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# Ecolibrium

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# We have the data. Now what?

Although still in its infancy, big data analytics is already impacting on the resources of many early adopters.

**Sean McGowan** explores this with Angus Grant, M.AIRAH, mechanical section manager and principal with Wood & Grieve Engineers; Jonathan Clarke, M.AIRAH, associate director and controls group manager with NDY; Scott Horsnell, team leader with Bueno; and Paul Jackson, M.AIRAH, associate director and commissioning manager with IBMS.

**Ecolibrium:** What has changed in the big data space since we visited the topic last year?

**Grant:** The focus is really on what has changed in the construction industry, and specifically how big data is affecting design, construction and management of buildings.

The construction industry traditionally is a slow adopter of new technology, and this seems to be a continued trend.

Although big data may be impacting developers in their decision making, the use of big data in building design and optimisation, construction approaches and planning, as well as facility management, still seems to be in the early stages.

**Jackson:** The term “big data” was and still is a buzzword that consistently pops up during conceptual project discussions and all the way through the construction process.

‘ The HVAC industry seems to have been among the fastest to utilise data, and embrace analytics ,

However, it is still widely misunderstood and incorrectly applied. This needs to change, otherwise we may still be in the “just talking about it” stage for another couple of years.

One thing I would say though, is that the HVAC industry seems to have been among the fastest to utilise data, and embrace analytics and new technology in this space.

**Clarke:** The biggest change we are seeing is that building analytics is becoming business-as-usual. Both owners and facilities operators are looking for ways to streamline their operations, and analytics is seen as a progressive method to cut costs. Early adopters that have been through the pain of integrating analytics



Angus Grant, M.AIRAH



Jonathan Clarke, M.AIRAH,



Scott Horsnell



Paul Jackson, M.AIRAH

are starting to see the benefits; however, it is not all plain sailing, and in some cases operational costs have increased.

**Horsnell:** The big data space has continued to progress at a rapid pace since 2015, enabling its growth across the breadth of building systems beyond building management systems (BMS) into areas that were almost purely theoretical a few years ago.

Root-cause analytics, machine learning and data-driven maintenance-based methods have evolved from being bleeding-edge features to now being incorporated into various business-as-usual applications, and are capable of providing earlier and much more effective and valuable outputs than anticipated.

**Ecolibrium:** What does big data analytics look like today? How would you describe it, and its influence?

**Clarke:** Two years on and it is still in its infancy.

There is one product that dominates the Australian market due to great marketing and a provider who picked up on this technology a number of years ago and has had time to develop implementation processes and a large customised rules library. The major BMS suppliers have their own analytics products, but we are not seeing a lot of these due to clients wanting a different analytics provider to keep a level of transparency of BMS performance. Analytics can be a very powerful tool across a wide range of services, and we are seeing that it is now used as the BMS police!

**Grant:** Big data analytics is a developing space as users find more and more ways to interact with large sources of

unstructured data in a simplified way. Analytics are being applied to large data sets, and to obtain answers to business problems is a big market.

However, the application of big data analytics in the design and operation of buildings seems to be only taking small steps in Australia. It is more focused on reviewing BMS trend data and making appropriate changes, as opposed to analysis of data from 50 similar buildings.

**Horsnell:** Within the building services market, there is a growing awareness and push for building system data collection, but often without a clearly defined purpose.

This endemic problem, as we have observed, leads to each building generating thousands of data points every second that are going nowhere and achieving nothing. Through big data analytics, we believe these data points can be used to tell us precisely when a sensor is broken, if ductwork is unbalanced or if there is an opportunity for efficiency tuning. Through a data analytics led approach we are confident that genuine actionable information will be created from day one of the planning and construction and will continue to provide insights at the frequency, resolution or accuracy that is not possible with typical manual point in time reviews of these building systems.

Where it has really evolved is in the applications of the technology. Rather than analytics historically being considered as a “bolt on” to building operations, more and more we are seeing analytics being adopted into the core way that the building operations function is delivered.

**Jackson:** Most people think that big data is another means to achieving greater energy efficiency. Although this

is true in some cases, the real value for the HVAC&R industry is in the ability to overlay multiple data sets from other sources than the HVAC control system to understand what is really happening at a specific moment in time.

A lot of end users think they need big data, but generally they don't know what the requirements are. So, it is very hard to give appropriate advice, and clients look towards the experts in the data space. These are few and far between.

The more locations where analytics engines are being applied in the built environment, the more data and information we have. Unfortunately, as a lot of the data is not shared we seem to reinvent the wheel each time an analytics package is introduced to a project.

**Ecolibrium:** How is big data analytics transforming the industry, and is this consistent with predictions?

**Jackson:** Where analytics are used correctly, it would appear that the smart providers are applying analytics to target predictive maintenance and advise when equipment is starting to drift outside of design parameters.

Of note is the fact that big data has been utilised for this purpose in the resource sector for years, and others could learn from this.

However, I have heard of a few instances where analytic “engines” have been replaced with skilled engineers, and this is where vast improvements of the analytic algorithms are still required.

**Horsnell:** The transparency that analytics is bringing into an industry previously cloaked under proprietary systems has been a significant transformation. The value it is unlocking is gaining more traction with clients

## AIRAH'S BIG DATA AND ANALYTICS SPECIAL TECHNICAL GROUP

AIRAH has recently initiated a Big Data and Analytics Special Technical Group (STG), which Paul Jackson, M.AIRAH, is chairing.

"We will be reaching out to interested AIRAH members who wish to assist and contribute to the committee," says Jackson.

"I urge any AIRAH member with an interest in this space to get in touch and become involved, as we look to help shape the industry."

To find out more about joining the Big Data STG, email [airah@airah.org.au](mailto:airah@airah.org.au)

**Ecolibrium:** What are the challenges that big data analytics has created in respect to people and resources?

**Grant:** The challenges are specific to market sectors.

The construction industry has the challenge of playing catch-up, and realising the opportunities that big data analytics can create. Consequently, suitability skilled people – together with resources to adopt and make use of analytics – add to the challenge in the construction industry.

**Horsnell:** With any new system or change in business-as-usual practices, the hardest part is promoting that cultural change and the engagement with clients and technicians completing the work, which needs to be inclusive to find any traction. If analytics are the only part of the solution, you will not be able to close items off and make improvements. Analytics partnered with engaging and intuitive tools to raise, track and measure any action taken is a requirement for success.

I would also say that big data analytics is creating opportunities, particularly in sectors that have or are being increasingly affected by an aging workforce and experiencing a drain on technical expertise, experience and knowledge. Big data analytics is enabling people to perform at high levels without the need for extensive experience or technical expertise.

**Clarke:** The industry is already suffering from skills shortages and adding this layer of technology onto a building is compounding the issue.

There are big data analysts coming into the industry who do not understand buildings and this raises many concerns. We have seen reports generated identifying building issues which are false, due to either misinterpretation of the data, or lack of understanding of how the building is intended to operate. We carried out an exercise of comparing an analytics report with one of our engineers logging into the BMS and doing a one-hour performance review and found a number of inconsistencies.

Having said that, there are a lot of advantages analytics can provide if set up correctly and in the hand of skilled operators. As the technology matures the need for human interaction will be reduced, and this will ultimately lead to reduced service costs and increased accuracy, as long as the data is validated.

who no longer have the desire to have companies that provide and maintain these control platforms being the only ones that can report on the performance of them.

**Clarke:** It has the potential to make significant changes in the way we operate buildings if implemented correctly. However, analytics is only as powerful as the data it is receiving.

Building analytics in its current status is typically automatic fault detection and not true analytics. Although this does provide a deeper understanding of how a building is performing and can identify anomalies, it is still quite some way to go until we have reached the world of data science and still requires a lot of manual diagnostics and interaction to generate the outcomes. This adds costs to the service, and erodes the potential savings.

**Grant:** There is no doubt that big data will transform our industry – it is merely a question of when. At this stage we can see steps being taken on some large projects around town in terms of integration of systems and setting things up to facilitate the use of analytics on building operations.

**Ecolibrium:** Who is adopting big data analytics and why? Is it more likely to be found in some sectors than others?

**Clarke:** The jury is still out debating the benefits of analytics. We have some clients who have, or are adopting this technology and seeing this as the future, while others are sitting out and observing, not convinced with the trend – particularly in commercial buildings. Data centre operators are on board and using analytics to assist with a number of things from energy monitoring to rack utilisation.

**Grant:** With a building only focus, the early explorers are the designers. Traditionally the mechanical sector has been keener to adopt analytics because of its scoping and implementation of BMS.

**Horsnell:** We have customers from a diverse range of property types, from petrol stations, supermarkets all the way through to some of the largest retail, entertainment and commercial portfolios in Australia.

The drivers are generally common to any of our clients, and include:

- Leveraging portfolio scale
- Working with existing platforms
- Maximising the value of a defects liability period on projects or new developments
- Easing reporting burdens
- Delivering performance transparency
- Producing OpEx savings
- Ensuring correct CapEx focus
- Delivering system optimisations
- Maximising labour productivity
- Measuring success across energy, comfort and experience for all types of buildings and systems.

As it has been the case in the past, customers who are obliged to meet certain performance outcomes through either corporate commitments or programs such as NABERS are often the most interested in data analytics.

**Jackson:** The better-informed clients in the retail sector seem to be utilising data in the most effective way to fully understand who is buying what and how long people are spending within major shopping centres.

## FEATURE



**Jackson:** There is lots of talk about big data but what about relevant data?

Surely, there is also the question of data integrity and accuracy. Sometimes

it is very similar to when you Google something and obtain what you think is the correct answer, only to find that the data source is vague and open to misinterpretation.

So, the issue with regards to resources is having the right people to effectively analyse the data and source code.

**Ecolibrium:** How often is a large amount of actionable data found, but there are not the resources or time to action it and make it valuable?

**Clarke:** This is the biggest challenge we are seeing.

When first implemented, analytics can generate a large number of issues that need to be addressed, require time and, in some cases, unbudgeted funding. There can also be a disconnect between the analytics provider and the various services companies to fix the issues. On one hand the analytics are monitoring servicing performance while on the other, analytics are feeding servicing work.

Back in the pre-digital days of servicing, we used to provide a carbon copy of a service report to the facility manager, and more often than not, it read the same

each month, with items outstanding for a long period of time. Analytics cannot overcome this. If real items are identified as issues they need to be resolved or it is all a waste of time and energy.

**Jackson:** As more systems are being installed, providing masses of data, it is becoming more and more difficult to prioritise. I wouldn't like to say how often useful data is located – however, the real issue is probably cost. As we get more recognition of the value of “data mining” this train of thought may change and place more focus in the space.

**Horsnell:** The basic thing to keep in mind about data analytics is, that it provides information, and that those are of no value unless action is taken from it.

Analytics can identify hundreds of faults or optimisation opportunities at any given building, but if the tools aren't used prudently, then the humans delivering the interventions can easily be overwhelmed. Identifying a million issues and fixing none is less valuable than

identifying one issue and closing it out. Therefore, having a good handle on the operational workflow for a site/portfolio/business and integrating your tools into this is much more important than the latest and greatest machine learning algorithm that you can implement into your platform.

We have adopted various techniques from other management frameworks like Agile, a software development philosophy, and are, for example, able to manage the active “work in progress” for a site.

**Grant:** A large amount of useful data is already being collected by BMS systems, but for numerous reasons, real analytics are not applied or made use of to solve or improve building operation.

Time and resources are always a constraint, but in many instances building operators don't understand the connection between cost and/or process to use analytics and the real financial benefit.

**Ecolibrium:** How do users or practitioners of big data analytics prioritise the actionable data available to ensure they can realise its value?

**Horsnell:** In practice, this means that you need to be ruthless in how you prioritise the information that you deliver to the technical resources managing the services.

We manage this by using an approach that prioritises the opportunities based on their criticality and value, and we work closely with our customers to ensure that their resource planning aligns with current and future state requirements.

Looking at the typical hard services “touch” points within the operational workflow we focus on getting more value out of each touch on an asset rather than bombarding and bamboozling the technicians and operations managers with the technology that sits behind the back end of our platform.

## FEATURE

We have developed an interface called “Bonfire”, which provides a dynamic triaged list of issues to our customers and any interested party and is able to review and program the action to them. The Bonfire system assists with creating a seamless interface between Bueno’s analytics platform and end users. This approach ensures transparency and ease to monitor and measure issues as they progress through the workflow. Access is available through any mobile device and standard internet browsers.

**Clarke:** Typically, we make sure that issues are identified with a set of KPIs to understand their category and impact, such as energy, comfort and maintenance. Energy is typically ranked a priority as it directly relates to costs, however, comfort conditions are also important to maintain tenant satisfaction. Having the ability to report on a number of KPIs is a powerful tool and particularly assists with portfolio management and corporate reporting requirements.

‘ At what cost  
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**Grant:** Big data analytics do not necessarily need to be specific about the selection of actionable data – rather the outcomes of analytics require to be assessed and actioned, based on cost and viability of implementation.

Therefore, the true challenges are:  
Will users trust the outcomes of analytics enough to run with the feasibility and implementation?

Or will the solutions be too left-field to be considered worth pursuing?

**Jackson:** This issue is “data swamping” and refers to the copious amounts of data and information available. The general theme is the perceived inability to properly analyse the data and provide useful outcomes.

**Ecolibrium:** What lessons can be learned in this regard?

**Clarke:** Analytics are never simple to implement. Existing systems can restrict data access.

Once implemented, a significant amount of manual interaction is needed to validate the data – for instance: Does it come from where it says? User interaction is also required in understanding the design and nuances of the building to set an operating benchmark from which to set rules. An appropriate budget should be defined to rectify the issues identified, with regular workshops held between the analytics provider and the various service providers.

This all takes time and money; however, once the initial period is over, the results can be significant and reductions in both energy and operating costs can be realised.

**Horsnell:** The days of static reporting on a monthly basis are dwindling, if not over. Customers expect high-quality and reliable information in real time, as this enables them to move from preventative maintenance programs into the data driven space. Data-driven maintenance provides significant benefits over traditional approaches in areas such as lifecycle, cost and productivity. The fastest way to a return on investment is to use the analytics platforms to supercharge how operators are doing their business-as-usual right now, rather than trying to force the cultural change required to fully leverage the new technologies.

**Jackson:** You need to get the right people with relevant experience on board to review the multiple data sets that are



becoming available. There is a need to start looking at standards or at the very least guidelines in this space and parameters for definition of relevant data.

**Grant:** Other industries are well advanced in the use of big data analytics. The question for the construction

industry is: At what cost will our slower adoption of the big data analytics come?

Adoption across the board will be a journey that the industry will need to make, with earlier adopters being well positioned to reap the benefits of solving problems with big data analytics. ■