The Top Shared Governance Data Requirements of Higher Education Institutions for Academic Resource Management

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TURNING KNOWLEDGE INTO INSIGHT

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Proper shared governance requires a shared platform. It is essential that there is a single view of the institution that includes the data required for both financial management as well as academic management.

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About the Authors

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Formerly Vice-President for Business and Finance and Vice-Provost, Research at Stanford University, Professor Massy holds a PhD in economics and MS in management from the Massachusetts Institute of Technology, and a BS from Yale University. Professor Massy's contributions to higher education are well known. His publications: Planning Models for Colleges and Universities, Resource Allocation in Higher Education, Honoring the Trust: Quality and Cost Containment in Higher Education, and Academic Quality Work: A Handbook for Improvement, have become standards in their respective fields. His latest book Reengineering the University: How to Be Mission Centered, Market Smart, and Margin Conscious is available from Johns Hopkins University Press.

Ms. Michelle Brooke

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Ms. Brooke is a senior member of the Pilbara Group team with nearly 25 years' experience in costing, performance measurement, funding and cost recovery reviews, and data collection / modelling / analysis in the public and private sectors.

Ms. Brooke manages all the Australian University implementations and updates, and consults on an as-required basis for US College implementations.

Dr. Massy and Ms. Brooke recently interviewed around 50 individuals at several higher education institutions across Australia to better understand what academics and administrators really need to support both their day-to-day as well as big picture decision making. They learned that **academics want to be involved in the financial management of their institutions to ensure they are sustainable.** In this white paper, Dr. Massy and Ms. Brooke explore the 11 shared data requirements uncovered during those interviews.

Requirement #1: Analyzing Workload Profiles

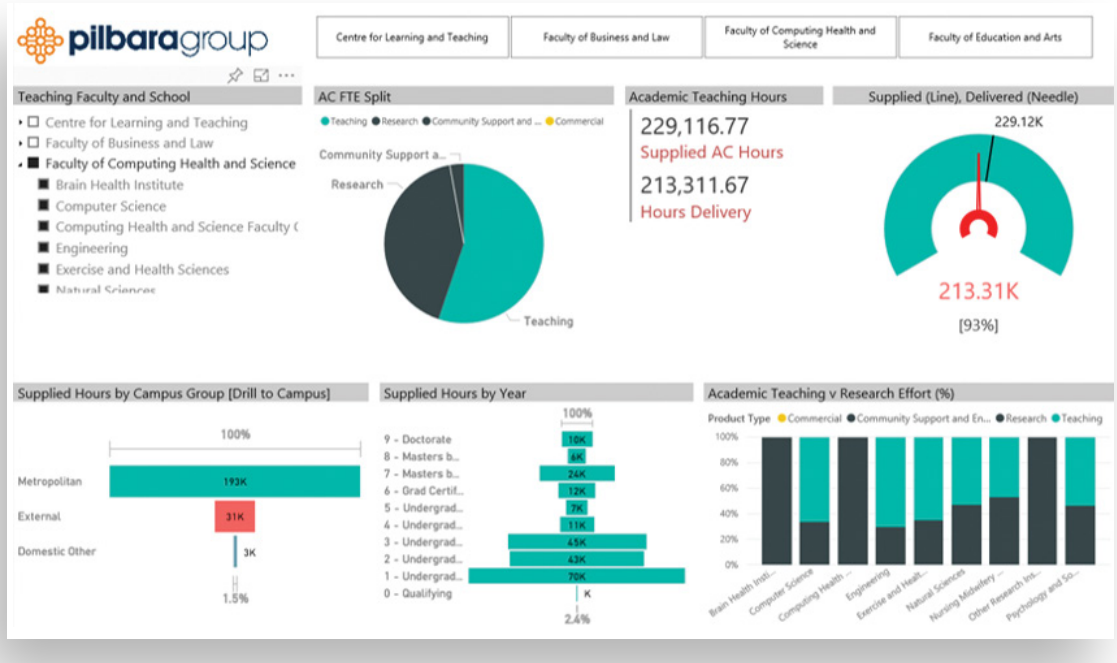
Academics today are more aware of their workload 'profile' than ever before as many universities increasingly lean towards individual workload profiles rather than a school or university-wide standard.

When Pilbara starting modelling universities over a decade ago, the standard was very much 40/40/20, whereas today many profiles are built from the bottom up and vary greatly depending on research load (externally funded research) and Higher Degree Research supervision requirements (with many universities now including this under their 'research' split rather than their 'teaching' split).

In some universities, Faculty can negotiate their individual workload profile, whereas others may be bound by specific teaching workload requirements as outlined in their respective Enterprise Agreements.

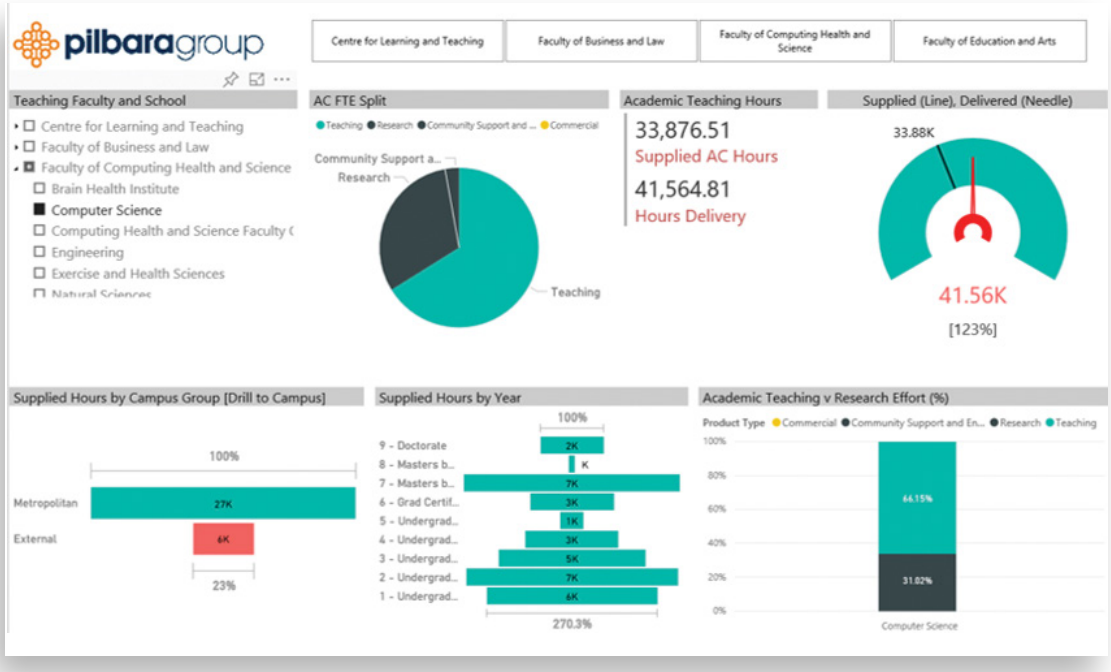
Regardless of whether these profiles are set at a university, faculty/college, school or discipline level, it may be hard to recognize the impact of those profiles on the relationship between, and cost of, teaching and research. Rarely does a Dean or Head of School produce data-supported evidence regarding the total level of teaching effort required by the school and compare that to available teaching effort.

The Pilbara model can provide evidence to support schools and disciplines that are under-resourced and thus having to reduce their discretionary research load to conduct the 'must do' teaching workload. For example, in the dashboard below, the overall academic hours required (delivered) for the Faculty of Computing, Health and Science sits close to the hours supplied (paid), at a ratio of 93% capacity.

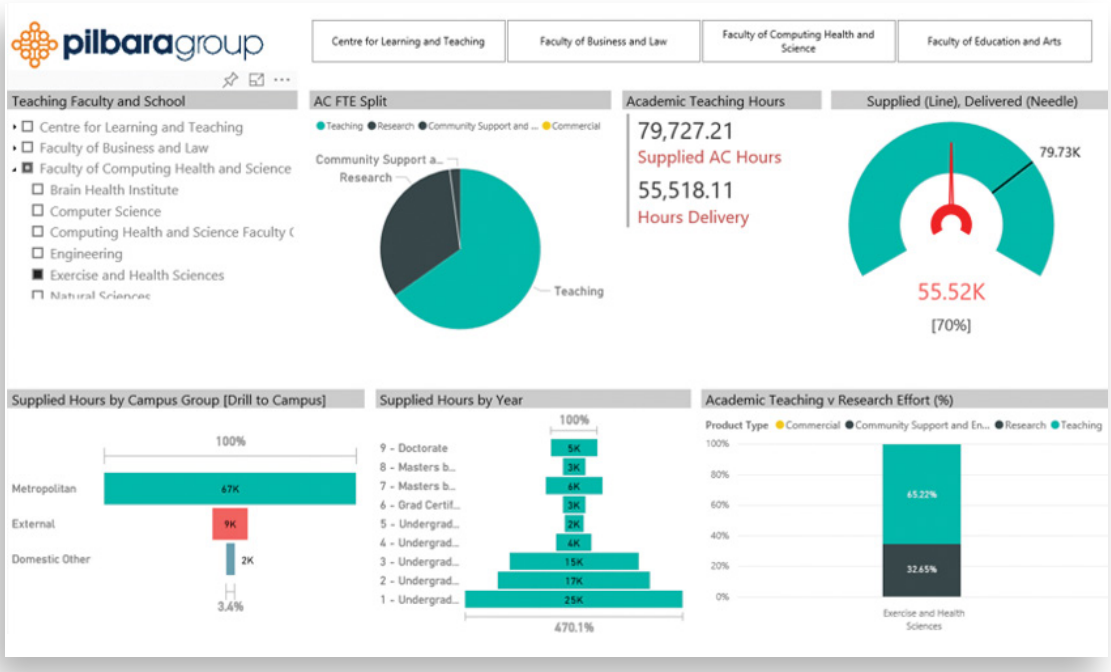


Analyzing Workload Profiles cont.

However, at the school level, there are some schools working well over capacity, i.e. Computer Science: (123%)



Whilst others, i.e. Exercise and Health Sciences, are working well under their capacity (70%):

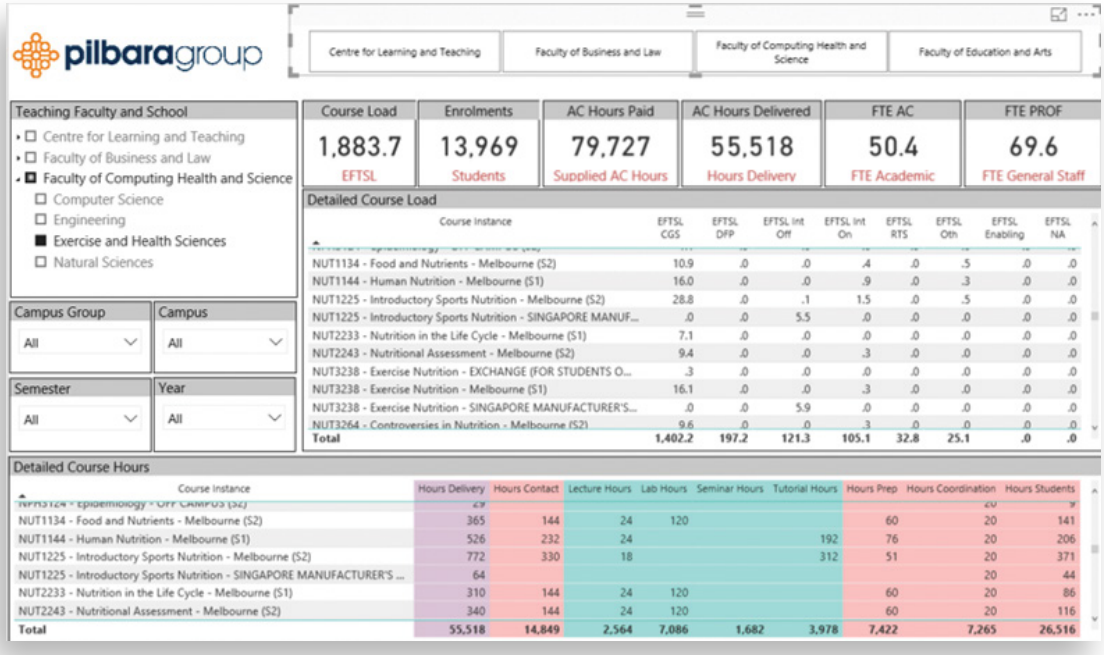


The model can assist Deans and Heads of Schools to better understand workload profiles within their faculty and where actual resourcing pain-points are occurring.

Further breakdown of the academic hours is also available, firstly breaking down the delivered hours into Contact Hours, Preparation Hours, Student Hours (marking and assessment etc), and Coordination Hours, and then secondly, breaking the Contact Hours down into class type, for example:

- Lecture hours
- Lab Hours
- Seminar Hours
- Tutorial Hours etc.

This breakdown can be shown at the Course instance level. Course instance is defined as where, when and how an individual course is taught, so a course taught in semester 1 is a different instance to the same course taught in semester 2.



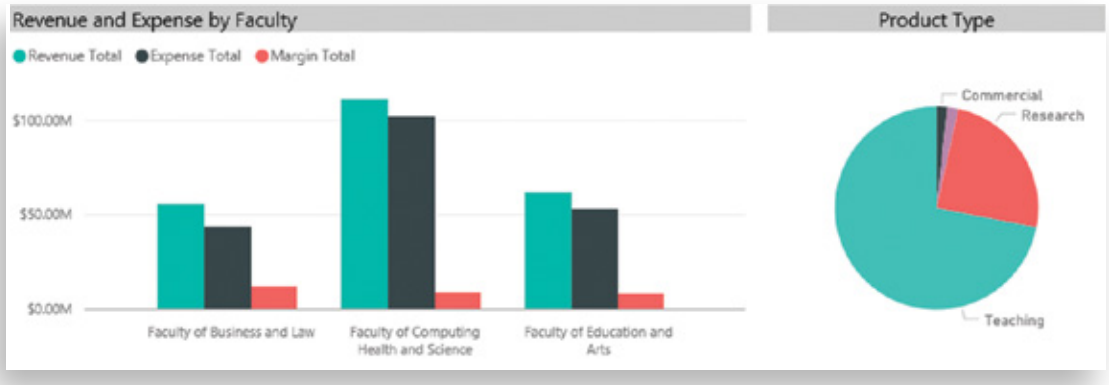
Requirement #2: Understanding Teaching & Research Relationships

Following on from knowing your 'available' versus 'required' academic hours, the next level of understanding is to apply that knowledge to all the outputs of the school or discipline and not just the teaching component. By understanding the full theoretical output of a school, and then applying the respective workload profiles (be they at the individual or school level) to help distribute academic salary (traditionally the biggest slice of the school's expenses), Deans and Heads of School will be able to better understand how teaching may be subsidizing the research outputs, or in some cases, vice versa.

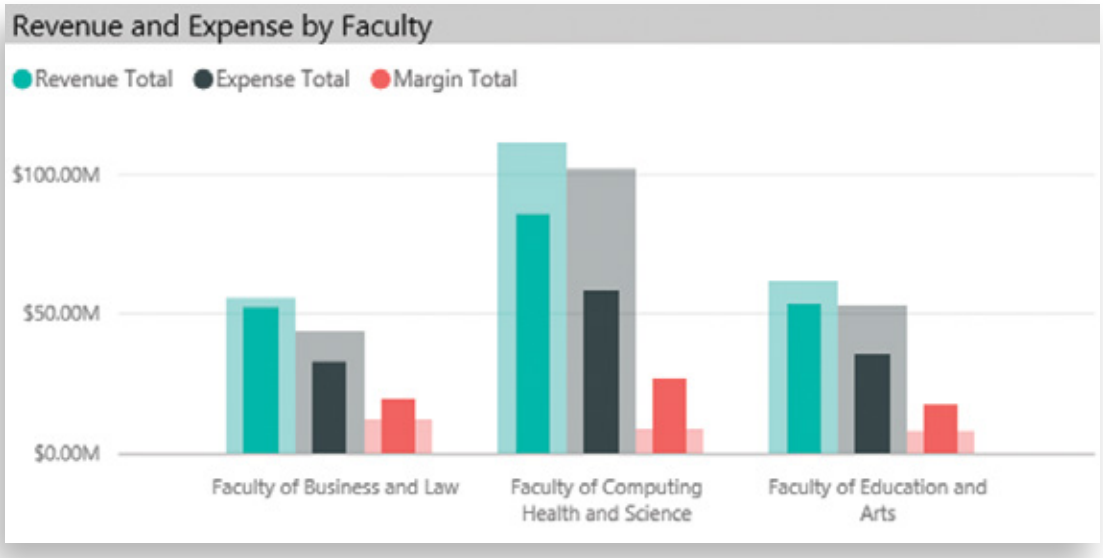
At a school or discipline level, it can be relatively easy to work out a simple split of direct costs between the two big product sets that a school or discipline produces. However, once you start to factor in any school or faculty support costs (including the *service or admin* component of the institution's workload splits), it can become more involved. Adding university-wide costs such as HR, IT and Facilities expenses makes it an all but impossible exercise to rigorously compare the different schools.

Providing a robust mechanism to distribute support and overhead costs down to the individual school products (subjects and degrees on the teaching side and fields and subfields on the research side) is a 'bread and butter' feature of a university's operational cost model.

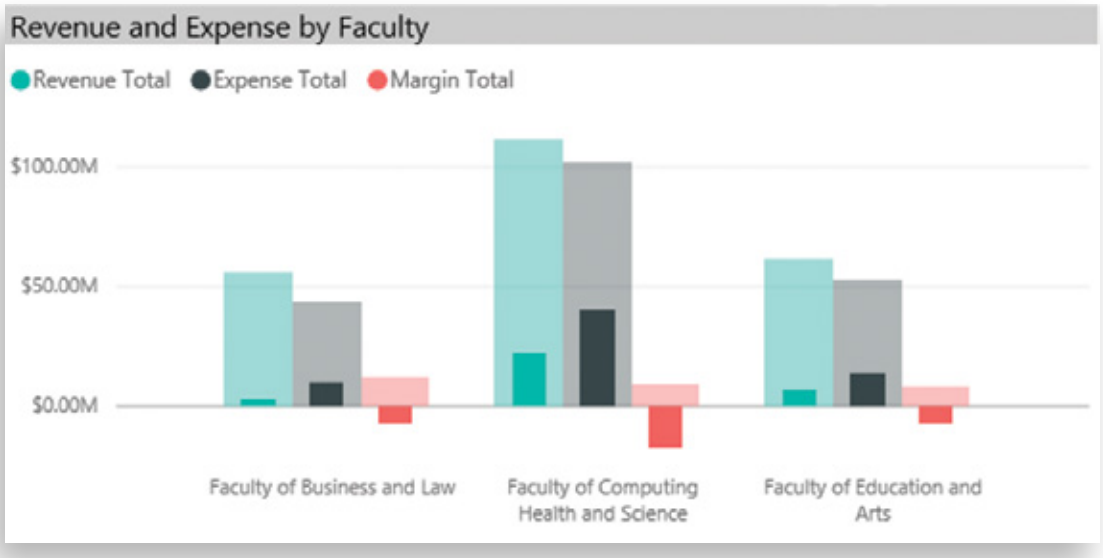
Below we can see the overall margins associated with each faculty, and on the right, the portion of expenses associated with the major product sets of Teaching, Research, Commercial and Community Engagement.



Microsoft Power BI adds further insight by showing how each product set contributes to the overall margin (in red). By allowing you to select a product (in this case 'teaching'), the revenue, expenses and margin of just that slice of the faculty's activity is then shown as compared to its overall figures. In the visual below, the solid bars indicate the teaching component, with all three faculties showing a higher margin for teaching (dark red bars) than for overall margin (the lighter red bars).



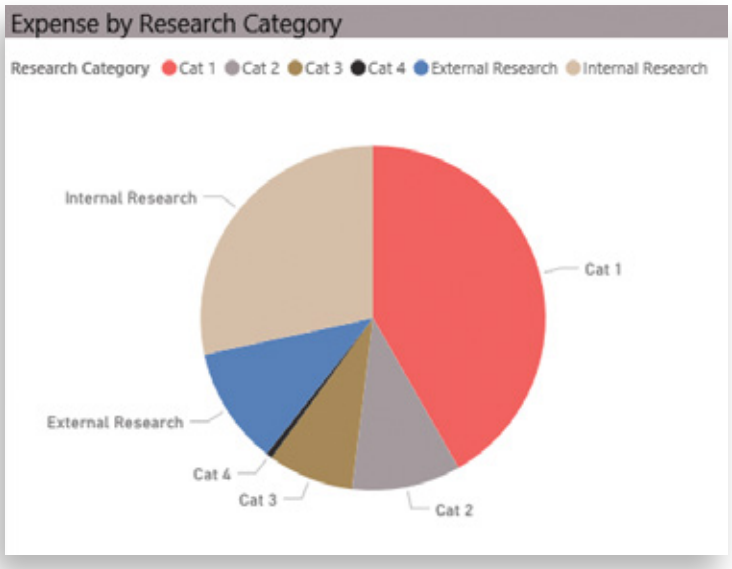
The view looks quite different when 'research' is selected. Here you can see how research has a negative margin within each faculty (the solid red bars), with the faculties' overall margin showing up as the lighter red bars.



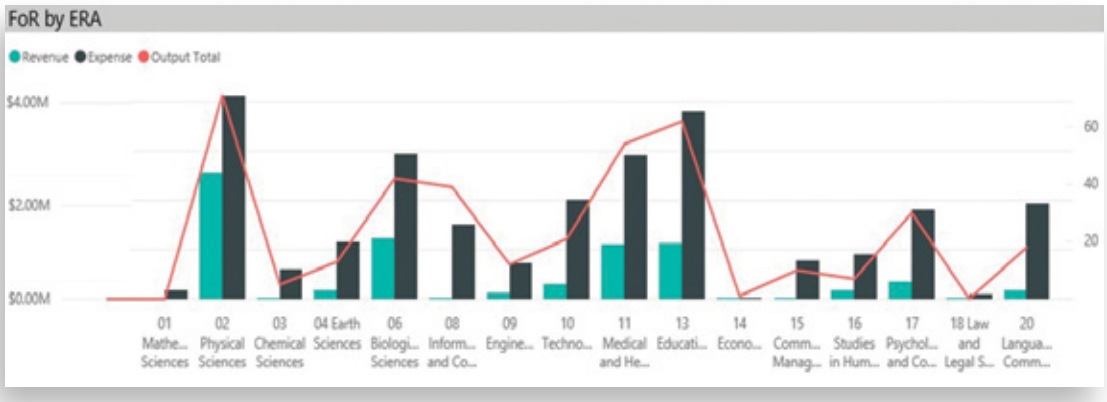
Understanding Teaching & Research Relationships cont.

If desired, the model can be configured so that HDR Supervision can be isolated as a completely separate 'product' enabling it to be viewed as either part of teaching or alternatively as part of research, depending on the user's requirements.

Once you understand the true cost of research within a school or faculty, the next step is to analyze the makeup of this cost. At a minimum, institutions should understand the cost of department (internally funded) research versus that expended on externally funded research. An even better view is one that details what type of research is being undertaken. In Australia, that can be by Research Category (Cat 1, 2, 3 or 4), or by field of research (FoR)/discipline.



In the graph below, the revenue and expense of each broad field of research is compared with the number of outputs (publications, journal articles etc) attributed to that discipline. One of the things we learned in our interviews is that disparities in this comparison may lead to institutions adjusting their research investment strategies.

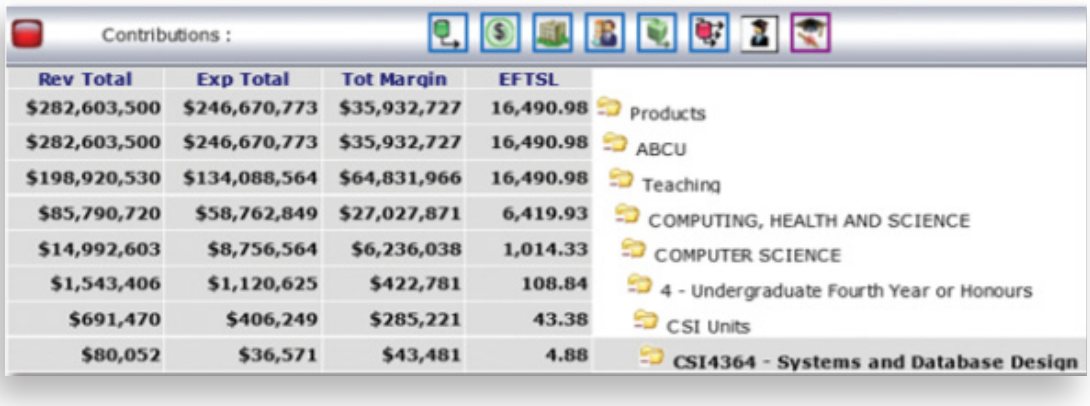


Requirement #3: Understanding Your Delivery Options

Universities are constantly jugging resources – research brings the rankings and brand while teaching brings the bulk of the revenue. In Australia, this has become even harder in 2018 with the capping of CGS (Commonwealth Grant Scheme) funding.

Universities see their students as customers and provide a range of services, both inside and outside of the lecture theatre, to entice, retain, assist and support them throughout the students' university life. This often includes providing a range of options regarding when, where and how a course (subject) is offered.

Having a cost model that provides you with the margin associated with a course name, whilst being suitable for many things, won't help you make decisions regarding the when, where and how. As shown below, CSI4364 is making a healthy margin…but it isn't telling you the whole story.

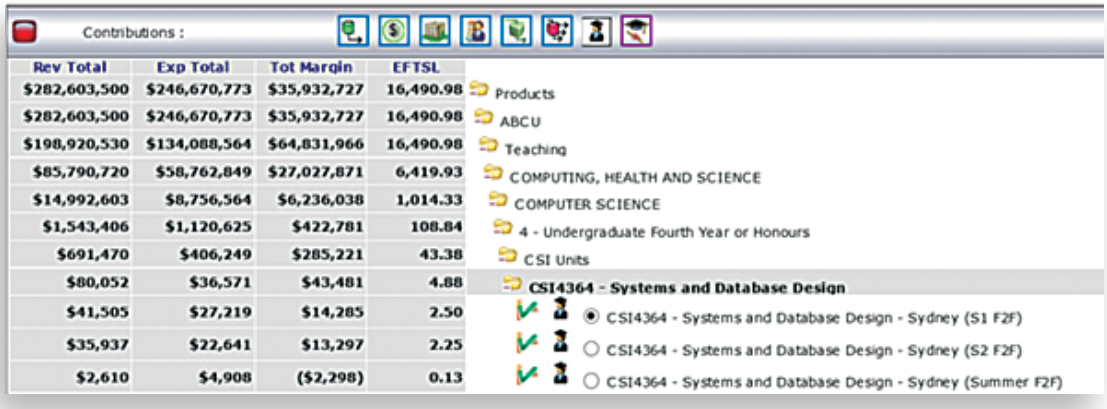


To do this, each course needs to be broken down by the three components making up the when, where and how:

- **When:** teaching period / semester / term
- **Where:** campus / location
- **How:** face to face / online / blended / external

Understanding Your Delivery Options cont.

It is not until you can pull apart the cost of delivering a course to this extent that the range of decision options become visible.



As can be seen above, whilst the course overall is doing well, it is being taught in three separate instances. In this case, they are all in Sydney, all face to face, but being taught in three different sessions – semester 1, semester 2 and summer. The two primary sessions have around 20 students enrolled in each instance and are showing a positive margin. However the course instance being taught over the summer period only has one student (0.125 EFTSL) enrolled with the result being that the summer version of this course is making a loss.

So now the cost model is providing you with additional information that can assist in some more complex decision making.

Is there a specific reason why the course needs to be taught in summer school?

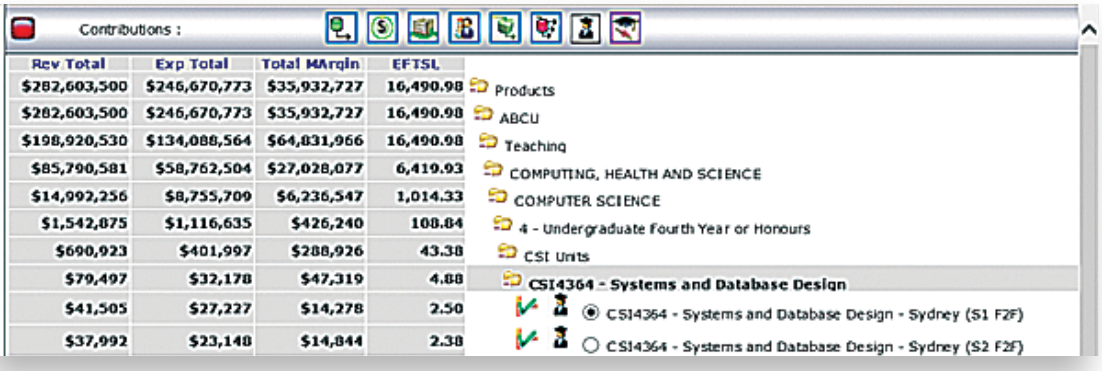
- If there is, is there a way to increase enrolments in the course? Note that cannibalizing students from the primary sessions isn't necessarily the answer here. But increasing overall enrolments with specific attention paid to the summer session could be an option.

But if there is no specific reason, then the next phase of the analysis should be looked at. If next summer the enrolments were the same, would the university save the $2,300 that it lost on teaching this course during summer if it was cancelled? It depends on what happens to that one student…

Option A – the student enrolls in either the semester 1 or 2 course instance instead.

- The university retains the direct income related to the student.
- The fixed costs associated with teaching that course over summer aren't saved (things like the provision of HR and IT etc.). Instead (assuming everything else remains constant at the university), the portion of fixed costs will be reallocated out over all the other courses being taught.
- The asset space costs associated with the rooms that were booked to deliver that course will go into the 'unused space' pool and be redistributed back out over the courses being taught (depending on the excess capacity rules used within your cost model).
- A portion of the direct costs associated with teaching that course over summer could be saved, for example, if casual staff had been employed to teach it.

By running this scenario through the model, we can see that the margin for the course has gone from $43,481 to $47,319 – just over $3,800 more.

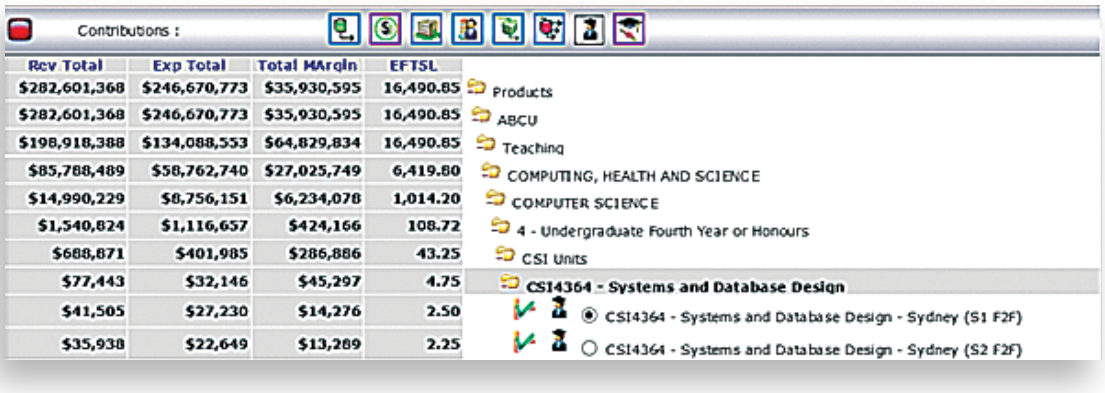


Understanding Your Delivery Options cont.

Option B – the student doesn't enroll at all.

- The university loses the direct income related to the student.
- All the fixed costs remain.
- Some of the direct teaching costs are saved.

This results in an overall margin improvement of around $1,800 for the course, but the university's margin has reduced by $2,132 – a worse outcome for the university overall.



Cost of Online Delivery versus Face-to-Face Delivery

The need to understand the cost and quality benefits associated with different delivery modes is increasing. Online teaching is not new. However, is the time saved by not running lectures and tutorials outweighed by the potential need to spend more time per student?

The only way to quantify any cost savings (or increases) directly related to online teaching is to firstly have a very good understanding of the cost of delivery face-to-face and what the course profiles are relating to assessment and student contact.

This is further complicated by additional factors that can blur the potential cost savings related to online delivery, for example:

- Blended delivery, where the lectures may be delivered online and the students turn up just for tutorials or labs;
- Online training being delivered by an external provider, often for a percentage share of the revenue earned via the student; and
- Having an external partner that may recruit and manage the online students, but not teach them, again for either a revenue percentage, or possibly a direct fee per student.

A Pilbara Group predictive model allows you to create alternative 'delivery method' scenarios, which together with other variables, such as class size, allows the user to model these types of changes quite easily.

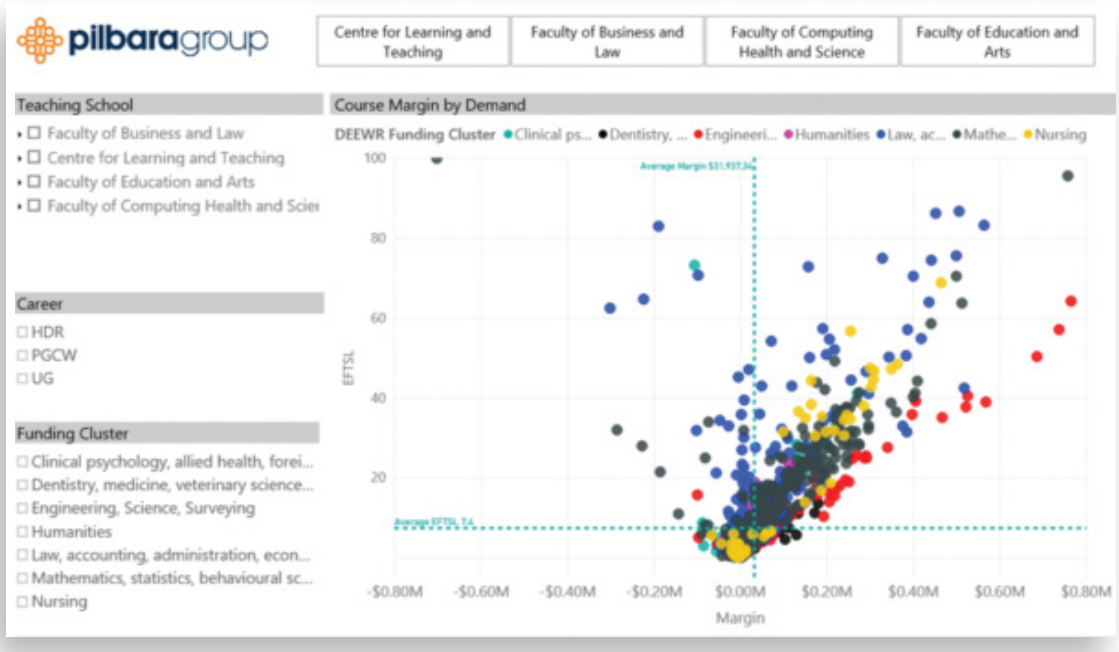
Requirement #4: Identifying Course Candidates for Redesign or Elimination

It is not uncommon for schools to receive pressure to address their low enrolment courses (subjects). For example, they may be told that they shouldn't be running courses with fewer than, say, six students in them.

So how do you go about distinguishing the 'good' courses from the 'bad' courses? It is not a simple process, nor is it overtly obvious – course analysis is like peeling an onion, there are many layers that need to be looked at before getting to the core of the issue.

Identifying the courses to review:

While low enrollment courses are the frequent recipients of these types of reviews they are not always the courses that should be addressed. Examining the scatter plot below (enrollment is plotted against the vertical and courses left of this axis are making a loss) we can see the largest losses are achieved by some of the courses with the highest enrollment. Reviewing the teaching methodologies for just a couple of these courses could have a much larger financial impact than all the low enrollment courses combined.



Returning our attention to the low enrollment courses that are running at a loss in the plot below, the red dots indicate the same course but taught in three different locations or sessions. The circled course may be taught at a new campus for the first time, or taught overseas, or may be required to allow students to fast track their degree by being taught in the summer. Hence there could be legitimate reasons to retain this loss-making instance, especially as the course as a whole is doing well. Conversely, it could be an instance that should be considered for teach-out whilst retaining the other two high-load instances of that course.

The course is an integral part of a program:

Low enrollment courses are frequently highly specialized third- or fourth-year courses that form a key component of a program, so it does not pay to review any course in isolation. For example, a course may be highlighted as being low enrollment and making a loss:

Course	Course EFTSL	Course Students	Expense Total	Revenue Total	Margin Total
Economics for Planning and Development	0.75	6	$47,558.08	$8,721.03	-$38,837.04

Identifying Course Candidates for Redesign or Elimination cont.

But when put in perspective against the program it is supporting, the program as whole looks very healthy (note that this program is only receiving 40% (or 0.3 out of 0.75 EFTSL[1] / enrolments) of the course):

Bachelor of Urban Development					
Course	Total Course EFTSL	Program EFTSL	Expense Total	Revenue Total	Margin Total
Economics for Planning and Development	0.75	0.3	$19,023.23	$3,488.41	-$15,534.82
Environmental Law and Administration	4	0.26	$2,493.08	$1,868.90	-$624.18
Planning and Development Law I	4.5	0.51	$3,200.03	$3,387.38	$187.35
Economics I	86.75	0.25	$1,023.51	$2,579.70	$1,556.19
Business Career Development	62.5	0.25	$4,376.63	$5,996.93	$1,620.30
Understanding Pollution	12.5	0.25	$4,111.07	$6,010.02	$1,898.95
Foundations of Business Knowledge	117.63	0.25	$3,382.99	$5,374.61	$1,991.63
Introduction to Social Analysis	21.25	0.51	$4,129.49	$6,253.61	$2,124.12
Project Management	1.63	0.54	$2,821.10	$5,525.49	$2,704.39
Legal Framework I	83.25	0.5	$1,385.07	$5,524.15	$4,139.08
Principles of Urban Design	5.5	1.3	$26,787.01	$32,803.42	$6,016.41
Business Knowledge Development	64.75	2.51	$37,649.12	$50,177.90	$12,528.78
Introduction to Community Work	28.63	3.05	$16,668.33	$35,095.79	$18,427.46
Ecology	19	3.52	$27,245.62	$74,187.36	$46,941.74
Bachelor of Urban Development Total		**14**	**$154,296.28**	**$238,273.67**	**$83,977.40**

So, while an individual course may come under scrutiny it is essential to understand its role in the programs being offered, and what the health of the programs are in their entirety.

Are the low enrollment courses making a loss?

Just because a course has low student numbers it doesn't necessarily mean it is running at a loss as shown in the table below. The delivery methods being used can have a high impact on the cost base of these courses. The types of students enrolled will also have a direct impact on the revenue, i.e. domestic vs international students. Courses with low student numbers can be profitable, so it doesn't pay to just draw a line in the sand and blindly assume that all small enrollment courses aren't contributing to the university's bottom line.

Unit Faculty	Unit School	Unit Name	Unit Level	Unit EFTSL	Margin
Faculty of Engineering and Sciences	School of Computer Science	CSC3017: Computer Science 3017 - Campus B (S2)	3 - Undergraduate Third Year	0.67	-$23,838.23
Faculty of Health	School of Psychology	PSY3019: Psychology 3019 - Singapore (S2)	3 - Undergraduate Third Year	0.67	-$2,706.26
Faculty of Engineering and Sciences	School of Computer Science	CSC3026: Computer Science 3026 - Campus A (S1)	3 - Undergraduate Third Year	0.67	$2,832.56
Faculty of Engineering and Sciences	School of Computer Science	CSC3023: Computer Science 3023 - Off Campus (S1)	3 - Undergraduate Third Year	0.67	$1,033.67
Faculty of Engineering and Sciences	School of Computer Science	CSC3012: Computer Science 3012 - Off Campus (S2)	3 - Undergraduate Third Year	0.67	$1,034.65
Faculty of Engineering and Sciences	School of Computer Science	CSC2020: Computer Science 2020 - Off Campus (S2)	2 - Undergraduate Second Ye...	0.67	$940.70
Faculty of Business and Law	School of Law	LAW3020: Law 3020 - Campus A (S2)	3 - Undergraduate Third Year	0.67	-$2,173.92
Faculty of Business and Law	School of Business	BUS3026: Business 3026 - Malaysia (S2)	3 - Undergraduate Third Year	0.67	-$1,544.73
Faculty of Engineering and Sciences	School of Computer Science	CSC2010: Computer Science 2010 - Off Campus (S2)	2 - Undergraduate Second Ye...	0.67	$830.65
Faculty of Health	School of Health Sciences	HSC2011: Health Sciences 2011 - Practicum Unit (S1)	2 - Undergraduate Second Ye...	0.67	$1,807.11
Faculty of Business and Law	School of Law	LAW3018: Law 3018 - Campus B (S2)	3 - Undergraduate Third Year	0.81	-$25,144.78
Faculty of Business and Law	School of Business	BUS2007: Business 2007 - Off Campus (S1)	2 - Undergraduate Second Ye...	0.81	-$1,035.41
Faculty of Business and Law	School of Law	LAW3009: Law 3009 - Practicum Unit (S1)	3 - Undergraduate Third Year	0.81	$670.39
Faculty of Engineering and Sciences	School of Computer Science	CSC2009: Computer Science 2009 - Off Campus (S1)	2 - Undergraduate Second Ye...	0.81	$2,683.35

[1] EFTSL – Equivalent Full-Time Student Load

Requirement #5: Identifying Candidate Programs for Investment or Disinvestment

Thinking in terms of degree and other academic programs is essential when considering your institution's revenues, costs, and margins. This kind of thinking goes beyond analyses based on faculties, schools, and departments. It is the program portfolio that connects the institution to the student marketplace, so that is the place where resource allocation strategy should logically begin.

Reviewing Your Current Program Portfolio

The most effective time to review your program portfolio is as part of the annual budgeting process. Comparing program sizes, revenues, costs, and margins is an important first step in resource allocation. The comparisons shown below are for an entire institution. (Scrolling up or down the window reveals data for additional programs.) You can narrow the view to show programs only for faculty if that better fits your institution's style of budgeting.

Programs Offered (Total Cost and Net Margin)

Degree	Course EFTSL	Revenue Total	Expense Total	Margin Total
G95 - Bachelor of Business	1,445.40	$20,222,311.48	$10,997,654.46	$9,224,657.01
I41 - Master of Business Administration (International)	581.48	$3,547,750.60	$2,499,703.36	$1,048,047.24
I11 - Master of Business Administration (International)	483.35	$3,196,954.80	$2,874,635.69	$322,319.11
466 - Bachelor of Business	473.11	$4,377,684.96	$2,463,889.38	$1,913,795.58
I23 - Master of Professional Accounting	173.76	$3,273,226.66	$2,682,034.50	$591,192.16
E04 - Bachelor of Hospitality Management	132.81	$2,047,732.28	$1,222,191.77	$825,540.51
V72 - Bachelor of Laws	117.75	$1,100,055.68	$1,209,972.65	-$109,916.97
G81 - Bachelor of Criminology and Justice	98.47	$929,349.84	$674,445.01	$254,904.83
M63 - Bachelor of Sport Management	69.79	$888,431.18	$501,571.58	$386,859.60
I22 - Master of Professional Finance and Banking	62.65	$964,580.94	$603,040.61	$361,540.32
Total	**4,786.45**	**$56,917,802.52**	**$37,488,862.25**	**$19,428,940.27**

The above includes the effects of overhead on cost and (net) margin. Overhead allocations are important in resource allocation, but sometimes you will want to look only at direct cost and gross margin (refer table below). Comparing the two displays shows that different programs draw different amounts of overhead, which you can analyze in detail through the model's other reports. In general, the more the overheads vary across programs the more dangerous it is to rely only on direct costs when judging relative profitability.

Identifying Candidate Programs for Investment or Disinvestment cont.

Programs Offered (Direct Cost and Gross Margin)

Degree	Course EFTSL	Revenue Total	Expense Total	Margin Total
G95 - Bachelor of Business	1,445.40	$15,567,819.03	$4,774,604.60	$10,793,214.42
I41 - Master of Business Administration (International)	581.48	$1,889,614.28	$671,599.25	$1,218,015.03
I11 - Master of Business Administration (International)	483.35	$1,774,067.92	$1,262,542.18	$511,525.74
466 - Bachelor of Business	473.11	$3,062,093.79	$833,072.80	$2,229,020.99
I23 - Master of Professional Accounting	173.76	$2,495,930.75	$1,596,628.88	$899,301.87
E04 - Bachelor of Hospitality Management	132.81	$1,593,461.57	$544,199.84	$1,049,261.73
V72 - Bachelor of Laws	117.75	$743,331.31	$689,148.21	$54,183.10
G81 - Bachelor of Criminology and Justice	98.47	$667,966.13	$310,527.70	$357,438.43
M63 - Bachelor of Sport Management	69.79	$684,046.40	$206,711.26	$477,335.15
I22 - Master of Professional Finance and Banking	62.65	$719,248.28	$275,798.17	$443,450.11
Total	**4,786.45**	**$41,751,782.68**	**$17,630,983.56**	**$24,120,799.12**

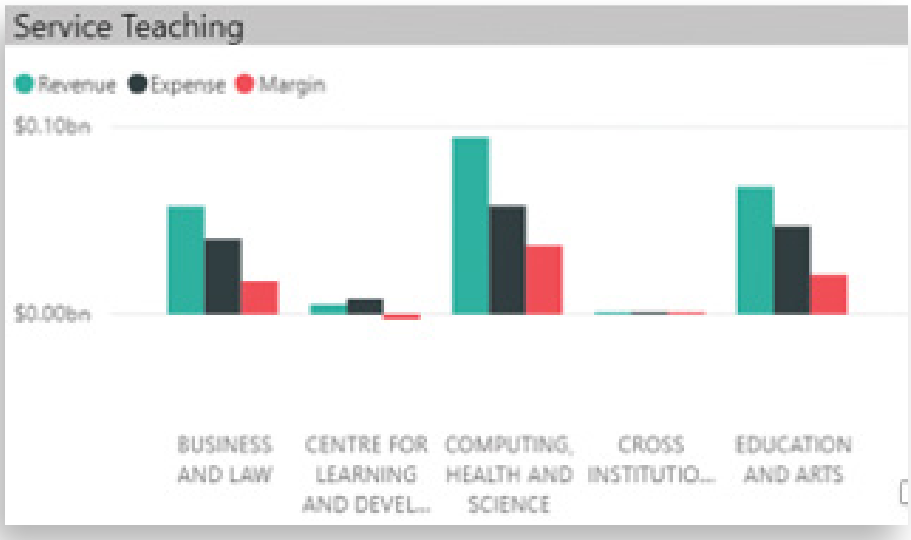
It's easy to scan up-and-down the program list to identify the ones that make or lose money. This is not the end of the story, of course. You'll also want to consider market factors and, importantly, the importance of each program to your academic mission. But knowing the programs' revenues, costs, and margins will aid immensely in making budget decisions.

Those decisions also depend upon the ways that program enrollments propagate through to course enrollments. The following table displays the courses taken by students enrolled in a nominated program, with the bar-chart on the next page that summarizes the teaching load by faculty.

Courses Taken by Students for Selected Programs

Course Name	E F T S L	Revenue	Expense	Margin
UPC0025 - Research and Writing Processes	125.00	$1,282,465.52	$2,052,470.14	($770,004.61)
BES1123 - Foundations of Business Knowledge	117.63	$1,519,371.21	$1,685,958.61	($166,587.39)
UPC0024 - Learning at University	117.50	$1,203,694.69	$1,901,214.60	($697,519.92)
UPC0026 - Numeracy Tools	114.38	$1,175,383.88	$1,875,284.03	($699,900.15)
MBA5736 - Business Strategy	101.88	$642,408.13	$760,903.96	($118,495.83)
UPC0027 - Accessing Knowledge	100.00	$1,006,830.46	$1,709,099.90	($702,269.44)
PSY1124 - Introduction to Psychology	95.63	$1,199,482.41	$443,013.47	$756,468.95
ECF1133 - Economics I	86.75	$1,016,715.24	$484,055.01	$532,660.23
MAN1123 - Management I	86.25	$1,002,854.49	$553,021.20	$449,833.29
LAW1123 - Legal Framework I	83.25	$1,048,904.06	$487,018.17	$561,885.89
Total	**16,490.98**	**$225,380,510.58**	**$153,064,319.48**	**$72,316,19...**

Summary by Faculty



Narrow the view by clicking on a program to get data on the courses taken by its students. This allows you to quickly determine how a program's enrollment contributes to the revenue, cost, and margin of courses (and the schools and faculties that offer them) inside and outside the major. Sometimes the results can be surprising. In a certain health sciences school, for example, Nursing courses lost money but courses in other schools taken by Nursing students made more than enough to compensate for the loss—a result that could not be known without the mapping of programs to courses.

Effects of Enrollment Change

The Pilbara predictive model, mentioned in Requirement #3, "Understanding your Delivery Options", can be used to analyze the effects of changed enrollment. Plug your new assumptions into the model and get the above results for the new scenario. You will also see how the changes affect class sizes and other operational variables, and so you can consider compensatory changes in staffing and other resourcing levels. The model takes account of any excess capacity in classes, and if properly configured it differentiates between variable and fixed overhead.

Identifying Candidate Programs for Investment or Disinvestment cont.

Cost Reduction

The mapping of programs to courses allows you to find opportunities for cost reduction, should that prove necessary. One way is to identify candidates for redesign or elimination (as discussed in Requirement #4 "Identify Course Candidates for Redesign or Elimination") from among the courses that contribute most heavily to the program's overall cost. Another is to look at the course-taking behavior of students, and perhaps to the curriculum itself. It's common for the list of elective courses to grow over the years, to a point that makes neither educational nor economic sense. Pruning the list or nudging the students in other ways may reduce the number of small-enrollment courses both inside and outside the major, with attendant efficiency and perhaps educational benefits. More significant curricular changes might concentrate enrollment in fewer, more optimally-sized courses. Thinking further outside the box, the cross-program sharing of more courses might move the institution or faculty toward creating a more coherent program portfolio. These moves will require strong academic staff participation. But regardless of the process or outcome, the first step is to get a clearer picture of how programs map into courses and conversely.

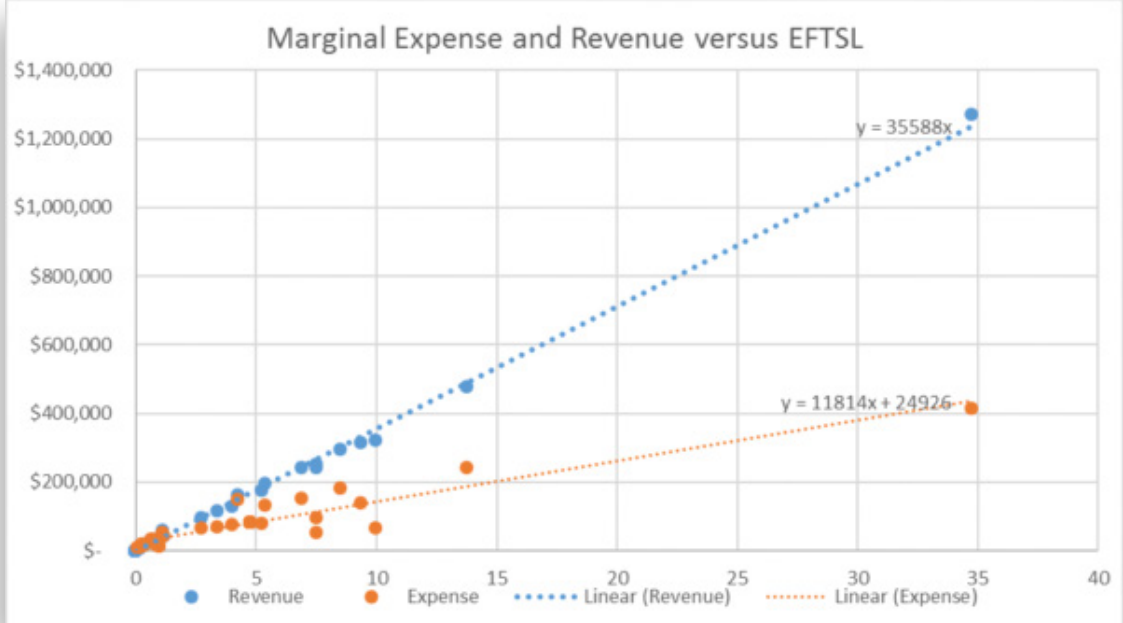
Requirement #6: Marginal Enrollment Cost and Break-even Analysis

Marginal Enrollment Cost and Break-even Analysis are two of the hardest concepts to both calculate and analyze as you need to have a detailed and robust cost model to support your decision-making process. Among other things, you need to be able to differentiate direct costs from support costs, and fixed from variable costs, at the course/subject level.

Based on the simple break-even analysis below, it would appear quite simple to make the decision about courses in this school or department – anything below 2.5 EFTSL (Equivalent Full-Time Student Load) is making a loss and could be a strong contender for removal from the course offerings:

Marginal Enrollment Cost and Break-even Analysis cont.

However, a deeper look into these courses is required. Instead of just looking at the margin, both revenue and expense should be analyzed separately. The following chart plots revenue and direct teaching cost as functions of EFTSL.



This will give you the revenue per EFTSL ($35,588) and the fixed and variable components of direct expenses – $24,926 fixed and $11,814 per EFTSL variable, summarized below with total contributing overhead to the school.

	per EFTSL	Fixed
Revenue Line Estimate	$35,588	$ -
Expense Line Estimate	$11,814	$24,926
University Overheads	$1,909,674	
Overhead per EFTSL	$13,870	

Let's cut to the chase—what does this mean? The following table summarizes the break-even point for both Gross Margin and Net Margin.

	Gross Margin	Net Margin
EFTSL	1.05*	2.52*
Total Revenue	$37,312	$89,566
Total Direct Cost	$37,312	$54,659
Total Overhead	n/a	$34,907
Margin	$ -	$ -

The fully burdened ("net margin") break-even point is approximately 2.5 EFTSL, so you need an average of 2.52 EFTSL in these courses to fully cover all your costs, including the university overhead.

However, you are covering your direct (school) costs at only 1.05 EFTSL. Therefore, courses below 1.05 EFTSL should be seriously reviewed as they aren't even covering the cost to teach them. But courses with between 1.05 EFTSL and 2.52 EFTSL are covering their direct costs AND contributing towards the nearly $2 million of university overheads that this school consumes.

What happens if you cease to teach any of these courses? You save on your marginal costs, but your fixed overheads remain the same and just get spread out over fewer courses (causing each of them to individually need more EFTSL to break-even), leading to a loss in revenue that is greater than what you save in expenses.

So be aware! A course that appears to be losing money can still be covering its direct costs and contributing towards some of the overheads (just not all of them). Removing these courses without fully understanding their contribution to the overall school bottom line can be very dangerous… you could easily end up in a worse position!

*The EFTSL amounts are rounded for presentation purposes. If you wish to do your own calculations simply divide the Total Revenue by Revenue Line Estimate per EFTSL ($35,588) to get the full EFTSL break-even amount.

Requirement #7: Tuition Price Setting

Tuition pricing decisions must balance each program's expected student demand (at a given price) against its per-student contribution margin and recover the institutions full costs when all the programs are added together. The Pilbara model calculates fully loaded and net margins (based on gross tuition and fee revenue, offset by financial aid/scholarship/waivers expenditures) for programs, faculties, departments, and individual courses. The historical model looks at results for past years and the predictive model projects what will happen if prices are changed. If planners think the price changes will affect enrolment, that, too, can be captured in the predictive model.

The ability to understand and project the relationship between prices and margins becomes more important as competition increases and virtual programs proliferate. Proper pricing of new programs is especially critical, since no historical information about these programs is available.

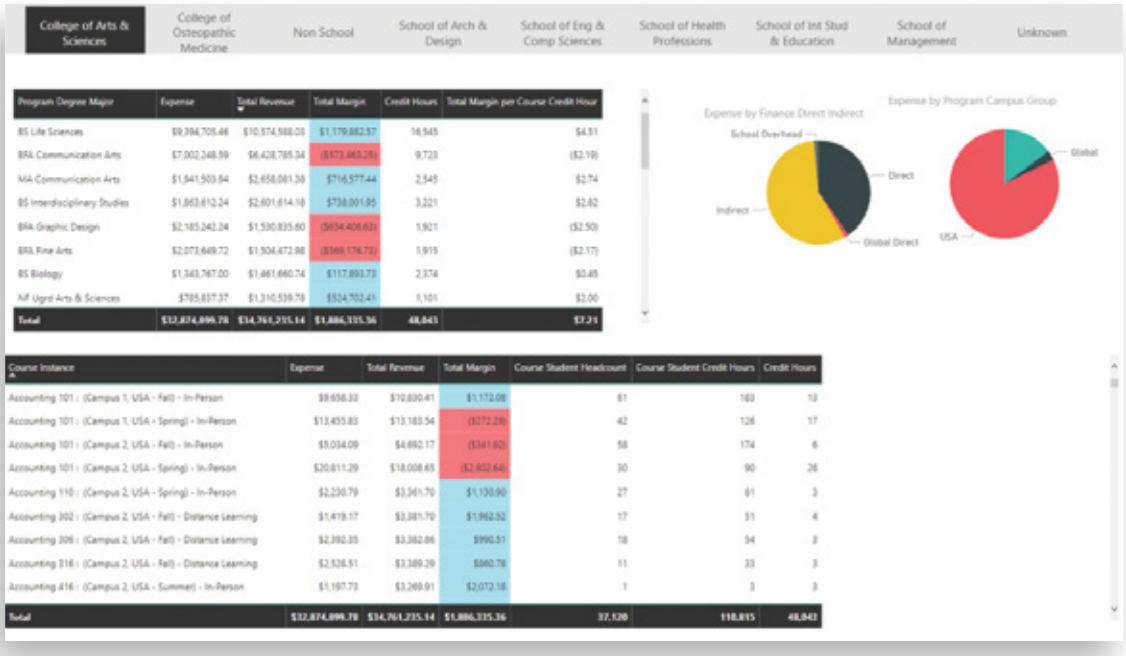
The following dashboard, which shows an American university's full cost (including overhead), revenue, and net margin illustrates the kinds of historical information that are reported routinely by the Pilbara model. All schools except the School of Management cover their full costs, and that some of them make considerable money. This suggests that there is no overarching pricing problem, though of course the university may want to adjust the prices for programs. A failure of the University as a whole to cover its full costs would signal impending financial difficulty.

The model also calculates direct costs and gross (i.e., contribution) margins. It was noted in Requirement #6 (Marginal Costing) that even if revenues don't cover full cost, they may more than cover direct cost and thus contribute to a component of the overhead. Eliminating courses or programs with positive gross margin would not reduce the university's overall costs. In fact, this would increase the overheads allocated to other courses and programs.

The following dashboard shows the direct cost analogue to the one for full costs that was shown above—notice that all units, including the School of Management, have positive contributions to overhead.

Tuition Price Setting cont.

To look at individual program prices we must drill down to data on individual programs and courses. The full cost data are shown in the following dashboard, the direct costs can be obtained by clicking that slice of the pie chart at the upper right.



If we zoom in on the program detail we can see that three of the first four programs are more than covering their full costs, with the BFA in Communication Arts currently running at a loss.

Program Degree Major	Expense	Total Revenue	Total Margin	Credit Hours
BS Life Sciences	$9,394,705.46	$10,574,588.03	$1,179,882.57	16,545
BFA Communication Arts	$7,002,248.59	$6,428,785.34	($573,463.25)	9,723
MA Communication Arts	$1,941,503.94	$2,658,081.38	$716,577.44	2,545
BS Interdisciplinary Studies	$1,863,612.24	$2,601,614.18	$738,001.95	3,221

We can zoom to course level to see where an individual program is making or losing money. These data can provide insights about where program prices and course fees might need to be modified. We could use the predictive model (which includes the same dashboards) to test specific pricing alternatives.

Course Instance	Expense	Total Revenue	Total Margin	Course Student Headcount	Course Student Credit Hours
Advertising 101 : (Campus 2, USA - Spring) - In-Person	$2,494.99	$1,396.80	($1,098.19)	15	45
Anthropology 101 : (Campus 1, USA - Spring) - Distance Learning	$1,244.13	$4,058.71	$2,814.58	17	51
Communications 101 : (Campus 2, USA - Fall) - In-Person	$3,348.13	$1,396.80	($1,951.33)	18	54
Criminal Justice 101 : (Campus 2, USA - Spring) - In-Person	$2,226.25	$1,398.49	($827.76)	11	33
Foundations of Inquiry 101 : (Campus 2, USA - Fall) - In-Person	$1,122.90	$1,392.74	$269.84	303	909

The analysis requires an extra step when it comes to costing and pricing new programs, but this is well within the capacity of the predictive model. Planners must enter the program's courses, expected enrolments, and prices into the model, which then calculates the resources needed, the revenues to be obtained, and the resulting margins. We will elaborate on that later.

Research can also be examined in the models, specifically identifying direct and overhead expenses to support research projects. This can be valuable data when negotiating with business firms and other sponsors to ensure the full cost of research projects is taken into consideration.

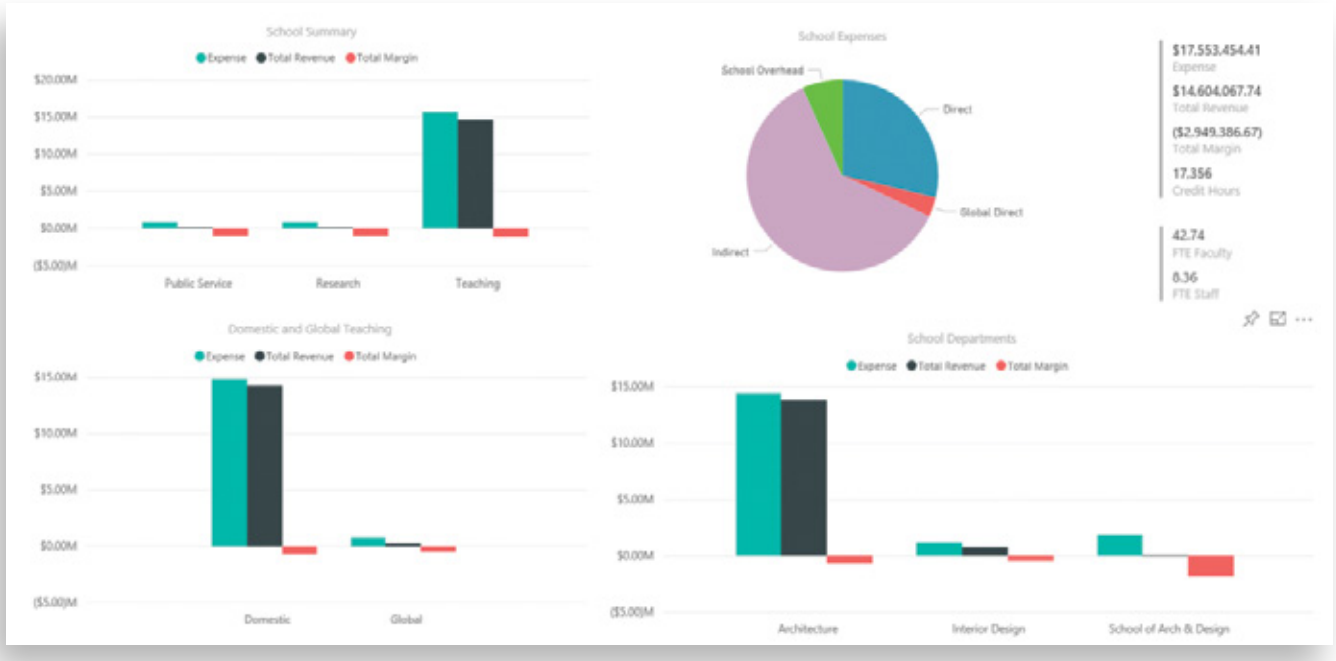
As an example, certain types of research projects can include nominated overheads in their expenses, so knowing this is very useful. For commercial projects, the institution would want to know the full cost of conducting the research so that they can make a conscious and knowledgeable decision regarding what 'price' to charge.

Requirement #8: Course & Program Relationships

Combining the analytic insights from using a tool such as Microsoft Power BI together with a robust cost model can open a previously hidden set of views to management, particularly with respect to courses (subjects) and programs (degrees). In the past, this data has not purposefully been hidden, but rather it's simply not captured for easy reporting and analysis.

The example outlined below is from our USA demonstration model, so it uses 'credit hours' instead of EFTSL, but the same principles equally apply in Australia.

The Power BI report below shows the fully burdened cost of courses taught within the School of Architecture and Design. The Summary graph (upper left-hand corner) shows the revenue, expenses and margin associated with the school's support of Public Service, Research, and Teaching. The total margin associated with Public Service is -$920k, Research -$940K and Teaching is -$1,090K. The table in the upper right-hand corner of the report shows the total Expenses of $17.5m, Revenue $14.6m and overall margin for the School of Architecture and Design -$2.95m. The school teaches a total of 17,356 credit hours using 42.74 FTE of academic time.



The graph in the bottom left hand corner of the report shows just the teaching expenses, revenue, and margins broken down by domestic and global students. The chart in the bottom right hand corner shows the expenses, revenue, and margin broken down by Department. The bar titled School of Arch & Design (third bar) represents the combination of Public Service and Research related activities.

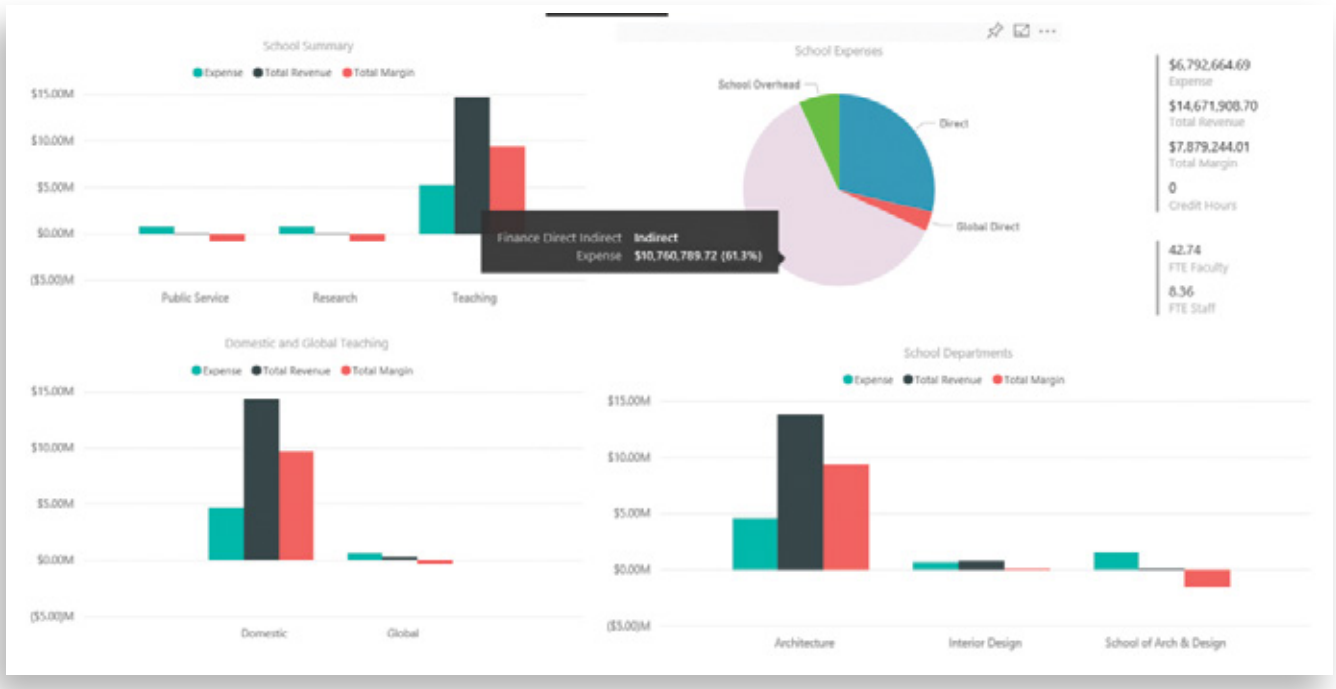
Although the School of Architecture and Design is losing $2.9m dollars on the courses they teach, you get a slightly different result when you look at the school from a Program viewpoint.

In the Power BI report below, the data is based on the courses the students pursuing a degree in the School of Architecture and Design undertook throughout the university. Based on this view, the School of Architecture and Design Programs are losing $2.8m when teaching their own students, but the College of Arts and Sciences have a positive margin of $1.9m teaching the School of Architecture and Design students their general education courses. When you examine the School of Architecture and Design from a Program viewpoint, they have a negative margin of only $900k. Thus, if the decision was made to eliminate the School of Architecture and Design based strictly on the expenses, revenue, and margin depicted in the first figure you would not be considering the lost margin associated with those students in the rest of the university.

Another important view of the data is to consider the cost of non-teaching activities. In the bottom left hand portion of the above report, you will also see the School of Architecture and Design is making a positive margin of $1.5 m on their fully burdened teaching efforts which offsets the majority of their Public Service, Research, and Global campus activities.

Course & Program Relationships cont.

Finally, when you filter the Power BI Report to just display the direct expenses, revenue and margin associated with Public Service, Research, and teaching within the School of Architecture (see below) you obtain a positive margin of $7.9m which is used to offset the School's portion of allocated overhead expenses of $10.7m. If the School of Architecture and Design was eliminated most of the university overhead would still remain and have to be borne by the other schools.



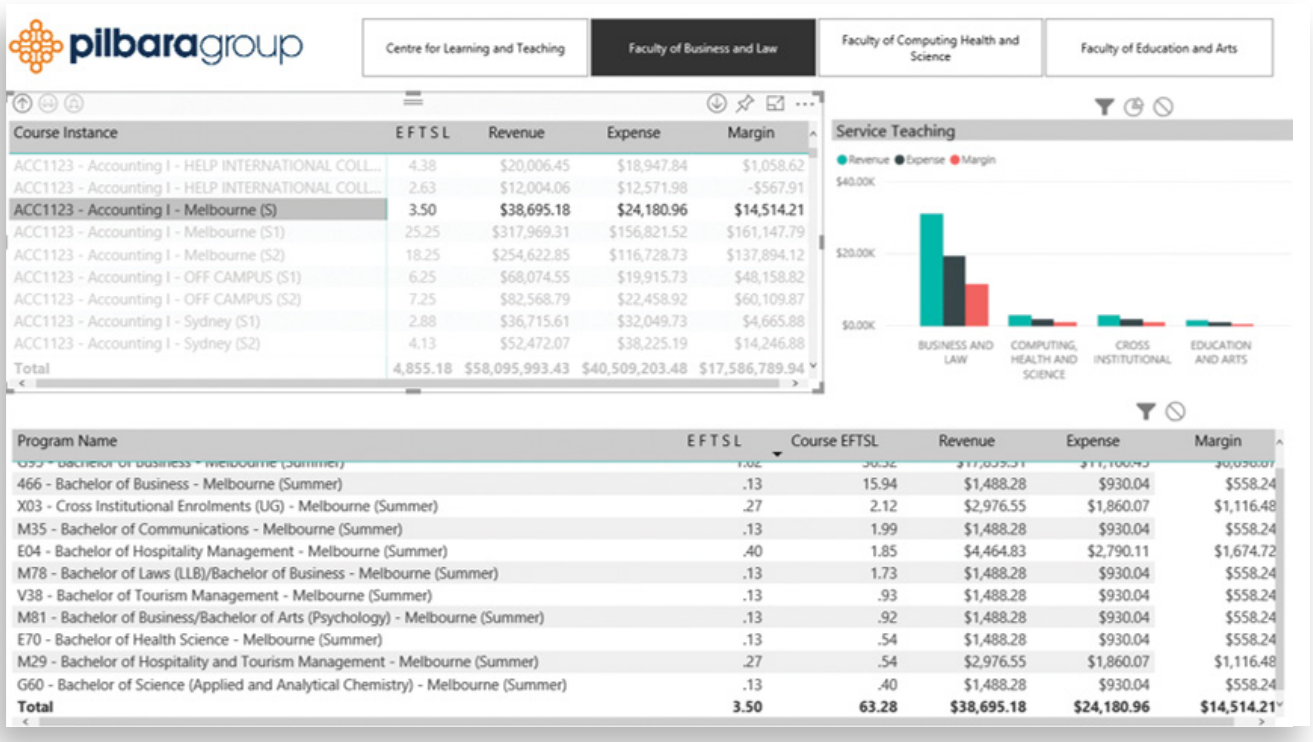
By using these types of holistic models, Academic leadership can start to see the overall university impact of decisions they regularly make inside their schools. Of course, dropping an entire school is a major undertaking, and was used here for illustrative purposes only. This type of analysis can easily be performed down at the Program level as well, to determine which programs to maintain/grow or cut.

Requirement #9: Improving Program Review

Previous blogs examined how the Pilbara model helps identify programs for investment and disinvestment (Requirement #5) and illuminates the economic relationships between programs (degrees) and individual courses (subjects). Now we turn to "Program Review"—a deep dive into the specifics of particular programs.

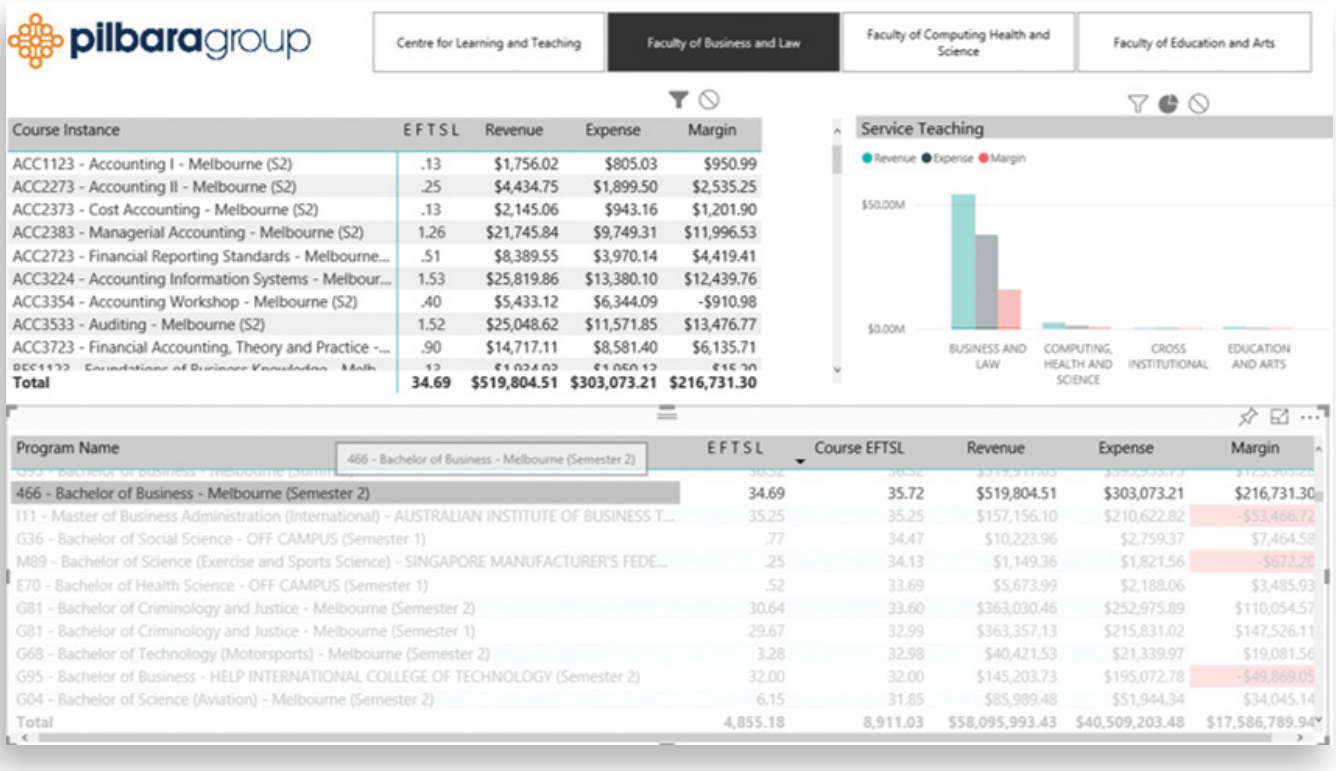
Traditional reviews look at a program's curricular structure, the institution's capacity (in terms of faculty, library resources, infrastructure, etc.) to deliver high-quality education in the area, student demand, and in some cases, the delivered quality of teaching. Typically, these types of reviews have not examined a program's operational detail or economic factors like revenue, cost, and margin, even though these are important aspects of performance. Now, thanks to the Pilbara model, that can change.

Step 1 is to examine the connections between a program and the courses that underpin it. This can be achieved with a simple dashboard that defines the linkages between courses and programs. Users can click on a course and see the program(s) that the students undertaking that course are registered against, and, more importantly, the revenue, expense and margin of both the course and the overall program(s) as well.



Improving Program Review cont.

Alternatively, users can click on a program and see the courses that the students in that program are undertaking—and, again, the revenue, expense and margin of each course and the overall program. Requirement #8 (Course & Program Relationships) presented these economic results in aggregate form, but now we drill down to the individual courses for each program.



So, what can program reviewers do with this new information? For one thing, they can see yearly and trend data on every program's cost, revenue, and margin, both in total and on a per-credit hour basis (or per EFTSL in Australia). We described how this works for individual courses in Requirement #8, and the linkage information allows these results to be aggregated to the program level. Programs, not courses, represent the university's face to the market. Without the explicit course-to-program linkages described above, there is a disconnect between data for the "production" side of the institution and data about the marketplace. Cross-referencing the two kinds of data should be a major objective in program review.

The linkages also permit reviewers to analyze the operational and economic detail available at the course level. For example, which courses are the most expensive, and which have the highest or lowest margins? What are the class sizes and teacher profiles, and what delivery methods are used? All this is based on the courses taken by students in each program, not on catalogue descriptions that include less-than-precise roadmaps about requirements and electives. For example, by looking at how the curriculum works in practice one can see where particular courses (including electives as well as requirements) and costs that may be disproportionately to their value for the particular degree being studied.

Finally, one can begin to identify courses that present bottlenecks to students' progress toward their degrees. For example, looking at so-called WFD (Withdrawal or a grade of F or D) can signal problems that reviewers might want to investigate. The same is true for data on which courses are oversubscribed semesters and locations. The model can easily include such variables if the institution's data system records them and thinking about benefits such as the above can provide the motivation needed to maintain the records.

Requirements #10-11: Improving the Budget Process & Scenario Planning

Every university goes through an annual budgeting cycle. There are about as many budget processes as there are universities, but they all have one thing in common: the need to take account of changes in enrolment, governmental support, and other external factors. This is not easy because each potential factor affects various parts of the institution in different ways, each of which may have different implications for budget making. Previous blogs have described how the Pilbara model can inform program changes, decisions about course delivery methods, tuition-setting, and many other decisions that have implications for budgeting. In this one we focus more broadly on analyzing the external factors, with the objective of improving the budget process.

The basic idea is that because Pilbara provides a detailed description of the university's teaching, research, and overhead operations, the model's predictive version can be used to adjust last year's spending to what will be required next year considering changed external conditions. Considering enrolments, for example, one can use the predictive model to determine what changes in academic staff will be required to maintain current class sizes, teacher profiles, and research efforts. These adjustments are shown on a department-by department basis rather than as aggregates for schools or faculties. The model also traces the adjustments' probable effects on overhead. Thus, academic decision-makers will be able to spend their time negotiating substantive issues like service levels and efficiency rather than trying to guess the consequences of predicted enrolment and workforce changes.

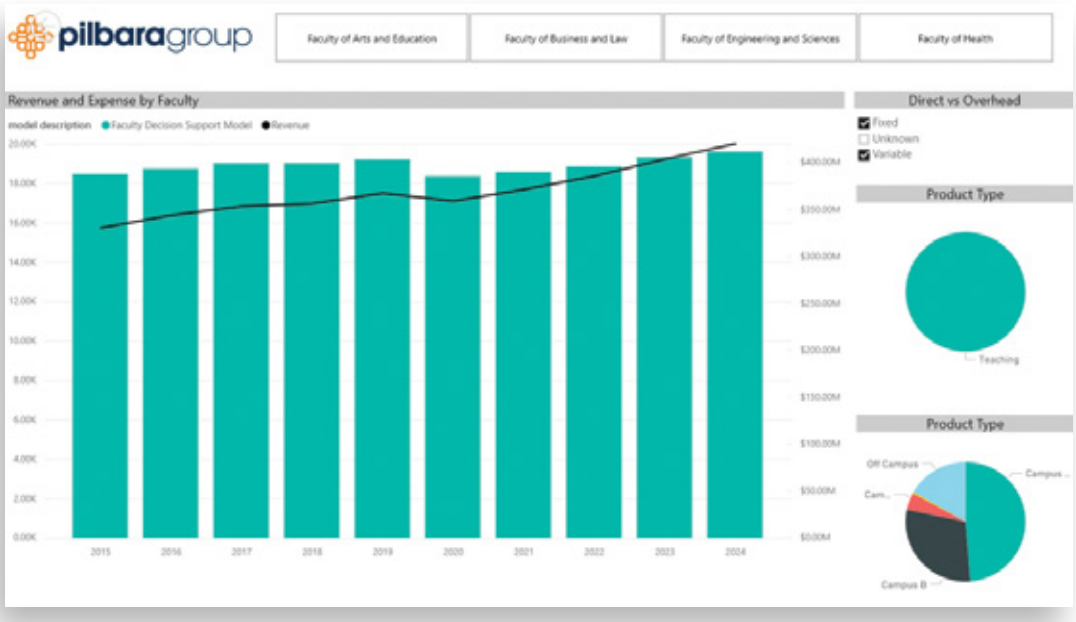
Scenario Planning

The ability to adjust for changed external conditions opens yet another exciting possibility: *Scenario Planning*. A 'planning scenario' combines a set of predicted events with an assumed set of university responses. As in the real world, the events can represent complex combinations of external factors – e.g., enrolment changes, reductions in Government student funding, a dramatic shift in the global economy, or even a structural change like the' half-cohort' expected to hit Queensland universities in 2020 because of adding a Prep Year to the state's primary schooling.

The university's responses can be as complex as required to deal with the projected changes. Multiple actions of the kind discussed in our previous chapters can be included in the scenario. Use of the Pilbara predictive model allows what-if analysis to be performed in an extremely flexible yet rigorous way. The analyses can answer questions like, "Do we have enough students to break even?", "How should we target different types of student to maximize our margins?" and "How do we set the price for fee paying students to ensure we aren't making a loss?" Such questions are becoming more and more important as universities' financial and competitive environments become more challenging.

The following visual provides two scenarios – a baseline scenario (grey) and the scenario containing two one-off events (capping of the Government's CGS grant in 2018 and a drop in CGS enrolments in 2020 due to the 1/2 cohort reaching university age)[1].

These simple events could be modelled in Excel – after all, they just show estimated EFTSL numbers based on a pair of straightforward assumptions. Even adding in the revenue adjustments based on the two events isn't taxing: again quite simple to do in Excel.

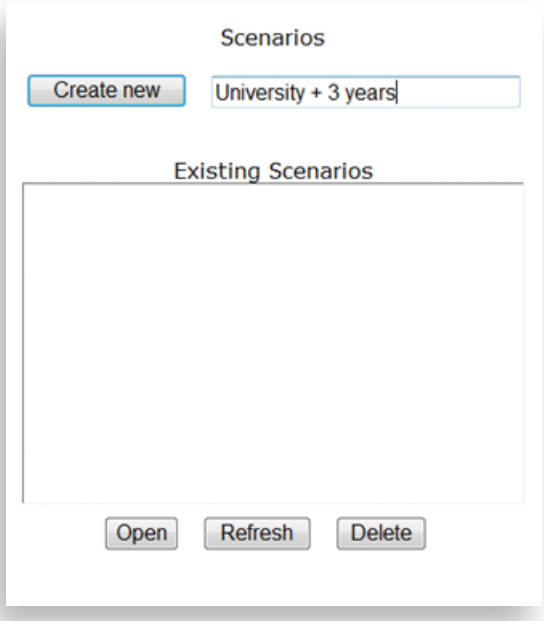


Improving the Budget Process & Scenario Planning cont.

The expense side is another story, however. Excel modelling of the changes to expenses, based on changes to the required teaching load, workload profiles and other variables would be almost impossible to do in a repeatable manner.

As can be seen here, the operating margin reduces in 2018 due to the capping of the CGS rates, and then before it gets a chance to recover, it is hit again, this time from the impact of the ½ cohort in 2020. The impact of this lasts for a minimum of 3 years as those students work through their degree.

From here, the university is then able to model new scenarios using this as the new baseline – what if they increase their market through online delivery, or additional Post Grad courses, or international students? What mix of these would be needed to offset the drop-in margin and maintain a financially sustainable institution over the next 5-10 years?



The effort to calculate the changes to expenditure university-wide solely based on the 7% drop would be intensive, but to then run multiple scenarios, for example a 6% drop, an 8% drop, a change in the casual

(sessional) / permanent workforce profile, a reduction in department (internal) research, a increase in online student, or a decrease in international students would be prohibitive in terms of effort without a model to support the ability to run these types of scenarios within minutes.

Any number of scenarios can be configured and compared, including ones that may seem unlikely but would have powerful consequences if they occur. Once these scenarios are developed and the model calculated, results can be presented in Microsoft Power BI or Excel, or using the online reporting tool provided with ACE, and direct comparisons between scenarios and previous performance figures can easily be seen. There is no need to manage scenarios in Excel, however. The Pilbara model provides a convenient way to create, store and manage whatever scenarios the user wishes to analyze.

Another example of how universities can use multiple scenarios to help with budgeting was discussed in the Blog Post **"It's a No-Brainer! Increasing Student Retention Makes Higher Ed More Money…Or Does it?"**

The Pilbara historical model also can help improve student retention and degree attainment by helping to diagnose problem areas and identify places where the interventions discussed in that blog post may prove effective. The best place to start is with so-called 'WFD' (withdrawal, fail, D-grade) records, which can be included in the model if the institution makes the data available. These data enable identification of courses where students tend to have difficulty. Several important lines of analysis and intervention follow from this important capability.

Searching for patterns in the data is one such inquiry. Using the historical model, one can compare the teaching methods, class sizes, instructor types, and instructors' time commitments for courses with high and low WFD rates. Then, virtual experiments using the predictive model can estimate the staffing and cost implications of emulating the low-WFD configurations on a large scale (one might cap class sizes, for example, or reduce the use of adjuncts). Projecting WFD improvements from the virtual experiments doesn't control for subject matter or student characteristics, but the staffing and cost estimates are based on solid data. In the end, of course, one would need to change on-the-ground course configurations and observe the actual results. For example, newspaper accounts of an experiment at the University of Texas-Austin's Chemistry Department suggests that such experiments have a good chance of success. Using the Pilbara model to make WFD data available for all course instances in every semester will eliminate the time-consuming step of tracking individual student transcripts back to potentially problematic courses.

The predictive model also can be used to evaluate the staffing implications and costs of interventions to reduce bottlenecks in students' progression toward their degrees. The bottlenecks are identified by looking at courses where capacity constraints cause would-be enrollees to be turned away, constraints that can be

Improving the Budget Process & Scenario Planning continued

mitigated by adding sections. Then the Pilbara model can be used to test the addition of sections in the same course instance, or the addition of new instances, to satisfy the disappointed students.

There are a wide-range of different types of scenarios that can be run in both the Historical Model and the Predictive Model. The objective is to allow better-informed decisions relating to budget setting and future planning to be based on actual data and models. It's important to note that this sets a *starting point* for budget discussions, rather than using last year's budget. Future year budgets can be estimated in the Predictive Model based on forecasted demand for teaching and research and then negotiations and iterative changes can be applied to this base budget.

[1] A 7% reduction is used for illustrative purposes – it could be higher for some QLD universities

This document is a summary of the 11 Shared Governance Data Requirements. For the full document please go to our website www.pilbaragroup.com or include the full URL if you know what that is yet.

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