The Key to Accurately Measuring Profitability

"If you can't measure it, you can't manage it." Where did I hear that before? Before we dig into the meat of this article, let's first say that it is written for the senior financial team at an FBO. Although, we would recommend that anyone responsible for analyzing or making decisions regarding the profitability of the FBO also take a few minutes to read this article. The focus of this writing is on measuring profitability, which runs through all of AVMAN/VIRTUOSO. You may not have heard of VIRTUOSO. VIRTUOSO is both the management and financial accounting system behind AVMAN, and it is seamlessly integrated with the AVMAN system. Since this article is focused on AVMAN, all of the examples and references are to aviation and specifically the operations of a Fixed Base Operator (FBO). In addition, if you see a section that seems familiar, we have borrowed from other papers that focus on a specific section of AVMAN.

Do not let the subject matter of this article make you fearful of AVMAN/VIRTUOSO. The system is very powerful and will provide your company with the information it requires. However, it was written (like its predecessor Comptroller) to provide this information without the people contributing data (invoices, labor records, journal entries, etc.) having an understanding of everything behind the data. We can provide this help, since our Expert Assistant is built into AVMAN. We cover the creation of AVMAN briefly in the section "Looking Under the Hood" in this article.

If you want to manage the profitability of your operations, then you will need to measure the performance (profitability) of individual jobs or activities. You probably want to know profit by business segment or by product (or product class). You may also need to manage multiple budgets for different departments in the business. If you are going to properly manage your business, you need to know where you are making money and where you are losing it. You need to know where you should be making investments and where you should be cutting back.

To look at costs properly we must first recognize the two primary groups of costs, **Direct Costs** and **Indirect Costs**. Direct Costs are those that are attributable to one or more products (product lines) or services. Indirect expenses cannot be directly tied to any one product or service. We will describe these in more detail below.

Jobs, Activities, and Overhead Cost Pools

Let's differentiate Jobs from Activities first. Both of these are where we collect direct costs and revenues. Therefore, every company will need one or the other or both. They are pretty easy to identify and there is no need to allocate the costs collected in them to other Jobs and Activities. Overhead Pools on the other hand is where we collect indirect costs, before we allocate them to Jobs or Activities. Let's start by defining these terms.

Jobs are used to manage discrete business activities such as contracts to perform a service. In aviation this might include tasks such as performing an annual, overhauling an engine on an aircraft, or conducting a charter flight. Those individual jobs can be grouped into Job Classes, which provide an additional way to look at performance. Jobs and Job Classes are used primarily for both maintenance and charter operations. If an FBO does not provide these types of services, it probably does not need to use jobs or what is called "job cost accounting".

Activities are used to track non-discrete business functions. In aviation, this could include measuring the performance of fuel sales or hangar rentals. You would not want to try to track the profitability of each individual fuel sale. Instead using activities, you can track the profitability of all fuel sales over a specified period of time such as a month. For FBO's that do not have a maintenance or charter operation, we usually see only Activities.

Overhead Pools are where we collect and allocate indirect costs. Over half of the costs in an FBO are indirect costs, so the treatment of these costs are important to accurately assessing profitability. This is where the real power of AVMAN shines. Let's refine the definition of indirect costs. They are costs that cannot be directly identified with a single, *final cost objective*, but instead identified with two or more final cost objectives. Said another way, Indirect Costs are those costs not readily identified with a specific product or service but incurred for the joint benefit of one or more products or services. These costs represent a large portion (usually up to fifty percent) of the costs of an FBO. Therefore, management of these costs is paramount to managing the profitability of the company. Some FBO Point of Sales systems focus only on the cost of fuel sold. Although this is a useful tool, it does not provide the information necessary to manage the profitability of a single FBO or especially a chain of FBOs. AVMAN provides these tools, but it also provides the tools necessary to manage the overall profitability of the FBO.

We use the term "final cost objectives" to refer to all of the Jobs or Activities of a company. When we use the term "single final cost objective" we are referring to a specific job or activity. The term "cost objective" is used when referring to all jobs, activities, and overhead cost pools.

Looking a Little Deeper at Indirect Costs

We can distinguish indirect costs from direct costs best by looking at an example. In an FBO, the cost of the fuel sold would be a direct cost of the fuel sales activity. You may even have two activities (in case you are interested in the profitability of those individual fuel types), one for Jet-A and one for Avgas. Also, the cost of new cylinders for an engine overhaul job would be a direct cost of that maintenance job. However, not all costs incurred by an FBO are directly related to a specific Job or Activity and those costs are indirect costs. An example of indirect costs would be the cost of uniforms for our line personnel. We cannot say that this much of our uniforms cost was for the Jet A sales activity, this much was for the Avgas activity, this much was for FBO Services, etc. By the way, we usually recommend that services such as the provision of a GPU, or De-Icing, or Lav services, etc. be grouped in an activity we usually call FBO Services. This is not a requirement, just a recommendation.

In AVMAN/VIRTUOSO we take these indirect costs and place them in overhead pools for later allocation to final cost objectives (Jobs and Activities). One estimate performed one time and one allocation performed one time and yes, it is an automated process in AVMAN. Set it up and just press the allocate button once a month (or whatever period you close). Yes, you could close (empty your temporary/Income Statement Accounts) once a year, however you might not want to delay a pricing adjustment based upon real numbers until the end of the year. In the end you decide what works best for your company. In case you want to talk this over with one of our team members experienced in this area please give us a call.

Shared Costs, a Type of Indirect Costs

In our example, the indirect costs we described are called Shared Costs. Shared Costs are those that are related to your manufacturing of a product or delivery of a service; however, they are not incurred on a product-by-product basis as is the cost of fuel (a direct cost) in an FBO.

Once you break down expenses into direct versus indirect, you then need to further breakdown the indirect costs in shared versus non-shared. Therefore, when you set up your overhead pools you are setting up both shared and non-shared overhead cost pools. Don't worry, it's not that complicated, and it's automated in AVMAN.

Not all of these overhead pools will be allocated to jobs, activities, or other overhead pools. Let's ignore "Other Overhead Pools" for now, since it is not very likely to be used in an FBO (even one with maintenance or charter operations) with one exception – Fringe Benefits. We will discuss that overhead pool later. For the most part you can think of shared costs as those indirect costs that will show up in cost of sales on your income statement. There is one rule that must be followed: you cannot mix shared and non-shared costs in the same overhead pool. Basically, everything in a shared pool is going to be allocated to jobs and/or activities as opposed to non-shared pools which are not. Again, we are not yet talking about overhead pools that are distributed to other overhead pools (e.g., Fringe Benefits).

Let's review and expand on our FBO example. Most FBOs sell Avgas and Jet A. When we sell a gallon of Jet A, there are costs associated with that sale. First, there is the cost of the fuel. The cost of Jet A fuel is easy to identify and is directly related to the sale. We call this a direct cost and when we record that cost, we distribute it directly to the activity we use to track Jet A revenue and expenses. Another direct cost might be the rent or depreciation on the Jet A truck. As we said earlier, not all costs associated with the sale of Jet A, Avgas, or any other activity can be directly associated with the sale of the underlying product or service. For example, the labor costs associated with sale of both Jet A and Avgas would be close to impossible to directly associate with either Jet A or Avgas. CSRs and linemen bounce back and forth dealing with the sale of both types of fuel as well as other items such as providing GPU or lavatory services, moving airplanes, making reservations for customers, etc. Other types of expenses that may fall into this category include compliance, training, uniforms, fuel farm rental, etc. These are our shared costs. Remember by "shared" we mean that they are shared among Jobs and Activities. By allocating these shared costs back to an activity we can determine the actual gross profit of each Activity. This is why we are doing this work.

Shared Costs, Allocated to both Final Cost Objectives and Other Overhead Pools

Ok, now we will address the Fringe Benefits overhead pool (and there are others). Earlier, we described some indirect costs that are not usually found in an FBO. There are some overhead pools that contain shared costs but are allocated to both final cost objectives **and** other overhead pools. These might be overhead related to purchasing departments, IT departments, infrastructure (or facilities) departments, legal departments, or other types of internal service organizations. What makes these shared indirect costs is that they can be allocated to Jobs, Activities, **and other** Overhead Pools.

One example might be purchasing departments. These departments may have their costs allocated by each Job or Activity for which they purchase items. However, they might also buy items for the administrative department and the sales and marketing department and should have some of their costs allocated to that overhead pool

Another overhead pool that might be allocated to other overhead pools is the infrastructure/facilities overhead pool. Companies that use this pool usually have costs that are allocated based upon the number of people in a department. This pool may contain expenses such as rent, utilities, phone services, facilities insurance, and other items where the costs incurred can be traced (at least loosely) to the number of people in a department. If you desire, you can even use the space consumed by each department as the basis for allocating the costs in the overhead pool. Whatever makes sense. You could even break the costs out into two overhead pools and assign some of the costs to be allocated by people and the others by space. It doesn't really matter since it is all automated in AVMAN. However, don't get carried away; someone still has to look at the results of this work other than the accounting department.

The overhead pool that we see in many FBOs that is allocated to both final cost objectives and other overhead pools is fringe benefits. Fortunately, the allocation of the costs contained in this pool is fairly easy. In fact, in AVMAN the allocation method used is called the SIMPLE method. The fringe benefits overhead pool usually contains things like

health care expenses, employment taxes, 401K expenses, etc. Since fringe benefit costs are usually allocated to cost objectives based upon salaries, you would of course expect that they would be allocated anywhere you allocate salaries. If the overhead pool receiving the allocation contains shared costs, then the allocated fringe benefits costs would be included in the costs rolled up into cost of sales. If the overhead pool contains non-shared costs, then they of course would remain below the line.

Non-shared Costs, a Type of Indirect Costs

Non-shared indirect costs in an FBO are usually those related to administrative matters and sometimes separately to sales and marketing. Non-shared costs include those that you may allocate to your Administrative or G&A pool. They include costs such as professional fees, payroll fees, bank services charges, the salaries of your accounting department and administrative personnel. On your income statement, these are usually "below the line" costs. Which means they come after the Gross Profit on an income statement and therefore are subtracted from Gross Profit to arrive at Operating Profit. If you have a separate staff working on sales and marketing efforts, you may decide that a sperate overhead pool is warranted.

Collecting and Allocating Costs

Let's look at the mechanics of how we handle indirect costs. Indirect costs present two problems. First, how should we collect the costs and second how should we allocate them to cost objectives.

Collecting the costs is straightforward. You can have them entered directly from accounts payable, inventory, labor management, and even journal entries. Allocating costs to jobs or activities in a manner that truly represents how they benefit from those costs is where we need to apply both knowledge and technology. We have used the word allocate a few times. If we are going to allocate the expenses contained in an overhead pool, we need a methodology. The methodologies used in AVMAN are also straightforward. We need a numerator and a denominator. The numerator is the sum of the costs in the cost pool. The denominator is a selected cost base.

Let's look at a common cost, "Supplies". Think of this as the "what" as in what kind of cost is this. So, we take out an account in the chart of accounts say "61101 – Supplies". Next, you need to think of the "where" as in where did we incur this cost, in other words who spent the money? Say we have a vendor invoice us for supplies purchased for use by the linemen. So, we distribute the cost of these supplies to say the "Flight Support" overhead pool (shared cost). Tomorrow, we may record an invoice for supplies purchased by the accounting department, and we would distribute those costs to the "Administrative Overhead" pool.

So, as we record costs throughout the month, we distribute those costs to the pool where they were incurred. I know you are thinking, I want to know both pieces of information, how much we are spending on something like supplies each month and where are those costs incurred. Yes, there are reports that provide both views of the information. At the end of the month, we are going to close the month and one of the steps is to "allocate" our shared costs. Here, we take the total shared costs in our Flight Support bucket and allocate them among the jobs and/or activities that benefited from them. Those could be the Jet-A, Avgas, and FBO Services activities.

Automation is what AVMAN's Overhead Management tool is all about. If you had to allocate these costs manually, you just wouldn't or couldn't. Afterall, accounting is no longer a field where a room full of men sit in green eye shades recording entries in their ledgers all day. When we configure AVMAN we tell it how to allocate costs we collect in the overhead pools. When we execute our entries to record overhead, AVMAN follows the defined configuration to perform these tasks. It's all about automation.

So, when we *distribute* costs, we are putting them into overhead pools. When we *allocate* overhead pools, we are placing those costs into jobs and/or activities based upon a methodology.

A Fact

Shared cost pools are the only cost pools that you will set up for allocation by AVMAN's Automated Overhead System.

Reprise, Indirect Costs

So, indirect costs are first collected in a "bucket" (we call them overhead pools). Shared costs (i.e., pools) are allocated to the jobs and/or activities that represent our products or services. In other words, we split the total costs collected in the shared costs overhead pool(s) between the items we sell so we can track actual gross profit. Many FBOs only need one or two overhead pools to collect shared costs. However, it doesn't take the accounting department much more time each month to allow more shared cost overhead pools if they make sense. FBOs usually only have one shared cost pool that is allocated to both final cost objectives and other overhead pools and that is the Fringe Benefits Pool.   FBOs usually have one or two non-shared overhead pools, sales and marketing, and/or General and Administrative.

One common use of multiple overhead pools is when you have more than one manager responsible for their own budgets. Each manager/department can have its own overhead pool or bucket. This makes it easy to track who is spending the money. We can set up budgets for each of these overhead pools and track those budgeted costs against the actual amount spent. In fact, budgeting often drives the selection of which overhead pools you will have.

Picking the right number of overhead pools is an art. Too many and you complicate the data entry and analysis processes. Too few, and you lose valuable information. So, think it through before you pick your pools. The staff at MOSAIX has many years of experience setting up various designs and would be glad to assist your staff.

To summarize overhead costs can be *Indirect Shared*, *Indirect Shared to Jobs, Activities, and Overhead Pools*, or *Indirect Non-shared*. Each one requires its own overhead pool.

In most FBO's we have seen the following definition of overhead:

FBO Operations, *Indirect Shared*	Property Rentals, *Indirect Shared*
Selling, General & Administrative, *Indirect Non-shared*	
Fringe Benefits, *Indirect Shared to Jobs, Activities, and Overhead Pools*	

If some small FBOs that did not have rental property (hangars) or the rental of the hangar space was a very small part of the FBO, then the overhead pool did not exist, or it was combined with FBO Operations.

In larger FBO's we have seen the following definition of overhead pools:

FBO Operations, *Indirect Shared*	Property Rentals, *Indirect Shared*
Maintenance Operations, *Indirect Shared*	Charter Operations, *Indirect Shared*
Sales & Marketing, *Indirect Non-shared*	General & Administrative, *Indirect Non-shared*
Fringe Benefits, *Indirect Shared to Jobs, Activities, and Overhead Pools*	

This large number of pools can be used to support budgeting and management since every Shared and Non-shared overhead pool was assigned to a manager. AVMAN supports an unlimited number of these types of designs.

Cost Bases Supported in AVMAN

AVMAN's Overhead Management Component allows the automated allocation of the costs accumulated in overhead pools to final cost objectives and/or other overhead pools. This powerful tool allows you to define the overhead cost flow structure of the company and save this structure for use by AVMAN in its automated overhead processing. AVMAN supports three types of overhead allocation methods, the Simple (company-wide) method, the Departmental method, and a few special methods, Square Feet, Headcount, and one called Flight Resources for use only in aviation. A description of these methods and a more in-depth look at overhead allocation can be found in an article entitled "Behind AVMAN's Overhead Management".

How Things Were Done in the Old Days

In many older systems you used to find the expenses related to jobs and activities, and therefore the products and service they represent, all grouped together. The had no way to break these things down. You could find out how much you spent on a certain item, such as *uniforms*, but had no way to know how much was due to (for example) maintenance operations, charter operations, or FBO operations. In some systems, they created departments to try to track overhead without any real way to allocate those costs back to products and services (the real generators of revenue and income). We also saw systems that tried to add accounts in the general ledger to try to track at least the direct costs, sometimes by tacking on a few numbers to the primary account number. Unfortunately, the chart of accounts became unwieldy within a few years, and the system bogged down and became slow and unresponsive due to unnecessary clutter in the general ledger.

In some other systems the only way to distribute costs is to allocate each one separately when you are entering invoices into accounts payable, recording labor, or even making a journal entry, you don't really have any other option. Those "one-by-one" distributions to one or more accounts can/will cause multiple errors since you are often estimating how much goes to each account. Those errors build up or compound as they are recorded. It is practically impossible to eliminate all estimating errors, however if you bundle them all together and then allocate them all at once you are naturally going to smooth the errors out and reduce their impact on the information you use to make decisions.

Looking Under the Hood

Let's start by defining AVMAN and VIRTUOSO. **VIRTUOSO** was developed from Comptroller, an accounting system that was originally written and sold beginning in the late 1980's. Understanding that technology had really changed in the intervening years, MOSAIX undertook the task of completely rewriting Comptroller for today's technology and it is now known as VIRTUOSO.

Comptroller is an Expert System which utilized Intelligent Database technology of the time and what came to be known as rule-based technology in the mid-2000s. Comptroller was developed during the mid to late 1980s in the heyday of AI. Natural Language, Intelligent Databases, Expert Systems and others were all ideas that were building up in the 1980s at places like MIT, Stanford University, and Carnegie Mellon University. We utilized this technology and know-how to provide the very first system to help small to mid-size businesses ($5M-$25M in the early 1990s) that required more advanced accounting systems. In the beginning, most companies that utilized Comptroller were manufacturers or defense contractors. An expansion of Comptroller for service-based firms came a few years later.

AVMAN is a vertical for VIRTUOSO and is all about aviation. Some of the features of AVMAN are the fuel point of sales (POS) system that includes many fuel pricing options, a fuel management system, a reservations system, a ramp fuel and FBO Services tablet system, a Line Operations Board, and many POS reports and tools. Also, within AVMAN is a complete Property Management (PM) system that includes tenant and lease management with a full understanding of the new lease rules. AVMAN's PM system also has the ability to handle reimbursable expenses (such as utilities) added to a lease as well as multiple lease years/changes and the uploading and storing of the actual lease documentation. The PM system is full featured, you can specify multiple types of structures including standard buildings, offices, tie downs, ground space, and even shared space. All of this and it is completely integrated with VIRTUOSO as well as other components of the AVMAN system.

The entire AVMAN/VIRTUOSO system is completely credit card aware and can accept all major brands (VISA, MC, AMEX, Discover, etc.) as well as most aviation specific cards (Aircard, Avcard, Avfuel Pro Card, Avfuel Contract Card, EPIC, Multi Service, TITAN Aviation, Worldfuel, etc.) AVMAN is also fully integrated with AVMAN Central, a mobile and desktop app that lets customers find specific FBOs and place on-line orders or make reservations with an FBO. AVMAN Central is an app that allows FBOs to make private fuel price offers to customers. This feature known as Tailored Pricing allows FBOs to make offers to selected customers – a truly private price system.

AVMAN/VIRTUOSO is a fully integrated business management system that automatically records the accounting transactions that are created in the point of sales system. AVMAN is outfitted with both a general financial accounting system and a fully integrated management accounting layer. ***All this without having the extra labor cost and time associated with two systems.*** A cost or management accounting system is one that collects and reports on the revenues and expenses and therefore, the profitability of individual business efforts in the company. So, with AVMAN you really have three systems working for you, the point of sales system, the financial accounting system, and the management accounting system. Utilizing ***AVMAN's Expert Assistant (or EA)*** many of these tasks are automated. This means that you do not require staff that is knowledgeable in all of these areas. The goal when ***EA*** was developed was to ensure that accounting teams can provide management information without increasing staff effort or costs. In fact, many firms have been able to reduce overall staff commitment. ***EA's*** job is to help keep it simple, and he is pretty good at that task.

Where do we keep the costs distributed to Jobs, Activities, and Cost Pools

AVMAN/VIRTUOSO keeps all the information related to job costs, activity costs, and overhead costs collected in three ledgers for each of these cost objectives. Not only does this make reporting and analysis more informative and efficient, but it also makes it possible to differentiate reporting so that valuable management information is not provided when financial statements must be made public or at least provided to an organization that does not need the in-depth financial information that is available to management.

This paper has been focused on costs/expenses; however, you can perform many of the same tasks with revenue that you can with expenses, however all revenue needs to be allocated to Jobs and/or Activities. Revenue cannot be assigned to overhead pools.

Therefore, you can have separate management reports that show individual gross profit for each fuel type you sell plus one for FBO Services. You can cause those activities to record all revenue and expenses to a single revenue and a single expense in the general ledger. This is possible since every Job and activity has both a revenue and an expense control account specified in the job/activity. This is automated in AVMAN/VIRTUOSO, so you do not need to manually update those accounts.

Interfacing Subsidiary Cost Ledgers to the General Ledger

How do we tie those subsidiary cost ledgers to the general ledger? Through control accounts, just like the accounts receivable ledger balance is tied to the general ledger.

A control account is a summary level account in the general ledger, they represent the balance in the subsidiary ledgers. Control accounts are listed in your Chart of Accounts and appear in your trial balance. These accounts contain the total of individual transactions from subsidiary ledger accounts. Control accounts are typically used to summarize the accounts payable and accounts receivable subsidiary ledgers. Those ledgers usually contain many transactions that should be separated into different subsidiary ledgers rather than clogging up and slowing down the general ledger.

The current balance for the control account should be the same as the balance for the associated (or linked) subsidiary ledger. When reviewing detailed information for accounts receivable or accounts payable, you would use reports in the specific subsidiary ledger.

For example, in the Accounts Receivable subsidiary ledger, you may have thousands of customers, all with balances. Each of those balances is recorded in a separate account within the accounts receivable subsidiary ledger. The total for all of these accounts is placed into the control account when that information is posted to the general ledger. This balance then appears in the general ledger, trial balance, and in financial statements such as the balance sheet.

By using subsidiary ledgers, companies limit how much space is used in the general ledger and also ensures that certain performance goals are attained. Now, there is only one balance in the general ledger/trial balance for accounts receivable instead of the thousands there would have been otherwise. If someone needs information about a specific customer, then they can check the subsidiary accounts or records to learn more.

Using control accounts and subsidiary ledgers makes it easier for bookkeepers to manage large sets of data. Very small companies, which have a very simple business model (usually one or two products), can use accounting systems where accounts and all the transactions are kept in a single general ledger. For larger businesses or those with multiple or complex business models, that usually have too many transactions to be managed by only one-person, subsidiary ledgers are utilized.

In these companies, if control accounts were not used, a bookkeeper would need to collect information about the balance from both the subsidiary ledger and the general ledger to determine the trial balance for an account. The need to refer to both (or all ledgers) is eliminated by having control accounts for each subsidiary account listed and maintained in the general ledger.

If you did need to see all of this information in one report, you could always run the Ledger Detail Report and specify that you want to include all "Cost Ledger Detail." When run this way, all of the control accounts in the General Ledger are replaced with all of the information in the Cost Ledgers. If your auditors are unfamiliar with how control accounts operate, this will provide them with the detailed information that they would obtain out of less capable systems.

Simply put, control accounts maintain the balance for each subsidiary account to prevent the general ledger from getting clogged up with information from many transactions regarding the possibly thousands of individual accounts.

Bookkeepers and accountants can also use control accounts to identify errors made in the subsidiary ledgers. If the trial balance doesn't balance correctly, then only the accounts where the control account doesn't match the linked subsidiary ledger has to be checked for errors. Use of control accounts also allows different individuals to check and maintain the control account to protect against fraud, thereby improving your internal controls. Control accounts also speed up the

production of management/cost accounting information because you can use the subsidiary ledger without waiting for individual balances to be extracted and reconciled. Finally, as said before, control accounts reduce how many details are listed in the general ledger thereby improving performance.

Conclusion

In addition to a traditional accounting system, AVMAN provides a profitability management and analysis system (also known as a management accounting system) that is fully and automatically integrated with its financial accounting system. AVMAN has been designed to provide all of this without having the extra labor cost and time associated with two systems or three when you include the point of sales system.

At MOSAIX we can discuss with you how we have seen other FBOs set up AVMAN/VIRTUOSO. Since we do not provide accounting system design or internal control system design for companies/FBOs, we would be happy to talk with you or any firm you may hire to assist your company with an overall design. Designing a performance measurement system is a dynamic process for almost all companies. Change is inevitable and AVMAN has been designed to handle this natural occurrence.

This paper has dealt with Jobs and Activities to describe how we measure profitability. It also has described how we use the cost pools and the overhead subsidiary ledger to collect and allocate those costs. Finally, it discussed how we tie everything together using control accounts in the general ledger.

If I may borrow from an earlier writing we undertook, "To understand where we are making money and where we are losing it, we need to understand the total cost of making and providing our products or services to our customers. We need to know where those costs are generated if we want to control them, and where they are spent if we want to know the true cost of products and services. That is the only way you will know if you sell more of that product, or deliver more of that service, you will make more money."

If you hope to understand the real cost of making/delivering a product or service, you need the information that can be attained using subsidiary cost ledgers and the methodologies described in this paper. Because after all… "If you can't measure it, you can't manage it."