Accounting for Knowledge Management

By Patrick Lambe

The Merchant of Prato

In the late fourteenth century, a busy Italian merchant named Datini, ordered twenty-nine sacks of wool from Spain. It would be three and a half years before the cloth made from the wool finally reached him.[1] Business in the middle ages was complex, with a multitude of different and complicated transactions at different stages of their cycles, and spread all over the known world – including the trading routes of Asia. Each major trading city had its own currencies, sets of weights and measures, and business regulations. The business of the time had many uncertainties associated with it. Information flows were unreliable and slow, risk of war, theft or loss from other means was high.

Memory was not sufficient to keep track of all this, and good record keeping was essential – in 1395, Datini complained of not having eaten or slept for two days because of all the writing he had had to do. Accounts were kept in a narrative format, almost like a diary of transactions, and including notices of commercial deals, accounts of wars, disasters and shipwrecks that might affect business affairs overseas. Business correspondence too with employees, partners and agents in far-flung cities, took this narrative format. Every deal had a "story". But these account books were also often more like portfolios, with multiple media objects providing evidence of the outstanding business transactions. These "ricordanzas" could include artefacts or heirlooms, items taken as surety for business deals, as well as diaries, letters, notices, bills of sale, contracts and statements of account.[2]

It was out of these complexities that double entry bookkeeping was invented, originally by the business partnerships of fourteenth century Italian merchants.[3] What this more abstract system did was to reduce all transactions to a common currency, and allow a formal periodic balancing of the books – revenues against expenditures – on the balance of transactions up to that date. The key forms of business communication became the letter (giving instructions, requests and reports) the inventory, and the account book. What bookkeeping provided was the ability to periodically assess the probable current status of the business and thus enable an informed assessment of risk in taking any further decisions about the deployment of assets. Bookkeeping is above all else about the

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[1] Iris Origo, *The Merchant of Prato: Francesco di Marco Datini, 1335-1410* (Boston: David R. Godine, 1986) pp.61-2

[2] Alfred W. Crosby, *The Measure of Reality: Quantification and Western Society, 1250-1600* (Cambridge: CUP, 1997) p.204; Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago: University of Chicago Press, 1998) pp.34-5

[3] Luca Pacioli, the so-called "father" of double entry bookkeeping did not invent it, but used the printing press to popularise it as an accounting method a hundred years later, in 1494. Alfred W. Crosby, *The Measure of Reality: Quantification and Western Society, 1250-1600* (Cambridge: CUP, 1997) pp.210-219

management of risk. It was invented to allow merchants to manage their businesses better.

Risk and Business Value

By the middle of the eighteenth century, huge trading concerns like the Dutch East India Company sprawled the globe. They too had complex trade routes and large lapses of time in their trading cycles to contend with. A return voyage to and from Asia could take up to a year, but these ships were often depositing one cargo and returning with the profits of an earlier trip. The original cargo might, like Datini's wool, take three or four years to reap its rewards in the final consignment back to Amsterdam. The Asian trade, headquartered in Jakarta, was a seasonal affair. The ships would leave Holland in the winter to catch the northeastern trade winds, or in April/May to catch the good weather up to the Cape of Good Hope. The Asian fleet generally arrived back in Europe in September.

The Board of the East India Company only met three times per year, for six weeks at a time. In that period they had to co-ordinate the affairs of an enterprise that had thirty settlements in Asia, more than a hundred ships, and thousands of employees engaged in complex economic and political dealings. The most important forms of communication to handle this were letters and reports from the settlements, giving accounts of what had happened over the previous year, and detailed reports and instructions from the Board back to Asia giving the latest policy, strategy and specifications for goods.[4]

Business affairs had to be handled over great distances and over long periods of time. Risks were also high. The Company lost 8% of its ships in the two centuries of its existence, but while this number may seem small, it was also unpredictable. Navigational technology changed, and so did voyaging practices. It was difficult to learn consistently about the dangers in the face of continuous change. During the years 1721 to 1748, the Dutch East India Company lost 89 ships – more than three a year. In May 1737, eight heavily laden homeward bounders sank off the Cape of Good Hope, a particularly bad year for the Company.[5]

The most important skill to learn in managing this business was how to be complete in one's accounting – that meant good narrative skills, and accurate conveyance of exactly the right information. Think about it, if the Jakarta office's report to the East India Company in Amsterdam had something missing or ambiguous, it would take a year for the Board to ask for clarification, and another year before they got the answer. *Completeness* was paramount. The Board also needed an account of the current status of transactions in a standardised format. The accounting methods effectively dictated a *template* into which the required information could be poured. Conventions and templates

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[4] Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) pp.15-22

[5] Walburg Pers, Dutch Enterprise and the VOC 1602-1799 (Amsterdam: Rijksmuseum Amsterdam, 1998) p.31; Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) p.58

were also developed for the other forms of business reports and letters describing the settlement's current state of affairs.

It was a heavily knowledge-based business. The experience and skills of master ship-builders assured the seaworthiness of the vessels sent out, as well as their expected lifetime. Ship's masters and crews were chosen carefully so as to mitigate the risks of the arduous voyages. Experience on the Asian routes was essential. Even a captain who had thirty years experience of sailing in European waters would only qualify as a first mate on the Asian route. The directors of the company were ravenous collectors of intelligence, and the maps of the Company were heavily prized and closely guarded.[6] The great distances at which they operated and the relative autonomy of the Company's employees for long periods of time did not prevent the directors from issuing detailed sets of instructions for all conceivable eventualities, to assure standardization, predictability and control.[7]

The levels of risk, and the unpredictability of the risk led to extreme volatility in the value of the business being conducted. Both profits and losses were high. Probably for this reason, the VOC, as it was known, was not a heavily capitalized business, although it controlled many assets at home and overseas. Its chief assets were its ships and its shipyards, but it depended relatively little on its capital to finance the voyages. In the entire period of the Company's existence, and despite its rapid growth and complex structure, the original capital stock was never increased. Shareholders had relatively little say in the running of the company for its first quarter century, and dividends were generally low. If money was to be made, it was not by owning shares, but by betting on individual voyages. When profits were low, the Company financed its operations by taking out loans of various kinds – most of them short-term, such as one-year obligations and advances. In effect, the high levels of risk meant that much of the cost of the operation was expensed rather than capitalised.[8]

Accounting for Knowledge

So how does this relate to knowledge? Knowledge-intensive businesses have many of the same features, and face many of the same issues as the Dutch East India Company in the 17th and 18th centuries. To borrow Baruch Lev's analysis, knowledge-intensive enterprises have three major accounting-related problems: partial excludability; inherent risk; non-tradability.[9]

Partial Excludability refers to the ability to exclude other parties from the benefits of one's assets or investment. It's essentially a matter of control. Physical assets are

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[6] Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) pp.63-66

[7] Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) p.20

[8] Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) pp.15-18

[9] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001). Lev's important book informs most of this section, with a special debt to ch.2.

relatively easy to secure, and in most countries legal frameworks and convention are effective in protecting ownership, possession, and control. Excludability is virtually complete if you own a factory. The benefits of investment accrue to the controlling parties, and there is relatively little leakage of value.

In the field of knowledge assets, however, ownership is poorly defined, poorly recognised, and almost impossible to protect. Laws and contracts may assign ownership of intellectual property to employing organizations or to individuals, but in practice when an employee leaves one organization and goes to another, knowledge goes with her, and if you discuss your ideas with somebody else to get some insight or feedback, then that somebody learns something. It is characteristic of knowledge assets that they accrue value socially. Knowledge must be shared in order to reap advantage – and not just shared internally, but with markets, customers and competitors. The value of knowledge assets is intrinsically leaky. If you can't ensure control, then you can't capitalise it and write off its value over a long period, because you don't know if you will have control of it for a long period. You have to expense it into the current accounting year, and limit the risk of losing the value of that asset.

In similar ways, the East India Company, by virtue of its far-flung activities in often-hostile environments, and without a reliable framework of international law, was often unable to prevent other parties from sharing in the benefits of its activities. Pilfering and fraud was rife and often undetected, personal side-ventures conducted by company employees riding on the back of a VOC voyage were common, and piracy was a constant danger.

Inherent Risk in knowledge-intensive enterprises is well documented. Clayton Christensen documented the low overall success rate of companies that entered the disk drive business in the period 1976-1993 in his book *The Innovator's Dilemma*.[10] Of thirty-five established players, only five could be said to have achieved significant success. In a study of the commercialization of patents in Germany and the United States, only 10% of patents registered, accounted for between 81% and 93% of total patent value – signifying that most patents were virtually without commercial value.[11]

The less tangible the knowledge activity, the higher the risk. Twenty-five years ago, a study of R&D activities in sixteen chemical, pharmaceutical, electronics and petroleum companies found that probability of financial success increased, the nearer the R&D effort got to commercialization in the marketplace. At the idea and discovery stage (almost complete knowledge-dependency), risk of failure was 43%. By the time it became commercialized (knowledge increasingly externalized into tangible process, product, service), risk of failure in the markets had declined to only 26%. These risks are probably under-representative of the market as a whole, since the organizations studied

[10] Clayton M. Christensen *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* (Cambridge, Mass: Harvard Business School Press, 1997) pp.128-132

[11] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001) p.38

were large, well-established enterprises. However the decline in risk levels as knowledge becomes transformed into tradable things, is worthy of note.[12]

High uncertainty can also exist with investments in tangible assets such as property. But such assets retain residual value, and market recovery also brings a recovery in value. London's massive Canary Wharf project, went from being virtually bankrupt to being a huge commercial success in the space of only five years.[13] When a knowledge initiative such as a new drug or a new business model fails, there is indeed residual value in what the individual players have learned, but the partial excludability of such knowledge means that there is no assurance that such learning can be harnessed to future corporate performance. There is no consequent sense of security about the recovery of the market. Failures tend to be permanent and absolute. Even if such learning is deployed by the company in future initiatives, the ability to link the prior failure to a future success is extremely limited. Of the billions of dollars spent in customer acquisition costs by internet companies during the dot com boom, virtually none of the value of that investment has survived within the span of control of the original investors.[14]

Extreme volatility is a direct consequence of the inherent riskiness of knowledge businesses. Costs must be sunk into the enterprise before you have any assurance of returns. But the scalability of knowledge, access to very large networks of buyers, and the negligible cost of reproducing knowledge assets once established, means that returns can be astronomical. Think of the cost of reproducing a software program relative to the sunk costs in its creation, and then compare with the cost of reproducing a car or building a house after the initial design work is done.

Some forms of knowledge business do look like the business of tangibles. A consulting or training business may appear to counter the model we have described for knowledge-based business, looking very much like a tangibles business – high cost of reproduction and low scalability. However, this kind of knowledge enterprise is essentially performance based, and therefore cannot benefit from the scalability of network effects unless it is highly templatized and unless the business model shifts from trainer/ consultant performance to content distribution.

Unlike the business of tangibles such as car-making, the tangible asset base in an education or consulting business need not be high, so long as it is performance based. If it chooses the intangible path, it attempts to leverage value from network effects and partake of high returns on knowledge deployed, and therefore must sink costs into content creation and distribution, without certainty of return. If it chooses the tangible path, and attempts to scale its performance activity, it must increase its tangible asset base, in property and equipment for effective delivery. Even ambiguous cases follow the same rules.

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[12] Edwin Mansfield and Samuel Wagner, *The Production and Application of New Industrial Technology* (New York: Norton, 1977) pp.22-32

[13] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001) p.39

[14] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001) p.69-70 n.54

The East India Company found itself having to deal with very similar problems. For them, their costs, very literally, sometimes sank. Both scarcity and demand drove the enormous rewards for the shipments of spice that they brought into Europe, but the risks of failure were also very high, and very unpredictable. Their business was highly volatile.

To give them greater assurance in the management of their risk, they gradually built mercantile, administrative and military infrastructures in the territories where they operated. But this too was a sunk cost. When competition from other nations increased, supply to the European markets also increased, and demand declined. The risks and the costs combined began to outpace the rewards, leading to increased business insecurity. Several times in its latter years, the Company had to be bailed out by the state government.[15]

Non-tradability refers to the absence of transparent markets for knowledge assets. If you don't have a public, transparent market where goods are frequently bought and sold, then there is no way of assessing the market value of an asset. How do you trade knowledge assets such as pre-patent R&D, human capital, the skills and experience of employees, structural capital, the processes, systems and methodologies used, and relationship capital, the collective ability of the enterprise to influence other people, whether they be stakeholders, customers, suppliers, partners or employees?

There are market mechanisms that provide proxy indicators for value – at least, at first sight. When you buy a company, the difference between the purchase price and the tangible asset value is known as goodwill. It's a big, over-generalised number, though, with no transparency into how the individual knowledge components were construed.

The market for employment also provides indicators in the going salaries for people with particular skills, knowledge and experience. But such indicators are poor predictors of value creation in the specific context of any company. Individual knowledge workers generally create value based on the social context within which they operate – it's the chemistry of teams, vision, resourcing and leadership that create knowledge asset value, not the sum of all employee salaries. We simply don't have granular insight into how most of our knowledge assets can be valued – or traded.

Of course, one reason for this is that the notion of a knowledge asset is a myth – an abstraction that is useful for some discussions (how do we account for the difference in performance between two companies of similar tangible asset disposition?) but not for others (how do we locate, extract and redeploy at will the key knowledge value drivers?). Location, extraction, redeployment are all central criteria for enabling trade to take place. But for the accountant and the manager, describing the notion of knowledge assets as a myth would be a too-easy release. We still have to manage and account for this increasingly important dimension of our activity.

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[15] Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) p.16

The East India Company too clearly encountered difficulty in valuing its own business. The stagnation of its share value was a doldrum it hardly recognised, but which ultimately caused it to founder. You could certainly trade in the risk of individual ventures, but shareholdings in the Company meant little beyond access to the trade itself. The long-term value of the Company could never be captured or developed, because the risks and the profits were essentially expensed into the current account, voyage by voyage, year by year. And yet its increasing commitment to the Far East trade compelled it to invest in infrastructure that ultimately could not withstand the volatility of its business. Its capital essentially worked only to establish the company, finance the initial risk, and qualify shareholders for access to future business risk and opportunity. Very much like contemporary knowledge-intensive enterprises, its most significant assets were essentially non-tradable.

In summary, if we look at contemporary knowledge-intensive businesses as well as at the Dutch East India Company in the eighteenth century, we see fundamental business problems arising from the collective impact of *uncertainty* – uncertainty around control, risk, and valuation. In the case of the Dutch East India Company, enormous benefits accrued to the Dutch State over two centuries, but the model – and the company itself – eventually collapsed under the costs of these uncertainties.

Information Asymmetry

One of the key consequences of the uncertainty surrounding control, risk and valuation is what Baruch Lev calls *information asymmetry*. Simply put, it means that insiders close to the business's operation have more and better information about the risks and opportunities than outsiders do. When you look at reporting rules for listed companies, the absence of a requirement to report on intangible knowledge assets means that shareholders and markets have very little insight into anything other than recent history. In a tangibles-intensive business, the relative inertia of tangibles means that this is a fair predictor of future performance. The value of the business will likely move on a trajectory that is relatively consistent with the value of the market as a whole.[16]

The more that businesses become dependent on deployment of knowledge for gaining competitive advantage, whether it be in R&D, brand building, customer acquisition, innovative business models, new organizational structures, or development of knowledge-intensive products, the more opaque these businesses become to the external markets.

This opacity amplifies the volatility of the market value, because in the presence of uncertainty and the absence of information, investors will react based on interpretations of simple signals. In supposedly rational investment climates, there is a context for reflection on an investment decision, normally provided by a diverse range of expert judgements based on comprehensive environmental information, and commonly coded reliable data emanating from the companies being considered. Markets reward

[16] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001) ch.4

information disclosure according to standards of consistency, common language and reliability. Investment decisions are felt to be less risky, and the cost of capital is therefore low.

However, since investor reactions are essentially binary decisions – buy or sell – in the absence of such comprehensive information and in the absence of agreed ways of interpreting data about knowledge assets, isolated signals related to these knowledge assets will be interpreted in a binary way – either good or bad. When directors of knowledge-based companies sell or buy stocks in their own companies, and this becomes visible to the markets through disclosure rules, the market generally follows in quantities that you would not expect from tangibles-based businesses.[17]

With the benefits that accrue to insiders from information asymmetry, the temptations of managing knowledge-based business are high. In 1622, the streets of Amsterdam were littered with pamphlets accusing the directors of the East India Company of enriching themselves at the shareholders' expense. Shareholders had almost no visibility into the management of the Company, the only public information being the results of the annual auctions of goods returning from Asia. As a result, bitter conflict ensued, culminating eventually in representative shareholders gaining more power on the Board as directors. Yet once ensconced, these directors too had many temptations. As of 1647 they no longer received a percentage of the returns on the Company's business but a fixed salary, because of widespread fears of manipulation and fraud.[18]

Many of the risks of a voyage in the seventeenth century circulated around the type and condition of ship being used, the experience and track record of the ship's master and crew, and known facts about the political circumstances of the scheduled landfalls. Outsiders had little or no access to this knowledge. The costs of outfitting a voyage were also kept opaque – ships were built in-house, supplies were purchased and stored in bulk, and a complex infrastructure was built both to spread – and conceal – the costs of an individual voyage.

When it comes to the particular uncertainties around 21st century knowledge enterprises, the information asymmetry around the uncertainties of control, risk and valuation accrues both benefits and temptations to those closest to the deployment of risk – executives and directors of the business. Generally accepted financial reporting rules and their focus on tangible assets mean that shareholders get very little insight into either the real drivers of the business, or the nature of the risks being undergone. And the drive to spread the risk of knowledge-based business by giving stock options to executives and directors simply reinforces the temptations. Externally, in the absence of data, irrational beliefs and an undue sensitivity to isolated signals take over.

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[17] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001) p.99

[18] Els M. Jacobs, *In Pursuit of Pepper and Tea: The Story of the Dutch East India Company* (Amsterdam: Netherlands Maritime Museum, 1991) pp.17-18

Enron

And so we come to Enron. The darling of new economy pundits until the eve of its demise, its fall was abrupt and shocking, displaying the vast gulf between market perceptions and real position. The two principal things to note about the case of Enron are that it demonstrates both the weakness of traditional accounting measures as well as the validity of its fundamental principles in relation to assets and risk.

It was *traditional, old economy* accounting and reporting rules founded on accounting for tangibles that were cleverly used to create a *new economy* perception in the marketplace. It was Andersen, a global leader in accounting and traditional methods of valuation, that fueled the mistakes. Ignorance about how new economy models really work is no defence in the Enron case, because new economy accounting measures were not attempted.

Analysing further it becomes clear that new economy hype about upside benefits of knowledge assets (network effects, extraordinary returns on low cost of reproduction) was combined with old economy manipulation of tangible accounting methods, to conceal the downside risks of knowledge assets (uncertainty about risk, control and value).

Somehow, Enron, Andersen and the markets all lost the plot. The markets themselves were complicitous in ignoring the downside risks of knowledge extensibility, as well as the oddness of the apparent synergy between financial performance according to old rules, and the transformation of Enron into a knowledge-based business. With so little disclosure about the knowledge-base underlying this transformation, and about its performance capabilities, why was the market so ready to believe that the well-documented volatility of knowledge-based business did not also hold here? Why was the market so shocked when Enron executives were found to have benefited so profoundly – at the cost of the markets – from the information asymmetry they enjoyed?

The accounting activity of Andersen, in the Enron case, became visible in its purest form as a perception management exercise, telling stories to markets that were decreasingly related to the facts of the business. At one level, we can understand the apparent justification for this. Information is disclosed selectively to markets in order to sustain another intangible – confidence. Confidence maintained is business value maintained, cost of capital is low, activities can grow.

But the owners of a business – the shareholders – are not, at the end of the day, founts of boundless confidence. They are also owners, and therefore require information about the business fundamentals – who owns what, who controls what, where are the risks and how large are they, what is the value of the outcome, and what is the value of the business if we liquidate it now? Once the story of a business is disengaged from an accurate representation of those fundamentals, it becomes increasingly difficult to bring the two stories back into alignment. It's not as simple as a run of bad gambling debts to be paid back by a big win.

Traditional accounting rules failed to the extent that it was easy to manipulate them in the presence of deep information asymmetries about the true nature of the business. Their inability to describe the risks and opportunities associated with knowledge-based business in any detail, in fact incentivised the directors and executives of Enron to create accountable assets out of nothing, so as to maintain market confidence. They were effectively banking *confidence capital*, which bore little relation to the real fundamentals of the business. But the principles of traditional accounting rules hold firm: intangible assets carry greater risk and uncertainty, and it is very difficult to attribute tradable value to them. They cannot and should not be treated as assets against which to securitize the confidence of future benefits.

Baruch Lev, whose study of accounting for intangibles has inspired much of this paper, argues strongly, however, for greater disclosure about intangible assets. He correctly notes that the only area of reasonably deep knowledge about the behaviour and performance of intangibles is about R&D investments, because information about these is both required and incentivised by the markets.[19]

The lack of public disclosure of detailed information about investment in and the performance of other intangibles such as human capital, organizational capital and relationship capital, means that the markets are unable to learn how to associate value outcomes to the disposition, composition and peculiar chemistry of these intangibles. It also means that executives within organizations have access only to their own limited experience, guess-work and instincts about such things, without the benefits of macro-economic or multi-year study. In such an environment uncertainty increases and decisions are less reliable, and there is an increasing tendency to manage by simplistic theory and anecdote. Where managers get early warning of gross advantage they are tempted to gain disproportionate benefit at the cost of the market. An indecent percentage of them do so.

The Accounting Agenda

If we return to the merchant of Prato, Signor Datini in 1395, we find a man grappling with many similar issues. His *ricordanza* contains more than mere numbers. He needs a wide range of artefacts to memorialise and account for the condition of his business. His challenge is, like ours, to find out how he can tell the multiple stories of his business in a meaningful way so that he can manage his risk, and reap value from his investments.

In an environment of ever-increasing dependence on knowledge-activity and knowledge assets, the task of the accounting profession is not how to learn to *count* intangible assets, in the mistaken belief that once petrified, they will behave in tamer and more predictable ways. That outcome is unlikely, and to pretend that risk can be diminished merely by quantifying it is foolish and mistaken. The quantification of a risk is less interesting to managers and markets than its *description*. Good descriptions contain within them the germs of good solution design. Numbers tell you only how terrified you should be.

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[19] Baruch Lev, *Intangibles: Management, Measurement and Reporting* (Washington, DC: Brookings Institution Press, 2001) ch.5

The task of the accounting profession in relation to intangible assets and knowledge-based enterprise is less about counting than it is about giving an *account* – telling the story of both tangible and intangible assets in meaningful ways, for both managers and markets.

We are not talking about perception management here. This is not the kind of storytelling made invidious by Enron but practised more often than our post-Enron rectitude will easily stomach. It's the storytelling practised by Datini, inextricably linked to tangible evidences of where his business really stood. At the moment, in many knowledge-based businesses, we are flying blind. We don't have to capitulate to the new economy pundits and assetize or capitalize our knowledge, because we are not equipped to do so meaningfully. Such measures merely pretend that the risk has become predictable.

We are also increasingly relying for our investment decisions not on financial reports prepared by accountants, but on reports prepared by industry analysts. These reports in turn derive from an opaque mix of numbers, trends, insider conversations, lunches and hunches. The unreliability of such analyses is becoming well documented, whether they be earnest or corrupt.[20] The stories that analysts tell share the same weaknesses as the stories that perception managers tell: they have little empirical basis in fact. Our hunger for these reports only demonstrates the magnitude of our sense of ignorance about the businesses we are looking at.

However, we do have to learn how to associate investments in knowledge with outcomes, in more than gross, undifferentiated ways. We need a lot of data. We need more granular and more intelligent reporting of where our businesses stand in the disposition of knowledge. And if precision is lacking initially, as our information fluency grows, we will acquire better insight into how knowledge can more effectively be managed to reap value for the enterprise and its owners.

It took a century for double-entry bookkeeping to evolve, before it was popularised by the Italian friar Luca Pacioli. We need to evolve faster than that if we are not to succumb to the eventual fate of the Dutch East India Company – an ultimately stifling inability to relate the fundamental value of the enterprise to its cost and performance.

[20] For a brief review of sources, see Mark Buchanan *Ubiquity: The Science of History or Why the World is Simpler Than We Think* (London: Weidenfeld & Nicolson, 2000) pp.133-134