
ann.bentley@uk.rlb.com

3. Stephen Mee
Global Board Director,
NSW, Australia
stephen.mee@au.rlb.com

4. Peter Knowles, FRICS
Executive Vice President,
North America
peter.knowles@us.rlb.com

5. Matthew Harris
Managing Director,
NSW, Australia
matthew.harris@au.rlb.com

6. Graham Roy, FRICS
Executive Vice President,
North America
graham.roy@us.rlb.com

7. Julian King
National Head of Retail,
United Kingdom
julian.king@uk.rlb.com

8. Paul Brussow
Executive Vice President,
North America
paul.brussow@us.rlb.com

9. Nick Ferrara
Director Advisory,
NSW, Australia
nick.ferrara@au.rlb.com

10. John T. Jozwick, Esq.
Executive Vice President,
North America
john.jozwick@us.rlb.com

11. Mark Williamson
Managing Director,
Caribbean
mark.williamson@lc.rlb.com

12. Scott Walker
Fitout Executive,
NSW, Australia
scott.walker@au.rlb.com

13. Terrence Lai
Associate,
NSW, Australia
terrence.lai@au.rlb.com

14. Conor Ellis
National Head of Healthcare,
United Kingdom
conor.ellis@uk.rlb.com

15. Grace Lam
Senior Cost Manager,
Singapore
grace.lam@sg.rlb.com

16. Silas Loh
Joint Managing Partner,
Singapore
silas.loh@sg.rlb.com

17. Ken Leung
Associate,
Hong Kong
ken.leung@hk.rlb.com

18. Ray Fang
Senior Surveyor,
NSW, Australia
ray.fang@au.rlb.com

19. Bill Kuck
MEP Cost Manager,
North America
bill.kuck@us.rlb.com

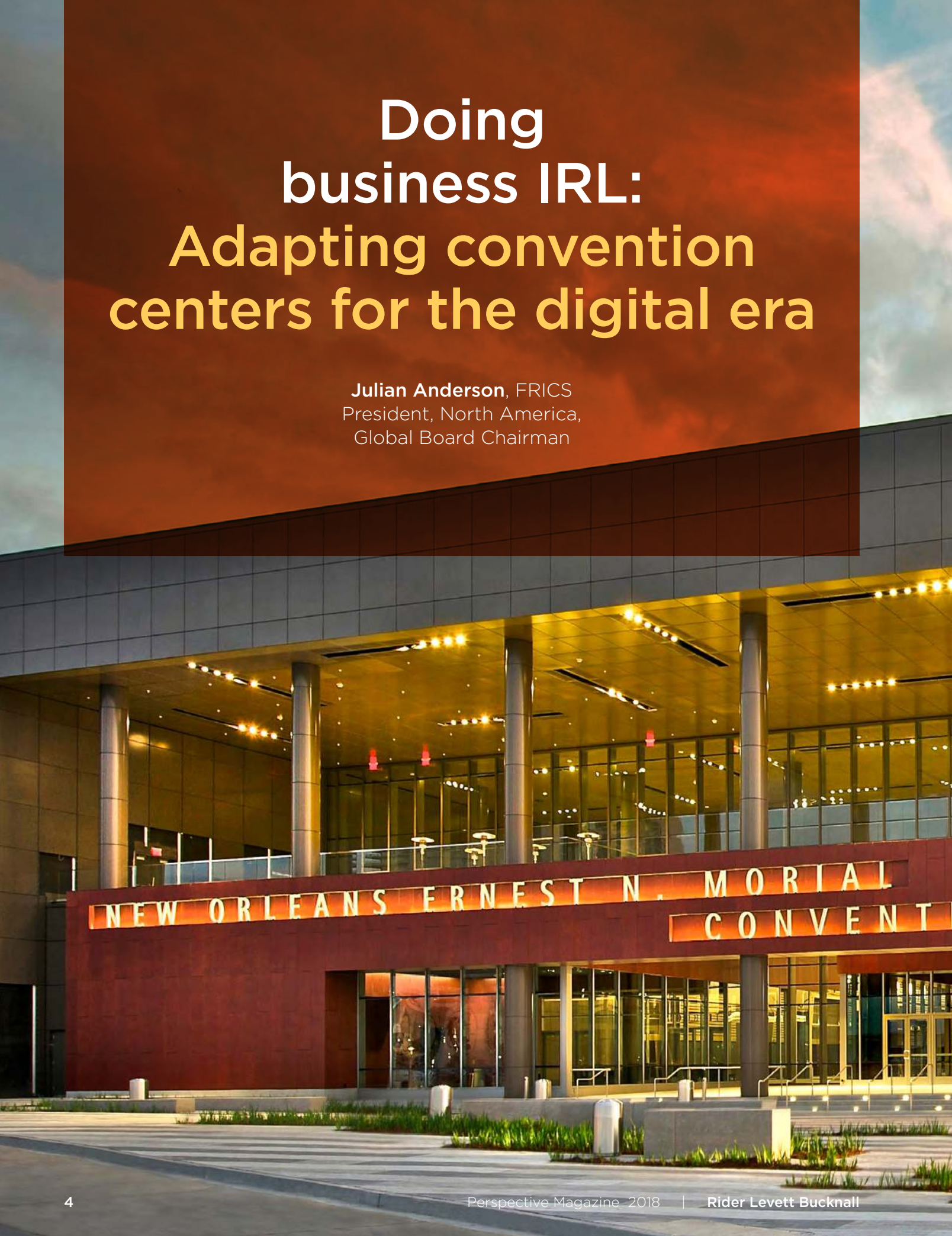
20. Tom Chatterton
Senior Quantity Surveyor,
New Zealand
tom.chatterton@nz.rlb.com

21. Ian Blakeman
Partner,
United Kingdom
ian.blakeman@uk.rlb.com

22. Frans de Jager
Director,
South Africa
frans.dejager@za.rlb.com

Doing business IRL: Adapting convention centers for the digital era

Julian Anderson, FRICS
President, North America,
Global Board Chairman



Chat with any colleagues who have recently returned from an industry gathering or conference, and, in addition to the business debriefing, you'll likely hear anecdotes, restaurant recommendations, and of course the latest insider gossip. In my experience, there's no substitute for this kind of personal interaction. Face-to-face networking, in such a concentrated way with people who have common interests, remains an incredibly effective, efficient way of communication.

Judging by a report in the June 2017 issue of Trade Show Executive, an increasing number of people share this view. Year-over-year, April 2017 exhibited 2.9 percent growth in nation-wide trade show attendance, and capped a run of four consecutive months of growth.

Especially in the age of digital meeting technologies, this positive trend is encouraging. As people are communicating more electronically—video-conferencing is de rigueur in large organizations, with approximately 450,000 systems installed in the U.S., and Skype alone logs eight billion hours of calls each year—it's obvious that quality, in-person time is viewed as valuable and that the convention industry, especially host cities and facility owners, should appreciate this by keeping their properties in top condition. A convention center can generate a significant amount of revenue for a municipality. The income isn't attributable to just the facility rentals, but also the expense-account dollars spent by visitors for dining, entertainment, and shopping. In 2016, the San Diego Convention Center welcomed 824,000 attendees, who directly spent $658 million in the city; the regional fiscal impact totaled $1.1 billion. Chicago's 2.6 million-square-foot McCormick Place generates $1.7 billion each year. The Orange County Convention Center brought $2.28 billion to the Orlando community in 2015, while drawing one million visitors to town.

"Cities are promoting not just their facilities and cultural attractions to conference organizers, but also their resources for innovation, often in the tech, research, and education sectors. This far-sighted, inclusive strategy stresses long-term growth for cities and regions, rather than short-term returns."

DISRUPT OR BE DISRUPTED

In light of these facts, it's clear that the meetings industry must make some significant changes if it is to continue to remain relevant. At the big-picture level, a new perspective on the economic relationship between the community and the convention business is emerging. Cities are promoting not just their facilities and cultural attractions to conference organizers, but also their resources for innovation, often in the tech, research, and education sectors. This far-sighted, inclusive strategy stresses long-term growth for cities and regions, rather than short-term returns. Austin's South by Southwest (SXSW) is a notable example of this approach. With minimal expense, the city leveraged its homegrown media and music industries to attract attendees as well as outside sponsors to the conference; the local economic impact of the 2016 event was $325.3 billion. Attendance at SXSW has increased eightfold since its establishment in 2011.

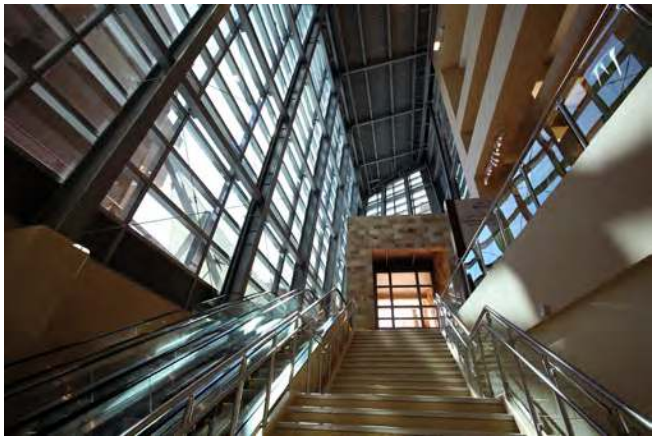
Redefining the destination-city in this way greatly enhances the draw to convention visitors. If they've made the financial and scheduling commitment to traveling, conference attendees want to go somewhere interesting. To remain competitive, it's incumbent upon cities to deliver a holistic experience to visitors.

DRILLING DOWN ON BUILDING UP

To keep up with these changes, the physical nature of convention centers has also evolved. In the 20th century, convention centers were all about scale. Except in cases where a facility regularly hosts heavy-equipment trade shows, the demand for cavernous exhibition spaces is waning. Replacing the bigger-is-better mandate is a focus on customizable meeting spaces that can be tailored to diverse specifications.

Many communities are faced with a choice between constructing a new convention center, or renovating existing facilities. Typically, building a new hall is easier than rehabbing an old one. However, finding a suitable site—one that is sufficiently large, centrally located, and within walking distance of urban attractions—is not always feasible. Opting to build from the ground up also eliminates the need to interrupt scheduled conventions, as they can be held in the outdated facility while the new one is being constructed.

For convention centers located on a landlocked, built-out site, there's typically one way to go when adding meeting space to the hall: Up. The old model for facilities situated everything at ground level for easy access; now, with land at a premium, most buildings are stacking spaces vertically. This presents its own set of challenges, including incorporating parking into the structure and planning the ground-



level programming and content – but it provides an opportunity to make a design statement.

When modernizing the envelope of an existing building, owners are seeking design solutions that go beyond merely dressing up a box. They are aware that an attractive exterior can help to compensate for the decline in performance that occurs once the building starts showing its age, between five and ten years after completion. Also, convention centers that have an architecturally iconic identity reflect positively on their home city and, by extension, on the attendees and the conference.

INTERIOR AMENITIES

Inside the convention center, user expectations are a combination of the pragmatic and the aesthetic. Conference organizers are attracted to environments that make a good first impression. Great-looking public areas and meeting spaces with a high level of quality detailing and finishes (think wood veneer, clear-span design, and glass partitions instead of drywall, concrete columns, and popcorn ceilings). Architecture that capitalizes on its setting, with a lobby or ballroom oriented towards a view of a river or park, is another enticement that appeals to meeting planners.

To maximize resources (both in area and revenue), it's possible to simultaneously increase meeting capacity and reduce exhibit space through creating a physically flexible design. Moscone West in San Francisco is an example of this tactic. The building features more than a mile of movable interior walls that permits a high degree of freedom to reconfigure the 200,000 square feet of function space on the second and third floors. Anaheim's new expansion also adopts this approach.

Of course, the technological features that are intrinsic to the impetus for upgrading a convention facility must be state-of-the-art. Digital resources, seamless connectivity, and security programs are central to every successful meeting. Intelligently planned and executed, investments in convention centers will yield not only great financial returns, but ensure a returning customer, as well. P

Julian Anderson, FRICS
President, North America
Global Board Chairman

As seen in:
Commercial Construction & Renovation, November/December 2017, "Doing Business IRL: Adapting Convention Centers for the Digital Era"

Procure for better value

Ann Bentley
Global Board Director,
United Kingdom

Construction matters. 10 percent of the UK workforce is employed in construction and allied supply industries. Construction regularly comes under a critical spotlight and it is unequivocal that productivity increases in the sector have fallen short of most other sectors in the UK economy. Over the past four years the Government has developed a number of strategies and proposals to improve the sector, and some improvements have been made, but there is a systematic lack of "joined-up" action within the industry – on both the client and supply sides.

And yet the potential prize is huge. Simply bringing the whole industry up to the current average UK productivity level would lead to £16bn savings per annum.

Add on to that whole-life efficiency, economies of scale, quality and health and safety improvements delivered through standardisation and pre-manufacture, and the opportunities that digital technologies present for changing the fundamental structure of the industry and it can be seen that the industry is on the cusp of structural change.

This paper builds on much work done in the past, and attempts to give some anchor points for clients, government and suppliers as the industry adapts and adopts new ways of working.

PROCURE FOR BETTER VALUE

By procuring with different outcomes in mind, clients can direct the industry to work more efficiently and effectively, thus delivering higher productivity and better outcomes for end users.

Publicly funded and regulated work accounts for approximately 40 percent of all construction and this could be harnessed to massively influence the concept of **Value**. This could happen very quickly with little short-term cost and huge long-term gain. It would, however, change the cash-flow of projects and will only be delivered if mind-sets move to whole life value.

Value and Productivity

Since 2013 the construction sector in the UK has made just a 0.1 percent productivity gain. Skills shortage, lower skilled labour – widely available and relatively cheap – and resources diverted to winning rather than delivering contracts are major contributors to this poor performance.

However, productivity of engineering construction projects in the UK is very variable, up to 30 percent better or worse than average. This variability far exceeds the gap between the UK and other countries. Similarly in the general economy, the most productive area of the UK is now almost three times more productive than the least.

The variability seen in the UK is due to the patchy use of best practice in project planning, project management and industrial relations management.

OUTCOME BASED PROCUREMENT

To achieve better value we must identify and establish models of value which are broader than capital cost.

Not only is the industry highly cyclical and massively variable in its productivity, it also delivers a variable product. Being both world-class and yet plagued with examples of assets which clients aren't happy with and projects which fail to deliver their early promise.

Public and private sector clients broadly agree that what they want from the industry are:

- Project outcomes which meet their business case objectives
- Adequate data on which to make informed decisions e.g.
  - Early cost accuracy
  - Alternative solutions
- Value for money
- Functional performance – built to an agreed timescale and quality
- Quantified levels of risk
- No surprises
- Legal compliance
- End user satisfaction
- No reputational damage

These are issues which clients can and should influence and control, by using their buying power and by defining what value actually means to them as a client or asset owner.

Best practice procurement guidance already exists from a whole range of public sector and regulated bodies, but these are not consistent nor are they comprehensively or uniformly adopted and they do not all advocate the same definition of value.

Recommendation

To capture the maximum benefit that projects or programmes can achieve, the definition of Value must be expanded to include:

- Whole-life value
- Capital and Operational Carbon Emissions
- Digital effectiveness, BIM and data capture
- Use of standard components and pre-manufactured value
- Design Quality Indicators
- Collaborative behaviour and supply-chain integration
- Government Soft Landings
- Social Value of the construction process
- Health, Safety and Well-being during construction
- R&D and Innovation
  - Supply chain incentivisation for delivery innovation
  - Sharing of innovation risk between client and suppliers

None of these are new themes, but are very rarely captured within the procurement process.

Actions to make the recommendation stick

Why isn't this being done anyway?

- No cross-industry common standards
- Lack of client and advisor knowledge and expertise
- Fear of the unknown – no-one wants to be first
- Deep in-built conviction that lowest price gives the best value
- No-one is checking anyway
- Time pressure on procurement
- Annual budget pressures

Solutions?

Development of a common definition of **Value** and a new procurement standard; enhanced competences in both clients and advisors, evidence based case studies, a consistent digital platform to capture and analyse the bid information and an audit or oversight function with teeth.

Cross-Industry Common Standards

What we are doing about it:

Develop Common Standards:

With the Royal Institution of Chartered Surveyors (RICS), the Chartered Institute of Procurement & Supply (CIPS) and major quantity surveying practices, Rider Levett Bucknall is sponsoring an inter-company working group to make and develop proposals on what this wider definition of **Value** and the associated procurement process would look like, how it would work, and how it would be implemented.

This will lead to a new RICS Procurement Standard for whole-life value, and through our work on the Construction Leadership Council we will be lobbying hard to ensure that this becomes widely adopted in the public sector – thus setting the benchmark for best-practice and new client attitudes to procurement. P

Ann Bentley
Global Board Director,
United Kingdom

Following – and forecasting – the money

Financial modeling for project managers

Paul Brussow
Executive Vice President,
North America

An independent project management team can serve the owner as well as other stakeholders—including architects and contractors—by prudently shepherding the schedule and proactively monitoring costs. In order to extract the full value a manager can bring to a project, it's wise to have them on board at the earliest stage of design. To wait until there's a problem affecting design and construction before consulting with a PM wastes valuable time when a project is at its most vulnerable point.

PERFORMANCE AND PRECISION

It's essential for PMs to have reliable, up-to-date information on which to base their counsel and recommendations to owners. While sophisticated software programs have simplified data collection, it's the degree of skillful interpretation and application brought by project managers that is often the telling factor in the successful delivery of a job.

Over the past years, Rider Levett Bucknall (RLB) has taken several approaches to computerized project management, including using off-the-shelf software and working with clients to develop exclusive programs that address specific issues. The firm has recently developed a comprehensive platform that not only streamlines the process of project management, but also achieves the highest levels of flexibility and integration.

This fall, a new, proprietary project-management program is rolling out to RLB offices around the world. RLB|Pulse ties the financial modeling of a project into one robust software package that provides clients with a real-time picture of their budget, expenditures, and financial risks. By linking six key functions—contract management, invoice management, project forecasting, change management, cash flow management, and executive reporting—into a single system, clients are able to make informed, timely decisions about the direction of complex projects.

"With construction costs comprising between 60 percent and 85 percent of the budget for commercial developments, the need to efficiently oversee and balance resources is a top priority. Key to this challenge is the project manager (PM), who synthesizes data on costs, materials, and time to maintain the integrity and momentum of the job."

Among the dynamic forecasting features of RLB|Pulse:

- Inclusive vendor interaction: Large projects typically have an extensive consortium of consultants and vendors, each generating its own stream of transactions. Pulse is programmed to manage the execution of each individual contract against the overall construction budget.
- Big-picture view of change orders: Change orders are a time-consuming reality of construction; typically, by the time they are agreed upon, drawn up, and ordered, up to three months may pass, putting progress at risk. RLB|Pulse can forecast fiscal impacts at the time change-decisions are made and track their implementation, enabling owners to have an accurate budget in real time.
- A calendar for cash: To assist in financial reporting, the program uses benchmarks and milestones to track and forecast the cash flow of a project.
- Currency conversion: A new development is located in Dubai, financed with US dollars, EU consultants are on board, and materials are ordered from Asia—international construction projects pose unique payment problems. RLB|Pulse is designed to seamlessly resolve complicated currency scenarios.

PARTNER PROGRAM

RLB|Pulse complements another program which was also created by the firm, Ross 5D. A far-reaching yet nimble construction-cost management tool, it allows accurate estimates and bills of quantities to be prepared from diverse information sources, including BIM models, 2D and 3D CAD drawings, illustrations, schedules, and other project documentation.

In the same way that BIM and CAD models are facilitating re-use and integration, ROSS 5D utilizes concepts of modularity to build a working cost model of a project. Complete costings can be prepared from minimal project information, and are continually improved and refined as the project design is further developed. The cost model makes it easy to analyze alternative scenarios, helping clients to spend less money and delivering more efficient, cost-conscious, and environmentally sustainable results.

Separately or in tandem, the RLB|Pulse and Ross 5D programs bring clarity and economy to the increasingly complex task of construction management, and contribute to the science—and art—of modern architecture while advancing the central role of the project manager. P

Paul Brussow
Executive Vice President, North America

The drivers of data center growth:

There is still a long way to go when it comes to crunching the numbers

Ian Blakeman
Partner,
United Kingdom

I like a statistic or two.

It's good that I do, as numbers and data are big news. The traffic generated by smartphones alone between 2016-2022 is estimated to increase tenfold and there will be an estimated 12 times more mobile data traffic in Central and Eastern Europe and Middle East & Africa by 2022[1]. All of this anticipated data will need to be housed somewhere.

From the infamous Dotcom boom and bust of the late 90s to the mid noughties when financial institutions began to increase demand, the construction of data centres has grown steadily, but in the last few years with the emergence of hyperscale data centres there has been dramatic growth.

Over the past 12 years, Rider Levett Bucknall (RLB), has been involved in the construction of 820MW of data centres IT load on more than 200 projects worldwide. Our longevity and diversity of projects has placed us at the vanguard of data centre cost management and has led us to develop industry leading processes to rapidly process design information and provide our clients with early, accurate costs to enable them to plan their deployment strategies and financing.

However, it is only recently that the hyperscale market has precipitated a sea of change in the scale of developments. Although these projects often employ similar engineering architectures to their developer-led wholesale or colocation equivalents, they respond to the need for massively scalable, modular and secure computer environments. All data centres face the challenge of dealing with huge server heat loads and this has seen the industry responding with innovative design and logistical solutions. We have therefore found ourselves operating more frequently in diverse locations such as Denmark, Finland and the Netherlands, where cooler climates allow free cooling solutions, thus increasing energy efficiency and revenue.

Hyperscale data centres represent over a third of the overall IT load we have delivered in the data centre sector and yet less than one tenth of the number of projects, such is their scale. There is estimated to be 490 hyperscale data centres constructed by the end of 2020, with spending on cloud data centres rising from $38 billion in in 2015 to reach nearly $75 billion in 2020[2].

Social media and streaming video have contributed significantly to the recent proliferation of data centres, staggering facts and figures include:

- Facebook users send on average 31.25 million messages and view 2.77 million videos every minute[3].
- We are seeing a massive growth in video and photo data, where every minute up to 300 hours of video are uploaded to YouTube alone[3].
- In 2015, 1 trillion photos were estimated to have been taken and billions of them shared online. By the end of 2017, nearly 80 percent of photos will have been taken on smart phones[3].

The social network is by no means the only game in town. The Cloud has been fueled by a relentless growth in Big Data, the Internet of Things (IoT) and Open Source Architecture, all of which may be interrelated but see the major hyperscale data centre operators working with them to best suit their particular market strengths. So what are they?

"...data growth appears to be spiraling upward and the resulting increase in construction output looks set to continue for a few years yet."

1. BIG DATA

Science increasingly produces, analyses and uses Big Data (which is basically the use of mass storage, processing power and analytical capability) to solve global (and local) healthcare issues and enhance human knowledge. To illustrate the advancements in data capture and analysis: Decoding of the human genome originally took ten years to process; now it could be achieved in less than a day.

The apotheosis might be the development of the Large Hadron Collider which is still endeavouring to further understanding of the formation of the universe by identifying the Higgs boson. In so doing, huge quantities of data are generated – so much so that only 0.001 percent of it is actually collected[4]. If it was all collected, the data flow would be more than 200 times all other data sources in the world.

Perhaps surprisingly, weather forecasting is also a significant consumer of big data. Why? Because predicting the increasingly erratic behaviours resulting from climate change may lessen the impacts of extreme weather events such as hurricanes, tsunamis, or wildfires – events that the US National Centers for Environmental Information states has cost their economy approximately 2.2 trillion.

2. THE INTERNET OF THINGS (IOT)

Forbes[5] has defined the IoT as "the connection of any device with an on and off switch to the Internet (and/or to each other)". The analyst firm, Gartner, says that by 2020 there will be over 20 billion connected devices (examples of which are smartphones, smart cities, transportation networks, intelligent shopping and washing machines). In 2017, the number of connected devices was estimated to be 8.4 billion[6].

There has been inescapable recent media coverage of the development of driverless cars and it is estimated that the amount of data produced by one car, driven for just one hour a day, is currently equivalent to the average data consumption of over 6,000 people[7]. It would be reasonable to say that little of this impact has reached data centres yet, but is definitely something that will need to be catered for before too long.

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"Smart Cities" have been adopted in cities such as Dubai, Songdo in South Korea, New York, Amsterdam and Barcelona, to name a few, where diverse new and existing technologies are being built into the civic infrastructure. The implications to the data centre from the above are fairly obvious – rapid increases in data transmission, storage and analytics require more facilities to process them.

3. OPEN SOURCE ARCHITECTURE

In simple terms The Cloud is the internet. It allows storage and access of data over the internet rather than maintaining the data on your own computer. Companies have increasingly seen the Cloud as a preferable option to upgrading or renewing their private IT environments, seeing advantages such as access to up-to-date software applications, improved performance, security and technical expertise. The hyperscale data centre picks up on this because the open source software that has been developed to run them is available for other organisations to access and develop for their own needs, resulting in improved operational efficiency.

And what does this mean for the hyperscale companies? Reported third quarter 2017 results for Amazon, Microsoft, Google and Facebook demonstrates breath-taking examples:

- Amazon's cloud business, Amazon Web Services (AWS), reported a 42 percent year-on-year increase in revenue and AWS now accounts for 11 percent of the company's total revenue[8].
- Microsoft's Intelligent Cloud division grew 14 percent year-on-year to $6.9 billion and noted that its public cloud business, Azure, saw revenue jump 90 percent year-on-year [8].
- Alphabet, the owners of Google, generated $27.77 billion in revenue, up 24 percent from a year ago and generated $7.8 billion profit with its "Other Bets" division, which includes driverless cars and IoT device manufacture, showing 53 percent growth[8].
- Facebook reported 47 percent year-on-year increase in revenues up from $9.84 billion to $10.33 billion with 2.07 billion monthly active users[9].

Perhaps the development of ever-faster processors or even major technology hikes such as quantum computing will result in a radical redeployment of our processing capacity and a re-think of construction activity, but data growth appears to be spiralling upward and the resulting increase in construction output looks set to continue for a few years yet. P

Ian Blakeman
Partner
United Kingdom

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[6]Gartner Says 8.4 Billion Connected "Things" Will Be in Use in 2017, Up 31 Percent From 2016." Gartner, Rob van der Meulen, 7 Feb. 2017, www.gartner.com/newsroom/id/3598917.

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Progress claims presented in the BIM model

Stephen Mee
Global Board Director, NSW, Australia

Terrance Lai
Associate, NSW, Australia

Ray Fang
Senior Surveyor, NSW, Australia

How far is the Property and Construction industry progressing in the use of the BIM Model in the preparation of monthly progress claim assessments?

The journey is just beginning, and it is pleasing to see progress is advancing beyond the smoke and mirrors and the marketing hype.

Outlined in this article is the early experience of Rider Levett Bucknall (RLB) in Sydney in adapting the use of a BIM Model in the interim progress claim assessment process of an inner-city construction project.

The project is a 25,000 square-metre net lettable area commercial office building, comprising two basements and 25 levels above ground, with a construction value of approximately AUS$105 million.

CONTRACTUAL RESPONSIBILITIES

The construction contract entitles the Contractor 'Built' to submit monthly progress claims for assessment and payment each month. These claims are assessed by the Quantity Surveyor, RLB, who prepares an independent report which is presented to the Superintendent, TSA Management. Based on the report, TSA Management then prepares a monthly interim payment certificate under the contract. This certificate identifies the amount the client, Investa, is contractually obligated to pay the contractor for the works completed on site.

Investa has a desire to optimise the use of the BIM Model to assess and present progressively the status of the completeness of the project throughout the construction duration. These interim assessments look at the performance of the contractor both in terms of the cost completed, compared to forecasted cash flow and the program duration required to complete the works based on the status of completeness.

BILL OF QUANTITIES

In terms of cost, the contract sum is tabulated via a Bill of Quantities, which is prepared using the RLB Rules for Construction Measurement as the basis of tendering the project.

RLB carries out a model using the Industry Foundation Classes (IFC) and DWFX file-based measurement to prepare the bill of quantities utilising the tender BIM Model to extract and check relevant quantities and information.

The tenderers submit their tender price with trade priced b ills of quantities and the contract sum agreed, matching the priced bill of quantities document.

The bill of quantities includes itemised trade-based quantities extracted from the BIM Model for the proposed scope of works, with individual cost rates for each item that are extended to calculate the total contract sum

MODEL, COSTS AND PROGRAM

A Federated BIM Model is a single BIM model that combines the individual BIM Model design disciplines, including architecture, structure and engineering services.

As the Construction Contract is Design and Construct (D&C), the finalisation of the 'For Construction' documentation is the responsibility of the Contractor. Hence, the Tender Federated Model is updated to a 'For Construction' BIM Model progressively as each design discipline advances and then the costs and programs are reviewed accordingly in this amended BIM Model. We note that due to the nature of the contract, all changes or updates that have a cost impact, are deemed included within the original contract sum design development contingency provisions.

Trade-based activities are also developed with the program. These are then linked to the BIM Model to illustrate the construction status.

The contractor utilises Asta Powerproject software to integrate the Federated BIM Model, costs and program into the same platform. Any changes to the costs and time can be updated to a single file to reflect the site progress. This software is also used to monitor cash flow, track trade progress and produce graphical representation of the actual project status.

Items that are not measurable (e.g. preliminaries, design fees and offsite material) or modelled (e.g. earth works) are only represented as an activity, and are not linked or shown in the model.

The cost for each activity is based upon the agreed items in the Bill of Quantities where the quantities for the items have been extracted from the BIM Model.

COSTS AND PROGRAM DURATIONS ADDED TO THE 'FOR CONSTRUCTION' BIM MODEL

Once the 'For Construction' BIM Model is agreed, both the proposed construction program durations and consolidated bill of quantities item costs are added into the matching activity within the BIM Model for the programmed works.

MONTHLY PROGRESS CLAIM ASSESSMENTS

The Contractor submits a monthly progress claim based on reasonable trade cost splits for RLB to assess using the Bill of Quantities and the Tender Model. The Quantity Surveyor and the contractor inspect the status of works completed on site and then agree the percentage complete for each activity item of the programmed works.

The agreed trade breakdown costs are then transferred into corresponding activities in the program which are linked to the model.

As part of the current process, RLB also performs a BIM Model-based claim assessment via in-house BIM Model cross checking to assess the submitted monthly claim. Quantities are extracted from the IFC Model based on the construction progress and rates as per Bill of Quantities are applied to these quantities. An indicative assessed amount is generated to cross check the value of works submitted by the contractor. If discrepancies are identified in a certain trade item, a different percentage of work completed to date is then discussed and agreed with the contractor.

The agreed percentages are then entered by the contractor into Astra Powerproject, which is integrated with the BIM Model, and both the total value of works complete is presented as a value against the contract sum and a graphic representation of the physical works status is produced in the following status of completeness:

- In progress
- Installed
- Completed
- Future or works not yet commenced

Image courtesy of Architectus

BIM CLAIM PROCESS

Outlined below, in Steps 1 to 5, is a simplified graphic BIM claim process integrating Model, Cost and Program:

1. Bill of Quantities is prepared via model-based measurement (BIM 5D). The bill is later updated with contract trade rates to form initial budget split for different trades in different sections of the building.

2. The Split is then agreed and forms the basis of the claim. Slight variations do occur due to design component development and miscellaneous items.

3. The corresponding amounts get transferred into individual activities linked to the Model.

4. Internal checking process by RLB occurs through model-based measurement in a similar method to BOQ measurement to determine the completeness of works to date.

5. Asta Powerproject platform is utilised to enable integration of Model, Cost and Program as well as graphic visualisation of the project status.

DASHBOARD PCG REPORTING

A dashboard presentation showing the status of the progress on site is prepared by the contractor, and this is presented at the monthly Project Control Group (PCG) meeting.

The purpose of the dashboard is to present a high-level summary of the current status of the project to the client's team who are not involved in the day to day running of the project. The dashboard presentations are also used by Investa to present to their Fund Managers and Board of Directors.

For the purpose of the dashboard and due to the nature and complexity of the items within the BIM Model, the construction works are split up into the following grouped categories for ease of graphic representation. The result is a Dashboard Report for the interim progress claim, presenting the percentage of works completed for each grouped category of works within the contract sum:

- Structure
- Façade
- Internal Fabric
- Finishes
- Services
- External Works
- Variations

The dashboard also reports on other portions of works which are not modelled in the actual BIM Model, but considered in the overall progress claim assessment each month. The items are as follows:

- Demolition
- Earthworks
- Preliminaries
- Design Fees
- Offsite Materials

The experience to date on this project, which is only 20 percent completed as at Oct 2017, is that the actual preparation of the progress claim involves a combination of the BIM Model technology for presentation and tabulation purposes together with the traditional methods of assessing percentage completeness for individual trades and items of work.

We are detecting that the task of entering data onsite into a detailed software program also has its restrictions to ensure safety, and to ensure that the data is correctly entered with challenges such as the glare from the sun, wind and rain.

The reality of the full utilisation of the BIM Model to produce the interim and final progress claims assessments still has many hurdles, but the journey of embracing new technology and testing the opportunities that can be advanced is well underway P

Stephen Mee
Global Board Director, NSW, Australia

Terrance Lai
Associate, NSW, Australia

Ray Fang
Senior Surveyor, NSW, Australia

"The reality of the full utilisation of the BIM Model to produce the interim and final progress claims assessments still has many hurdles, but the journey of embracing new technology and testing the opportunities that can be advanced is well underway."

Shaping the future of the built environment

The first building in Australia to be designed by renowned architect Frank Gehry, the Dr Chau Chak Wing Business School of the University of Technology, Sydney (UTS) features 320,000 custom bricks. Each laid by hand in a particular order.

UTS appointed RLB to work with Gehry Partners, LLP, to create this world-class business school. RLB provided cost planning, estimtaing, bills of quantities and post-contract services. The vision of this bespoke design with a mirror finish and 'crumpled' balustrade, was acheieved on budget.

RLB.com

RLB Rider Levett Bucknall

The Space Odyssey

Sasol's voyage to future ready

Frans de Jager
Director,
South Africa

The days of quantity surveyors being asked how many people could be packed into a building's space have disappeared into the dust of the rampant digital revolution. Increasingly the question is, rather, what type of space should be provided for millennials, what environmental management systems, what global connectivity systems, what ease of mobility, what wellness facilities, and what questions should we be asking? And lastly, does the role of the quantity surveyor change?

An example of this is the new SASOL Corporate Headquarters. Established as an oil-from-coal enterprise in South Africa over 60 years ago, SASOL is a major multinational energy and petrochemicals organisation. Reflecting its wide range of activities, the company grew to occupy 17 buildings in Johannesburg. Due to the large number of buildings, there was a need for SASOL to rationalise their needs and achieve a future-ready outcome. Due to the number of buildings SASOL occupied across various nodes, it was important for them to consolidate all of its business units into one centralised head office, thus combining all their business units into one building. This rationale was also driven by the necessity to rationalise space requirements and to eventually optimise space requirements by reducing the workspace requirements per person. A project to consolidate all office accommodations into a new corporate head office entailed a lengthy and exploratory feasibility evaluation before finally getting underway in 2013. The project was complex, however, at the end the team delivered the clients goal.

INVOLVED DESIGN

Paragon Architects' design concept was based on the SASOL logo with its central spherical nucleus and six rotating satellite spheres in an 'S' formation, representing the company's business units. The building evolved into an asymmetric glass structure, floating over a landscaped indigenous park. Initially accommodating 2,500 employees and 300 auxiliary staff, the new corporate office will ultimately bring all SASOL's' employees into one future-ready, people-focused space within walking distance of Sandton City, the Gautrain station as well as other accessible traffic nodes.

The eleven-storey office complex has 67,000 square metres of rentable area surrounded by over 3,000 square metres of landscaped indigenous parkland. Although the use of alternative transportation will be encouraged, a seven-storey basement parkade provides almost 100,000 square metres of parking for over 3,000 cars. The design allows for free movement vertically and horizontally throughout the complex. The concept of openness and easy access to remote work spaces is enhanced to create a people-focused environment with social amenities such as restaurants, canteens, pause and break away areas, wellness centre, a fitness centre and an art gallery.

The unique features and intent of the development led to the following key challenges:

1. UNIQUE FEATURES

The floor plate design of the building was challenging due to the connectivity of floor plates across the two, multiple volume atriums with link bridges connecting the floor plates. These link bridges are a major feature of the building and contribute to the horizontal circulation between floor plates.

The biggest structural challenge was the construction of the main cantilevered section on the northwest corner of the building which is approximately 13 metres long and 2 metres above the podium level carrying four levels of office space above

The external glass facade required proper planning in advance to follow the construction programme and to minimise programme challenges to ensure that the building envelope could be closed for the internal fit-out. The facade is unique and a clear testimony of our ability to provide world class facades

2. SIZE MATTERS BUT COMPLEXITY CHALLENGES

While the sheer size of the SASOL Building was challenging, the degree of asymmetry in both shape and size of the floors proved to be the most challenging aspect. There was no duplication from floor to floor on which to base consistency of costs, and consequently, each floor had to be approached almost as a project on its own. Peak activity involved approximately 80 selected subcontractors with the associated tendering, adjudication, financial control and management of the contracts.

The subcontract packages and tender / award process had to be carefully thought through and awarded to ensure that the sub-contractors were capable to deliver their scope of work with the programme constraints.

The fit-out process of SASOL's internal space layouts were very intensive and whilst we worked in close collaboration with the space planners we had to be conscious of affordability and budget constraints prior to signing off budgets after which the procurement process had to follow.

"The SASOL building demonstrated RLB's ability to provide a world-class quantity surveying service that recognized the unique traits of each project. Through successful collaboration with the professional team on this iconic building, we completed the project within budget"

3. SUSTAINABLE DESIGN

Targeting a 5-Star Green rating to comply with the Green Building Council of South Africa (GBCSA), the SASOL building aimed to push 'green' boundaries. A key element in this was the incorporation of high performance double-glazed panels of vision glass and spandrels as well as the highly sophisticated louvre blind system to maximise natural light as well as to control glare and comfort levels

Other major green design features include a vast atrium with large skylights to allow for natural lighting; water recycling measures; and extensive insulation. Intelligent building management systems are standard throughout the building.

Impressive outside spaces feature extensive landscaping and parkscapes, with planted areas and facilities for employees such as courtyards, braai and yoga facilities. Selected drought-resistant trees and shrubs acknowledge water as South Africa's precious resource with xeriscape planted areas. Reflecting SASOL's long-standing commitment to supporting birdlife in South Africa, a mini-ecosystem has been created to encourage birdlife, butterflies and frogs.

The achievement of a 5-Star Green Star SA-Office v1 Design rating in October 2016, was a testament to the collaborative sustainability commitment of the project team.

CONCLUSION

The SASOL building demonstrated Rider Levett Bucknall's (RLB) ability to provide a world-class quantity surveying service that recognized the unique traits of each project. Through successful collaboration with the professional team on this iconic building, we completed the project within budget. RLB influenced the future-ready design without compromising the design intent. Our team truly lived up to the RLB commitment of Bringing imagination to life. P

Frans de Jager
Director,
South Africa

Avoiding trouble in paradise

Tips on building successfully in the Caribbean

Mark Williamson
Managing Director,
Caribbean

The Caribbean's idyllic beaches and balmy sea breezes are a magnet for visitors from around the world; many ultimately put down roots in the community, living and working there on a permanent or extended basis. This creates a potentially lucrative market for housing and recreational development. However, in true rose-coloured-glasses tradition, individual clients and even seasoned AEC professionals can be in for an unhappy surprise when undertaking a construction project in the islands.

The island setting itself is at the root of several of these disruptive assumptions. One of the most common misconceptions prospective developers or residents have concerns the cost of building in the Caribbean. Many believe that because the cost of general labour on an island is low, then the cost to construct a project will also be low—particularly when compared to the cost of building a similar project in their home region of Europe or North America. But this reasoning is flawed, and can lead to dreams turning into nightmares.

Rider Levett Bucknall's (RLB) experience in the Caribbean goes back 50 years, offering guidance identifying and mitigating the risks of the construction and development process for local projects. To realize a small or large building, it's critical to be aware of several conditions that might not be on the radar, particularly if the client is new to construction in the Caribbean. Among them:

"One of the most common misconceptions prospective developers or residents have concerns the cost of building in the Caribbean."

NOT A DEEP LABOUR POOL

While the cost of labour in the Caribbean is generally lower than in the U.K. or U.S. (In the islands, the median hourly wage for construction work is $8.61 [2015]; the U.S. rate is $16.07 [2016]), with many islands having populations of less than 100,000, the work force for building projects is limited. Skilled labour—such as HVAC technicians and appliance, media, and electronics installers—are a particularly rare commodity. As a result, contractors must resort to importing skilled workers from larger islands or even from outside the region. So, while the cost of employing an unskilled labourer to excavate a foundation trench may be low, to complete other, more complex elements of the building, the labour cost could be much higher as it may have to factor in expenses for travel, accommodation, and local transportation.

LIMITED MATERIALS MARKET

While most Caribbean islands have limited manufacturing capability, such as small factories that manufacture concrete blocks, when it comes to producing other building materials, most, if not all, need to be imported from outside the region. This reality adds freight fees, import duties, and potentially schedule-slowing delivery periods to the cost of the project. In places, the raw materials—such as aggregates for concrete—are simply not available locally, and need to be shipped in for the specific project.

It is not just building materials that can be a challenge to source locally. Construction equipment, such as large excavators or cranes, is often ferried from island to island as project demand dictates, again adding to the cost to build. And bear in mind that should machinery break down, spare parts, too, may likely need to be imported.

Finally, most developers are accustomed to hooking up to municipal utilities in a routine manner. But in the Caribbean, sufficient infrastructure support cannot be taken for granted. Hotel and resort operators and their design teams need to ensure at the outset that there will be adequate potable water, power, and sewage treatment capacity to properly service the property. For most projects, it's very unlikely that all of these facilities are all existing; upgrading the infrastructure systems must be factored into any feasibility costing.

LOCAL COMPLIANCE AND CONNECTIONS

When building in any remote location, it's important to have representatives on site. It's no different in the Caribbean. In fact, island regulations require all construction drawings be submitted for government approval by a locally based, registered architect, so establishing some sort of working partnership with a Caribbean resident is necessary for off-island developers who opt to work with a design team from their home countries. Local designers not only know the ins and outs of local codes, customs, and procedures, but can offer insight into proven solutions for hurricane and seismic risks. Resort buildings must be "insurable" against such known risks, so architects must design to standards recognized and approved by insurance companies.

These are some of the major points that can direct decisions for any new construction project in the Caribbean. From a single villa to an expansive destination resort, projects of all scales can benefit from careful thinking, advance planning, and selecting the experienced team. P

Mark Williamson
Managing Director,
Caribbean

As seen in:
Building Design + Construction, May 2017, "Avoiding trouble in paradise: Tips on building successfully in the Caribbean"

Digital disruption or digital transformation?

Julian King
National Head of Retail,
United Kingdom

There is no doubt that technology is driving the way we work, play and live, but the changes taking place in the retail sector are happening so fast that many retailers are finding it hard to keep up. This article looks at how retailers can use technology in their design of space, customer experience, warehouse and stock control, build and refurbishment to maximise their offering, experience and ultimately sales.

AN INTEGRATED DIGITAL APPROACH & PERSONALISING THE CUSTOMER EXPERIENCE

Advances in technology have changed the landscape of our high streets forever and those retailers that have survived the demise of the UK high street have done so by realising that what customers want is not a single source solution of bricks and mortar, but an integrated omnichannel shopping experience.

Until recently the primary drivers of digital change in store have been customer payment improvements like the productivity enhancements of self-service checkouts. The next generation of this change is now on trial with forward thinking retailers with efficient mobile-pay apps likely do away with checkouts altogether in the not too distant future. However, the challenge as this transformation occurs will be to maintain customer contact and thus loyalty via strong underlying customer service principles.

In-store digital transformation rather than disruption is the order of the day for most bricks and mortar retailers with concentration on ensuring operations are slick, cost effective and customer friendly. A best in class example of this is the newly digitised McDonald's restaurant estate now driving increased sales volumes via new menu choices, order customisation, fresher "made for you" food, and table service. This brings together the best of digital and increases opportunities for quality customer contact whilst simplifying the customer journey and speeding up production to cater for those hours when the restaurant is at its busiest.

Mobile phone retailers and other such operators are developing their own versions of the technology enabled store with cleaner lines and a less cluttered look. A prime example is the recent flagship development by mobile phone provider, EE in Tottenham Court Road and O2's recent completions at Brent Cross and Westfield all located in London Gone are the extensive displays of product and sales collateral, now replaced by interactive screens to help personalise the customer's buying journey. Turning the traditional retail interaction on its head, retailers today are aiming to provide a bespoke solution for a customer's lifestyle – e.g. 'more data to download music, less minutes and texts and a larger handset, of course' – rather than offering a product to be shoehorned into their lives - 'we have three packages - which suits you better?'

With technology enabling less sales collateral and more information now online the impact in store is noticeable with a cleaner and clearer retail look and feel within the sales space. This change is in turn enabling selective products, and more importantly accessories or add-on purchases that have higher profit margins, to be displayed more prominently. A leading UK home electronics and accessories retailer we have worked closely in supporting their refurbishment programme, has recently announced a 15 percent uplift in sales in its new look stores that incorporate and showcase technology, bringing a sleeker and more streamlined look and feel for their customers.

It is not just about the look and feel of the store though. European retailers are fast adopters of tech and have been using it to deliver shelf edge prices based on supply and demand for a while already. Trials are already underway at one of the top four UK supermarkets to take this a step further with the latest shelf edge technology and linking new video device capability to aisle-based marketing campaigns.

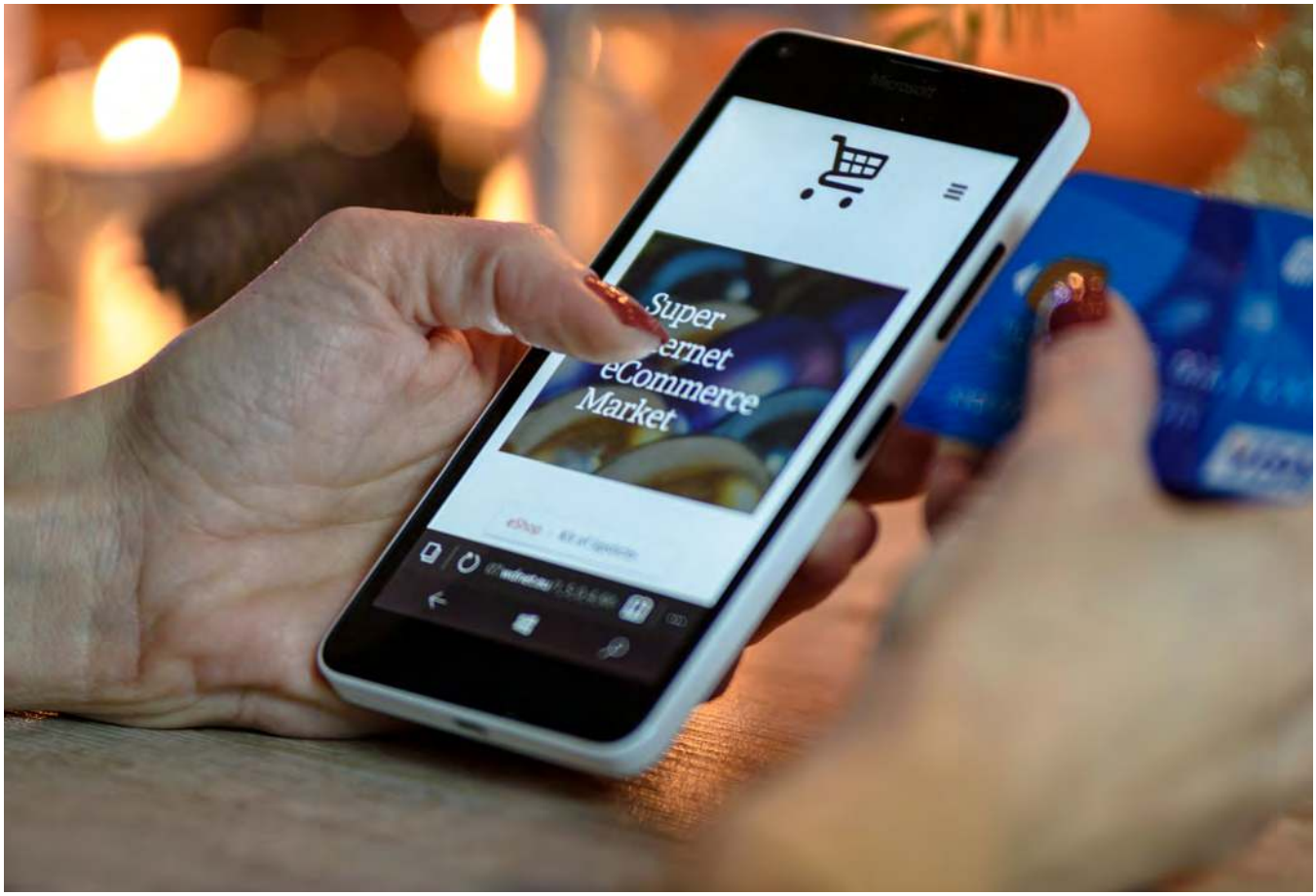
Introducing electronic pricing allows retailers to change the price according to the shelf life of the product, time of day and promotional calendars. Capability even exists to go one step further by broadcasting proximity information on Global System for Mobile Communications (GSM), Bluetooth or Wi-Fi to mobile phones to personalise prices and offers for individuals. An example message might be "As a loyalty customer, here's your special price on cheese and why not try combining with crackers and wine, at another special price just for you."

"At RLB, we have seen the first-hand use of applied learning and technology to manage build process and the contracting supply chain."

BEHIND THE SCENES: FROM BUILD AND REFURBS

It is not just in the customer-facing side of retail that tech is evolving. Technology is being integrated into the retail build process with 3D modelling used to plan, design and fulfil the space. However, technology is becoming increasingly beneficial in allowing retailers to more accurately cost and manage the build or refurb activity and help to bring projects in on time, and on budget.

Promoting service improvement and innovative thinking, the advent of mobile technology has provided an opportunity to replace paper-based reporting with a more efficient, streamlined process. At Rider Levett Bucknall (RLB), we have seen the first-hand use of applied learning and technology to manage build process and the contracting supply chain to ensure they meet their KPIs and that programmes remain on target. We have achieved this with the launch of 'RLB Field,' an app that enables data capture, live reporting and surveying directly from site, reducing extensive administration time and paperwork. Once captured, data is uploaded securely and allows the opportunity to sense check and QA the data before final reports are generated.



A key feature of the app is the ability for RLB to write bespoke forms and reports that can be tailored for each commission. Ongoing service improvement workshops enable updates and improvements to be made – a powerful example of which is at handover. RLB designed a set of standard procedures for data including record photographs and signatures to be captured at this stage – changing the way snagging/defects issues are dealt with and scored from a KPI perspective – and leading to immediate improvements in clear up rates and numbers of defects listed at handover. An instant feedback loop to the supply chain means contractors can (graphically) see their performance and ranking when compared to others, and enables RLB to monitor performance of key second tier or nominated suppliers on behalf of customers.

For instance, at Tesco, RLB has deployed the RLB Field app to support the capture of real time project data and building condition survey data. This has enabled a small programme office to receive and analyse both performance and risk data so Capital Expenditures (CAPEX) can be prioritised and targeted to achieve maximum value.

Feedback from RLB customers and their end users about RLB Field has been encouraging. Customers (and end users) have seen a marked improvement in the performance of their suppliers, who are also recognising the benefits of Field. Handovers are accurately recorded and certified - with no surprises – resulting in handing over projects often with zero defects. RLB Field is also helping RLB to deliver valuable insight using innovative data analysis – supporting the desire to be at the forefront of thought leadership and maintain a trusted advisor status.

Innovation continues through the development of RLB Focus - an interactive data visualisation tool that will complement RLB Field data outputs – through displaying visually engaging, joined up reports which can be accessed via desktop, mobile or tablet.

MAXIMISING EFFICIENCIES THROUGH STOCK MANAGEMENT

Centralisation of data, facilitated by technology has also made an enormous difference to the retailer's ability to manage stock, analyse supply and demand and undertake trend analysis. We are working with another high-street retailer to help categorise and centralise the components on their petrol station forecourt estate. So, at the touch of a button, they will know (e.g.) what sort of light bulb is used in the toilets in the Epsom petrol station and what material is used on the roof at their Dundee forecourt. This kind of data collection means that they can predict, and be equipped for the future, allowing them to buy smartly and save warehouse space on unnecessary maintenance parts.

In time stock rooms will become more digitally enhanced with robots set to take over stock distribution and replacing security guards and talk of depots using delivery drones literally in the cloud. So far RFID (Radio Frequency Identification) chips have been successfully implanted in palletised consignments, with sensors detecting their location and checking the quantity and positioning of stock, making deliveries and distribution more efficient and significantly increasing productivity.

Technology is here to stay and whether we are excited or enraged by it we need to embrace the benefits. Integrated effectively into the retail businesses and their spaces it can increase productivity, save waste, resources and cost. For the customer, it helps to keep costs low, it can personalise their experience making it more in line with their lifestyle and reduce the time and effort involved in having to peruse irrelevant products or services. The challenge is to choose wisely and invest in the right technology to ensure we keep up with what the customer expects and deploy the right technology to simplify rather than complicate the retail business. P

Julian King
National Head of Retail,
United Kingdom

As seen in:
Retail & Leisure International, December 2017/January 2018, "Digital Disruption or Digital Transformation?"

Defining sustainability
Now and for the future

Julian Anderson, FRICS
President, North America,
Global Board Chairman

As any student of history knows, the concept of sustainability is not new. It has been practiced in agriculture and forestry as far back as 6000 BC, when it was recognized that the success of future harvests was dependent upon crop rotation.

But what is sustainability relative to the man-made environment? The concept has come a long way since the early (and much criticized) Bruntland Report of 1987, which described "sustainable development" in the broadest terms, as being "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

Gradually, the definition of sustainability has been refined. More recently, the National Institute of Building Sciences developed the Whole Building Design Guide (WBDG) to help architects and owners create successful, high-performance buildings by applying an integrated design and team approach to the project during the planning and programming phases. While the WBDG acknowledges that the definition of sustainable design is constantly changing, it identifies six fundamental principles:

1. Optimize site potential
2. Optimize energy use
3. Protect and conserve water
4. Optimize building and material use
5. Enhance indoor environmental quality
6. Optimize operational and maintenance practices

Another government agency, the U.S. General Services Administration, has been pursing green initiatives since the 1970s, and has developed a more detailed, holistic approach to the subject. In its Sustainability Matters publication, it endorses strategies that aim to reduce the total life-cycle cost of ownership and enhance occupant well-being in addition to addressing the resource concerns articulated in the WBDG.

The drive toward sustainable design is a good thing for the environment and, therefore, for humanity as a whole. However, by focusing on the metrics most commonly used to evaluate sustainable design, it is possible to overlook other important, emerging factors which should be considered when developing a building. With the intent of crafting a future-oriented definition of sustainability that responds to and anticipates the needs of an ever-changing world, four of these are examined below.

PURPOSE, PROGRAM, AND PERMANENCY

The first aspect, and likely the most fundamental, is the purpose of the building. Most structures today are designed with a theoretical lifespan of between 40 and 50 years. But in the context of sustainability, what are the implications of this—and does it make any sense?

I would posit that if the purpose of a building is to house a single event, say perhaps a garden party, then an acceptable design for that one-time occasion might be a tent: reusable and relatively inexpensive to erect and take down, few would contest that is a both a suitable and sustainable solution. Extending that analogy to permanent structures, if the project in question is to be a national library or a capitol building, then it should be designed not with the typical life expectancy of 40-50 years, but with a significantly longer one, perhaps 100 or even 200 years.

In constructing a building to last 100 or 200 years, it may not be possible to achieve the level of LEED® sustainability—as conventionally measured by today's standards—that one would hope for. Nevertheless, it is quite arguable that creating a building that will last for two centuries is more sustainable than creating a building that lasts only 40 or 50 years because it more effectively uses natural resources; however, this reasoning relies on the building maintaining a sole, defined purpose for an extensive period of time.

CONSTRUCTION QUALITY CAN BE QUANTIFIED

Another missing dimension to the calculation of sustainability is the impact of quality. We know from our studies using RLB's Building Quality Assessment methodology that buildings which score high in quality attract higher occupancy rates and command higher rents than structures with lower quality scores. They also typically have better outcomes for the building's occupants.

Since quality derives partially from the aesthetics and functionality of the building, it therefore follows that functional flexibility of the space will also allow a building to have multiple tenants / uses over time (and therefore be more sustainable). Of course, there are some building types—baseball stadiums, for instance—which are difficult to repurpose owing to their very specialized nature.

THE EFFECT OF MAINTENANCE

The third missing component of sustainability that RLB has identified is the role of long-term maintenance—or, more accurately, lack thereof. Our building-life research confirms that the quality of maintenance is directly related to the longevity of a structure. Poor, substandard maintenance can substantially reduce the tenure of even LEED® Platinum construction. When a building is not properly maintained for the initial two-thirds of its life, the price of renewing that building with needed renovation almost always becomes cost-prohibitive; with the damage done, owners frequently resort to the more economically convenient strategy of replacement, which clearly runs counter to the philosophy of sustainability.

WDGB recommends that building operations and management teams emphasize ongoing training programs for facilities managers and maintenance staff in order to minimize critical system failures. If utility-monitoring equipment breaks down or is not functioning at optimal levels, it's impossible to benchmark a building's energy performance—a key gauge of sustainability.

THE FINANCIAL IMPACT OF SUSTAINABILITY

Finally, a well-recognized conundrum is that sustainability is difficult to monetize and, unless the value of an activity or product can be expressed in cash, it can be hard for businesses to evaluate its true worth.

If we look back to the GSA's guidelines, we can see they measure the financial impact of sustainability at two levels: reducing the total life-cycle ownership cost of facilities and improving energy efficiency, water conservation, and reducing material consumption. However, they do not capture more complex and nuanced elements of modern planning and design. These include increasingly meaningful factors such as worker productivity levels, achieving better 'outcomes' for building occupants, energy savings garnered when a building is constructed in close proximity to mass transport, and the measurable improvements in structural lifespan that arise from conscientious maintenance.

A solution would be to include a comprehensive rating of a corporation's "green-ness" as part of its annual report. One example of this is the Global Reporting Initiative (GRI). Designed to be universally applicable to organizations of all types, sectors, and sizes across the world, the GRI's G4 Guidelines require companies to disclose their most critical impacts—positive and negative—on the environment, society, and the economy. Based on this information, it is possible to generate reliable, relevant, and standardized data with which to assess opportunities and risks, and enable more informed decision-making both within the business and among its stakeholders.

In addition to GRI, there are other fiscally-focused sustainability indices, including the Dow Jones Sustainability Index. The general idea is that having measured the gamut of a corporation's sustainability practices (including the sustainability of its assets), one can attach that rating to the financial evaluation of the business. A good sustainability rating translates into a higher stock price than for an identical firm with a lower rating. Whether this is successful in the long-term remains to be seen. Nevertheless, as an incentive for responsible stewardship of the built environment, it is a compelling start to embed sustainability into corporate valuation. P

Julian Anderson, FRICS
President, North America
Global Board Chairman

As seen in:
Design Intelligence Quarterly, Q2 2017, "Defining Sustainability - Now and for the Future"

Fueling our industry through convergence

Matthew Harris
Managing Director,
NSW, Australia

To me, it doesn't seem that long ago that things in our sector, the built environment, were a lot simpler. Traditionally, projects were simpler, expectations more easily managed. Companies could grow organically to meet expanding needs and demands of clients. Competitive edge was established through specialist skills provision, sometimes down to the specific professional and their reputation. You knew who had the best façade specialists, the best tall building experts, the best sports planner, the best cost planners. Some even specialised in being good 'all-rounders' or 'specialist generalists'! However, today, globalisation and 24/7 markets are the playing field and you can no longer rely on the longevity and loyalty of your star recruits to form the basis of a company's reputation. Simple procurement, work and delivery packages no longer exist. Our clients, whether from the government or private sector, have changing preferences that are rapidly evolving. Industry convergence and disruption is occurring as a necessary way to respond to a now very dynamic and complex market.

We hear daily how industries are 'disrupted' through the displacing of established market-leading firms, products, and alliances. So, what is the concept of industry convergence? Well convergence is a term that can perhaps be best defined as the 'blurring' of boundaries between industries, induced by 'converging value propositions, technologies and markets', and has probably been best illustrated by the interactions between various industry settings, such as information and communication technologies – 'smartphones', biotech and pharmaceutical industry – 'biopharmaceuticals', nutrition and pharmaceutical industry – 'nutraceuticals', or energy and information technology – 'smart grids'.

So how will convergence affect the built environment?

It has been widely acknowledged that when sectors do converge, new, game-changing innovation is the result; creating opportunities for some, and threats for others. In the Built Environment sector, we live within a web of environments that are rapidly evolving and converging:

- the natural environment – life, land and water
- the built environment – infrastructure, buildings and technology
- the virtual environment – networks, communication, models and data

So for me, I think successful convergence in our sector relies on an agile response to market needs, through innovative partnerships that magnify the benefit of the solution. I also believe that due to the traditionally conservative nature of our industry, our convergence is witnessed more as a slow burn, with the occasional game-changer, rather than instant and radical innovation.

Take for example the government as a key client for our sector. They are not just relying on the private sector to build buildings or simple civil infrastructure anymore. They are entrusting our industry to deliver cities; smart, connected, vibrant and diverse places, where we can get around unhindered, and connect on a global scale.

As these projects become bigger and more complex, and as the risk profile increases, the complexity of delivery equally becomes more intricate. Our industry and companies are expanding, both in number and capability, bringing in-house the risk and returns, as well as Intellectual Property, and of course, any competitive advantage. It is no longer enough to be 'just' a quantity surveyor, project manager or even just a builder, to deliver on market and client expectations.

Two examples of where industry convergence is already occurring in the built environment include:

1. The Public Private Partnership (PPP) delivery model, it is a tried and tested form of convergence in our sector. The PPP model brings together, as a team, multiple capabilities and specialisations, all of whom are key players under a single umbrella. Financiers, lawyers, quantity surveyors, engineers, architects, planners, IT specialists, media, marketing, the list goes on. They are all working together to cross-pollinate their experience and deliver on a common project objective.
2. Urban regeneration projects are another example of the new frontier, and a key driver in our sector for convergence. The current thinking here is to provide a one-stop-shop model to help simplify the delivery of highly complex built form outcomes. Large urban renewal projects require us to think about integrated infrastructure, private and public realm connectivity, smart grids, sustainability, vibrancy, and density, bringing in experts and industries that specialise in these fields. They haven't necessarily shared the same client before, let alone had to work together to harmonise an integrated solution. Like the industry's approach to PPPs, the solution will be in innovative thinking and collaboration.

Beyond this, think of the 'mega-trends'; an ageing population, social media and technology, infrastructure, and sustainability. These trends underpin the business strategies for government and our private clients. They will all require a multidisciplinary approach, calling on innovation and collaboration.

Often when we talk about industry convergence, Mergers & Acquisitions activity springs to mind. However, while I believe it is a contributing factor, and it has certainly become short hand for rapid commercial growth in this convergence trend, it is not necessarily a driver for it.

While all hear about the headline mergers, and how this activity will not slow with long-term structural shifts in power and demographics, it is the full-service integrated model that is gaining popularity, particularly among multinational clients. They are looking at companies with an extended geographic reach, and the ability to deliver on complex and higher-risk projects.

"Successful convergence in our sector relies on an agile response to market needs, through innovative partnerships that magnify the benefit of the solution."

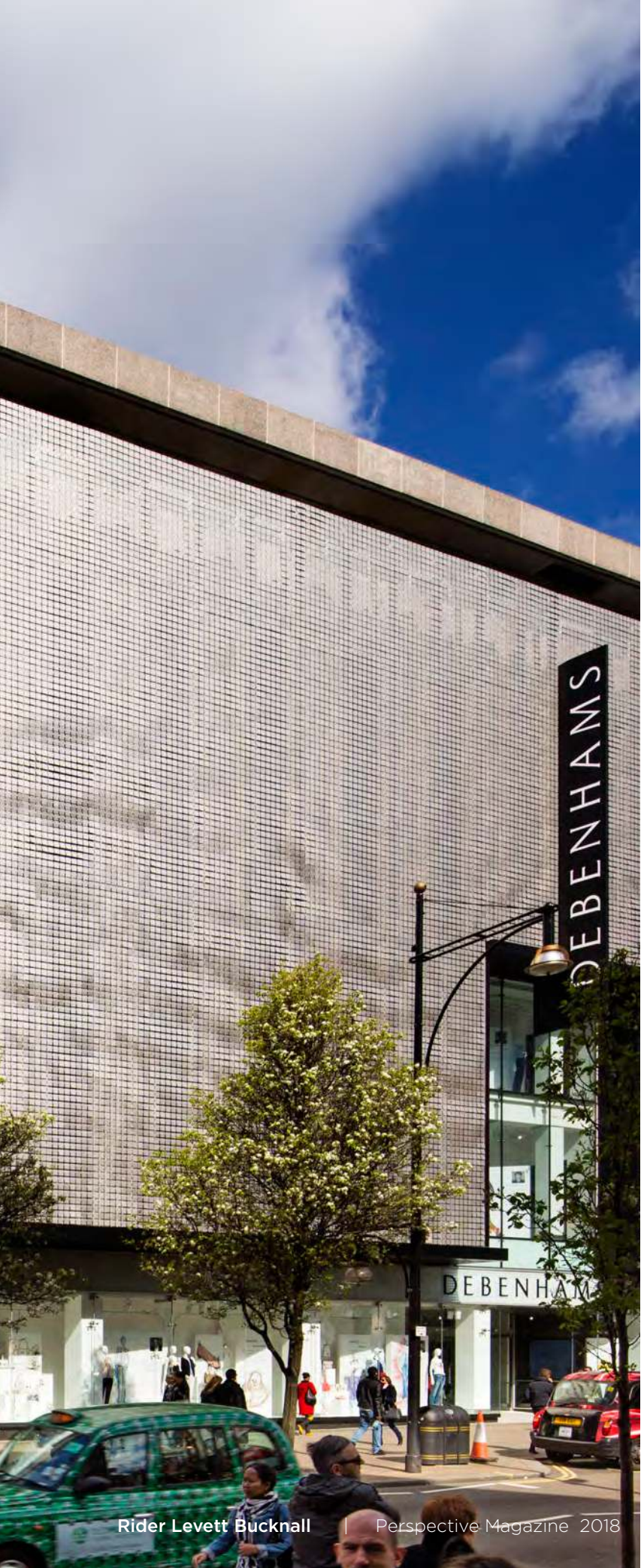
It is perhaps some of the associated industry convergence activity that is yet to occur that will be the most surprising, challenging and innovative. We may see companies such as Apple Inc. buy into our sector, converging virtual and physical connectivity, BIM and 3D printing, transforming hard, grey infrastructure and once hidden building services into the 'must have' items in any thriving urban renewal project.

Industry convergence will indeed bring new opportunity and exciting innovation to our sector. It is a concept that will challenge some of our traditional pillars, but should in turn reward our industry's collaborative spirit and pioneering heart. P

Matthew Harris
Managing Director, NSW, Australia

As seen in:
Australian Engineering Magazine, March 2016, "Our Industry and Beyond". *Article has been updated since initial publication.*

The road ahead



Trends in the retail property market for 2018

Julian King
National Head of Retail,
United Kingdom

It's been a rough ride for those working in the retail built environment over the last few years with the second quarter of 2017 seeing the number of shop openings across Britain fall by 84 percent compared to the same period in 2016. However, where one store door closes another opens with the significant trend of openings in retail distribution as online disrupters and traditional retailers concentrate on their growth plans.

The following retail trends are anticipated in the year ahead:

1. RIGHT SIZING

All major chains will accelerate rightsizing. Others will trial new formats and new locations to address their online demands. Small format stores (up to 22 percent smaller), agile, multi-functional spaces and last mile concentration are key to any expansion plans.

2. ONLINE TO PHYSICAL

Online retailers, burdened by the cost of the average 30 percent returns rate and unable to break though the need for show-case space, will continue to test the water with an actual store presence. We have already seen Missguided, Amazon, Boden & Simply Be taking a limited number of regionally located outlets in the UK to counter this demand. We have yet to see how Amazon will leverage their acquisition of Whole Foods but with their Amazon Go convenience concept launched at the end of January 2018 it may point the way to a much more advanced in-store solution to conquer the time wasted queueing in old fashioned checkout based stores. It's a new store in which you arrive, scan your phone, and cameras and Radio-Frequency Identification (RFID) chips around the store track the items you pick up. Gone is the pesky checkout, you are just logged in and out through glass barriers much like those at airport security. You simply walk out when you're done and everything is charged directly to your Amazon account. This could present a new threat to the established grocery retailers.

3. EXPERIENTIAL RETAIL

Physical retail isn't dead; lacklustre retail is. Following record closures in 2017 we forget that there were many openings too. Unremarkable retail and highly deliverable products have already gone online, yet by this time next year circa five out of six purchases will still be done in a physical store location. Commodity buying is a chore and is typically focused on seeking out the lowest price and maximum convenience, this is where online retailers have made the greatest inroads. Shopping has evolved, it is a social activity and the role of physical stores and customer service is essential. Brands that invest in experience and driving footfall in new experimental ways will continue to prosper.

4. HEALTHY RETAIL

Landlords and developers will see growing value in developing scheme designs to an environmental, health and wellness remit. Far from a trend, it is fast becoming a prerequisite in new developments and refits, driven by higher expectations from customers. The market has seen huge "lettability" advantages for landlords, with retail tenants seeing up to a threefold increase in sales in schemes focused on an environmental, health and wellness remit.

5. WALKABLE RETAIL FOR FUTURE GROWTH

Continuing the theme of healthy retail, studies have found that Millennials are moving to metropolitan areas at high rates. Demographic shifts attributed to the "Coming of Age" of Millennials – a large proportion of the population – are driving this trend. Developing walkable retail areas appeal not only to this generation, but to older generations looking to move to vibrant communities. Walkable retail environments will drive large economic returns.

6. MARKET CONSOLIDATION

In many aspects of today's retail world, scale is more important than ever and this will continue to drive well suited mergers and acquisitions, particularly where systems or technology create capacity for accelerated growth. In some sub-sectors there is still capacity to come out of the market. The department store space is a prime example. Funds and well capitalised companies will make acquisitions where they feel a turnaround is possible.

"Just like the spaces we create, we need to remain agile and responsive by continuing to innovate within our own services using digital ways of working and helping us to concentrate on the core information that drives better decisions and better management"

7. TECHNOLOGY

Retailers have always been at the forefront in the drive to be efficient and provide the right technology solutions where it matters. The journey towards increased productivity will continue as retailers continue to downsize their management teams further this year. At Rider Levett Bucknall in the UK we have been at the forefront of helping our retail customer base make a significant difference to the productivity of travelling management teams. We are seeing an increasing trend in the investment in digitisation, mobile data collection and analysis tools, helping to bring a more data driven approach to decision making in the property functions. Using our RLB Field app and RLB Focus analysis tool we have helped our customers make significant progress in the speed, accuracy and productivity of their teams and we are expecting this to be a continuing development.

8. PAYMENT PRODUCTIVITY

Until recently the primary drivers of digital change in store have been significant staff productivity enhancements like kiosks and self-service checkouts. Forward thinking retailers are now trialling the next generation of this change with mobile payment apps that are likely do away with checkouts in the not too distant future. We can all see it coming, the race is on for the first checkout-less supermarket. The challenge will be to maintain customer contact and thus loyalty via strong underlying customer service principles.

9. DATA DRIVEN DECISIONS

Retailers are taking full advantage of the plethora of data now available to them and will continue to develop ways of using this data to help make the crucial retail property decisions when identifying new locations, analysing existing performance, and tracking the status of their competitors. These are still core skills, but new tools and richer sources of data will provide grounding for better and well analysed decisions.

10. THE LAST MILE

Retail distribution has been the unsung hero of the property world in 2017 and is set to continue into 2018 and beyond as the big operators tweak their operating models and close in on their last mile services. This way they can close the loop and create the holy grail of end to end online shopping and returns services. Amazon trialled this in the US with “Wardrobe”, but for this to be truly possible the last mile needs to be conquered.

CONCLUSION

So what does all this mean for those of us who work in the built environment? Just like the spaces we create, we need to remain agile and responsive by continuing to innovate within our own services using digital ways of working and helping us to concentrate on the core information that drives better decisions and better management – that way we can truly deliver “more with less” and continue to help retailers’ compelling and exciting retail propositions. P

Julian King
National Head of Retail,
United Kingdom

Modern work space trends

A shift in organizational strategies

Scott Walker
Fitout Executive,
Sydney, Australia

With the ideal Central Business District (CBD) office space becoming increasingly difficult to find and more expensive to rent, organisations are looking for a way to reduce costs whilst still being able to provide a city centre location. The Property Council of Australia reports that in 2017 the vacancy rate of office space in Sydney CBD reduced from 6.2 percent to 5.9 percent over the six months to July and the future supply of office space in the next 18 months is projected to be well below historical averages. This has led to an increase in rents across asset types and a reduction in incentives made available to organisations as part of their lease agreements.

This is leading organisations to increasingly move away from the more traditional forms of office layout and look towards a more collaborative working environment where layouts can be better utilised.

Key market indicators, Sydney CBD (aggregate)[1]

Grade	Vacancy, Jul 17 (%)	Vacancy, Jan 17 (%17)	Net absorption, 66 months to Jul 17 (sq/m)	Net absorption, 12 months to Jul 17 (sq m)
Premium	9.5	12.5	35,930	82,573
A	3.6	4.1	66,313	69,267
B	5.8	4.0	-48,084	-101,466
C	6.9	6.6	-28,807	-56,594
D	3.8	2.9	-3,136	-1,507
Total	5.9	6.2	22,216	-7,727

This has resulted in change in the way organisations consider workspace strategy, from the traditional open plan office model to an activity based / agile working model that has been evolving over the last 10 years and is now fast becoming the norm.

WHAT IS ACTIVITY BASED WORKING?

Activity Based Working (ABW) is a workspace strategy that provides organisations with a choice of locations for workspace activities rather than providing locations for individuals to undertake all their work. ABW enables employees to physically locate themselves where it is most suitable for them to complete their work. Workspaces are designed to create areas where focused work can be completed but also incorporates spaces where meetings can take place and be flexible depending on the task being undertaken. This strategy affords organisations flexibility in their accommodation strategy and allows for contraction and expansion in demand and headcount over time.

An Agile Working model expands from the ABW model, whilst still providing the same creative spaces and workspace flexibility, it focuses on a team's needs rather than the individual's. It is much more focused on providing spaces for specific tasks and projects and bringing people together in collaborative working environment.

There are many benefits to organisations choosing to adopt these strategies including increased employee satisfaction, higher productivity, reduction in employee turnover and, with increasing rental costs, a more efficient utilisation of office space.

[1]Property Countcil of Australia. "Sydney CBD vacancy rate drops." Sydney CBD vacancy rate drops, The Property Council of Australia, 3 Aug. 2017, www.propertycouncil.com.au/Web/Content/Media_Release/NSW/2017/OMR_SydneyCBD_Aug.aspx.

"In the changing workspace landscape, where more emphasis is put on employee satisfaction and space utilisation, it is essential that organisations evolve from more traditional forms of office layout to a more collaborative workspace strategy."

THE ASSOCIATED ORGANISATIONAL BENEFITS

Empirical costs are difficult to associate with the many benefits to organisations embracing an agile working strategy, however, the utilisation of office space is one of the main benefits that can have a direct correlation to an organisation's costs. ABW and Agile Working can allow organisations to save money through space utilisation by potentially reducing the Nett Lettable Area (NLA) of office space. Organisations can analyse their workspace requirements and only provide the number of workspaces necessary to cover the maximum capacity of employees using the office space at any one time. An example of this would be an organisation with a total of 100 employees but where a maximum of 80 employees are present in the office at any one time. An organisation can utilise this by only providing workspaces required for 80 employees, therefore reducing the NLA of office space required and all associated rental and ongoing occupancy costs.

It should be noted that there is no one size fits all when it comes to space utilisation. How an organisation utilises office space is driven by the activities of that organisation. For example, a financial organisation is more likely to utilise an agile strategy based on their ability to complete tasks using modern mobile technologies, whereas a law firm, because of the requirement of privacy in their tasks, would typically require a higher ratio of individual offices.

The measurement of workspace density is a metric commonly used for assessing how efficient organisations are at utilising their space. This is measured by calculating the NLA of a lease, deducting any support spaces and dividing this by the number of workspaces. The best organisations can achieve a density rating of 12m2 per workspace.

COST CONSIDERATIONS

With agile workspaces becoming more the norm, the additional cost of utilising these strategies has reduced. However, there can still be additional costs associated in its adoption. Where there are savings associated with the reduction of individual offices areas (reduced partitioning and associated engineering services modifications), these are offset by increased costs in providing additional workstations to workspaces and specialist furniture to collaboration areas. The implementation of flexible workspaces has also seen the increased provision of sit-to stand workstations which can lead to an increase of each workstation cost by up to 60 percent. Overall, it would be reasonable to estimate that an adoption of a flexible workspace model can increase the cost of a typical office fitout by as much as 10 percent per m2 over a more traditional model. However, organisations should consider any additional capital costs holistically against the benefits, as previously outlined, of adopting a flexible strategy. It should be noted that any additional costs are also dependent on the quality of fitout implemented by an organisation.

Adopting flexible working strategies has also changed the way a budget for a new office fitout can be calculated. Whereas previously a square metre rate benchmark range of AUD$1,200 - AUD$1,600/m2 would commonly be used, more organisations are using the benchmark of a cost per person. This allows an organisation to estimate the cost of a fitout without the requirement of knowing the actual area of office space available. This metric is of particular use in the early stages of planning where only the number of employees an organisation requires to accommodate is known. Typically, an allowance of a cost per person for an Agile Working office space located in Sydney CBD with a workspace density of 12 m2 per person, is between AUD$15,000 to AUD$20,000 per person.

THE EVOLUTION OF THE WORKSPACE

Workspaces are evolving from the more traditional form of office layout model to a more collaborative working environment, which can result in many benefits for an organisation. How successful organisations are at implementing these new strategies can have a major impact on employee satisfaction, productivity and turnover, as well as ongoing organisational occupancy costs. In the changing workspace landscape, where more emphasis is put on employee satisfaction and space utilisation, it is essential that organisations evolve from more traditional forms of office layout to a more collaborative workspace strategy. P

Scott Walker
Fitout Executive,
NSW, Australia

A better tomorrow through flawless execution today

The striking and innovative Louvre Abu Dhabi building was designed by Pritzker Prize-winning architect, Jean Nouvel. Combining modern architecture with inspiration drawn from the region's traditions, the design reflects the desire to create a universal museum in which all cultures are brought together. Two thirds of the museum is covered by a white dome, 180 metres wide in diameter, which is an emblematic feature of Arabian architecture.

RLB is providing cost consultancy services on the Louvre Abu Dhabi, which will display works of historical, cultural and sociological significance, and from ancient times to the contemporary era, and will encompass 9,200 square metres of art galleries.

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The professional quantity surveyor's role in collaborative BIM

Tom Chatterton
Senior Quantity Surveyor,
New Zealand

By now we are all aware of what BIM is, but not everyone knows what it takes to achieve a successful BIM project.

Building information modelling (BIM) is a process, and at the heart of the process is collaboration between its stakeholders. This includes the client and design team members such as the architect, the structural and service engineer, the contractor, and the quantity surveyor (QS). We often witness the architect and the various engineers of a project collaborating in a single live model to increase efficiency by reducing clashes, accumulating information, and reducing time and cost taken with the overall design. The QS then receives the model once completed. With collaboration at the heart of BIM, it is critical for the project to include quantity surveyors in the collaboration period.

The deficiency of early collaboration can be accentuated when full versions of BIM models are not provided to quantity surveyors and contractors. Many times, limited versions of the models are given to contractors and quantity surveyors for 'information only', often citing intellectual property.

This happens for a multitude of reasons; however, it is primarily due to considerations of potential liability of the designer, based on what the model may be used for at different stages. While a valid concern, this opposes the concept of BIM – sharing information as effectively and efficiently as possible.

MODEL QUALITY

The ease of releasing the model will be determined by when the QS becomes involved with the BIM process, the project, and whether the BIM requirements were communicated clearly.

However, particularly in the earlier stages of design, often we see that the model the QS receives, from which they extract quantities, can vary greatly in quality. This quality has many driving factors such as unfamiliarity of how a QS takes off quantities and their involvement in the BIM process; poor communication from the QS about their requirements due to their misunderstanding of how the design team is pulling together the BIM model; or late engagement of the QS by the client.

For the QS, BIM can assist in making greater efficiencies with cost estimation, time projections, materials analysis and supply, and post-contract contractor liaison. It also facilitates the process of making changes in design or layout for efficiencies for value engineering, and therefore helps the QS convey these efficiency changes to the project owners.

Early collaboration enables the QS to carry out their role more effectively and efficiently by increasing productivity and ensuring a more thorough approach to individual projects. It saves the QS time in carrying out their daily tasks, creating more time to add value to the project in areas such as advisory roles in areas such as procurement, building materials and offsite construction measures.

OVERCOMING THE CHALLENGES

So, working as a collaborative team, how do we combat these issues?

If it is known to be a BIM project, then engaging the QS from the outset is essential. It will enable the design team and the QS to effectively communicate from the beginning.

By having the appropriate QS on board early, it can allow them to advise on the financial viability of the project adopting BIM. Financial viability is an ongoing issue for BIM as clients are often worried that it has not yet been tested and proven. By having BIM-competent cost consultants on board early to advise of the efficiencies and the value added by having it implemented, it will undoubtedly aid in the uptake of BIM.

Secondly, the QS needs to communicate with the design team in the appropriate manner. At Rider Levett Bucknall (RLB), we have a set of standard protocols and templates which include documents such as a BEP (BIM execution plan). Issued at the outset of the project, the BEP sets out, in a general sense, the requirements needed for efficient take-off, how the objects ideally need to be described, how they are presented, and what form of measurement is needed within the metadata to take off quantities quickly and efficiently.

This may not be possible in all circumstances, and a level of flexibility is required by all parties to come to an agreement. Having those same parties sign up to the model's agreed requirements is a good start to the process. This is only achieved if all parties are on board and communicating at the earliest opportunity.

Lastly, design team members could involve and communicate with the QS and the contractors throughout the process, extending that collaborative approach to the rest of the team allows the efficiencies that BIM promises. BIM requires good planning right from the outset – this means all members of the design team in agreement and understanding with every other member of the team. The team members will have to buy into the collaborative approach, as well as have a clear understanding of the QS's role in collaborative BIM, regarding the limitations of the model at the various stages of design.

LAGGING BEHIND

Although the terms 6D and 7D BIM are used when describing BIM's capabilities, 5D BIM is currently the global standard for a BIM project. 5D BIM is the extension of the 3D model with time (4D) and cost (5D) incorporated.

The QS profession in New Zealand is arguably lagging, in comparison with other design team members, when it comes to their BIM adoption and maturity.

In an effort to upskill the industry in BIM and provide a standard that quantity surveyors should be working towards, the New Zealand Institute of Quantity Surveyors (NZIQS) BIM committee (made up of consultants, contractors, academics and software experts) is producing a BIM best-practice guide for quantity surveyors, which will complement the New Zealand BIM Handbook.

This in turn will help BIM projects in New Zealand and their design teams to understand the importance of the whole team collaborating and working together for the common goal.

RLB has used its global experience to learn and develop its collaborative approach during BIM projects. We have determined that to have a successful BIM project, the design team and QS need to work together, without barriers, whilst having robust yet flexible protocols, outlining their requirements from engagement. This criterion combined, can generate a project that produces an efficient and effective project for all stakeholders. P

Tom Chatterton
Senior Quantity Surveyor,
New Zealand

More than meets the eye: The hidden costs of stadium and arena renovation

Peter Knowles, FRICS
Executive Vice President, North America

To keep up with the ever-increasing pressure to upgrade existing sports and events facilities to improve fan experience and maximize revenues, owners and operators of tired buildings are faced with what can be a daunting choice of which action to take: determining whether renovation is the responsible choice to make or designing and building a new facility from the ground up.

Of course, the sources and availability of financing play an important part in the final decision. But before proposing a municipal bond offering, new sales tax, or starting a search for private donors, it is prudent to study—to a fair degree of granularity—the costs associated with either option. Intuitively, one would support the argument that the renovation of an existing facility will cost less than building anew. But in reality, is this always the case?

Overhauling an existing sporting or event venue to provide a state-of-the-art experience for spectators can encompass a multitude of options, ranging in scope from minor fixes to major renovation work. Among the latter, the list is very likely to include program-related changes such as demolishing parts of the seating bowl to allow for the construction of higher-value areas (including clubs and suites), the installation of space-efficient escalators in place of miles of pedestrian ramps, roofing over open-air sections of a stadium, expanding parking facilities, upgrading concession stands to provide both greater variety and higher quality of food and beverage service, and improving the general experience within the public spaces.

In addition, no renovation of even a relatively modern arena or stadium would be complete without the requisite replacement of audio/visual systems, including scoreboards, high-definition video screens, and internet and WiFi connectivity, all critical components of providing the audience with a total immersion in the event. With careful study, it is possible to accurately estimate the probable cost of such a significant upgrade to an existing facility; and by using benchmark costs from new construction, a comparison can be made which, again, would lead stakeholders to think that renovation is the correct path to pursue.

Unfortunately, this conclusion is often based on misleading or incomplete information.

REALITY CHECK

In the excitement of being presented with renderings and plans for revenue-bolstering private club areas, cushy new luxury suites, and advanced A/V technologies that would make George Lucas envious, one thing is frequently overlooked by facility owners: an honest appraisal of the intrinsic quality of the venue itself. At Rider Levett Bucknall, we encourage our clients to reevaluate their assumptions and look at the project from a number of perspectives to get a true and comprehensive understanding of the proposal before committing to any plan.

All building components, whether it be the structure—typically, concrete or steel—or the various mechanical systems (such as HVAC and MEP) have a finite useful life. With regard to mechanical and electrical equipment, this may be as short as fifteen years. In a renovation scenario, the costs associated with addressing deficiencies in these basic building-wide systems can be enormous. This condition can be exacerbated if the structure has suffered from a poorly implemented maintenance program.

Relatedly, the age of a facility can impact the cost of renovations. In 2014, both the Pittsburgh Steelers and the Green Bay Packers embarked on a similar program of upgrades to their stadia, with the scope of work encompassing WiFi installation, new scoreboards, and concession stand improvements. The tab for the work on the Steelers' 2001 arena came to $38M; by comparison, the Packers' 1957 venue cost $166M to renovate.

In some instances, the problem presented by a dated structure is compounded by its historic status. Yankee Stadium, Chicago's Soldier Field and Wrigley Field, the Olympic Stadium in Berlin—renovating these fabled athletic landmarks was complicated by the need to preserve their iconic identity while modernizing the facility.

NOT AN OPTION: CODE COMPLIANCE

In addition to their failure to recognize the big-picture issues (which are often not considered with proposed program improvements) there is a second issue waiting to spring on the unsuspecting venue owner: rectifying deficiencies in code compliance. It is very likely that a significant renovation project will trigger the need for the building to be in step with the latest codes and standards.

Of prime concern are life-safety requirements. Since stadiums are often used year-round for events other than sports, their fuel loads can differ between game-days and non-game-days. As fire protection—both structural applications and alarm-, sprinkler-, and smoke control/evacuation- systems—is typically calculated on the building's primary use as an athletic venue, owners contemplating renovation work should be aware that the initial fire-safety engineering recommendations may not be sufficient for all the arena's uses.

Sustainability is another factor that can impact the construction budget, and has implications for both the short- and long-term life of a stadium. Respecting environmental standards may or may not be mandated, although there are obvious and significant benefits to including them in a project. In a renovation, the opportunities to better a building's performance are numerous; for lighting alone, options include using energy-efficient LED lamps to installing solar panels to incorporating passive shading devices in the design. Low-flow plumbing fixtures and fittings cut wasteful water usage, as can a strategy for stormwater conservation. At Arena Amazonia in Manaus, Brazil, rainwater was collected and reused to service restrooms and irrigate the field throughout the duration of the 2014 FIFA World Cup Brazil tournament.

Renovating to maintain compliance with these types of clearly-defined building codes may be easier than it is to achieve a set of general standards, such as those contained in the Americans With Disabilities Act (ADA). ADA requirements are not a building code, nor are they enforced like one; they are design and construction requirements which are issued under a civil rights law. Building departments are not required or authorized by the ADA to enforce the ADA Standards (some building departments even include a disclaimer on their plan checks indicating that ADA compliance is not part of their approval process).

Among the ADA features stadium owners need to assess in their construction plans are restroom accessibility and fixture count; general circulation and egress issues, such as the width of stairways, number of elevators, etc.; and dispersed seating in all areas of the stadium (including skyboxes and specialty areas), with unobstructed sightlines to the field of play.

After taking a closer look at the conditions of a facilities' structural and mechanical systems, what started out as a seemingly rational assumption—that renovating an old sports stadium will cost less than building a new one—is revealed to be not such an easy assessment after all. If owners have the benefit of an accurate and detailed survey of the existing structure and fully understand the improvements dictated by its condition, then it's possible to maximize their investment dollars and make the smart decision for enhancing both the fan experience and the revenue of their facility. P

Peter Knowles, FRICS
Executive Vice President, North America

As seen in:
Stadia Magazine, December 2017, "The Hidden Costs of Stadium and Arena Renovation"

"What started out as a seemingly rational assumption — that renovating an old sports stadium will cost less than building a new one — is revealed to be not such an easy assessment after all."

Following the money: Project payment certification

John T. Jozwick, Esq.
Executive Vice President, North America

Regardless of whether a construction project involves millions of dollars and dozens of subs and consultants or has a modest budget and scope, keeping track of progress and payments is a critical, ongoing process. Owners, who have multiple contractual obligations, have a particularly large stake in the process.

Construction contracts typically call for the project owner to make periodic progress payments to the general contractor and architect. There is no single method of calculating progress payments, but the most common formula is the percentage of completion applied to the total contract price, less a retainage which is held by the owner until final acceptance of the project. On simpler jobs, payments are frequently tied to milestones in the work.

"CERTIFIED" — THE WORD CARRIES WEIGHT

In wide use for 25 years, the American Institute of Architects' Application and Certificate for Payment form G702-1992 (and its accompanying Continuation Sheet G703-1992) serves as both the contractor's application for payment and the architect's certification of that request. Submitted to the project owner, the forms require the contractor to show the status of the contract sum to date, including the total dollar amount of the work completed and stored to date, the amount of retainage (if any), the total of previous payments, a summary of change orders, and the amount of the payment currently requested.

Its use can expedite payment and reduce the possibility of error. If the application is properly completed and acceptable to the architect, the architect's signature certifies to the owner that a payment in the amount indicated is due to the contractor.

The G702-1992 contains language that significantly impacts everyone who works with it.

A close reading of the document spells out what an owner can expect from the architect when signing off on a progress payment:

> In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the amount certified.

It's important to note that this is not a blank-check authorization, either literally or figuratively. The form allows the architect to certify a dollar amount that is different than the amount applied for by the contractor, with an explanation provided by the architect. The primary purpose of this certification is for the architect to confirm that the contractor has not billed the owner for more work than actually has been performed.

The language for contractors in the G702-1992 is similar, with three points that require certification (and subsequent notarization):

> The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received form the Owner, and that current payment shown herein is now due.

TRUTH OR CONSEQUENCES: THE IMPACT OF FALSE CERTIFICATION

Filing a false or inaccurate G702-1992 has repercussions for all parties. As far as architects are concerned, an erroneous certification can expose them to a claim of negligence. Contractors put themselves at risk of fraud and misrepresentation if the certification is not truthful.

From the owner's perspective, there are several reasons for concern. Considering that an owner's exposure to liens by subcontractors is significant when contractors delay or fail to pay their subcontractors, the certification language of the G702-1992 has been developed to warrant that the contractor has paid its subcontractors.

An owner wants to ensure that funds are available throughout the duration of the project. Overpaying at the start of work, or over the course of a job through inflated progress claims by the contractor, creates a possibility that finances will be exhausted before the work is completed. This situation may arise when contractors overstate the percentage of progress for the work (or any line item on the schedule of values), or when contractors overly front-load the schedule of values in order to receive additional funds at the start of the project under the guise of working capital.

Challenging a progress payment, while at times necessary, often has the unwanted side effect of delaying construction. Delays in and of themselves can trigger lawsuits, subject the project to price increases in materials, and of course put the scheduled opening date of a project in jeopardy.

PROTECTION FOR OWNERS

At Rider Levett Bucknall, we've identified several sound principles that can help owners bring projects in on time and on budget. Fundamental yet effective, they apply to projects of any scale.

Watch your (contract) language

A proactive step that can benefit all parties, a well-written contract is essential. Terms and conditions must be clear and unambiguous. Because the manner in which progress payments are calculated or structured is a matter of contractual consent, a sloppily written contract can lead to miscommunication and misunderstandings—problems that could land an owner in court. Troubleshooting the language regarding progress payments before signing a contract can help avoid such situations.

Call in the pros

Acting as the owner's representative, construction management professionals are charged with controlling a project's schedule, cost, scope, and quality from inception to completion. A skilled, experienced project management team can keep the job on track, and, just as importantly, give the owner leverage over any disputes that might arise. (But finding such help may be increasingly challenging: a recent industry survey found that 45 percent of owners report that a lack of qualified project managers is impeding progress on their projects.)

Ensure accountability

Owners can reject requests for payment because of incorrect completion percentages, incorrect math, or applications that are submitted late. In order to achieve profitable progress billing revenue recognition, effective processing is important. Owners (or their authorized representatives) should be sure to review vendor invoices and percentage completions with field supervisors to avoid over- or under-billing. Also, while it may sound elementary, be certain to double-check calculations—an errant decimal point can make a big difference.

Stick to the plan

A study published by the Associated Schools of Construction in 2017 points out that the role of the owner was significant as a top factor in causing construction project delays, and change orders were identified as the primary cause. While some COs are to be expected in the course of any project, taking extra care in the design phase can help minimize the disruption they cause.

PAY THE BILLS, NOT THE PIPER

In the end, properly certified progress payments give owners control not just of the financial aspects of a project, but its overall successful completion. Instituting a transparent, verifiable process can help ensure that all parties are free to focus on delivering their best work with security and confidence. P

John Jozwick, Esq.
Executive Vice President, North America

As seen in:
Building Design + Construction, September 2017, "Following the Money: G702 Progress Payment Certifications"

Confidence today inspire tomorrow

This collaborative effort between the Arctic Slope Native Association and the Indian Health Service involved replacing an existing 30,000 square-foot, wood-constructed hospital with a new 100,000 square-foot, modern critical care facility, to provide the villages of the North Slope of Alaska with the most advanced healthcare services.

RLB's role began with a market analysis of potential construction scheduling, logistical, and cost challenges associated with building this type of facility in such remote, harsh conditions. We then provided cost consultancy services to the architecture team during design. RLB was subsequently hired to provide owner's representative and project management services throughout construction, FF&E installation, commissioning, and project close-out.

RLB.com

RLB Rider Levett Bucknall

Planning for health

Future healthcare trends and using the project process to affect health outcomes

Conor Ellis
National Head of Healthcare,
United Kingdom

Rider Levett Bucknall works on healthcare projects globally and is currently working on over 60 projects in the UK each year. Aligning our international experience gives us the opportunity to consider the key demand drivers of the sector, which in turn provides the lessons learned on improving project and health outcomes in the industry. The health industry has similar themes worldwide:

- Demographic and population increases
- Chronic disease management and lifestyle illnesses
- Technological and big data applications
- Government requirement for lower operating costs of the system -"more for less agenda "
- Pharmacology and continuous clinical change
- Increasingly larger health organisations integrating via Accountable Care Principles
- Regulation via Accreditation regimes

Projects have to look at balancing the needs of these major trends. When health organisations look at new projects, they tend to focus on the difficulties at activity forecasting, building design and construction and fail to note that many adverse outcomes occur at the project commencement.

STRUCTURING A PROJECT

All projects should start with a Project Initiation Document that makes clear the purpose, scope and deliverables so communication and deliverables are understood by all. It should cover:

- The project objectives and benefits
- What roles each of the health organisation and its advisors will play
- The outputs and links to dynamic situations – IT, authorisation deadlines, commissioning
- Clear timescales that show how the project reaches completion
- Project risks and ameliorating measures
- Meeting health organisation standards (accreditation, government and insurers).

On a recent project, we identified seven objectives covering roughly 25 key criteria.

Project objectives & investment criteria
Improve safety, the Clinical Environment & facility ascetics
Deliver policy guidance and sustainable facilities meeting future demand and regulation standards
Improve access and provide community benefit
Deliver operational efficiency
Maximise the use of the Estate and reduce revenue
Aid staff retention, recruitment and wellbeing
Meet the deadlines for service commencement/continuation

This makes it easier for health organisations to structure thinking and to each we applied weights between 5-10 percent for timescale to 26 percent for the highest weighting for improving clinical environment and safety. This allows options to be apprised more scientifically and projects delivered in line with the perceived programme benefits.

SUSTAINABILITY IMPLICATIONS

In the past, health projects looked at the building fabric and lifecycle. Now it is about achieving a sustainable system improving clinical quality and increasingly the manner in that the health system can deliver operational services. It is far too easy to value engineer a building to a financial number but fail to consider the costs of use, availability of future medical staff and disruption. All too often a building opens but is outdated within a decade – or worse still underused.

DELIVERING AN INTEGRATED FLEXIBLE HEALTH STRUCTURE

Evaluation toolkits are often very country specific. All share common aims but most need a long-term view created by BIM sophisticated modelling that combines evaluation of buildings and operational processes together. Health globally, like all industries, has been pushing sustainability - with reduced energy consumption by new technologies, better operation and increasing renewables. With a focus already agreed of looking at revenue and in use costs of premises, health organisations have to look at total asset performance over its lifetime.

BETTER AND LEANER PROCESSES

With staffing costing between 60-70 percent of costs in healthcare, ensuring organisations achieve at least current mean performance going forward is necessary by benchmarking clinical activity to reduce staffing and process variability. We often use stimulation modelling and patient flow models to look at improvements to care pathway trajectory to help focus on the future clinical model. Technology is often given scant consideration in the healthcare sector especially compared to the automotive, retail, aviation and banking sectors where a revolutionary process of change has happened since the 1980s. In health we have witnessed a growth of day processes and lower hospital stay times but is broadly a fairly similar system - and evolutionary in outcome to that of 30 years ago. Still it is predominantly working hours focused and classically driven by a series of singular linear appointments. Some of this is down to finance and manpower, but some to a system and personal proving intransigent plus a failure to simplify the multilayer clinical professional model that looks at individuals as a series of parts/systems.

Consumers all expect smart thinking. Today's population is used to connecting instantly with applications via the Internet, with smartphone health applications now representing a top three global growth phone trend of 1.7 billion users from pregnancy, diet advice to chronic disease

management results to doctors from patient's phones. Avoiding delays in discharge from test results or better monitoring of patients remotely are two simple system benefits. This means more care at home and in the community, changing the nature of the hospital and requiring investment in both high technology and more mobile systems. Technology providers are working on massive system integration bringing direct analytical benefits and changing delivery methods and needs for facility types.

Looking at both the integration of building facility products and processes with performance standards should lead to better operating costs. Health organisations should answer:

- Can we achieve the desired operating service at a good median price point?
- How do we increase production and lower operating costs by sharing or franchising for the future?
- Can we manage with less or change the product radically?

Changing operating regimes ahead of moving into new or refurbished facilities requires leadership and discipline, but it mostly requires organisational intent. BIM provides so many options for designers - it needs to be used by clients as a long term operating platform for omitting design imperfections, audit, building maintenance and management of its assets.

A RADICAL FOCUS ON ASSET AND DESIGN MANAGEMENT TO REDUCE REVENUE

Health organisations need to focus on grouping activities together so that future staff, equipment and rooms are all allocated in a flexible manner. This cuts against the medical model, but is essential to reduce unused space, reduce risk and maximise staff. Pioneering work in places like Karolinska, Sweden where they have reduced hospital rooms to around 120 has already occurred, enabling different procedures to occur flexibly and allow clinical change for future use. Acknowledging that tomorrow's processes and room use will not be like today's, rebuilding the current health clinic or hospital the same way is not the way forward.

Many studies from Ulrich, Mazuch and others have shown the advantages of good environmental planning - views, patient control and tranquillity make patients heal quicker such as the Healwell project in Maastricht Netherlands, where something as simple as access to light makes patients respond faster and increased staff satisfaction.

The same principle of integrated system planning applies to health purchasing. Often twin drivers apply, health agencies considering lowest cost not best value procurement or adhering to meet a singular speciality request rather than a fast-changing clinical environment. Often individual clinicians request products or facilities that either meet a current way of operating or want equipment that is n significantly more expensive than that of other manufacturers or may have compatibility problems with IT or reporting systems. Processes must be optimised and this should mean less choice to clinical users for safety and for price variation, as is the way in every other industry, notably automotive and manufacturing.

Globally, we know that health organisations are going to have to concentrate upon achieving excellence or scale – those that are smaller in nature or non-specialist are going to hemorrhage cash. Part of this solution may be agreeing in a sub-regional locality to share resources such as Estates, FM or management into much larger groupings. The clever health providers are meanwhile bringing together 15-30 facilities to form integrated care organisations or health hubs.

IMPROVING CLINICAL CARE AUDIT & ACHIEVING GREATER COLLABORATION BETWEEN HEALTH AND SOCIAL CARE AGENCIES

We are moving to an era of Accountable Care Organisations. From a patient perspective the lessons from the Kaiser model in the United States are apparent – empower key workers to sort patient problems whether linked to the design of the home, access to rehabilitation or community care. If a patient with one of the four most common chronic diseases admits regularly it becomes far more effective, better for the patient and cheaper for the provider to sort out their condition than rely on the revolving door to the Emergency Department.

CHANGE PUBLIC BEHAVIOURS VIA HEALTH EDUCATION

We have to improve health education - too often emergency services and paramedics are required to deal with social issues. Education needs to be harder hitting. The failure to take public health advice, on diet, weekly exercise, alcohol and drug intake continues to put pressure on every global healthcare system. This includes matters as simple as patients understanding the links between non-attendance of their ambulatory appointments and the consequence of extended waiting time for treatment, as studies show many urban hospitals have a 20-25 percent non-attendance rate leading to longer waiting time in weeks for appointments in primary, mental health and hospital care.

CONCLUSION

Our experience at RLB shows several key themes:

- All organisations should benchmark workforce, building design and asset usage to prove it is necessary for future value for money. This includes making better use of BIM models and sustainability
- Organisations should look for evidenced based design LEAN models and standardising layouts to minimise risk and improve flexibility
- Avoid today's demands, concentrate on future long term 'long life, loose fit'
- Take a more commercial focus and make every square-metre count
- Plan now for the IT and consumer revolution
- Scale is king for future healthcare providers
- Learn from visiting pilot projects - the early adopters move the market - their experiences should shape your future P

Conor Ellis
National Head of Healthcare,
United Kingdom

Building support for safer school buildings

Achieving extreme resiliency

Graham Roy, FRICS
Executive Vice President, North America

Typically, ensuring safety in public schools is a matter of modifying human behavior. From playground bullying to gang activity to more violent crime, these troubling issues are being addressed through concrete, preventative actions and strategies. But in many cities and towns, there's another danger, one that is to a great extent out of their control. For schools located in regions susceptible to natural disasters, providing protection rises to a higher—and broader—concern.

In 1999, the state of Oregon released geological hazard maps showing Cannon Beach and Gearhart elementary schools, Broadway Middle School, and Seaside High School would all be severely damaged in case of a major earthquake/tsunami event. Subsequently, in 2013, the Oregon Seismic Safety Policy Advisory Commission published the Oregon Resilience Plan (OPR), a report for the state legislature that outlines several paths to reduce risk, increase resiliency, and improve recovery from such natural disasters. The OPR's survey of more than 2,000 K-12 educational facilities—buildings of various structural types, sizes, and vintages, including numerous structures that are more than a century old—revealed that 47 percent were rated as Very High to High for risk of collapse in the event of a severe earthquake. This statistic underscores the urgency of why many school districts are pursuing seismic improvement programs for their buildings.

Throughout the Pacific Northwest, communities contend with earthquakes inland and tsunamis on the coast. To withstand a catastrophe of this kind, school districts are taking action to structurally upgrade their facilities, in some cases going beyond current building code standards.

One example of this can be found in Ocosta, Washington, a small logging and fishing coastal community that is home to North America's first vertical tsunami evacuation shelter. Located atop the local school's new gymnasium, the taxpayer-funded facility will be open 24 hours a day, seven days a week and can shelter up to 2,000 people in the event of an earthquake and tsunami that follows.

A critical cause, but at what cost?

Funding for these upgrades is often supplied through school bonds, measures that must be approved by local voters.

Because of the expense these projects often incur, sticker-shock can be a factor in whether or not a bond is approved; whether intentionally or by oversight, the cost to increase safety and resiliency is often factored in after the bond passes. Such an unwelcome fiscal surprise can be seen as a political bait-and-switch ploy, alienating the public and jeopardizing future support for similar projects.

But occasionally revised measures get through, in a better-late-than-never scenario. In 2016, Oregon's Seaside School District voters approved a $99.7 million bond to move three schools out of the tsunami inundation zone—three years after a $128.8 million-dollar proposal failed. The scaled-back plan eliminated improvements that were seen as not wholly germane to the purpose of the bond, including a new auditorium, covered bleachers, a varsity playing field, and long-term emergency shelters.

Another reason voters may resist the measure: the payback isn't immediately perceived. If the issues regarding resilience are presented in the forefront of a bond, and not buried in the fine print, the priorities are clear. Therefore, honestly framing the scope of the work and presenting its budget from the outset is the best strategy.

A complete and accurate cost analysis forms the basis for this. Several of Oregon's largest school districts (including Portland Public Schools and Beaverton School District) have worked with Rider Levett Bucknall (RLB) to help create realistic and accurate budget frameworks for these kinds of school construction projects before going to bond or to help recalibrate the budgets on a successful bond application. Over the course of more than two decades, our firm has provided cost estimating and management services for more than 40 school improvement projects to these districts, guiding them through pre-bond budgeting to design milestone estimating and change order management—a purposeful process which ultimately ensures that the user requirements are maximized within limited available funds.

From safe schools to community shelters

While compliance with current building codes is a minimum goal, some school districts are looking to expand their role beyond the safety of students and faculty and are voluntarily stepping up their seismic standards so that their schools can function as a shelter to provide a full range of post-disaster relief services to the entire community.

The Beaverton School District has taken on that challenge, passing a bond measure that includes the construction of seven new schools. Using the ORP as a guide, these schools will act as a demonstration project to explore how they can be used as shelters following a disaster, and be able to re-open in a timely manner—72 hours instead of the 18 months allotted for resuming core educational functions—to aid recovery efforts.

The American Red Cross has established criteria for minimum emergency shelter requirements. As outlined in the ORP, these are secure facilities that can be naturally ventilated, get people out of the weather and keep them warm. Beyond that, the availability of electricity for lighting and cooking, water and removal of waste water would be significant additions that would improve the efficiency and livability of the shelter.

Even with new, ground-up construction approved by the voters, incorporating all of these features into a school building requires extensive integration with a community's infrastructure. To manage this, RLB teamed with the Beaverton School District to create a long-term, escalated budget model that benchmarks the entire construction program. For a school district, cost modeling can provide the transparency, clarity, and direction that get a bond project off on the right financial foot, putting a resilient school improvement program on safe and solid ground. P

Graham Roy, FRICS
Executive Vice President, North America

As seen in:
PRISM, December 2017, "Building Resilient Schools on Responsible Budgets"

Sky high

The role of the independent certifier in high-rise buildings

Nick Ferrara
Director of Advisory,
NSW, Australia

The Independent Certifier (IC) performs an integral function in the procurement of high-rise buildings when multiple parties have an interest in the development. Objective, clear-headed thinking is required, to understand and assess often varied obligations in competing legal agreements which will result in a functioning and occupied facility.

Most IC Agreements (commonly referred to as Deeds) happily define what an IC can and cannot do within the terms of the main agreements between the stakeholders. Unlike other construction industry professionals, such as architects, engineers, and quantity surveyors, there is no clear definition for the term 'Independent Certifier'. The term combines two concepts – independent and certify.

The Macquarie Concise Dictionary (Fifth Edition, reprinted 2012) defines independent as (inter alia); '1. Not influenced by others in matters of opinion, conduct, etc., thinking or acting for oneself. 2. Not subject to another's authority or jurisdiction; autonomous; free. 3. Not influenced by the thought or action of others'.

The term 'certify' from which Certifier is derived, is defined as; '1. To guarantee as certain, give reliable information of. 2. To testify to or to vouch for in writing'.

At some point, the IC is required to issue a 'certificate'- a document that is; '1. A writing on paper certifying to the truth of something or to status, qualifications, privileges etc. 3. Law a statement, written and signed, which is by law made evidence of the truth of the facts stated, for all or for certain purposes'.

I define an Independent Certifier as one who, having given due consideration through independent thought and / or analysis, and without external influence, attests to truth of compliance of one (or many) conditions with the agreements between various stakeholders and certifies that attestation.

I have read one UK website that describes the role of the IC similar to the old-fashioned Clerk of Works role – a description with which I disagree. For those old enough to remember, a Clerk of Works, though employed directly by the Building Owner, reported directly to the architect. The Clerk of Works had little or no authority under the Building Contract. The Clerk of Works is usually limited to construction matters. The IC role is more extensive, in scope and knowledge, with direct responsibilities to the various stakeholders.

The role of the IC often supplements that of the Superintendent / Contract Administrator / Project Manager who may be limited to administering a specific (usually construction) contract. The IC acts within the framework of project agreements with the many stakeholders (Owner / Investor, Developer, Lessee(s), Contractor) addressing specific tasks that may or may not be undertaken by others (especially under a construction agreement). A multi-stakeholder project usually involves several agreements where some of the stakeholders may not be directly involved in one of the other associated agreements (e.g. a development agreement between an Owner / Investor / Developer or a construction agreement between a Developer and a Contractor). A specific determination under one agreement may or may not be applicable or allowable under another agreement. Some of the agreements which may be used in a major project for the progression of concept to reality include:

- Project Development
- Developers
- Financiers
- Investors
- Design & Construct (Building)
- Agreements for Lease
- Operations and Facility Management
- Ground Leases
- Fitout Works
- Specialist Suppliers
- Central Plant (over a large precinct area)

At times, these agreements may have conflicting clauses where what may be allowed in one (e.g. a time delay) may be excluded in another.

The role of the IC is to provide certainty and assurance, and ensure that the overall project objectives are achieved, by providing a resource with the expertise and resources to ask the right questions and correctly state the answers. The IC can provide flexible input and customised reporting to suit specific client requirements and project needs which could involve:

- Independent review of costs and program for the Parties
- Pre-commencement Cost and Program Audit report for Financiers Syndicates
- Monthly certification of costs to completion (not the remaining unexpended funds)
- Detailed commentary on risk status
- Program review status
- Variation monitoring and impact on contingency
- Contingency recommendation
- Authorities approval status monitoring
- Insurance status monitoring

To achieve a positive and just outcome, the many stakeholders often engage an IC to resolve claims and counter-claims regarding time, quality, cost and to provide a clear direction forward.

"The role of the IC is to provide certainty and an assurance, and ensure that the overall project objectives are achieved, by providing a resource with the expertise and resources to ask the right questions and correctly state the answers."

The IC performs an integral function in the procurement of high-rise buildings when multiple stakeholders have an interest in the development. Objective, clear headed thinking is required to understand and assess often varied and contradictory obligations in competing legal agreements which will result in a functioning and occupied facility. The IC role can be limited to granting Practical Completion (with a heavy reliance on the certification provided by the other consultants). The role can also be extended to include many of the functions performed by superintendents or project managers. In one role, I was required to be on site 2 to 3 days a week for its duration as administrator, adjudicator, mediator, and making determinations on the correct interpretation of the design brief under a design and construct contract.

Does the role of the Independent Certifier alter the obligations and duties of the 'traditional' design professionals? The answer is a definite NO! The Design Team, who may be novated to the Head Contractor, remains responsible for design compliance with what I consider to be three fundamental principles:

- The Design Brief
- The requirements of all relevant authorities (planning and building regulations)
- National and Local Standards and Codes.

The novation of design consultants, generally under a design and construct contract, may be beneficial to a project as it maintains design continuity, but it denies the developer and / or the building owner and / or the end user, the opportunity of seeking direct advice from the former consultants. The use of certificates confirming compliance of the three principles becomes essential.

The Head Contractor and sub-contractors are responsible for the installation works being compliant with the three fundamental principles listed earlier. Design Consultants, through their on-site inspections and quality control tests, have an intrinsic requirement, per under their contractual obligations, not only to the Head Contractor but also the Developer / Building Owner / End User(s) in the wider context.

THE IC DOES NOT:

- Replicate the work of the other consultants
- Comment upon design matters unless they specifically relate to the interpretation of the design brief
- Project manage the work
- Certify compliance with building and planning regulations

The professional consultant team is still responsible for their work – design and construction documentation, inspections, defects reporting, solving construction detailing, etc.

THE IC ROLE:

- Is not limited to Practical Completion (though it can)
- Requires to be across all the project details and agreements
- Provides a balanced analysis of the project status
- Requires a good understanding of varying construction methods and techniques
- Has clear communication and interpersonal skills
- Can work closely with the Contractor to develop the completion process
- Is independent

WHY IS INDEPENDENCE IMPORTANT?

- The IC role is a position of trust and ethical behaviour
- Knowledge of the project and correct application of contract clauses
- Unbiased, timely advice and determinations
- Ability to work with all parties
- No conflict of interest

The many parties to agreements, which overlap in the overall development of a project, may consider the appointment of an IC for the duration of a project as this will give the optimum outcome for a successful project. P

Nick Ferrera
Director of Advisory,
NSW, Australia

Adopting technology for better cost advice

Silas Loh
Joint Managing Partner,
Singapore

Grace Lam
Senior Cost Manager,
Singapore

The landscape of the construction industry is undergoing a period of change. We as quantity surveyors (QS) are feeling the pressure to meet demands to provide value-added services in times of increased competition and rapid change. Toor and Ofori[1] said the changing landscape of the industry demands that current practitioners as well as future professionals should be proactive to drive change instead of merely coping with developments.

SMART INFORMATION DELIVERANCE – BIM AND MORE

Much is asked these days how advanced QSs are in adopting the technology of Building Information Modeling (BIM) in their practice as other professionals in the construction industry are already demonstrating their BIM capability and reaping its benefits. But, what is BIM? Perhaps an effective definition is provided by Schewegler et. al.[2] as the process of creating an information database for a project in which lifecycle information is expressed in an interoperable manner to create, engineer, estimate, illustrate and construct a construction project.

BIM is now regarded as a part of a larger paradigm shift towards the adoption of digital technology as automated quantities technologies and BIM systems are revolutionizing current practices and automating the measurement of quantities from drawings. These technologies facilitate the preparation of accurate estimates[3]. Mitsutaka[4] thinks that new technologies have the potential to provide competitive advantages by increasing opportunities and lowering costs. BIM measurement (a.k.a. 5D BIM) presents an approach that has already proven to have a marked impact on preconstruction processes. It is also considered to be a challenge to the conventional QS services and other construction disciplines. There is growing demand for experts like

us in cost engineering and financial management; this is a chance for us to broaden our involvement in projects, while improving upon our skill sets and traditional knowledge bases, with our responsibilities evolving from bill producers to cost advisors.

DEMANDING EXPECTATIONS FROM QS SERVICES

Poon[5] wrote that QSs are ubiquitous in the construction industry. Conventionally, we know the scope of QS services is wide and knowledge intensive. Generally, the QS profession is necessary to estimate the cost of the whole endeavour, as well as the quantity of the building materials, on top of cost and contract management. It typically involves preparing a cost estimate of the concept design to assist the developers to set a feasible budget, monitoring cost implication as the design develops, and preparing tender documents. Primarily, we are the project's cost consultant; we act as an advisor to the client and other project team members on matters relating to procurement and the contract[6]. Considering the prevailing and future challenges and opportunities, our profession is at an important road junction from which it can go beyond its traditional cost engineering and financial management roles and use its core competencies to assume a value-added and leadership role in the industry.

To deliver more sophisticated cost management services, it is very important for us to embrace and become a key player in the BIM environment. Ultimately, what clients want from all their consultants is to complete their construction projects within three important parameters – Time, Cost and Quality. We ought to note that quantity take-offs from BIM software and automated quantities technologies is only part of the process to meet the value add.

IMPLEMENTING 5D BIM PRACTICE

There are perceived barriers to implementing 5D BIM for Cost Management. According to Olatunji[7], it is frequently the prerogative of the firms to explore how best to manage their BIM-specific solutions. With so many vendors in the market touting different types of software, industry professionals in the construction industry may find themselves lacking the knowledge/skills to work with each other's different software due to software incompatibility, even though currently there are the Industry Foundation Classes (IFC) standards to improve the exchange of data between CAD software tools, estimation software tools and other construction application software tools. Other barriers include prohibitive initial cost outlay, the lack of protocols for coding objects within building information models, or the lack of an electronic standard for coding BIM software, which are an essential pre-requisite for full interoperability. Consequently, the potential of 5D BIM is yet to be realised.

Muzvimwe's[8] studies found that the value of QS services is raised by being able to simulate and explore various design and construction scenarios for the client in real time through having their cost data and quantities integrally linked in the live BIM model. Smith[9] thinks it is equally dependent on the QS having BIM capabilities/expertise and having the intuition to analyse and critique the information that is being generated by the model.

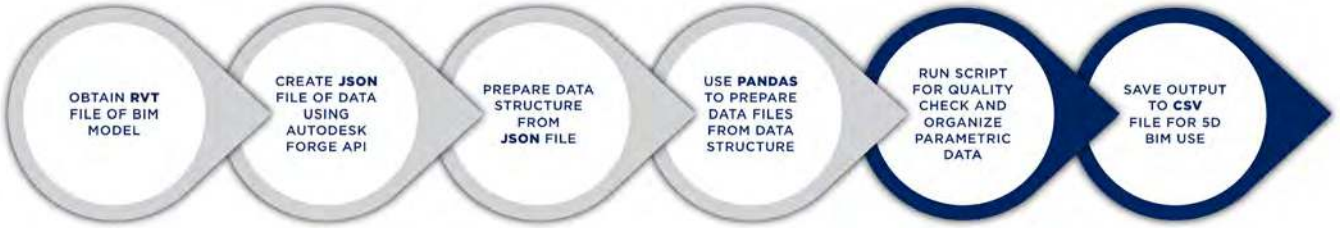
Being on track with this paradigm shift, our local authority, the Building and Construction Authority (BCA) is inspiring action and stimulating innovative ideas for the whole construction industry with its most recent theme of "Embracing Innovation, Building Our Future". BCA is leading industry players in transforming the construction industry into a culture of Integrated Digital Delivery (IDD). IDD encapsulates various collaborative practices such as Integrated Project Delivery (IPD), Integrated Concurrent Engineering (ICE) and Virtual Design & Construct (VDC) to form a more complete picture of how technology adoption is shaping the evolving process of design, design review and construction execution in this 4.0 industry revolution.

COMPUTATIONAL BIM FOR QS

It is empirical that maturity and progress toward BIM adoption is uneven among the QS professional practice. Despite the current challenges and constraints, for our profession to move away from being traditional bill producers to value-add cost advisors, we need to quickly adapt and learn computational skills instead of relying on commercial software/ programmers to do 5D BIM. Once we attain the right level of computational BIM skill, we would be able to achieve parametric documentation of a project's financial data, including embedding project models with valuations or actual project information, as well as reconciliation of a project's financial data.

So, in RLB Singapore, we explored on how to work outside commercial 5D BIM software - literally out-of-the box - and embarked on coding and scripting to mine data of any BIM Model. This is done through a series of processes as illustrated in the flowchart (Figure 1) on the following page.

MINING OF BIM DATA OUTSIDE COMMERCIAL SOFTWARE



With this approach, our QSs can validate the quality of the BIM Model, organise and manage the design data according to various elemental categories before applying standard method of measurement and other code compliance as required. It also improves processing speed as data are handled without having to wait for 3D rendering refresh on screen. Once the data of the BIM Model is organised in CSV (Common Standard Value) format, the data can be worked upon in any common spreadsheet software. Bills and reports can be generated as usual, and with relevant spreadsheet skill such as pivot table and macro scripts, bespoke dashboard reports can be creatively produced for presentation to client and assist with improved making on design options based on cost viewpoint.

APPLYING BIM AND BLOCKCHAIN FOR POST-CONTRACT MANAGEMENT

Another possible application of BIM for QS is on progress payment and valuation at the post-contract stage. We know the traditional procedure for progress claim and payments is tedious and the lengthy cycle time is unproductive for all stakeholders involved as different stakeholders' reports and claims are mostly kept separate. Traditional QS duties require us to produce numerous documentation and verification. Locally, disputes with contractors over the quantum of work done are common and projects often see accumulated unresolved disputes which pose potential risk of formal dispute resolution such as adjudication under Singapore's Security of Payment (SOP) Act. BIM technology, applied together with blockchain technology, can circumvent these issues by integrating fragmented information.

[1] Toor, S.R. and Ofori, G. (2012). Role of Leadership in Transforming the Profession of Quantity Surveying, Department of Building, National University of Singapore, Singapore, The Australasian Journal of Construction Economics and Building [Vol. 9, No. 1], 37-44.

[2] Schwegler, B.R., Martin, F.A., O'Connell, J.M., Reijo, H. and Jarmo, L. (2001). Near- Medium- and Long-Term Benefits of Information Technology in Construction, Center for Integrated Facility Engineering (CIFE) Working Paper Nr 65, University of Salford.

[3] Aouad, G., Wu, S. and and Lee, A. (2007). Advanced Technology for Quantity Surveying: Proceedings of the Quantity Surveyors International Convention, 4th – 5th September, International Islamic University, Malaysia, 313-322.

[4] Mitsutaka, H. (1989). Evaluation of Technology in Construction. Technocal Report Number 16, Centre for Inegrated Facility Engineering, Universoty of Salford, U.K.

[5] Poon, J. (2003). Professional ethics for surveyors and construction project performances: what we need to know. Proceedings of Construction and Building Research (COBRA) Conference, Royal Institution of Chartered Surveyors (RICS) Foundation.

[7] Olatunji, O.A. (2014). Perspectives on Modelling BIM-enabled Estimating Practices, Construction Economics and Building, UTS e Press, VOL 14, NO 4 (2014).

[6] Fellows, R., Lou, A. and Fong, C.M. (2003) 'leadership style and power relations in quantity surveying in Hong Kong', Construction Management and Economics, 21(8), 809-18

[8] Muzvimwe, M. (2011), 5D BIM Explained, http://www.fgould.com/uk/articles/5d-bim-explained/

[9] Smith, P. (2015). Project cost management with 5D BIM, 29th World Congress International Project Management Association (IPMA) 2015, IPMA WC 2015, 28-30 September – 1 October 2015, Westin Playa Bonita, Panama, Procedia - Social and Behavioral Sciences 226 (2016) 193 – 200.

The process involved is fairly simple:

1. Create a Valuation BIM Model by mapping the contract value of bills of quantities items to the Contract BIM Model.
2. Share Valuation BIM Model with all stakeholders involved in payment process. This may include resident site staff if their site report on progress of work is conventionally used as supporting documents to verify work done. Parameters in the shared model may be restricted to hide contract value from technical staff if it is deemed not appropriate.
3. Apply blockchain technology to track every task in the payment process. Blockchain technology is typically known as "technology of trust" by using smart ledgers to record transactions and activities of various stakeholders. Bitcoin is one common example of how blockchain technology works.
4. Contractor updates the Valuation BIM Model and submits together with his payment claim to indicate the work done on site for the QS to review their payment claim in 3D visual form.
5. The centralised Valuation BIM Model should contain records (smart ledgers) of digital approvals of resident site staff on inspections carried out and quantum of work done on site.
6. QS relies on the records in the Valuation BIM Model to verify the claimed amount against the Contract Sum to recommend payment-on-account.

By sharing and working on a singular model and digital platform, the process would be more integrated and perhaps gaps and disputes between the contractor's claim and the QS's valuation can be reduced substantially. This would provide detailed documentation and clarity for all parties and would also certainly improve productivity in the payment process.

CONCLUSION

In today's construction projects, where vast design information are collaborated digitally, there is a sense of urgency for the QS profession to develop and build their own computational skills set and adopt technology for their work to avoid being left behind from other professionals in the construction industry. Being able to grasp the inherent opportunities in BIM will help deliver the profession from being traditional bill producers to become value-add cost advisors.

Computational BIM and blockchain technology application will probably be a common practice soon and newer technology and collaborative method may soon be developed to harness on augmented reality technology which many other industries are already exploring. Some say it is better late than never. We say "you snooze, you lose" in this demanding industry. P

Silas Loh
Joint Managing Partner,
Singapore

Grace Lam
Senior Cost Manager,
Singapore

Don’t leave your office or business vulnerable to drive-by lawsuits

John T. Jozwick, Esq.
Executive Vice President, North America

It might have been a surprise to some viewers of “60 Minutes” on December 4, 2016 to hear Anderson Cooper’s report. “Thousands of lawsuits have been filed in the U.S. for violations of the Americans with Disabilities Act (ADA), but many business owners say they're nothing more than a shakedown,” he said. “You might think you have to be a customer of a business to file a lawsuit against it, but in some states you don’t. You can simply drive by a store or restaurant, and if you see a sign in the wrong spot, or a ramp that’s off by a few inches, you can sue.”

To many business owners, though, the story was all too familiar. Across numerous states, unscrupulous attorneys are filing hundreds of these “drive-by” lawsuits that are founded on non-compliance with ADA regulations against businesses that often have no idea they have done anything wrong. In 2014, more than 4,430 cases reached federal courts. In Phoenix alone, more than 1,700 businesses were sued in 2015 by an organization named “Advocates for Individuals with Disabilities.”

FRIVOLOUS LAWSUITS, SERIOUS COSTS

Because the ADA statutes apply only to public accommodations, most of the cases filed are against commercial businesses. Whether you own or operate a coffee shop, beauty parlor, a retail business, movie theater, or other commercial properties, you are at risk.

In addition to bearing the cost of rectifying the violations, targeted businesses are also responsible for their own defense costs, including attorneys' and experts' fees—and for the plaintiff's fees and costs, as well. Often, these litigation costs are far greater than what it would cost to bring the property up to code.

Here's a real-life example of how the scheme works. On a single day in 2011, a plaintiff and his lawyers filed eight identical ADA lawsuits against small businesses located within a two-block radius of one another. Later, the complaint was amended to include another defendant who ignored the lawsuit, resulting in a default being taken. After the court issued a cursory $14.31 default judgment, the plaintiff's counsel filed a motion for fees and litigation costs in the amount of $15,172.

THE LEGISLATIVE RESPONSE

Why are these lawsuits so prevalent? Without casting aspersions on human nature, the reason is simple: Because they are easy. Parking lot violations are low-hanging fruit for these drive-by litigants, who cruise through parking lots of commercial businesses, looking for infringements of ADA regulations. Non-compliant conditions are readily apparent to the opportunistic eye.

While several states—including Arizona and California—have enacted legislation that curbs the serial lawsuits, some litigants have simply begun filing their claims in federal court instead of at the state level, so businesses within the state are still impacted. In response, U.S. senator Jeff Flake of Arizona has introduced the ADA Education and Reform Act at the federal level. The bill would restore the spirit of the ADA by requiring businesses to be notified of a violation and granted 120 days in which to correct it. If the violation is not resolved in this time frame, only then can suits be brought against the offending business.

KNOW THE LAW

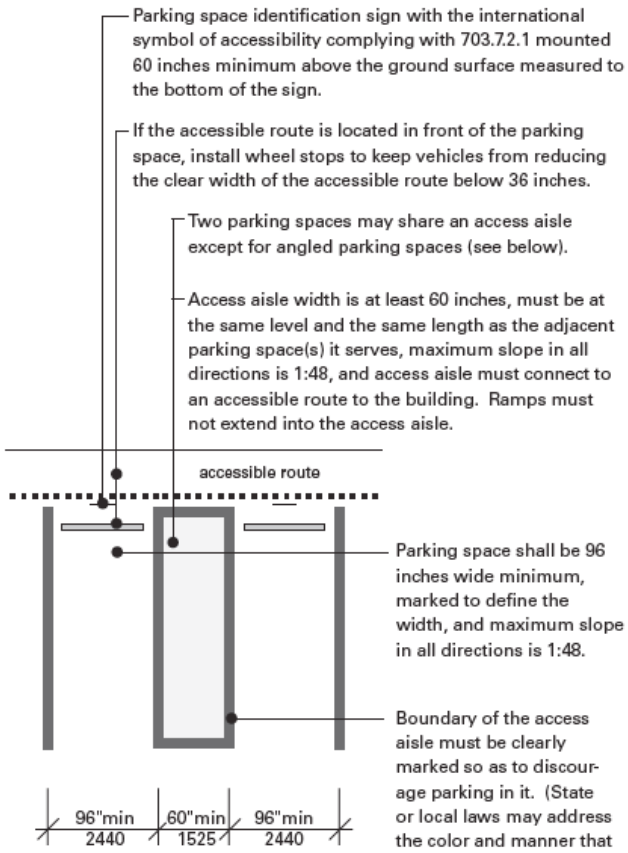
While these legislative measures will help combat these nuisance complaints, it's vital that businesses know where they stand. Many business owners and property managers are under the mistaken belief that because their building was built before the 2010 revisions to the Americans with Disabilities Act took effect, they are grandfathered from compliance. This is not correct.

Those modifications that the U.S. Department of Justice determines are readily achievable shall be made. Parking lots are an area of readily achievable modification. As stated by the U.S. Department of Justice:

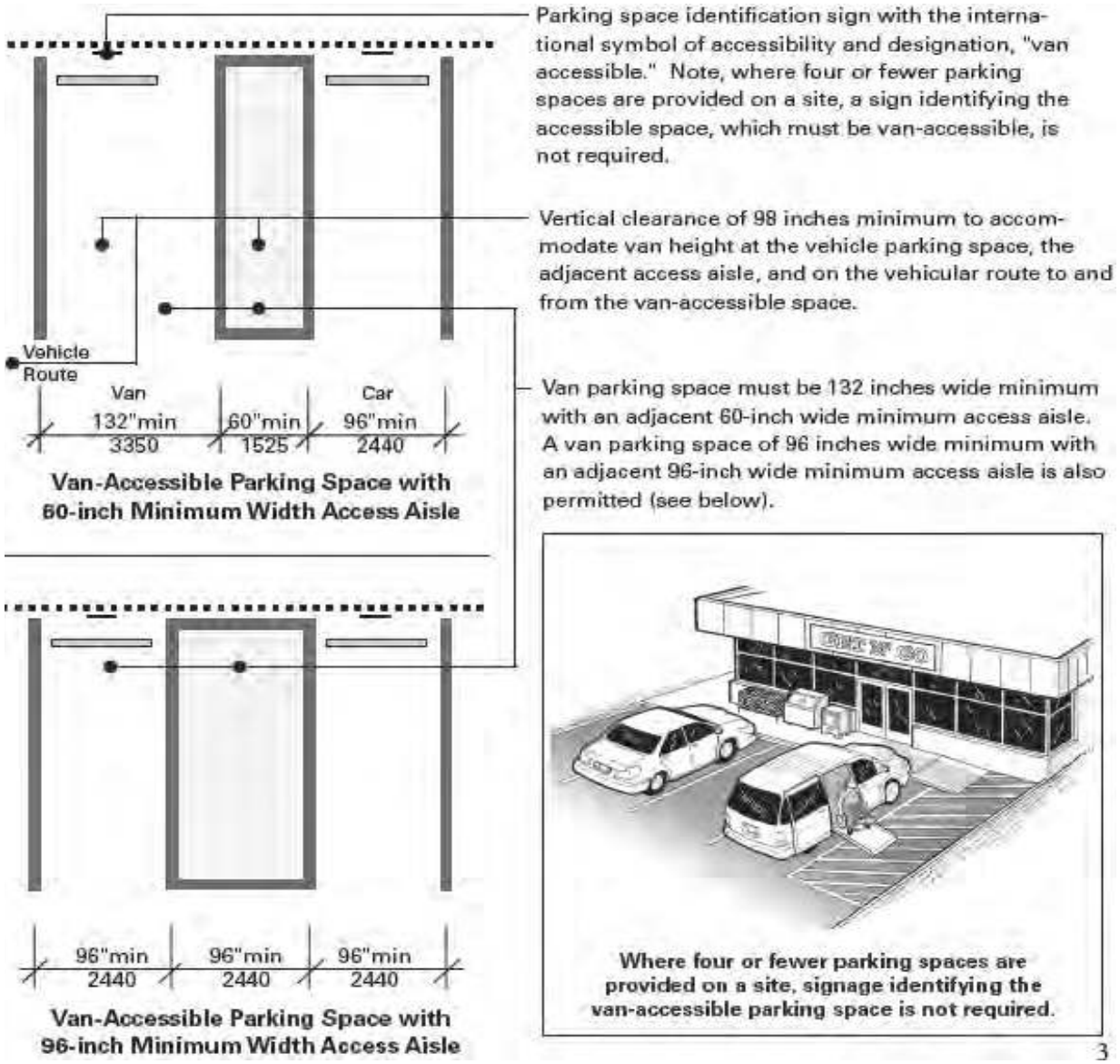
"When a business or State or local government restripes parking spaces in a parking lot or parking structure (parking facilities), it must provide accessible parking spaces as required by the 2010 ADA Standards for Accessible Design (2010 Standards). In addition, businesses or privately owned facilities that provide goods or services to the public have a continuing ADA obligation to remove barriers to access in existing parking facilities when it is readily achievable to do so. Because restriping is relatively inexpensive, it is readily achievable in most cases. State and local government facilities also have an ongoing ADA obligation to make their programs accessible, which can require providing accessible parking."

—Americans with Disabilities Act, ADA Compliance Brief: Restriping Parking Spaces, U.S. Department of Justice, Civil Rights Division, Disability Rights Section, December 2015

Features of Accessible Parking Spaces



Accessible Parking Spaces with 60-inch Minimum Width Access Aisle for Cars



The ADA Compliance Brief provides the following illustrations of accessible car and van parking:

According to these guidelines, there are several observable violations evident in this parking lot, making it an easy target for a drive-by suit. These include:

- **Signage height:** Height to the bottom of all signs is not 60 inches
- **Dimensions:** The center parking spot is labeled for van-accessible parking, but the width of the spot and aisles are not van-compliant
- **Wheel stops:** There are no bumpers to restrict a car or van from parking with the nose of the vehicle over the sidewalk and reducing the clear sidewalk path
- **Ramps:** Ramps are not allowed to extend into the parking spots or access aisles
- **Grading:** Slopes in the parking space exceed 1:48

PROTECTING YOUR INTERESTS

The best way to avoid becoming the target of drive-by suits is to proactively investigate, identify, and remediate all noncompliance issues so as to avoid the possibility of suit altogether. Hiring an ADA accessibility consultant and architect to identify and correct violations before they trigger a lawsuit is far less costly and less time consuming than litigating a trumped-up case—which would ultimately require correcting any infringements, anyway. In these situations, an ounce of prevention is truly worth a pound of cure. P

John T. Jozwick, Esq.
Executive Vice President, North America

As seen in:
Building Design + Construction, February 2017, "Don't Leave Your Office or Business Vulnerable to Drive-By Lawsuits"

Modeling QS for BIM

Ken Leung
Associate
Hong Kong

WHAT IS BIM FOR QS?

Building Information Modelling (BIM) is now a well-developed concept throughout the world and its potential benefits are enormous for the entire project cycle. The evolution of BIM has not only revolutionised the way architects or designers work in the construction industry, but has also brought similar impacts to Quantity Surveyors (QS).

BIM contains valuable information including dimensions, types and constraints that can generate quantities automatically from the model and data captured within the model. Therefore, it is important for the QS to be aware of this new technology so they can adapt to the changing environment in the profession.

At this pivotal point for the QS profession, BIM supports and promotes better cost management as an integral part of the process, because professional advice is always sought by clients to analyse and interpret cost data in preference to the output from raw model, no matter how sophisticated they are. The sequential nature of design always means that early design models lack detail and definition. These models provide opportunities for the QS to get involved in collaboration and analysis, testing and validation, forming the basis of comprehensive measurement and estimation exercises.

A NEW MEASUREMENT APPROACH

The application of BIM in the measurement or estimation process is typically called '5D BIM'. Automated generation of quantities is a faster and more accurate tool to analyze data and subsequently provides better cost advice to the clients.

Traditionally, Quantity Take-Off (QTO) has been carried out manually, measuring directly from physical 2D drawings. However, BIM has revolutionised these tasks to provide automatic procedures for extraction of data from 3D BIM models.

Now, BIM can automatically generate necessary take-offs, measurement and counts from the object itself. More accurate models will provide a much better result in cost estimation. However, the reliability of BIM measurement depends a lot on the accuracy and completeness of the 3D BIM model, which has often been characterised with minimal data.

It is therefore vital for the QS to develop a new measurement approach that is compatible to BIM technology, and can be used in an interoperable environment where different BIM formats and data are shared seamlessly among the project team. This new approach allows clients, designers, engineers, quantity surveyors and contractors to collaborate and explore opportunities with the aim of eliminating risks, reducing costs and producing better buildings.

"Future growth opportunities will only exist to those QS and professional firms who are prepared to embrace BIM technology, which will ultimately enhance their range and effectiveness of professional services that differentiate themselves from the competitors, and provide a strong platform for a new phase of growths."

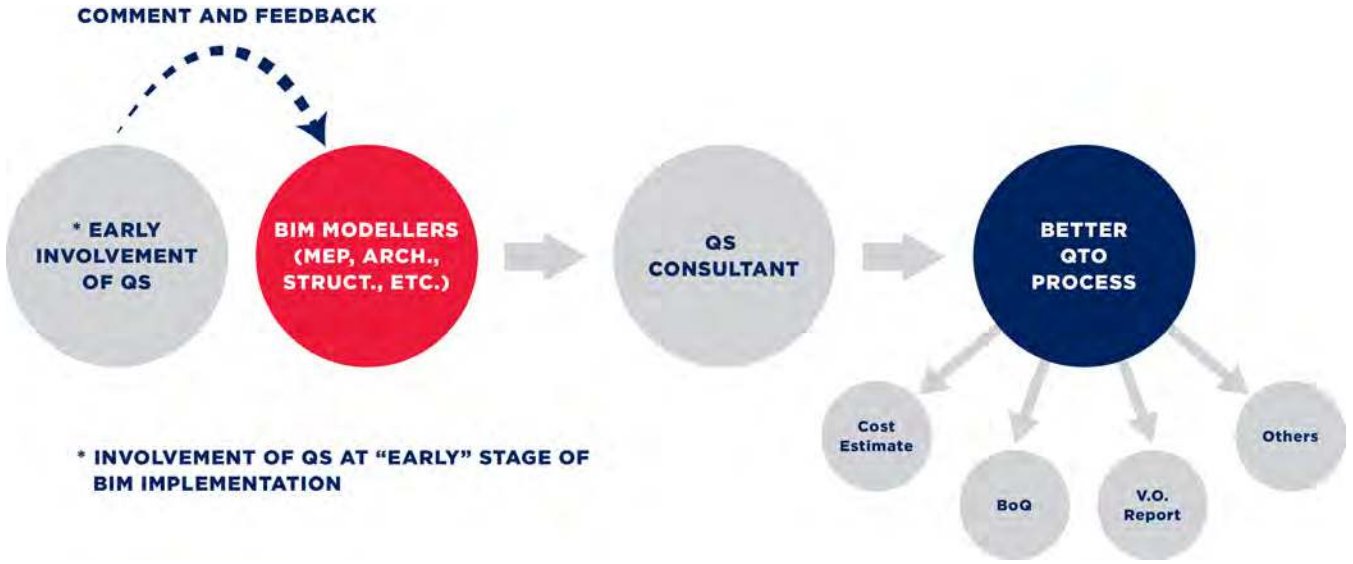
COLLABORATION IN MODELLING

The majority of BIM models are not created for measurement purposes and often, these models lack the important information required for the preparation of Bills of Quantities (BQ) or Cost Plans.

One of the key challenges in extracting quantities from a BIM model is the requirement to follow the measurement rules in accordance with the local Standard Method of Measurement (S.M.M). Quite often, we see incorrect information and lack of detail or information for elements inside a BIM model.

To facilitate the measurement in the BIM applications, additional parameters and QS requirements can be incorporated into the model. For example, concrete grade, reinforcement ratio, door or window mark, formwork class, fitting or equipment number, electrical circuitry, finishes or insulation material, ironmongeries, other accessories etc. The QS can assist the project team to develop a collaborative approach with the modellers for producing the BIM models that can serve at least two purposes; design and measurement.

PROPOSED WORKFLOW FOR 5D BIM



THE FUTURE

Although BIM can bring many benefits to QS, there are still many challenges and obstacles that need to be considered and overcome. Efficient production of BQ and cost plans still hinge on relevant information being inserted into the BIM models beforehand. This requires a lot of knowledge and experience from the QS in the early design and planning process.

As BIM is getting more popular in the construction industry, the traditional 2D process will be gradually replaced and will disappear under the collaborative model-based working environment. This leaves the QS with more time for better and more important tasks, e.g. analysis, interpretation and organisation of data into a logical, consistent and suitable format, shifting the traditional role of costing a design, to designing to a cost.

In the past, professional QS firms have implemented new technology for improvement of their workflow and productivity. However, one of the major obstacles is the organisational change resulting from the introduction of new technology. The transition from the traditional method to a new BIM technology will not come without the necessary challenges and commitments from 'top to bottom' in the hierarchical management.

Future growth opportunities will only exist to those QS and professional firms who are prepared to embrace BIM technology, which will ultimately enhance their range and effectiveness of professional services that differentiate themselves from the competitors, and provide a strong platform for a new phase of growth. P

Ken Leung
Associate
Hong Kong

Harvesting energy and profits

A new approach to MEP cost analysis

Bill Kuck
MEP Cost Manager,
North America

When it comes to environmental issues, the AEC community plays a central and ever-changing role. Whether it's through voluntary or regulated compliance, we are tasked with implementing new ideas that have been designed to counter a century of damaging ecological effects. A clear understanding of these technologies has important implications for the built and the natural environments—and, of course, the construction budget, as well.

During the course of providing cost estimating services, educating the client on making prudent choices is a high priority for Rider Levett Bucknall. While our primary responsibility focuses on managing cost, we can simultaneously work to help save the planet, too. Fortunately, these two concerns increasingly overlap through the development of innovative, energy-harvesting products and applications; as a result, there's a growing awareness that incorporating MEP costing into the design process is of tremendous value to all parties.

Accurate MEP costing is a critical component to construction procurement, supply chain, design, and operational facility management. Informed estimating of MEP systems brings to the forefront the many ways that energy harvesting products can have a significant effect on a project's short- and long-term efficiencies. Among them:

- Using alternate power sources to promote energy conservation
- Enhancing energy efficiency to lower utility costs
- Reducing maintenance and repair expenses through strategic materials and systems specifications
- Employing operational commissioning programs to track and document the performance of facility systems

It's notable that energy-centric improvements have nearly universal application potential. Energy-conscious materials and systems can be utilized in both new construction as well as existing structures. Virtually every building type—residential/multi-family, commercial, hospitality, industrial/manufacturing, sports venues, and more—can benefit from energy-harvesting strategies. Facilities that are operational round-the-clock, like airports and healthcare facilities, frequently stand to gain the most in efficiency and savings by including energy-harvesting features.

"Informed estimating of MEP systems brings to the forefront the many ways that energy harvesting products can have a significant effect on a project's short- and long-term efficiencies"

Much of the cost savings stems from industry-sponsored rebates that help customers pay for the initial investment in equipment; every state maintains a list of these incentives. Then there's calculating the long-term payback—a key part of the MEP costing process.

Below are some of the new renewable-energy technologies and products we have identified through our cost estimating as real game-changers. While some are still in development, others are already on the market, making a positive difference.

BUILDING MATERIALS

High Density Solar Panels: These parallel-connected cells produce reliable power, reducing power loss and increasing efficiencies.

Kinetic Floor Panels: Suitable for high foot-traffic areas, piezoelectric panels generate electricity using rotary motion generated from pedestrian weight-displacement.

Solar Roofing: For commercial use, solar cells are integrated into textured glass tiles with interconnections for generating power, usage, and storage. A shingle-based design is available for residential applications.

Solar Windows: Glazing coated with thin, transparent solar cells is capable of producing electricity in the sun or shade.

INFRASTRUCTURE APPLICATIONS

Solar Roads: A modular system of panels fitted with glass microprocessors captures solar energy that can be used to illuminate integral road markings and activate heating elements that keep snow and ice from accumulating.

Kinetic Energy Speed Bumps: Cars traveling at 5mph over these high-tech traffic controls generate kinetic energy that can be converted to an estimated 2000 watts of electricity per vehicle.

ENERGY GENERATION

Tidal Energy: Suitable for coastal locations, underwater turbines are placed in areas with high tidal movements, and are designed to capture the kinetic motion of the ebb and flow of breaking waves to produce electricity.

Kinetic Water Flow: Utilizing gravitational flow from rivers, canals, dams, and streams, stored energy can be converted into kinetic energy as the water flows through a large outlet and activates a turbine.

Earth Movement: Harnessing motion from earthquakes or shifting tectonic plates can capture energy to produce emergency electric power and lighting.

Human-Based Power Generators: Hooking up tread mills and stationary bikes in health clubs and gyms can help power facility lighting and services. Similarly, dance studios and clubs can utilize kinetic flooring.

Roof-Mounted Vertical Wind Turbines: These cost-efficient turbines operate 24/7/365 and with 360º input.

With engineers, architects, and owners continuing to commit to intelligent, proactive energy planning, conducting independent MEP costing campaigns plays a vital part of the process, quantifying sustainability in both dollars and in sense. P

Bill Kuck
MEP Cost Manager,
North America

As seen in:
Building Design + Construction, January 2018, "Harvesting Energy and Profits: A New Approach to MEP Cost Analysis"

Bringing imagination to life

With a network that covers the globe and a heritage spanning over two centuries, Rider Levett Bucknall is a leading independent organisation in cost management and quantity surveying, project management and advisory services.

Our achievements are renowned: from the early days of pioneering quantity surveying, to landmark projects such as the Sydney Opera House, HSBC Headquarters Building in Hong Kong, the 2012 London Olympic Games and CityCenter in Las Vegas. We continue this successful legacy with our dedication to the value, quality and sustainability of the built environment. Our innovative thinking, global reach, and flawless execution push the boundaries. Taking ambitious projects from an idea to reality.

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