Driving decisions though data

The Future of Higher Education in Australia

Microsoft

Contents

Foreword by Professor William F. Massy

I'm always surprised to learn – even now – when higher education institutions are not making good use of data to support evidence-based decisions. This limits rationality in decision-making, deprives administrators of agency in key areas, and may allow special interests to exert a heavy influence.

As Australian universities steer their way through a complex set of national and international changes and an emerging new higher education model, it's the right time to consider how data helps support effective decision making in the disruptive marketplace.

Capitalising on the opportunities presented by intelligent data analysis has the potential to unleash a variety of financial and performance related benefits ensuring the future prosperity of Australia's economy.

Yet, Australian universities invest relatively little in systems to support their decision making, especially in the mission-critical academic areas. In contrast, they spend $280 million annually on compulsory compliance reporting to Government and even more on audited financial reporting to stakeholders.

Encouragingly, the technology and processes exist today to empower the sector to make the necessary investments that contribute to long term success.

Australia institutions have more than pulled their weight in the development of best practices, but there is much that can be learnt from looking outside these shores as well as into other industries.

By prioritising data at every level of decision making, the higher education sector will be well positioned to make more strategic use of resources, increase the long-term profitability of institutions, and contribute to the ongoing viability of the sector, and the country's workforce.

Just as universities encourage students to challenge the status quo, it's time to shift mindsets toward data as something that can help solve future challenges, rather than expose new, or old problems.

"Traditional universities need to reform themselves to meet economic, competitive, technological, and political challenges of the twenty-first century, and this needs to be done in a way that preserves their most precious assets and sustains their essential values."

Professor William F. Massy

While new legislation reforming Australia's higher education sector is due in mid-2017, the reality is the longer we wait to implement any type of change the risk of falling further behind in the global economy increases.

In Microsoft's mission to empower the world through technology – and ahead of the rules coming into force – we are working with institutions to take action today by laying the foundations for a digital future.

Executive summary

How can Australia's higher education institutions implement meaningful change empowering the sector to deliver superior and tailored student experiences, achieve operational excellence, ready itself for new reforms, and optimise investments and resources to create a new generation of workers designed for success in the digital age?

These are the fundamental questions Microsoft will discuss in The future of higher education in Australia to reveal the change required, and how it can be achieved.

Regardless of what may lie ahead, the effective and agile use of data will become a powerful differentiator for Australian institutions working to thrive in a more complex marketplace.

Applying this pro-active approach ensures the sector is on the front foot to rapidly deliver against the Government's reforms. An approach that will benefit the sector, our students, and our nation's economy and global standing.

The state of the nation

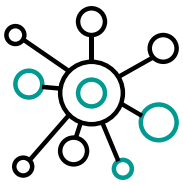
When it comes to harnessing the value of data for smarter-decision making in the higher education sector we discovered it is a practice followed by few in a consistent way. Instead, most institutions could be defined by the following:

1. Institutions unsure of what data they have at their disposal and lack the means or the 'know-how' to extract value from it
2. Institutions that understand the importance of evidence-based decision making and want to understand how others are using available tools

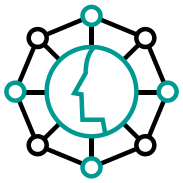
Actions into outcomes

What changes must Australia's higher education institutions make to ensure they are making the most of the valuable data that's spread across the organisation?

Microsoft identifies three core strategies to capitalise on the opportunities made possible through more intelligent data analytics:



- Create a data-centric culture: Fostering an understanding of what can be achieved with data encourages a willingness to change and do more, as well as drive adoption and utilisation



- Enable the democratisation of data: Breaking down departmental siloes results in more data being shared, unlocking a plethora of new operational efficiencies that were previously not possible

- Complement existing data warehouses with real-time business intelligence apps: Tailored decision making platforms that sit within existing applications and systems result in faster insights and smarter decisions applied in real-time

Microsoft believes improved data driven insights are central to the future success of Australia's higher education sector.

It is the key that will unlock a host of additional benefits revolutionising the services delivered, from enabling improved student engagements, adapting courses for current market needs, and optimising investments.

"I believe everyone should have access to affordable, high quality higher education regardless of geography, social or economic status."

Lea Patterson, President & CEO, Pilbara Group.

The biggest danger for Australia's universities is doing nothing at all

Australia's higher education sector is data-rich. But the insights gleaned from the swathes of information are insufficiently harnessed for the purposes of decision making.

For many, decisions remain based on history, tradition, and personal preferences – a stark contrast to organisations outside the education space, such as retailers, digital start-ups, and media companies, which are increasingly turning to data to refine business models and strategies.

It's a state of affairs that mean many of our country's higher education institutions – and as a consequence our future generations – are missing out on the ample opportunities technology presents to improve the lives of us all.

But why is this? Especially given those in the sector are some of Australia's most complex and large organisations responsible for delivering nuanced and specialised research shaping best practice across all sectors.

Microsoft identifies three common challenges, applicable to institutions unaware of the data at their fingertips and how to use it, as well as among those who understand the value of insights and are now looking to harness them:

Departments not sharing insights to create mutual value

Internal discussions are not based on a holistic view of the data available. For instance, the CFO has a firm grasp on the numbers, but might not have information on what courses experience the highest drop-out and why. These siloes make aggregation and decision making difficult.

Slow and costly processes limit effectiveness

The traditional way of analysing data is to build data warehouses, which can be a time-consuming and exhaustive process, that produce weekly or monthly reports of siloed data sets. The problem here is by the time the decision-maker has all relevant information at hand it's not integrated, and no longer a true representation of the situation. A lot of conversations in higher education remain about the past and what happened last year, impacting the ability to act in an agile and meaningful way.

Pressures to maintain surpluses

Competition among our country's higher education institutions is fierce, with significant pressure to build the surplus required to invest now and in the years to come ahead of the new reforms. In some instances this leads to a reluctance to change, which ironically means the sizeable growth opportunities made possible by smarter decision making remain untapped.

The biggest danger to Australia's higher education sector is institutions believing they can go on doing things the way they've always done them. This approach is currently about serving a purpose, rather than improving the sector and Australia's international competitiveness against a rapidly changing university sector globally.

But there is a different way. A way that's more agile. More nimble. More cost-effective for the university.

It starts with building a data-centric culture.

An improved student experience and reputation

Most higher education funding comes from students actively ***choosing*** to study at that institution because of the experience available to them.

Using their plethora of data, universities can improve the student experience and teaching standards to move up the ranking tables, and subsequently increase investments made in the institutions.

These two challenges are front of mind for most in the sector, immediately demonstrating the power and potential of data.

Importantly, harnessing the power of data among those in the sector – or any organisation – does not need to be daunting, over-engineered, or exorbitant.

What's needed to drive change is education around the opportunities enabled by improved data insights, and what questions to ask and processes to implement.

Armed with an understanding of what's possible with data – tailored teaching experiences; reduced student drop-outs; better profitability modelling and resource allocation; and increased enrolment to name but a few – the first step is to define the questions you want data to answer and create a data-centric culture.

For those unsure of the data at their disposal and how to extract value from it, Microsoft suggests decision-makers engage industry experts and their IT teams around the following questions:

- How do we use data to drive our institution forward?
- Are our existing data sets of high quality and encompassing of the entire organisation?
- How do we define the areas where improved data analytics can offer the most value?
- To limit impact, how can we build analytics into our existing systems, services, and processes?
- What is needed to remove siloes between departments and improve data sharing?
- How can I get faster access to data enabling smarter decisions?
- Can our IT infrastructure rapidly evolve to accommodate changing market dynamics in the years ahead?

Empowering business intelligence

Understanding the possibilities and working with technology experts to build associated strategies and create a data-centric culture is the absolute first requirement in unlocking the power of data among Australia's tertiary institutions.

It will ensure decisions are made on up to date insights, meaning they resolve relevant situations affecting the university at that time. Currently, the decision making process is too slow which results in actions that are no longer entirely relevant to success.

That's why explicitly demonstrating the positive impact of improved insights to faculty, given many are rightly focused on the day-to-day running of their department rather than learning about and creating advocacy for IT improvements, is key.

"Our understanding of the potential for data remains incomplete. This limits rationality in decision-making, deprives administrators of agency in key areas and may allow special interests to exert a heavy influence on government."

Professor William F. Massy

Bringing together academic and business officers will lead to improvements benefitting strategic decision making and operational effectiveness. This helps institutions make better use of their existing resources, provide students with improved experiences, and enhance cost management to ensure all fulfil their potential in the digital world.

With the foundations laid for a data-centric culture, what can Australia's universities do to unlock further value from the insights captured; catapulting them up the international league tables, and benefitting the wider national economy?

The data opportunities

Tailored teaching experiences

Use existing student experiences, activities, and interests to pro-actively suggest other courses, events, or content they might be interested in. For instance, recommending video content relevant to a project they are working on. Applying this predictive approach demonstrates an understanding and care for the student as an individual, improving the overall experiences delivered.

Reduced student drop-out

Data helps universities identify students likely to drop out of their course, and undertake effective intervention. Having a holistic view of the student, such as those not viewing course materials, starting work on assignments late or not checking their grades, identifies the pain points, empowering institutions to address these and maintain student enrolment.

Profitability modelling & resource allocation

There is huge capital investment across all areas of a higher education – it's not just about students. Having an insight on internal resources, such as use and cost of space, lecturer availability and expertise, and the cost of delivery, enables smarter decisions benefiting the bottom line.

"If people understand the underlying rationale they are much more likely to come along for the ride."

Professor William F. Massy

Convert interest to enrolment

Being able to expertly profile students expressing an interest in studying at a select university based on factors impacting their decision allows tailored recruitment policies and messaging. To give an example, some students might place more value on transport options to campus, while others want to see the success of previous alumni.

RMIT builds a global reputation for excellence with data

RMIT University runs 17,000 classes across three campuses and two sites in Victoria, and a number of offshore locations with partners in Asia and Europe, offering a full spectrum of vocational, undergraduate and post graduate programs to 80,000 students. The university is known for its state-of-the art facilities, transformative approach to education, and excellence in technology, design and business.

"Universities can be incredibly viable businesses if you get them right," says Wayne Poole, Deputy Director of Financial Services at RMIT.

'Getting it right' has been part of RMIT's long- term strategy – executed in partnership with consultancy firm Pilbara – with a focus on creating a 360-view of the university so it can understand the viability of each program, course and student.

As a relatively young university, RMIT has had to work hard to source outside investments in cutting-edge design, technology, and infrastructure, meaning Wayne and his team closely monitor all available data to boost business performance.

"While everyone wants to teach certain programs, the reality is those programs sometimes aren't always profitable. Until we started analysing the data available to us, we could never have seen exactly how and where we were cross subsidising between programs and sectors."

Identifying the need for change in how the university viewed its investments, resource management and conceived "profit", Wayne led RMIT down the path of activity-based costing. The institution began working with Pilbara in 2012 to collate information and data in a way that was tailored specific to the organisation.

"We're bringing together half a million transactional lines. With Pilbara's model we can take our entire student database, payroll system, every course, program, timetabling data from room bookings, and drop it all in one platform. This, combined with external data at the teaching census (for example, library usage), shows us a complete picture of our finances each year."

RMIT also started correlating non-financial data into analytics, including Good Teaching Scores from student evaluation surveys and Excellence in Research for Australian (ERA) scores.

"We're layering that data with our financial data to see if there's a correlation between money invested in a research or teaching service, and whether that leads to increased student satisfaction."

Analysis that might take some organisations a week, RMIT can now complete in under 24 hours.

The next step is to integrate this data with our Office of Business Intelligence, which will leverage visualisation tools to make data a more accessible resource for all.

"Visualisation is the key. You know everyone loves data but it's bringing it to life that really allows you to tell the story."

Leveraging and analysing the masses of data available to it, RMIT continues to generate surpluses which RMIT contributes to more advanced research, better infrastructure and student facilities, and ultimately, the reputation of the institution on global scale.

"What differentiates universities is reputation and the ultimate end-point outcome for those who study with us. We look at our business with multiple lenses and we're focussed on our customers - our ultimate customer being our students, and the society we're optimising education for."

Wayne Poole, Deputy Director of Financial Services at RMIT University

The data democratisation in higher education

Having developed an understanding of the potential of data, the next step for institutions in realising the opportunities is implementing processes, systems, and developing the right skills enabling them.

Microsoft once again encourages faculty and business officers to foster a new mindset. One that sees the institution operating as an agile, competitive business – rather than inflexible organisations limiting internal collaboration and innovation.

As the value of data is recognised by all staff, the shift to both a data-centric and agile culture will accelerate.

It's at this stage of data democratisation in the transformation – where siloes break down and departments begin to share insights for better decision making – where data shows its true value.

Achieving real-time decision making

Much data from the higher education sector today comes from the core systems of record: student information systems, finance platforms, learning management tools, and sporadic public data.

It is structured, siloed, and often consequently viewed in isolation. The data reveals only basic financial information, instead of outlining the cause and effect of different approaches.

Complementing existing IT infrastructures used by much of Australia's higher education sector, there are business intelligence tools and analytic dashboards capable of integrating existing and diverse data sets to enable faster and smarter decision-making through a holistic view of the entire situation.

The rewards of this approach are positively impacting finances and funding in the sector, student experiences and employability, and industry reputation – nationally and globally.

Universities embarking on this next stage of their data journey must consider how they make more real-time and historical data available within the organisation.

Once data insights are captured, there must also be a willingness to experiment with how it can be used. The insights and learnings gleaned can be used to refine further strategies.

For instance, comparing the impact on student attrition rates from the student / staff ratio. This empowers decision makers to rapidly identify and resolve trends. It also allows rapid modelling of 'what if' questions to short circuit the often time-consuming process of debating whether there are relationships between different factors, because you can quickly check the reality against the diversity of opinions in a group.

Real-time insights empower institutions to quickly get into the business outcomes conversation, rather than stuck on lengthy analytic processes. In Australia we've seen examples where real-time business intelligence tools have cut the time to deliver business insights from months to minutes.

The potential is huge. Microsoft recommends the following considerations are made at this stage of the data journey, designed to ask intelligent questions of the data already captured through existing platforms:

- Does the institution have the skills to use the data and integrate it in an agile way?
- What insights will we need to glean in the coming years to empower our students, researchers and faculties to be successful?
- Do we have a holistic view of our students – from course completion, careers, and location – allowing us to identify trends?
- Can we demonstrate to state and federal government how investments are being successfully deployed?
- Can our systems easily integrate with rapidly emerging publicly available data sets to unlock further value?

Focus on outcomes not inputs

Out of the realisation there's many different sources of data people can use to improve processes and overcome challenges is the culture of thinking about how to improve things using data. Not only at an organisational level. But an empowered individual level too.

Agility – at technical and cultural levels – is required to ensure data makes a real-time impact. Universities can no longer afford – from an investment and resource perspective – to undertake data analysis projects that can take up to two years for completion. We need to read the data at its source and use it to make a fast decision.

The reason we need faster data analysis and decision making is our business problem cycles are getting faster all of the time. We no longer have the luxury of months to make a decision, and sometimes we don't even have the time to collect the data into a single place before using it.

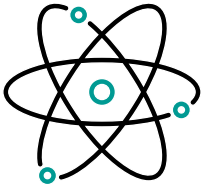
When institutions are agile and willing to experiment with data they get to the answer much quicker.

The tools and insights unleashing this future exist. The challenge for Australia's higher education sector is now putting them both to good use to help our students and nation achieve its full potential in the global, digital economy.

The value of integrating data

Make worthwhile investments

Comparing data sets like number of students against teaching quality or number of staff enables tertiary institutions to rapidly understand the impact current situations are having. It allows action to be quickly implemented, overcoming challenges and grasping opportunities.



Help graduates become more employable and boost funding

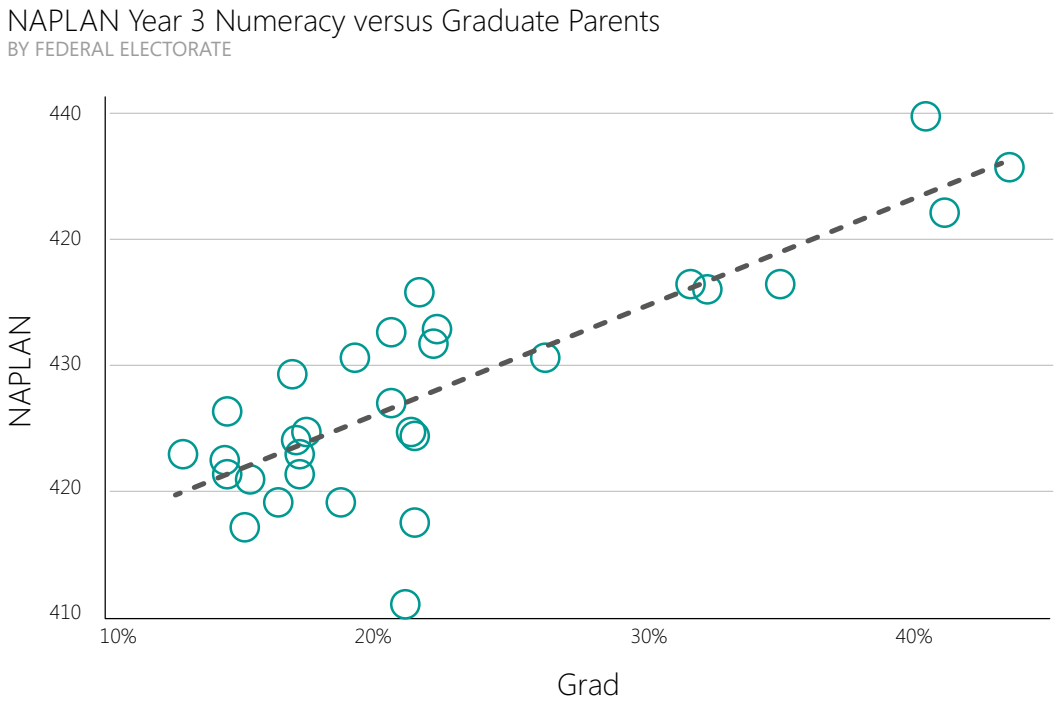
As government funding in investment increasingly aligns with a national economic focus, predictive analytics allows universities to show where its students will find employment after graduating. Similarly, it allows institutions to provide personalised support to help students get jobs.

Faster Decisions

Using modern dashboard technologies, analytic projects can be completed in a matter of minutes. This means more questions can be asked and more insights achieved to foster smarter decisions across all facets of the organisation.

Setting the global standard

Few higher education institutions across the globe are using data insights to their full advantage, meaning an opportunity to lead in this space exists. Those grasping the opportunity will see their reputation – across education experts and students – grow, attracting the best talent and investments to develop further processes and value.



"It took me thirty minutes to use ABS data and Queensland's Open Education data to uncover whether there was a relationship between NAPLAN scores compared to parents' education levels by suburb across Queensland. Previously, people would have spent ages trying to justify whether they would even ask the question because it involved three to four months' work from somebody else."

Ray Fleming, Education Industry Solutions Executive, Microsoft

What Australia can learn from Stetson, the small university with big ambitions

Founded in 1883, Stetson University is a private, non-profit university spanning four colleges in Central Florida. With a student population of 4,300, it's comparatively smaller to other, better known institutions in the state. Yet, Stetson is steadily gaining a reputation as the affordable, progressive school of the American Southeast – driven by its innovative use of business intelligence.

Like some of Australia's leading universities, Stetson has faced its share of challenges with history and tradition long dictating decision making.

As the volumes of student data captured through digital platforms and the various engagement points have grown, data curation became increasingly difficult. The process was time consuming and analytics were built on outdated information, which had the potential to have an adverse impact on the student experience.

To future-proof the organisation and better appeal to students in the competitive U.S market, Dr. Resche Hines, Assistant Vice President of Institutional Research and Effectiveness at Stetson set out to answer three questions:,

1. What makes students stay or transfer to different courses and institutions?
2. What leads to academic successes and struggles and how can they be anticipated?
3. How can curricula be optimised and brought into the 21st century?

Hines recognised the need to extract, interpret and democratise the needed data, and to introduce ways of viewing and curating it that would be scalable, user-friendly and familiar. The insights captured would debunk long-standing institutional myths and engage the entire academic community with accurate, relevant information.

Stetson's chosen tool was Microsoft Power BI.

To encourage user adoption and show how Power BI alleviates the challenges of data management, Hines demonstrated to every school and department chair how the tool could be used.

The response was overwhelmingly positive. Today with Power BI rolled out across the institution students, academics, teachers, administrators and alumni are empowered to drive their own data-led investigations, and have better-informed conversations helping the Campus evolve.

"Students are more engaged, connecting with their campus through visual information. The faculty feel more supported to make new requests that enhance learning, and most importantly, Stetson has built its ability to conduct complex research and have more pointed conversations relating to the future of the university and student retention," said Hines.

He continues, "I can understand that many people in my situation know the data is there, but might be grappling with what to do with it. Power BI has allowed Stetson to collate and transition data to a platform where we can finally look at it in a visual, comprehensive, interactive way, and respond in real, relevant, and impactful ways."

A streamlined journey to success

The journey to a data-centric and agile culture in Australia's higher education sector does not require a significant overhaul of existing IT capabilities.

Instead, it involves deploying complementary technologies enabling faster-insights from the data sets already available, and which integrate with many of the applications and tools used by students and employees alike.

The ease with which insights can be made is why developing an understanding of what's possible with data is fundamental to success.

Sharing data between multiple departments is a key driver in the transformation of the higher education sector. Deploying powerful decision-support models with well-tailored user interfaces is the first step toward improvement.

Aggregating data into a single platform allows tertiary institutions to:

1. View the entire organisation under one dashboard, from financial information through to real-time updates from outside systems. Consequently, trends can be easily identified and resolved, and predictive analytics allows users to forecast the impact of expected changes. The data made available can also be tailored for users so they only see what is relevant to them.

2. Produce real-time reports helping users analyse, visualise, and share reports in minutes, explicitly demonstrating the value delivered back to the business. Creating an awareness of what can be achieved with data is critical to success of all business intelligence projects, and the speed and ease at which it can be achieved has the potential to accelerate the sector's transformation.

3. Share analytic models with other departments, ensuring a high consistent level of service. Once successes begin to be realised, more departments will want to follow suit. Having a ready-made set of templates allows business intelligence tools to be quickly rolled out and the benefits realised.

4. Embed analytic tools into existing applications like Microsoft Excel, PowerPoint and Word, empowering users to draw their own data insights. It means more questions can be asked, more answers gathered, and most importantly ensures those at the front-line are investigating issues that matter and make a real difference.

Harnessing the potential of all technology to unlock further benefits, institutions will benefit from decision-support models deployed in the cloud and available across devices – whether that's the PC on their desk, or their mobile phone.

As more data access is required for mobile users and when users are off the main campus network, it's important to consider data classification and the services being used remotely. Some of the information gathered and analysed may be commercially confidential, or may have a sovereign need to stay within Australian shores. It's therefore critical these considerations are made when institutions select the cloud service for their needs.

Making data available on desktop platforms and mobile devices, such as tablets and mobiles, should also be a priority considering the mobile nature of work in higher education – whereby employees work across locations and devices. Addressing this need allows users to analyse data when and where they want, in the way that suits them best.

The reality is with new reforms on the horizon and new technologies coming to the fore, none of us truly know the exact data the higher education sector will need to be analysing in just a few years' time.

But we do know we will need to make smarter and faster decisions.

What we need – and the action we can take today – is tools and systems allowing us to

work with data wherever it comes from and whatever it looks like.

Fostering a data-centric culture and deploying real-time business intelligence technologies is essential to the transformation and future success of Australia's higher education sector.

Pilbara: turning knowledge into insight

Pilbara Group is an Australian-based global consulting and Software Company dedicated to helping universities and colleges measure the cost-effectiveness and quality of research, as well as academic resource allocation down to individual courses and subjects.

The company is working with higher education institutions across the globe – including the Australian National University, Deakin University and Western Sydney University– to unlock the power of data and thrive in this new environment.

The Higher Education Decision Support Model (HEDSM)

Central to enabling this, is Pilbara's Decision Support Model, visualised using Microsoft Power BI, and its own modelling software ACE on-Demand, built on Microsoft SQL Server.

Configured specifically for higher education institutions it is designed to provide:

- Enhanced Activity Based Costing reports on teaching activities at the course level, driven by timetabling and student management systems
- Detailed data about the costs, revenues, margins and activity, and outcome-related variables like class sizes, teaching loads, and student performance and attrition where this data is available
- Historical views of past performance, plus the ability to test alternative assumptions about future financial planning and budgeting decisions
- User-friendly dashboards that display both the historical and forecast data.

Supporting strategic and tactical decision makers

Because the HEDSM covers the entire university, it can be used to support high-level strategic questions as well as lower level tactical questions.

It now take only minutes to hours to answer these questions, compared to the days or weeks associated with using traditional or manual methods.

The types of questions the models can support include:

- Which courses/programs are running at a loss?
- What are the margins associated with each of the different teaching delivery methods (online, classroom, flipped etc.) and if the data is available, which method(s) are the most effective for student learning?
- What is the minimum number of students for a course to break even?
- How do different student types contribute to the course, program, school and university margins?
- What will be the financial impact of a drop/increase in international student numbers?
- What is the financial impact of adding/removing courses?
- What is the financial impact of a reduction of Government funding and/or an increase in student fees?
- Is teaching subsidising research? If so, by how much and in which disciplines / schools / faculties?
- What is the ratio of direct expenses to every direct dollar of Research Grant revenue?
- How does this change once you add in faculty support or university-wide costs?

Essentially, Pilbara's model enables universities to build a complete picture of their organisation at any given time, respond to questions on budget and resources quickly, and model what-if scenarios based on future parameters.

Supporting budgeting and financial planning

"There's a range of data universities can start looking at to go down a particular strategic path. Ordinarily, it could take a long time to pull data together and build spreadsheets for one question, and then do it all again for a completely different question. Whereas when the entire university is modelled you can answer multiple questions. It's a build once, use many times solution."
Lea Patterson, President & CEO, Pilbara Group.