



Institute of Actuaries of Australia

# A new look at valuation and the actuarial profession

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## **Executive summary**

Frameworks used to value corporations today have a number of inherent problems that are becoming more apparent with the rise of innovative offerings in the global marketplace. The valuation framework proposed in this paper addresses these problems by taking a new and holistic approach to valuation. Fundamentally, this approach does not attempt to break down the source of value in corporations into its components, but rather seeks to predict the value creation behaviour of corporations from a practical understanding of how its assets interact to create value.

The framework uses future income and the operating risk to which that income is subjected to calculate the present value of the entity. While this principle is not new, its application in this context means a move away from the assumption of perfect information which is employed when taking a market-based approach to valuation. As such, it creates a common means of valuing start-up companies, intellectual property, brands and other value-creating entities where markets tend not to exist. Underlying the difference in this approach is the clarification of the definition of an asset. This has been explored by comparing the practical differences and similarities between tangible and intangible assets, and the nature of assets as holders of value-creating potential.

A practical means of evaluating and monitoring asset development is also suggested, through the use of operational performance measures. By comparing actual asset performance with that expected in the strategy adopted by the business, deviations in expected income can be attributed to the contribution of specific assets. This technique requires validation through a statistically significant study. Once tested, this framework has the added benefit of providing a template for the measured development of business over time.

The framework has also been extended beyond traditional company boundaries to encompass sustainability principles. This creates a quantifiable link between the natural, community and global knowledge environment in which a corporation operates and its ability to create value into the future.

Many of the steps and procedures described in this paper have parallels in actuarial practice. Exploring this field of study from an actuarial perspective has the potential to expand the profession's technical analysis of risk management into a new field of practice. The opportunity for actuaries is to develop this field of practice as an interdisciplinary exploration, thus partaking of the spirit of many of the other breakthrough findings of the twentieth century.

## **The need for new valuation frameworks**

### ***Valuation today***

The valuation of corporations and other organised entities is a highly developed field of business analysis, yet it remains an inconsistent and inexact endeavour across its practitioners. Traditional methods of ascribing capital value to corporations use information from financial statements and market behaviour (for example, industry or company beta and price-earnings ratio). This approach, which has supported decades of financial decision-making, tacitly relies on the market to understand the future income-creating potential of a corporation, and in doing so utilises the perfect information assumption of efficient markets which we know does not hold.

The limitations of current valuation methods have also gained exposure with the evolution of “virtual” companies. Many of the new entrants in the booming service industries such as logistics and outsourcing have no tangible assets or established markets on which to base a traditional valuation. In this situation, the present value of future income streams is adjusted for risk using “comparable” beta values and/or risk discount factors.

The valuation of start-up companies and intellectual property is particularly problematic. Comparable markets or financial statements tend not to exist for these entities, and valuation procedures look to the risk-adjusted present value of future income and capital worth. These calculations are characterised by the use of savagely high risk discount factors, of up to 50% per annum. This technique is employed ostensibly to compensate for the high degree of uncertainty in predicting the success and stability of future income streams. A significant consequence of this technique is that it often erases the development potential of innovative products and services, thus skewing the emergence of innovation to those with the shortest vesting periods.

The common feature of the approaches described is that they circumvent the articulation of a meaningful formula for how value is stored, released and sustained in a corporation. The unique configuration of people, processes and tangible assets in a business entity demarcate its ability (or disability) to create value for its stakeholders. But, the constituents and behaviour of the “corporate alchemy” that is generated by this configuration have thus far remained a mystery in the mathematics of valuation.

### ***Corporate alchemy and the true source of value***

Corporate alchemy is a nebulous yet acknowledged hallmark of the world’s successful corporations. It can be recognised as the quality of the interaction of resources in a corporation, which are productive, self-learning and harmonious in the best corporations and varying degrees of stagnating, wasteful and disengaging in others. The difficulty in understanding and measuring corporate alchemy arguably lies in its purely qualitative nature. For example, a research and development (R&D) team are resources of a corporation that have the ability to create value for it, much like other raw materials. Their day-to-day work, procedures and even physical locations structure their interactions within the team and with other parts of the organisation. Corporate alchemy can be illustrated as, say, a chance comment from a customer to a sales representative which is turned over to the R&D team from which an innovative and profitable new product line is created.

The importance of these qualities is readily acknowledged in the marketplace.<sup>1</sup> An investor acquiring a business is likely to consider the “qualitative” aspects of it first, such as customer relationships, staff, in-house processes and only then the tangible assets. Their manifestation in a corporation’s value has been attributed to *intangible assets*, informally understood as the difference between book value, as indicated by the balance sheet, and market value.<sup>2</sup>

The difficulty of measuring and monitoring the value of intangible assets using current frameworks is well noted in accounting textbooks and business strategy publications, as well as international accounting standards. Many of the world’s most highly regarded business thinkers have applied their minds and the funds of top business schools to developing frameworks and techniques for resolving this problem. Leading accounting firms have created detailed methodologies to respond to demands for meaningful evaluation of intangible assets. These efforts, aimed at assessing the true source of value-creating ability in a corporation, assume that corporate alchemy resides in intangible assets, presumably because it does not appear to reside in tangible assets. Some of these approaches arguably confuse the intangibility of corporate alchemy with issues of asset control and ownership, as discussed later in this paper.

### ***The valuation challenge***

In the absence of markets, an asset or business entity may be valued as the present value of its future income, adjusted for any risk to that income and its ability to retain its capital worth. This is not a novel concept. Equally unoriginal is using current income as a basis for estimating future income. The challenge then is to *evaluate* the persistence of current income by assessing a corporation’s unique configuration of assets, tangible and intangible. Persistence can be regarded as an inverse measure of financial risk in operations, i.e. a high degree of persistence in current income reflects a low level of risk to the ongoing production of that income. In this way, the problem at hand takes on an actuarial perspective, whereby projected income is not determined as a maximum value discounted for risk, but an expected value with upside and downside<sup>3</sup>. Finally, if the persistence of income can also be assumed to drive the retention of capital worth, a meaningful valuation is achievable.

Such an approach links a corporation’s assets with its income-creating ability, which not only accomplishes a more fact-based valuation of corporations – no matter what stage of its life cycle – but also creates a template for the measured development of successful enterprises. A necessary feature of this approach must be the equitable treatment of tangible and intangible assets, founded on a practical understanding of how they foster and sustain corporate alchemy in a business entity.

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<sup>1</sup> The Journal of Accounting Research published a report confirming that analyst coverage is significantly greater for firms with higher levels of intangible assets. See M.E. Barth, R. Kaznik and M.F. McNichols, “*Analyst coverage and Intangible Assets*”, Journal of Accounting Research, Volume 39 Issue 1, June 2001

<sup>2</sup> This definition of intangible assets can be misleading as book value rarely reflects replacement or fair value of the constituent tangible assets. See F. Gu and B. Lev, “*Intangible Assets: Measurement, Drivers, Usefulness*”, Boston University School of Management Accounting

<sup>3</sup> Refer J.B. Claridge and K. Griffin, “*An Introduction to Holistic Risk Management*”, 1997, for a discussion on the importance of considering both upside risk and downside risk in actuarial practice.

## Assets and value creation

### *The problem with intangible assets*

To understand how to treat the income-creating potential of tangible and intangible assets equitably, their similarities and differences must be understood.

“Intangible assets” started as an accounting term, used to describe a variety of non-physical resources available to a corporation, including goodwill created by marketing (brand, franchises); intellectual property (research and development (R&D), copyrights, patents); rights (licences, import quotas); and other miscellaneous items (motion pictures!)<sup>4</sup>. It has since been used to describe operating essentials such as systems, employees or workplace culture and relationships with customers and suppliers, in an effort to recognise the critical contribution of the so-called “soft factors” of business activities. The accounting definition of intangible assets is arguably the financial result of these “soft factors”, and as this paper seeks to study and measure the source of value in a corporation, the latter definition will be adopted. “Tangible assets”, on the other hand, is less ambiguous, and describes cash, building, machinery, land, and other similarly material resources.

The International Accounting Standards Board (IASB) defines an asset as “a resource that is controlled by the enterprise as a result of past events (for example, purchase or self-creation) and from which future economic benefits (inflows of cash or other assets) are expected”.<sup>5</sup> Thus, three defining characteristics of an asset are said to be:

- identifiability (defined as separability and arising from contractual or legal rights)
- control (power to obtain benefits from the asset)
- future economic benefits (such as revenues or reduced future costs).

Unfortunately, by this definition, intangible assets do not easily lend themselves to being assets. Against each of the defining characteristics of assets, problems arise because:

- they are practically and conceptually difficult to separate from other assets, e.g. innovation and culture
- they are often not owned or wholly controlled by the business, e.g. customers, employees
- they are not guaranteed to generate future economic benefits, e.g. R&D.

Perusing the examples of intangible assets listed above, it is also apparent that they are, in fact, manifested in organisations in some physical way. As noted by a leading business thinker:

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<sup>4</sup> Source: IASB website <http://www.iasplus.com/standard/ias38.htm>. NB: this definition excludes financial assets, mineral rights and exploration costs, and intangible assets arising from insurance contracts with insurance companies, amongst others.

<sup>5</sup> Informal definitions taken from IASB website: <http://www.iasplus.com/standard/ias38.htm>

*“Customers, for example, appear tangible to most people. Staff are pretty tangible, too, as are a product range, suppliers and distributors... It is clearly difficult, and of dubious validity, to put a financial value on these items, not least because they are not actually owned by the business. Even so, most reasonable businesses can reliably expect that staff who were with them last week will probably turn up on Monday morning, as will their customers.”<sup>6</sup>*

	<b>Tangible Assets</b>	<b>Intangible Assets</b>
<b>Form</b>	Physical, eg, buildings	Physical, eg, computer systems
<b>Identifiability</b>	Physically separate from other assets; may be purchased, developed or sold	Conceptually separate from other assets; may be purchased, developed or sold
<b>Control</b>	Physical asset is owned outright or partially; other assets are applied to it to create productive outcomes	Rights to the asset's productive potential are owned wholly (eg, intellectual property) or partially (eg, working hours of an employee)
<b>Future economic benefits</b>	Income-producing through creation or facilitation of saleable products or services; capital realisable through sale in appropriate market	Income-producing (possible but not certain) as an input to the development of products and services; little or no capital realisable as markets do not exist

**Table 1: Summary of characteristics of tangible and intangible assets**

Thus, intangible assets are no less physical than factories, paper clips, revolving doors or any other tangible assets. It is the qualities and outcomes these assets exhibit, recognised as valuable and critical to a corporation, which are non-physical. This distinction is important, not only for semantic clarity (i.e. employees are intangible assets, employee training is not; information systems are intangible assets, efficient processes are not) but also because it establishes common ground between tangible and intangible assets. Specifically:

- both tangible and intangible assets are real and physical
- both tangible and intangible assets possess value-creating potential;
- neither tangible nor intangible assets create value without interaction with other assets;
- the quantum of value created by assets is driven by the nature and quality of their interactions with each other.

For example, a factory, no matter how automated, is only likely to be productive with staff or management properly equipped with the appropriate skill sets. The same factory is likely to be even more productive when that staff has significant experience in using those skill sets and works well

<sup>6</sup> Kim Warren, “Invisible Ink”, Business Strategy Review, Winter 2004.

together as a team. Similarly, referring to the first example given, a corporation may employ the most skilful R&D team and competent sales staff available, however, this is no guarantee that the requisite alchemy exists across the firm to create the innovative opportunity described.

Thus, by clarifying the definition of intangible assets to the physical resources creating value for the corporation, a means of treating intangible and tangible assets equitably emerges. The remaining task is to evaluate the value-creating potential of these resources, which comprises the income expected to arise from their interaction and the risk to which it is subjected.

### ***Attributing value creation to assets***

It has already been shown that to consider the value-creating behaviour of corporations is to consider the value-creating behaviour of its constituent assets in concert. It stands to reason that different assets create different kinds of value, which combine to produce monetary results (income) and other, non-monetary outcomes. While the relationship between the activities of tangible assets and income is relatively transparent, the nature of intangible assets is such that the quality or magnitude of their specific outcomes is uncertain. Alternatively, these results may not be manifestly visible or directly attributable to the asset or action.<sup>7</sup> Neither of these issues is a contraindication of the contribution of intangible assets to the future value of corporations, as demonstrated by recent, ground-breaking research.

Empirical research and statistical analysis conducted by Bélen Villalonga of Harvard Business School shows that intangible assets are positively related to the persistence of firm profits.<sup>8</sup> This large-sample study quantitatively analyses the effect of intangible assets on inter-firm performance across several industries in the United States in the 1980s and 90s. Villalonga demonstrates that intangible assets can be 30% more important than tangible assets in their contribution to a company's sustainable competitive advantage.<sup>9</sup> Importantly, the study also shows that the converse is true: intangible assets are equally significant contributors to a company's sustainable *disadvantage*. Villalonga goes further to pose the provocative view that investment in intangible assets can be considered a high-risk, high-return strategy.

To facilitate the consideration of the different contributions of each asset, all the assets of a corporation may be ascribed points on an uncertainty spectrum, where the economic outcomes created by intangible assets are the least certain.

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<sup>7</sup> For example, an extensive employee training program may not create the expected outcome of increased sales or improved productivity, however, it may serve to prevent employee attrition and the loss of valuable knowledge to competitors or identify a common, hitherto unknown productive capability amongst a subset of staff. Furthermore, such unexpected results may not necessarily generate benefits for the business unless it chooses to act upon them.

<sup>8</sup> B. Villalonga, "*Intangible Resources and the Sustainability of Competitive Advantage*", Harvard Business School, November 2002.

<sup>9</sup> *ibid*, interpreted from results of analysis of manufacturing industry firms.

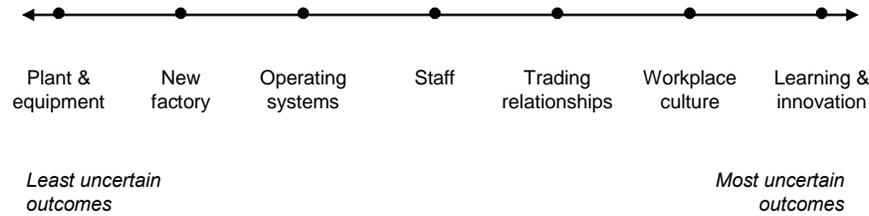


Figure 1: Uncertainty spectrum<sup>10</sup>

Over the course of business activity, each discrete asset interacts with other assets to create value for the corporation. It is assumed (for now) that these benefits can be meaningfully allocated to each asset, illustrated as individual economic outcomes  $V_X$  attributed to each asset  $X$ .  $V_X$  may be considered to be a probability distribution of varying range. In other words, the most uncertain outcomes will belong to the intangible assets, which will have the greatest range of values in the probability distribution.

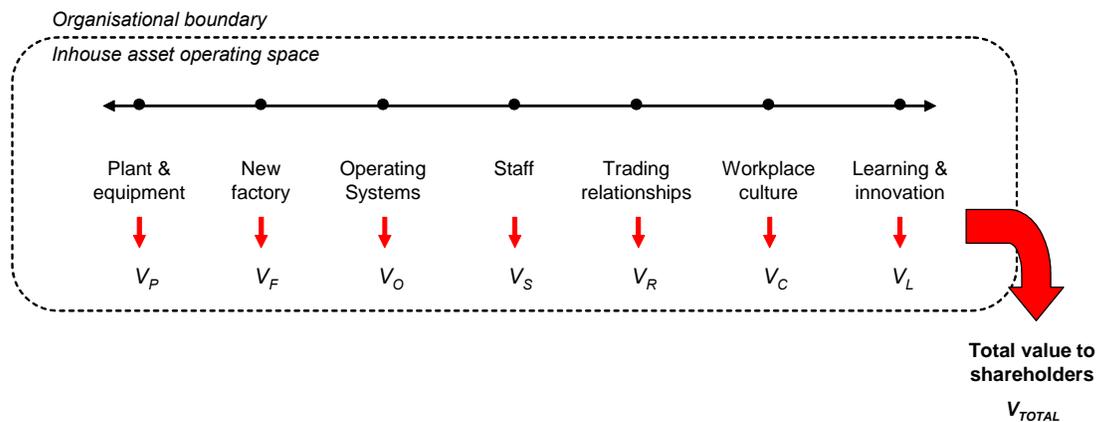


Figure 2: Value creation within organisational boundaries

Given our understanding of the interrelatedness of both tangible and intangible assets in producing ongoing value for the corporation, it follows that the distributions of  $V_X$  are not independent. This yields a complex set of value creation outcomes  $V_{TOTAL}$  for any entity, which certainly reflects the reality of organisations today. Left to their own devices, assets are not likely to produce income; however, businesses implicitly or explicitly employ a strategy to draw each individual asset into *alignment* with some operational goal. It is this strategy, and the management practices that facilitate it, that can be said to influence each distribution of economic outcomes to produce a certain expected value  $E(V^{Strat}_X)$  from each asset.

<sup>10</sup> Adapted from E. Webster, “Intangible and Intellectual Capital: A Review of the Literature”, University of Melbourne, June 2002.

### Strategic misalignment and its implications

Business strategy may be defined as a corporation’s desired integrated response to a market need, whether real or perceived. Thus, the ongoing success of this strategy, as indicated by returns to shareholders, is dependent on the ongoing accurate interpretation of the market it serves. The strategy of a business is assumed to seek the maximisation of returns to shareholders. It follows that if assets are not aligned to the corporation’s strategy, or the strategy is not aligned to the market, this will detract from maximum value creation potential, regardless of the performance or capacity of each individual asset.

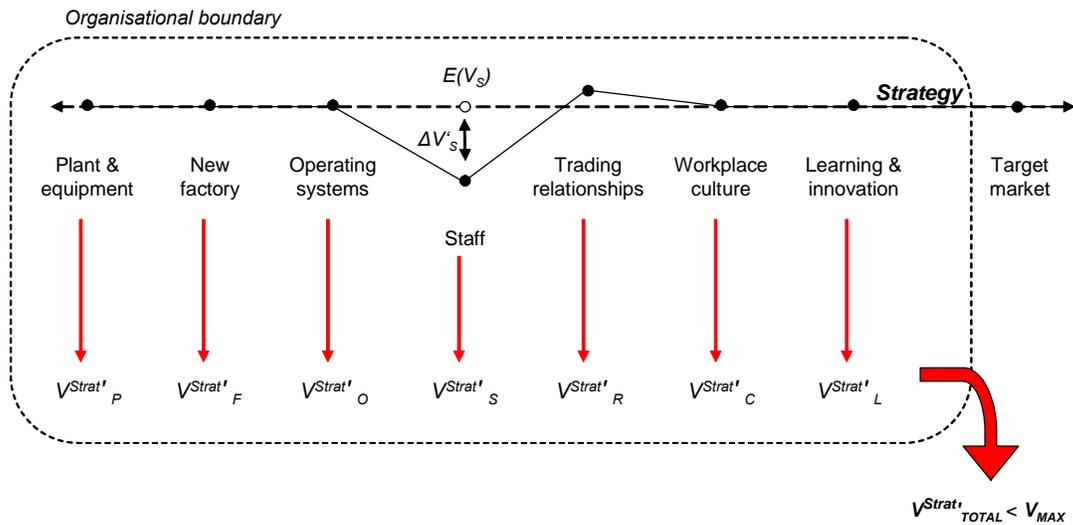


Figure 3: Misalignment and impact on value

This creates:

$$\begin{aligned}
 V'_{TOTAL} &= \Sigma E(V_X) - \Sigma[E(V_X) - V'_X] \\
 &= \Sigma E(V^{Strat}_X) - \Sigma[E(V^{Strat}_X) - V^{Strat'}_X] \\
 &= V^{Strat}_{MAX} - \Sigma(\Delta V^{Strat'}_X) \text{ OR, simplifying,} \\
 V_{MAX} - V'_{TOTAL} &= \Sigma(\Delta V'_X)
 \end{aligned}$$

where  $\Delta V_X$  is the difference between expected and actual value created by asset X under a business strategy – a measure of *misalignment*

and  $V_{MAX}$  is the maximum value attainable via the business strategy.

In other words, the value (income) foregone is the sum of the misalignment of assets with a corporation’s desired strategy to market. Alignment of a corporation’s resources with strategy and its subsequent impact on value is also a known concept, and has been investigated extensively in

several applications of management science, including supply chain<sup>11</sup> and performance measurement<sup>12</sup>.

Because the behaviour of  $V_X$  and therefore  $\Delta V_X$  is unknown (and possibly unknowable, as the assumption of separability of assets does not hold in all cases), it is useful to consider the behaviour of individual assets in the context of  $V_{MAX}$ , a reference point external to the corporation. While most business leaders and stakeholders may prefer not to cap the value-creating potential of their firm in any given year, common sense suggests that, at the very least, the productive resources available to a corporation will contain the operating value achievable. The view of value creation as having an expected value with upside and downside is also reinforced.

It is also possible in this context to consider the target market of a corporation as another of its assets. Just as intangible assets are accepted as difficult to separate, control or generate certain economic outcomes for a corporation, the target market differs only in that it creates – or, more aptly, releases – monetary value to the corporation and resides outside of organisational boundaries<sup>13</sup>.

This insight that *assets (tangible and intangible) that create value for a corporation need not be controlled by the corporation or reside within company boundaries* poses a critical departure from long-held assumptions about the nature of corporations. The accounting assumptions of separability, certainty and control which underpin the difficulty in valuing intangible assets actually stem from practices set in motion during the thrust of the industrial revolution. This insight, already being exploited in today's marketplace in the form of networked or outsourced business models, gives us cause to rethink not only what we consider to be value, but also how corporations are defined in today's information age.<sup>14</sup>

### ***Measurement considerations***

The approach employed thus far has served to model asset interaction in and around corporations while retaining its alchemic complexity, but has yielded no greater insight into how the quality of interactions between assets create different types and amounts of value. Given the potentially infinite number of assets, interactions and strategies available to a corporation, to create an actuarial model for this problem is comparable to predicting the weather. While approximating chaos through linear and nonlinear models is possible, the effort required to build and maintain such a model gives cause to rethink a more practical framework for valuation purposes.

In considering the value of a corporation as its future income-creating potential, the need to break down this potential into its components is unnecessary as long as the distribution of the aggregate outcome is known. Using the formula derived, the expected value  $V_{TOTAL}$  is known with the business strategy, which is generated by an expected level of operating performance from each

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<sup>11</sup> For example, J.L. Gattorna's Alignment model, see J.L. Gattorna (ed), "*Strategic Supply Chain Alignment*", Gower Publishing, 1998

<sup>12</sup> For example, Strategic Readiness model, see R.S. Kaplan and D.P. Norton, "*Measuring the Strategic Readiness of Intangible Assets*", Harvard Business School Publishing Corporation, 2004.

<sup>13</sup> This statement does not hold in full where some of a corporation's customers are also its employees.

<sup>14</sup> Network business models and the future of enterprise are topics that may be discussed at great length. The research and literature on this subject is also evolving at the present time.

asset. Asset misalignment, therefore, can be estimated as the difference between actual and expected values of asset operating performance.

In manufacturing parlance, the operating performance of assets is measured using a variety of ratios and other key performance indicators (KPIs). A sample set of KPIs that may be used to measure the operating performance of assets include:

- utilisation rate (plant and equipment)
- employee retention (staff)
- customer satisfaction (relationships)
- number of innovation suggestions posted on company intranet (learning and innovation)

The utility of this approach is highly dependent on correctly estimating the required performance of key assets to achieve financial goals. This can be a subjective endeavour<sup>15</sup> for any single value of  $V_{TOTAL}$ , however, by monitoring the value creation trajectory of corporations over time, the relationship between income foregone and asset misalignment can be predicted with greater certainty. In other words, the behaviour of corporate alchemy as manifested in an organisation reveals itself in the pattern of returns. This process is familiar to actuaries in the fine-tuning of mortality curves.

Using this approach to value start-up companies yields a potentially less arbitrary approach to ascertaining value and risk. Monitoring operational performance, based on a preliminary understanding of how it is expected to drive income creation, provides the management team as well as the providers of funds with a means to track the fit of business strategy with the start-up offering and its market. As such, it is a valuation approach that does not necessarily assume predictable outcomes, but can sequentially identify and quantify the asset development required to create a sustainable business.

It is worth noting that under the principles of this approach, the portfolio investment strategy of venture capital firms is reinforced and extended. A typical investment strategy of venture capital firms is to select ten start-up companies from a pool and calculate an amount to invest in each based on some estimate of expected return. The expectation is that one in ten investments will return enough to counter the losses of the rest. Applying this approach, the firm is better off providing a much smaller amount of funds to many more start-up companies, and observe how productively each firm employed those resources in asset development over the course of, say, one year.

This approach requires a suitable large-sample statistical analysis to test the relationship between misalignment and operating profit foregone.

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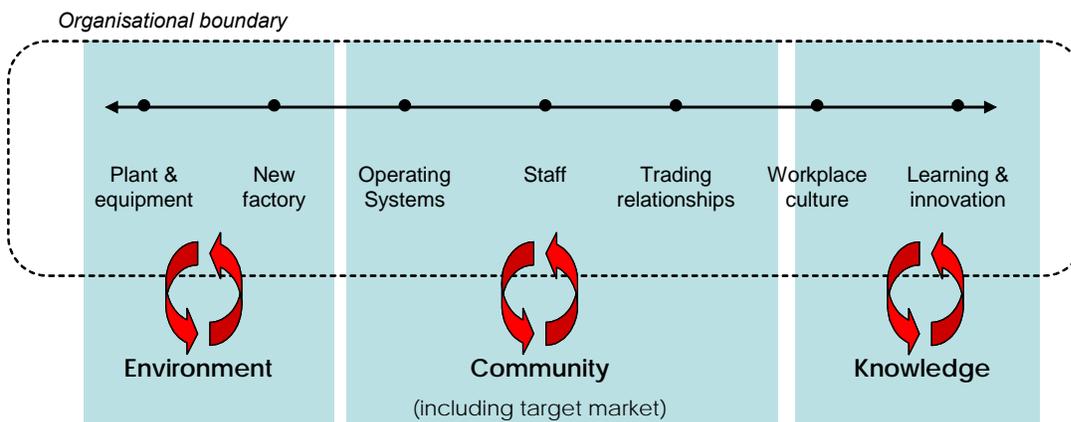
<sup>15</sup> Analyst reports already investigate this kind of information on behalf of investors.

## Closing the loop

### *Extending the model*

Also exerting influence on a corporation's assets, particularly the intangible assets, is a complex web of external factors: an ageing population, climate change, language barriers and the price of oil are a few examples. I have summarised these into the three conceptual juggernauts of the natural environment, community welfare and the global body of contemporary knowledge. These serve both as external sources of interaction with a corporation's assets and as the greater context in which the assets operate.

Tying these notions of a corporation's interaction in a global context with tangible value has been problematic for those who have tried and, for the most part, has been considered to be an unnecessary over-complication. Like the target market, these resources have the potential to benefit the corporation, and thus can be regarded as external, intangible assets. Unlike the target market, the benefits are not monetary, but rather contribute to the persistence (or risk) to which value creation is subjected.<sup>16</sup>



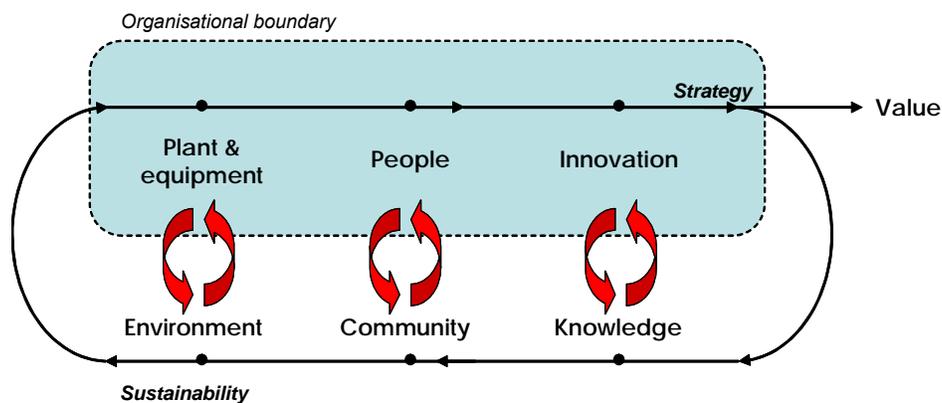
**Figure 4: External influences on company assets**

By treating these resources as intangible assets, the cultivation of corporate alchemy extends beyond the walls of office buildings. The value enjoyed by a corporation whose strategy also aligns with these assets is arguably what we have come to understand as *sustainability*, both for the corporation and the holistic context in which it creates value. In other words, this argument brings together the semantics of sustainability as the inverse of financial risk and sustainability as a corporation's harmonious collaboration with its external resources. It also raises two additional applications of the proposed valuation framework: the ability to measure and monitor the

<sup>16</sup> In the illustration provided, the target market is absorbed in one or more of environment, community and knowledge, thus taking on more attributes than simply the source of demand for products and services.

contribution of sustainability on business risk and value creation, and a means to evaluate which external assets most contribute to a corporation's value-creating abilities.

The first application is simply an extension of the methods already discussed. As these external assets do not contribute monetary value to the corporation, save for the subset of the target market, their contribution as interacting assets is to the persistence of income, or risk. Intuitively, it makes sense that nurturing the broader context of in-house assets stabilises the growth path of those assets. This is no more apparent than in the impact of global warming on insurance and reinsurance in Australia and other nations. Other anecdotal examples that support this notion include the impact of community welfare on a productive working environment, and the relationship between the ease of sharing information and the rate of global innovation.



**Figure 5: Asset loop and value creation**

Selecting the KPIs to measure for these purposes yields the second application of the framework, i.e. how to determine which assets are the most important for value creation. Management philosophy posits that “what you measure is what you get”, in other words, the act of measuring the performance of certain assets creates a greater awareness and focus on its contribution to the business. In applying this principle to external intangible assets, the importance of selecting the most appropriate measures for the business arises.

For example, it is possible for a Sydney-based manufacturer to use the national infant mortality rate as a measure of community welfare. However, this external asset (i.e. all Australian children) may have fewer interactions with in-house assets than, say, the adult community that directly and indirectly serves the corporation's head office. This may include the staff of nearby restaurants, transport providers, community centres, cleaners and the local police, to name a few. In this situation, the local unemployment rate may be a far more meaningful measure of the health of the broader environment in which the corporation operates, and thus the risk to which its value creation is subjected.

The selection of appropriate, meaningful and impactful measures of sustainability is one of the greatest challenges for business this decade. The development of environmental cost-benefit analysis frameworks for infrastructure projects and the rise of corporate sustainability indicators

shows that the desire to change the way corporations conduct business has found traction amongst investors. The holistic valuation framework proposed in this paper directs its practitioners away from altruistic notions of corporate responsibility (or corporate guilt), and towards a practical and robust view of a business's relationship with its environment.

### ***The opportunity for the actuarial profession***

The argument put forward in this paper may be interpreted as an invitation for the actuarial profession to evolve. The last several decades have seen the growth of valuation as a field of technical expertise. The analytical rigour, sound business judgement and professionalism requisite for good valuation practice are, perhaps, the defining qualities of what actuaries offer their clients.

A traditional actuarial gambit may be to demystify an increasingly complex world of business with finer and more extensive quantitative models. However, our contemporary knowledge of chaos and complexity<sup>17</sup> suggests that this labour-intensive approach is ultimately self-defeating, and that the power of corporate alchemy lies in its very unpredictability.<sup>18</sup> As such, the challenge for the profession is to reconcile the strengths of traditional practice with the emerging requirements of twenty-first century business. The profession may also need to facilitate complementary changes in related fields of technical expertise, such as accounting and financial mathematics.

The opportunity for the actuarial profession arises from its stewardship of the actuarial Control Cycle. Many qualities of this explicitly actuarial practice create a ready-made template and skill set for valuation work using the framework described in this paper. Furthermore, the approach gets to the core of operational risk, and links it with financial value creation, which is the archetypal domain of actuaries. The choice for the profession now is whether or not to pursue an infinitely more dynamic and influential role in the business community, as this author believes its skills and professionalism rightly warrant.

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<sup>17</sup> It is worth noting that quantum leaps in our understanding of the way things work, such as relativity theory and chaos theory, arose from interdisciplinary explorations. The approach proposed in this paper is a combination of management science, actuarial studies, complexity theory and systems dynamics.

<sup>18</sup> One of the features of complex systems, such as organisations, is that seemingly small influences or events can have substantial and unforeseen implications, i.e. the "butterfly effect". This phenomenon can be modeled using sophisticated techniques such as systems dynamics and linear modeling. The limitation of these models is that they remain approximations of the system, and as such cannot reliably predict the emergence of new influences and their subsequent impacts. For this reason, such models are useful for short-term endeavours such as business analysis or operational problem-solving, but should be used with caution in predicting the long-term value-creation behaviours of a corporation.

## **Conclusion**

As sustainability becomes an increasing concern in an age of information and virtual corporations, a more robust appreciation of the role played by intangible assets and their relationship to operating risk is a business necessity. Estimating the future value-creating potential of corporations is not a field that lends itself to traditional methods of valuation, and attempts to apply traditional methods merely tinker around the edges of a required shift in the way we perceive and allocate value.

Indeed, sustainability can be interpreted as an inverse property of risk, whether that risk is easily quantifiable or not. Certainly, risk as described in this paper has manifested very differently to the kinds of risk articulated at the birth of the actuarial profession. The opportunity for actuaries now is to bring their considerable actuarial skill, as well as those other skills unconsciously absorbed along the way, to what could be a revolutionary, holistic and more accurate means of valuing corporations.

## Suggested reading

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Kim Warren, “*Invisible Ink*”, Business Strategy Review, Winter 2004.

A. Battram, “*Navigating Complexity*”, Industrial Society, 2000.

M.J. Wheatley, “*Leadership and the New Science: Discovering Order in a Chaotic World*”, Berrett-Koehler, 1999.