



# What is the Value of Asset Management?

John Woodhouse, CEO, The Woodhouse Partnership Ltd (TWPL)

*This paper summarizes and clarifies the different perceptions of value and benefits associated with assets and their life cycle management. It seeks common ground of terminology and practical measurement or demonstration of impact for the varied audience of financial, technical, regulatory, customers and other stakeholders. It also illustrates some of the reported benefits (added value) being achieved by (better) asset management, such as those being generated through the introduction of PAS 55 or ISO 55000 standards.*

## Getting the terminology clear

### Value, Benefits or Value-for-money?

“Value” represents the concept of a gain being greater than any associated pain. Good value means that the benefit/cost ratio is highly attractive, poor value obviously the reverse.

It can be confusing when the word ‘value’ is sometimes used as a direct substitute for ‘benefit’ *ignoring* any dis-benefits. So, in such circumstances, we must be careful to make sure we use the value term only to describe net benefit (after taking any dis-benefits into account). The term ‘value-for-money’ is an example of such acknowledgement. However, dis-benefits might not only be financial – there may be lost opportunity, risk, sustainability constraints, reputational disadvantage, and other negatives to consider.

The positives also can be very diverse in their manifestation and perceived importance. Beauty lies in the eye of the beholder. What is regarded as a benefit from one perspective (or stakeholder) will often be irrelevant or even a dis-benefit to another. So, in our concepts and measurement of ‘value’, we must also always consider “to whom?”. Many of the confusions and conflicting priorities in asset management stem from the multiple agendas and perceptions of its importance.

And it is certainly difficult to consolidate and demonstrate ‘total value delivery’ from the different degrees of success in meeting multiple stakeholder expectations. This paper will try to map out some of the elements required to do so.

### Value or Values?

**Value** (singular) represents, as explained above, the satisfaction of desires or expectations of identified beneficiaries, with a scale for such satisfaction based on the degree to which benefits exceed dis-benefits. Most of this paper will be discussing the understanding, clarity and measurement of such value from assets and their (improved) management.

**Values** (plural), on the other hand, is a term often used to identify principles, attributes or deliverables that have highlighted importance. An organisation, or an individual, adopts and/or promotes certain values to encourage particular behaviours or define standards of acceptable behaviour. “*We believe in protecting the environment*” or “*Our customer always comes first*” or “*Safety is our top priority*” represent communication of such values – which stress the significance of the chosen subject, commitment or other outcome. And, since these commitments involve addressing the interests of certain stakeholders, their evident significance should also be reflected in how value (singular) is recognised, monitored and demonstrated. Values (plural) are therefore often the *communication tools* for the significance of *some* manifestations of value (singular).

The Values adopted by an organisation should obviously therefore provide a strong and direct influence on how Value is assessed. Unfortunately, however, a depressingly common double-speak is evident in many organisations. They adopt and promote publicity-friendly Values, but actually act on very different priorities. ‘Green-leafling’ illustrates the behaviour: establishing environmental credentials with a superficial ‘be seen to be doing something’ while pursuing a different agenda, such as a short-term, profit-driven basis for investments and activities. Some Enterprise Risk Management systems also fall into this category –



created and only used for visible compliance with Sarbanes-Oxley<sup>1</sup> corporate reporting requirements rather than supporting risk-based decision-making and assurance processes at all levels in the organisation.

Even if the Values are genuine and passionately embraced, it can be difficult to 'walk the talk' in applying them, particularly if there are multiple priorities, non-negotiable 'policy' commitments and constraints to their delivery. This is where Optimisation comes in – finding the best Value compromise within the absolute boundaries of obligations and constraints.

## Value FROM, and Value OF

Consider two scenarios:

- a) I own/manage a food packaging facility (or utility network, airline or coal mine)
- b) I own/manage an investment portfolio of artwork (or gold bars, rare wine vintages, classic cars).

In the first case, Value (in my eyes, at least) comes mostly from the (profitable, safe, environmentally responsible, sustained) *performance of the assets*. This is what economists call 'utility'. In the other case, however, the principal manifestation of Value is the *capital worth of the assets*, and how this might grow, or at least be protected.

This reveals an important feature of asset-related (and therefore asset *management*-related) value: it is generated from a combination of function (what the asset does, or what we use it for) and intrinsic worth (what we can buy/sell it for). These are two sides of the same coin: if we over-exploit an asset for 'usage' benefits, we can erode capital value. If we put our artwork in a bank vault, we might protect it better, but we are sacrificing the aesthetic (usage) value of its display.

Asset management therefore needs to consider the *combined* impacts of functional (utility) value and capital value. At corporate finance levels, these are (partially) represented by the Profit/Loss account, and the Balance Sheet respectively. In stock markets by Dividends and Share Price. Within the world of (physical) asset management, however, the quantification methods can be quite tricky.

**Value FROM** = functional benefits exceeding operational costs and other dis-benefits, over a horizon that smooths any time lags between expenditures and performance consequences (e.g. asset life cycle). The main challenges lie in quantifying (and measuring) the *non-financial* benefits and dis-benefits, and in the combining or 'amortizing' the combination of short- and long-term impacts.

**Value OF** = realisable capital value on potential sale. Clearly this is dependent on the needs and perceptions of a potential acquirer as well as a host of other factors such as asset condition/ capability, functional/ economic life (including potential re-purposing), supply and demand trends etc. And if no 'sale' is likely or even possible, the 'fair' capital value can only be inferred by very indirect means, such as the original procurement/creation cost and some extrapolation based on asset care/condition and ongoing functional/economic life assumptions. The very crude method of 'discounting' asset value using a purely time-based formula (as used in many accounting and regulator models) is where a fundamental conflict is encountered: we encounter assets that are recorded as having 'zero value' in the accounts, simply because they are now xx years old, yet their *functional* value may be completely unchanged (perhaps even as good as new, if well-maintained).

What is missing, in such cases, is a method of representing functional value in terms of capital value, and *vice versa*. Or, better still, a recognition of value that incorporates both capital and operational costs and benefits over the whole asset life cycle. This is where Life Cycle Costing (LCC) and various methods to estimate or quantify TotEx (CapEx, OpEx and, ideally, RiskEx)<sup>2</sup> can be helpful.

## Value to whom?

Customers expect high quality and reliability of service, at low cost. Investors and owners will probably be seeking financial return and stability but can also have other aims (e.g. societal benefit). Safety regulators and environmental watchdogs want evidence of compliance, risk management and good governance. Employees seek financial and non-financial rewards, such as job

<sup>1</sup> Sarbanes-Oxley Act (SOX) passed by U.S. Congress in 2002 to protect against fraudulent accounting activities (following Enron and other scandals), includes requirements for enterprise risk management reporting.

<sup>2</sup> Total Expenditure, Capital Expenditure, Operating Expenditure and Risk Exposure

satisfaction, recognition, learning opportunities and other motivations. Suppliers and service providers sometimes even have quite mature 'relationship' agendas (not just the maximisation of fees, at least effort).

'Success' in organisational performance is therefore seen through many different pairs of glasses. Improvements in one direction (e.g. improved financial results this year) may well be at the expense of another (e.g. sustainability). It is therefore unwise to claim that asset management has delivered *better value* without also mentioning *to whom*.

To be rigorous in both monitoring performance and claiming benefits for any 'improvements' that we introduce, it is essential to have done some preparatory homework:

- a) identify the stakeholders and, for each, what is the nature of the relationship and mutual interest. Note: this context knowledge is needed in any competent management system (e.g. ISO 55001).
- b) identify (*from their perspective*) what is, or would be, perceived to comprise 'good value'.
- c) agree the significance of these competing desires in relation to the vision and mission of the organisation. This will be a combination of the importance of satisfying them, and the leverage or power they can exert on the organisation.
- d) Check that these influences and their different scales of importance are consistently represented in the:
  - i. Definitions of asset, systems and activity criticalities,
  - ii. setting of asset management objectives,
  - iii. scales of consequence (types and severities) within risk management system,
  - iv. criteria for prioritisation of activities,
  - v. decision-making processes and criteria,
  - vi. design of corporate performance measures (e.g. dashboard) and selection of Key Performance Indicators (KPIs).

## Criticality, risk and the prioritising of improvement activities

There are a host of other terms that also express the sense of significance and urgency of things we do (activities) and importance of things we have (assets). While not attempting to create a full dictionary here, some practical tips may be helpful in distinguishing how these terms are commonly used.

**Criticality of assets or asset systems:** the impact of loss, or loss of function (e.g. failure) to the delivery of asset management objectives. Critical assets justify greater care in their management, more detailed consideration of life cycle plans. This is because, with a higher potential impact, it is worthwhile to control the *probability* of failure to a lower level.

**Criticality of asset management activities:** the impact of poor or non-performance (or delay) of an activity upon the delivery of asset management objectives. Again, it is 'failure consequence' dominated, justifying extra care in lowering the likelihood of such errors.

**Risk** – combines both failure consequence and likelihood. The level of risk represents scope to improve, by lowering probability and/or mitigating consequences. Failures can have diverse consequences, and impact multiple objectives or 'value drivers'. So most risk management frameworks include equivalency tables that enable different event types to be consistently treated for risk value. This puts an inferred, monetized value on various impacts, and is both necessary and valuable in asset management decision-making, prioritisation and valuation of improvements.

Reducing risk is a significant part of value delivered through better asset management. However, the 'as is' risk estimate is only a suitable basis for prioritising the *investigation* activities. The prioritisation of worthwhile *improvement* tasks, and the value that they yield, should be based on the *change* in risk that will be achieved i.e. the before vs after difference, in relation to the cost or efforts of the change<sup>3</sup>.

**Value-for-money Prioritising and Decision-making criteria.** Risk reduction, in relation to the cost of the risk control, is an example of value quantification, and can be used for prioritising improvement activities. So too can other benefits/cost ratios. The ranking and selection of projects, investment opportunities or other activities by a consistent value-for-money criterion is an important

<sup>3</sup> Unless the risk lies in an 'unacceptable' region (policy, legal obligation or risk-appetite intolerable), in which case the cost is not an issue: urgency is a matter of compliance!

part of the asset management toolbox. Decision-making and prioritisation criteria are a formal requirement of any Strategic Asset Management Plan<sup>4</sup>. This applies to discrete improvement tasks or interventions, the combination of them over an asset's life cycle, and the combination of them across multiple assets in the asset systems or whole portfolio. So the methods<sup>5</sup> need to be proportionate and coherent, including the handling of trade-offs (e.g. between competing objectives, between short- and long-term impacts etc) and task timing/intervals (when risks, performance or costs are changing with time, e.g. maintenance intervals or asset renewal timing).

## Quantifying & demonstrating value

### Value realisation at different levels in the organisation

As explained in the IAM Guideline "Life Cycle Costing and Value Optimisation"<sup>6</sup>, there are usually different levels of asset intervention and value realisation (Figure 1). We tend to do things to assets, and incur corresponding costs, at a granular level of discrete tasks on discrete asset units (e.g. equipment or sub-systems). However, the health, reliability and performance of such assets is only recognised in value terms at a higher level of *system* performance. This means that value-for-money is not easy to demonstrate: the cause and effect relationships are complex and the influence of capital value (e.g. buying/selling, growing/renewing, at Portfolio level) and functional value (using/maintaining assets and asset systems) are difficult to 'optimise'.

Furthermore, there are also time-lags involved (what we do/don't do to assets might take several years before it is evident in system/portfolio performance). For example, in very crude 'macro' average<sup>7</sup>, inadequate maintenance (which might save money this year, so provide short-term perceived benefits) typically results in c.4x additional *corrective* costs, 4-5 years later. And that is not including the impact of downtime or other failure consequences, which are often 10x higher.

#### Typical priorities & concerns

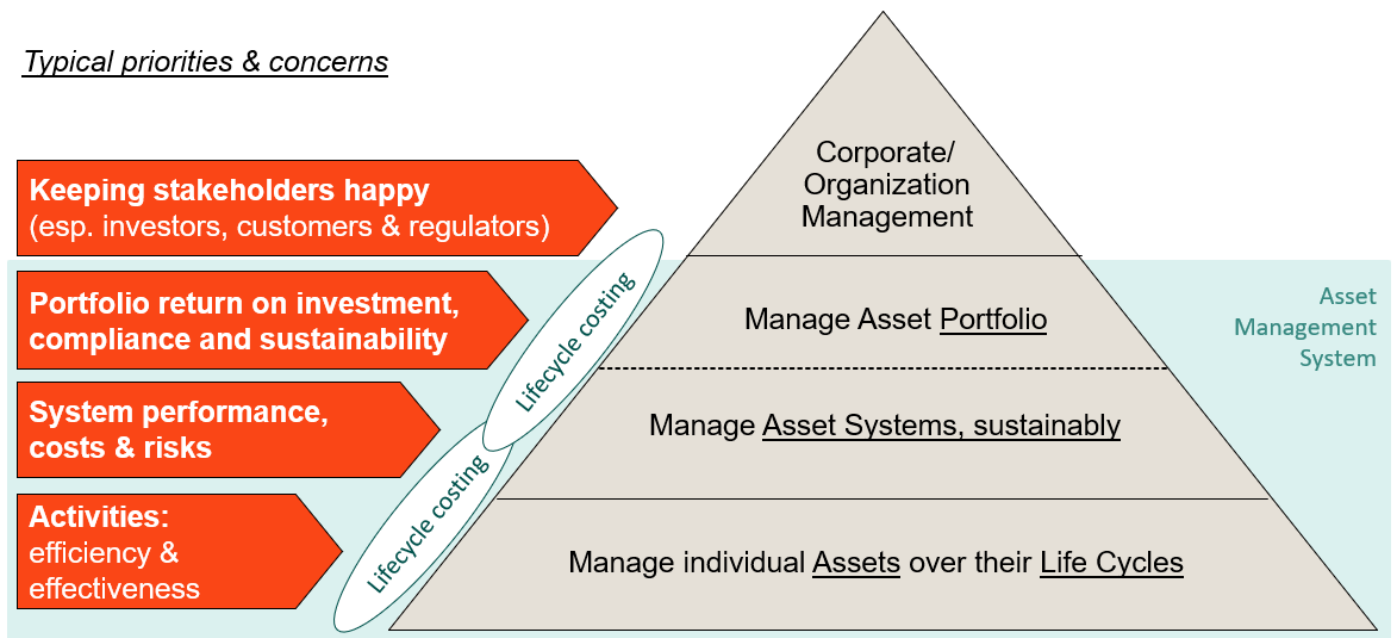


Figure 1 Value realisation from systems but asset interventions on components

<sup>4</sup> ISO 55001

<sup>5</sup> Asset Management decision-making: the SALVO Process" from [www.SALVOproject.org](http://www.SALVOproject.org)

<sup>6</sup> See [www.theIAM.org](http://www.theIAM.org)

<sup>7</sup> Repeated observations by author over c.30 years in multiple industries

## Corporate performance evidence

At the top of any organisation, there are mandatory reporting requirements for *some* aspects of Value. The financial accounts record income and expenditure, and balance sheet values/liabilities, however derived. Return on Capital Employed or Return on Assets (capital value) and other indicators attempt to show 'value for money tied up'. And performance reporting usually also extends to include some social responsibility impacts, environmental and risk management performance. Triple Bottom Line<sup>8</sup> and Balanced Scorecard<sup>9</sup> models are long- and widely established now.

Yet our accounting methods and corporate performance criteria *still do not adequately reflect asset management success*. They are often distorted by short-termism and the practical difficulties of 'balancing' the scorecard (e.g. how much is 'sustainability' worth, in terms of sacrificed short-term financial results?). The scorecard needs a balancing mechanism.

Companies also report performance features individually (e.g. profit, service levels, environmental impact etc. While there are some usages of assemblies such as TotEx (CapEx plus OpEx), and Total Cost of Ownership (TCO), these rarely also incorporate risk exposures ('RiskEx?'), either as a 'probabilistic cashflow' or as an uncertainty applied to more concrete costs or benefits.

Financial reporting clearly needs better methods of recognising 'lost opportunity' cost, risk and the value of assets that are more representative of the *functional* worth, not just their theoretical, time-depreciated sales or replacement value.

However, despite these significant gaps and distortion problems, a recent study<sup>10</sup> by KPMG suggests that good asset management does manifest in conventional performance evidence. While the study of 100 organisations only characterised some very broad bands of 'asset management maturity', and the cause-effect relationship was not safely proven, they indicate that an 11-19% rise in EBIT (Earnings Before Interest and Tax) and 10-13% rise in ROE (Return on Equity) might be associated with organisations that are 'started' or 'on the journey' in terms of asset management maturity.

## Business process improvements:

### 1.1 Empirical reports of 'value added'

Until the accounting world finds solutions to the current constraints, and corporate scorecards are refined, the value enhancement through asset management is probably best shown through the range of published case studies and their reported impacts. Value improvement is the primary objective for introducing or improving a management system<sup>11</sup> for asset management. And fortunately the widespread adoption of PAS 55 and ISO 55000 standards is now yielding a good range of benefit examples, slowly trickling into the public domain (not least via submissions to the annual IAM Achievements awards)<sup>12</sup>. Examples include:

#### ICE, Costa Rica (26 power generating stations) – IAM award winner

*The asset management programme involved about 200 people directly and about 600 indirectly, from all parts of the company.*

- *Project payback is outstanding: the total cost of the whole 3-year project was recovered within the first 6 months of implementing the first round of changes.*
- *Cost-risk-performance evaluation for projects and spares have saved US\$7-figures/year, allowing us to achieve big sustainable budget reductions and cope with fuel prices increases without impact on customers.*
- *Total measured benefits are US\$ 8-digits per year.*

#### Sodexo (Global Facilities Management, most industry sectors) – IAM award winner

- *Improved control of day-to-day activities and business efficiencies: 7-8% average improvement*
- *40% reduction of risk-related costs*
- *100% compliance in regulatory activities*
- *Reduced failure rates: 20%*

<sup>8</sup> Social, Environmental & Financial results

<sup>9</sup> Kaplan & Norton model of four 'perspectives' (Financial, Customer, Internal Business Processes, Learning & Growth) to monitor and motivate both short term results and long-term prospects

<sup>10</sup> Asset Management: financial benefit case, KPMG, 2016

<sup>11</sup> As specified in the ISO 55000 family of standards

<sup>12</sup> "Benefits of Asset Management", Tim Kersley 2017, [www.theIAM.org](http://www.theIAM.org)



Of course, these are 'snapshot' reports, with measurement durations of around 2 years. However longer-term evidence is also emerging. SABIC Innovative Plastics in the Netherlands applied asset life cycle and maintenance cost/risk/performance methods to their production planning and biannual shutdown strategies, back in 2012 – resulting in range of plant modifications, €8-digit annualized financial benefits and a doubling of the interval between major shutdowns. The 4-year running period has since been successfully achieved, with complete reinforcement of all the assumptions, asset behaviour forecasts and realised benefits. Scottish Water shows 10-year sustained improvement trends in both performance measures and cost reductions. China Light and Power, similarly, report 15 years of continual improvement, including 90% reduction in customer supply interruptions, at the same time as 40% network growth and 20% total cost (tariff) reduction.

## 1.2 Structured approaches

Previous attempts at identifying and revealing *systematic* value improvement within business processes (e.g. Michael Porter's Value Chain model) have enabled a clearer linkage between organisational purpose and the linear sequence of contributors towards a target of customer satisfaction, supported by various 'enabler' or supportive functions. While this can certainly help<sup>13</sup> in alignment and de-bottlenecking, it is mostly suited when there is a clear primary beneficiary of the service (customers) and a dominant (e.g. financial) measure of sustained success. The multi-stakeholder world of asset management, in contrast, can sometimes be more like a network or multi-dimensional set of value chains, all needing to be managed coherently, despite some of the stakeholders and their expectations varying in their significance and often being uncertain.

It may be time, therefore, to establish a revised model for demonstrating Asset Management performance and value. It would necessarily consider all the elements of the management system, and their contribution to the delivery of organisational objectives. It should also recognise the very different value improvement opportunities presented during different asset life cycle stages (getting design and procurement decisions right may be difficult, but they hold the potential to yield greater whole life cycle value than 'optimising' the operating and maintenance of the asset).

To develop such a 'value contribution' view for asset management, we will need some clearer bottom-up evidence from the assets and from the asset management activities. And therein lies a significant 'evidence' challenge. Good, or better, asset management often eliminates the evidence of what would otherwise have occurred. The business case justification for many asset management activities is the 'road untraveled'. This can be true for design, procurement, operations, maintenance<sup>14</sup> and renewal activities. In cumulative effect, the better we get at asset management (*only doing the right things, for the right reasons, in the right way, at the right time*), the more successfully we eliminate the evidence of what we would otherwise have done or suffered. The better we get, the more difficult it becomes to prove the value of what we do!

Nevertheless, there are still currently plenty of opportunities to show value, and some structured approaches and methods for quantifying both the tangible and intangible benefits of assets and their management. As the following section explains, there is even scope for a 'total value' formula, such as

Asset **capital value** (however derived, from potential buyer view, or replacement, or somehow derived from purchase price and condition attributes)

+

Functional **performance value** x remaining **economic life** (the former comprising usage benefits, in terms of quantity and quality, minus total operating costs. The latter being the shortest horizon of economic renewal, contract/external constraint or natural resource limitation – or, if 'infinite' life system (ongoing 'patch and continue'), then a chosen standardised horizon that smooths out any political/regulatory/major investment cycles)

**+/-** (note: risk can be probabilistic *pain or gain*, so +/- as appropriate)

**Risk** x remaining **economic life** (sum of known opportunities/threats, with a conservative bias for the low probability/high consequence outcomes, where quality of knowledge is inevitably weaker, and may even include existential risk)

+

<sup>13</sup> "Value from Assets: understanding the value chain", Thomas Smith 2017, University of Wisconsin

<sup>14</sup> Resnikoff's conundrum, 1978 "successful preventive maintenance entails preventing the collection of the historical data which we think we need in order to decide what preventive maintenance we ought to be doing"

**Intangible or perception** benefits (using one or more of the inference methods<sup>15</sup> for monetizing – as introduced in next section below).

## Bottom-up measures of value contribution

Asset management is defined<sup>16</sup> as the activities that realise value from assets. This applies equally well to asset management activities that directly impact on assets (buying them, designing, building, operating, maintaining, modifying, renewing, disposing of them) and the supportive activities of work planning and management, information, risk and people management etc. All of what we do needs to be worthwhile, i.e. deliver positive value. However, only the activities that impact assets directly can really be assessed for their cost-effectiveness in terms of the resulting performance of assets/asset systems (with the problems of Resnikoff<sup>13</sup>, time lags etc). The supportive or 'management system' activities deliver their contributions more indirectly, via the 'added value' route of improved efficiency and effectiveness of processes that they enable or support. This gives additional problems of demonstrating cause and effect, sometimes addressed by establishing internal service level agreements.

The measurement toolkit is also immature. *Some* attributes are self-evident and easy to monitor, enabling 'before and after' demonstration of improvements: for example, operating cost reductions, improved output volumes, quality measures and some types of compliance evidence. Other impacts are harder to measure or take too long to become evident. The most rigorous review of value quantification methods is represented by the Shamrock Diagram<sup>17</sup> (see Figure 2). This shows how typical stakeholder interests (external ring) can be represented in just 5 'universal toolkit' methods (inner ring) for quantifying the scales of their achievement.

An easy way to understand this relationship is:

- a) Combine the attributes around the outside into a single sentence ("*We want to be safe, reliable, long-lasting, cost controlling, .....*") and compare these aspirations with your company goals or mission statement. Does it cover all the bases?
- b) Now consider what 'total success' achievement for the inner 5 topics would look like: i.e. delivery of *zero risk, infinite life, 100% operational efficiency, total compliance and complete (intangibles) happiness*. Would there be any scope for further improvement, in any aspect of assets or their management?

While the green connecting lines show just a few examples, the Shamrock enables us to quantify **any** stakeholder value perceptions, through the use of one or more of the inner ring methods. For example, the outer ring 'Safety', as a value perception, can be quantified and demonstrated as a combination of (regulator/legal) *compliance*, plus quantified *risk management*, plus an '*intangibles*' premium (if, say, *reputation* for safety is recognised as additional value).

Clearly the terminology will vary somewhat (e.g. Operational Efficiency = functional performance = 'utility' in economist language) but the principles are robust and consistent (e.g. Operational Efficiency represents the ratio between outputs and inputs). It is an expanded and more rigorous version of the much-quoted goal of 'cost/risk/performance' optimisation 'over the asset life cycle'. We should perhaps be saying 'compliant, sustained, risk/cost/performance optimisation with appropriate premiums paid for human psychology (e.g. reputation)'.

<sup>15</sup> Methods for quantifying the value of intangibles were well reviewed/developed by SALVO consortium [www.SALVOproject.org](http://www.SALVOproject.org)

<sup>16</sup> ISO 55000

<sup>17</sup> From European EU1488 MACRO Project research 1995-2000.



Figure 2 Shamrock diagram of organisational value drivers and quantification methods

Three elements in the Shamrock present practical challenges when trying to demonstrate their value contributions. These are:

- The **low probability/high consequence** part of the risk management spectrum
- **Sustainability** or expected asset economic life (from present day knowledge)
- **'Intangible'** benefits (the value attached to *human perceptions*, over and above any directly quantifiable benefits)

Quantification techniques for all three of these 'tricky areas' DO exist, however<sup>18</sup>. They may involve probabilistic methods, or extrapolation, or inference, but these tools can be used to capture and even monetise the value of such 'fuzzy' areas. Some say 'you cannot put a price on such things.' But we certainly can, and indeed we are all doing so every day, in what we chose to do or not do. The SALVO collaboration programme found several ways of range-estimating, inferring and extrapolating in order to put a financial equivalence to these different and 'subjective' value dimensions. So, while the data quality will certainly be poorer, we can at least include them in a consistent manner. Even a range-estimate is better than dismissing such value as 'too intangible to consider' or, just as bad, treating them as over-riding, with no accountability for 'how much' they are important.

The prize of enabling an organisation to quantify all the Shamrock outcomes, even with acknowledged uncertainty (i.e. range-estimates) is very great. It means that a true total value can be assembled; one that combines costs, risks, benefits and sustainability, capital value and asset functional (performance) value. This also enables more consistent prioritisation between competing benefit types or stakeholder interests, more transparent decision-making where trade-offs are involved, and a method for 'balancing of the scorecard'.

<sup>18</sup> "Asset Management Decision-making: the SALVO Process" available via [www.SALVOproject.org](http://www.SALVOproject.org)





## Conclusions

This subject of value in and from asset management is a 'hot' topic. There are acknowledged deficiencies in both out top-down view (e.g. accounting practices) and bottom-up evidence methods. Yet the combination of case studies, cumulative effects and even partial/filtered tangible examples clearly show the scale of benefits to be great, in a wide variety of industries, cultures and business environments (public and private sector). The debates about the valuation of indirect, probabilistic or intangible benefits (e.g. monetization of risk, value of reputation, morale, customer satisfaction etc) will continue, but solutions do already exist for these, and the advantages of their usage is such that it is mostly a matter of awareness, understanding and cultural acceptance before they become accepted parts of the asset management toolbox.

I can also see that is time to do some more systematic research and development into monitoring of asset management performance and value at the business processes level (e.g. the management system); perhaps we can create a next generation 'balanced scorecard'?

John Woodhouse