

# The Galileo Disclosure Model (GDM): reengineering Business Reporting through using new technology and a demand driven process perspective to radically transform the reporting environment for the 21<sup>st</sup> century

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<sup>1</sup> DISCLAIMER: while this paper was developed under the work AICPA’s Special Committee on the Enhanced Business reporting it does not represent in any form the official position of the AICPA or its committee. It represents the opinions of its authors.

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## Outline

<b>Outline</b>	<b>2</b>
<b>1. Overview: Problem Definition and Solution</b>	<b>5</b>
1.1 The EBR Consortium and the Role of the Galileo Project	5
1.2 Back to Basics	6
1.3 Rethinking the Role of the Standard Financial Statements	9
1.4 The Role of Technology	12
1.5 Paper Outline	12
<b>2. An Evolving Scenario</b>	<b>13</b>
2.1 The Intractable Problems of the Current Accounting and Reporting System	13
2.1.1 Consolidation	13
2.1.2 Intangibles	14
2.1.3 Materiality	15
2.1.4 Stale, erroneous, and opaque information	16
2.1.5 The specification of contractual terms in the measurement model	17
2.1.6 Valuation	18
2.1.7 Deterministic representation of stochastic phenomena	19
2.1.8 The disclosure of predictive information	21
2.1.9 Semantic versus quantitative description of accounting phenomena	22
2.2 The Real-time economy: The Technological Basis for Reengineered Business Reporting	23
2.3 The Evolving Path for XBRL	24
2.4. Continuity Equations: The Conceptual Basis for Reengineered Business Reporting	29
2.4.1 Levels & Basic Concepts	33
The spreadsheet analogy	38
<b>3. The Proposed Solution</b>	<b>43</b>
3.1 Objectives and Constraints	43
3.1 Axioms of a New Reporting Paradigm	46
Axiom 1: The extreme accounting model here presented is not the proposed solution but an input on ranges of potential solutions	47
Axiom 2: When in doubt of valuation, disclose the facts	47
Axiom 3: Support estimates	49
Axiom 4: Raw, not processed data, panoramic view of details	49
Axiom 5: Standardization of form and substance of transactions	50
Axiom 6: Multiple-model disclosure	51
Axiom 7: Digital standards – not principle-based	52
Axiom 8: Data level assurance (due to the balkanization of data)	52
Axiom 9: Information provisioning is a continuum from internal to external information	53
3.2 Required Technology Infrastructure	54
3.2.1 Medium/Technology	54
3.2.1.1 Impounding Technology into the reporting Process	54
3.2.2 Slice and Dice	56
3.2.3 The power of the drill-down	58
3.2.4 The power of Hyperlinks	60
3.3 Information	61
3.3.1 External Data (Exogenous)	64
Plentiful of external data	69
3.3.2 Internal data (Endogenous)	72
3.3.3 Dimensions of Disclosure	72
3.2.1.1 Continuous reporting	79
3.3.3.2 Stochastic reporting alternatives that are context dependent	85

3.3.3.2 Frequency	85
3.4 Rules of Measurement (Accounting)	89
3.4.1 Business reporting portal	90
3.4.2 Virtual Entities	102
3.4.3 Points of comparison (POCs)	106
Points of Comparison/benchmarking	106
Points of comparison – POCs (as statutes)	107
3.4.3 Non-Financials	109
Sustainability	112
A Methodology for determining disclosures and points of comparison	117
Conceptualization of the Building Blocks	118
Sample Non-Financial Process Measurements	119
3.4.5 Relationships Reporting	127
3.4.5.1 Internal and External relationship Disclosure	127
3.4.5.2 Types of relationships	128
3.4.5.3 Types of Structural relationships	129
3.4.5.4 Continuity Equations Modeling	131
3.4.5.5 Modeling real-time Analytics	134
3.4.6 Dynamic Valuation (Inventory, PP&E, depreciation, others)	135
3.4.7 KPI's and Analytical Monitoring	139
3.4.8 Future Oriented Information	140
3.4.9 Formalization of Business Artifacts	142
3.4.9.1 Fuzzy Organizational Structures actions and outcomes	142
3.4.9.2 A taxonomy of business Financial Instruments	143
3.4.9.3 Structuring and Formalization of MDNA	145
<b>4. Illustration</b>	<b>146</b>
4.1 Basic Stakeholder Driven Disclosure Technology	146
4.2 Valuation	147
<b>5. Conclusions</b>	<b>148</b>
5.1 The environment	148
a. The Axioms	149
5.3 The Proposed Model	149
5.4 Takeaways	150
5.5 Miscellaneous Issues	150
Appendix A: Real time economy: Dynamic Systems and Continuous Assurance -	152
Electronization of financial processes	155
Appendix B: The umbrella of assurances	158
Appendix C: Non-Financial Disclosures: Key Variables	160
<b>List Of Figures</b>	<b>163</b>
<b>List Of Tables</b>	<b>165</b>
<b>Hyperlink 1: economic Performance Indicators</b>	<b>166</b>
<b>Hyperlink 2: GRI measures</b>	<b>167</b>
<b>Hyperlink 3: relationships in GRI</b>	<b>169</b>
<b>Hyperlink 4: Structure and Governance in GRI</b>	<b>170</b>
<b>Hyperlink 5: stakeholders in GRI</b>	<b>171</b>

<b>Hyperlink 6: GRI Disclosures</b>	<b>172</b>
<b>Hyperlink 7: Indicators in the GRI framework</b>	<b>173</b>
<b>Hyperlink 8: GRI notes</b>	<b>174</b>
<b>Hyperlink 9: The bucket model of accounting</b>	<b>175</b>
<b>Hyperlink 10; MDNA Edgar Online</b>	<b>176</b>

## **1. Overview: Problem Definition and Solution**

### **1.1 The EBR Consortium and the Role of the Galileo Project**

Since the joint collapse of Enron and Arthur Andersen in 2000, there has been a series of accounting related scandals which, at the very least, raise serious concerns about the appropriateness of the current financial reporting system. In response, the AICPA has taken the initiative of re-thinking financial reporting by establishing the Special Committee for the Enhanced Business Reporting Model (EBRM), also called the Starr Committee after its chairman Michael Star from Grant Thornton. This committee examined the proposals presented in the early nineties by another special Committee, the Jenkins Committee. Despite the fact that its chairman, Ed Jenkins, subsequently headed the FASB, the Jenkins Committee recommendations were mainly not put into practice, one reason being that the late 1990s bull market made its concerns about the adequacy of GAAP seem redundant. By contrast, one of the underlying questions confronting the Starr committee was an unanswerable one - whether the malfeasance crisis could have been avoided if the improvements to financial accounting and reporting suggested in that earlier report had been implemented.

While these questions are mostly speculative, the committee decided that the accounting profession by itself did not have the authority or the ability to create a new reporting model with its enormous societal consequences, and so in order to bring about substantive change it transformed itself in July 2004 into a broader consortium of stakeholders in the financial reporting process. The Enhanced Business Reporting Consortium (EBRC) describes itself as: "A Consortium of stakeholders collaborating to improve the quality, integrity, and transparency of information used for decision-making in a cost effective, time efficient manner." The Star Committee, under its Public Company Task Force, had a set of work products that will serve as inputs to the EBRC. These work products of the consortium were a set of sample reports that illustrate the kinds of enhanced disclosures that it advocates as necessary and useful for complex organizations in today's information economy, and which serve as a starting point for further discussion.

By design, the content of the first two sample reports are not especially “radical”. As Paul Herring, the chair of the Public Company Task Force wrote during the process that created these reports: “Formats that follow outlines that are already in general use in the business information supply chain are likely to gain faster acceptance than those that are new... We will explore potential enhancements to the existing financial reporting format but will not consider wholesale re-structuring of the financial statements.” By contrast, the third sample report project, labeled the “Galileo project” was the one that was meant to be far-reaching in nature. The Starr Committee examined extended financial reporting—additions to the standard set of GAAP based accounting reports, with the

explicit understanding that while these reports are no longer appropriate for stakeholders, the committee itself was not in a position to change GAAP.

This incremental approach may make perhaps sense in terms of change management, but it can also constrain the possible changes to the reporting model that are made available to the consortium to discuss. Thus the Galileo project serves as a remedy to the cautious approach, by being the medium to consider “extreme accounting” including both supplements to standard reports as well as possible changes or modifications to GAAP itself. Further, while all the sample reports use somewhat technology to transform the way in which financial information is presented, Galileo goes further in examining how the IT infrastructure of today’s digital can also fundamentally transform the process of obtaining and preparing, as well as communicating, financial information.

## 1.2 Back to Basics

Financial reporting would not be needed if all stakeholders in the firm shared the same information about how the firm has performed in the past and had similar expectations as to how it will perform in the future. Furthermore this shared information should be correct and well representative of the actual business conditions of the firm. In reality, those within the firm are inevitably in a better position to know its state than those stakeholders outside of it. Moreover, the former are not just informationally advantaged, but as managers they can actually shape the firm’s future performance. This is the fundamental informational asymmetry that bedevils financial reporting, a reflection of the conflict of interest between shareholders who only care about the financial performance of the firm as reflected in its market price, and managers who can directly benefit from exploiting the firm’s assets.

These informational asymmetry and moral hazard issues add the possibility of deliberately distorted reporting to the already formidable problem of measuring firm performance even in a non-strategic setting. Moreover, measuring past firm performance is largely a means towards the end of forecasting future performance for it is only the future and not the past that affects firm valuation. Clearly managers can affect the degree to which past performance predicts future performance, thus affecting the value of financial reporting.

Adding to these measurement problems are changes in the way in which firms transform capital into returns. Once the main function of the firm was to apply unskilled labor to physical assets, so that the reporting which concentrated on the disposition of those physical assets adequately captured firm performance. XXXX Indeed, even accuracy in measuring assets could be sacrificed for other goals such as verifiability through the doctrine of conservatism without greatly reducing the usefulness of the reports. But today firms create value by the use of such intangible assets as knowledge and the skills of its workers with the result that the relationship between its physical assets and its performance is greatly diminished. This creates two problems: a pure measurement issue of how to account for the presence and role of intangibles and a strategic measurement

problem in that this broken relationship opens up a wider scope for managers to manipulate earnings.

An example of these problems comes from a sizable accounting transaction: the decision by Cisco Systems, in May 2001, to write-down its inventory by \$2.25 billion, an amount larger than the inventory value in its books.<sup>xxx</sup> One explanation is that the write-down related to the value of inventories that could be not sold by its suppliers in the value chain where Cisco had a contractual or moral obligation. In particular, during the e-commerce boom Cisco had offered vendor financing to many dot com firms in exchange for sales contracts, while signing contracts itself with downstream suppliers in anticipation of tight demand. These obligations were not reflected anywhere in the financial reports. Of course, even granting these problems, there was also the suspicion that the sheer magnitude of the write-off resulted from the use of the well known tactic of the “big bath”, in which all the bad news are anticipated in advance, all at once, thereby creating reserves to boost income in the future.

This example and the difficulty in disentangling its purpose are indicative of the difficulty that users face today with financial reports. In fact, the underlying accounting fails to account for the way in which the modern firm operates and for the intangible factors which underlie value creation or destruction. Moreover, managers are able to take advantage of the resulting ambiguity to act in their own best interest and not necessarily that of the firm or other stakeholders. Most importantly, this is not an example of outright fraud or audit failure, but rather an example of what is arguably a far more compelling problem: the systematic inability of the current financial reporting system to meet the needs of users, to understand the ways in which complex organizations perform and to hold managers accountable.

This example also undermines one of the arguments in support of the current financial reporting system and against changes to that system: the need to maintain comparability and consistency across firms in the ways in which they account. But even strict rules, such as those that apply to inventory valuation or special purpose entities, is no guarantee that firms will apply those rules in the same way given the underlying ambiguity about what is being measured. This is really an argument for more information disclosure to enable stakeholders to better discern the purpose and meaning of specific business activities.

Other examples of the difficulties posed by the existing financial reporting system are reflected in many of the recent scandals, as the prosecution of the perpetrators did not deal directly with the core malfeasance issues but attacked more peripheral facts. Thus,

- Arthur Andersen was not convicted for performing bad audits but of destroying evidence.
- Martha Stewart was not convicted for trading on insider information, but for lying to federal investigators.

- Dennis Kozlowski of Tyco will likely be convicted for not paying sales taxes in the state of New York not for plundering the treasury of his company in lavish self-given benefits that were “approved” by a deceased director.

The press attributes these aberrations to the hesitation in the part of prosecutors to discuss a set of “arcane accounting laws” in a court of law where jurors, lawyers and judges will have great difficulty comprehending the issues presented by armies of highly paid attorneys who, in collaborations with expert witnesses, point out the ambiguities of the law and explore the “beyond reasonable doubt” concept.

It is also striking that the parties that have been involved in many of these cases are stalwart institutions which help define the nation’s economic environment. Take for example the case of Enron, which had over 600 CPAs on its payroll and hired McKinsey for strategic advice, Arthur Andersen for audit and consulting services, and worked with Citibank, Merrill Lynch, and JP Morgan for structuring and supporting its financial operations. These firms, the best and the brightest in the business, helped Enron stretch the boundaries of accounting in order to manage its earnings. These financial institutions had entire groups devoted to “structured transactions”<sup>3</sup> whose main purpose was to disguise the nature of the financial transactions of Enron within the “arcane set of rules” of accounting that they expected never to be revealed to the world, and in case of litigation expected the prosecutors to avoid.

Enron also had an intricate web of additional financial relationships with its directors who advised it on many issues while handsomely profiting from their relationship. These directors were also stalwarts of society and most likely were aware of the aggressive nature of Enron’s accounting even if there were not cognizant of the criminal profiteering of some of its top managers. Ex-regulators, leading academics and well known international figures were compensated by being on Enron’s board as well as by providing other services as external consultants. The fundamental problem is that the highly complex nature of Enron’s transactions would have been very difficult to detect by even the most committed and best trained external director.

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<sup>3</sup> *The New York Times* in October 8, 2004 article by Eric Dash entitled “Parmalat Files Another Suit Naming Bank of America” relates a law suit of Parmalat against Bank of America stating that “It charges that between December 1997 and December 2001 Bank of America helped certain Parmalat senior managers structure and execute “a series of complex, mostly off-balance-sheet transactions that were deliberately designed to conceal Parmalat’s insolvency.” ... Meanwhile, the bank and its executives collected tens of millions of dollars in interest, improper payments and transaction structuring fees, ..... seven examples of what it claims were fraudulent and highly lucrative transactions that Bank of America managers arranged for Parmalat subsidiaries in Venezuela, Brazil, Chile and South Africa. “In some cases, what appeared to be conventional loans from Bank of America were in reality intracompany transfers or loans from other Parmalat entities,” the complaint said.

*“In other cases, what appeared to be conventional debt offerings to third-party investors, supposedly underwritten by Bank of America, were in reality loans to other undisclosed Parmalat entities,” the complaint said.*

*The complaint said investors were intentionally misled into believing that Bank of America was standing behind Parmalat’s creditworthiness when the bank’s activities really suggested that it was doing all it could to reduce its risk. In some cases, the complaint said, it established secret loan guarantees and side-letter agreements so it had no risk at all*



The need for drastic change in financial reporting has been recognized by many. Arthur Levitt<sup>4</sup>, the former chair, commenting on Senator Carl Levin makes a very damning statement:

... well before the Enron disaster, he saw *the fiction that corporate financial statements had become*: companies technically were in compliance with accounting rules, yet their financial statements were hiding huge debts and other liabilities. (p 243, emphasis added)

What is needed to update the financial reporting system to deal with this kind of complexity? The rest of this paper discusses the options in detail. Here we present the main issues and principles of a new financial reporting process.

### 1.3 Rethinking the Role of the Standard Financial Statements

The current financial reporting system is centered on the annual income statement and balance sheet as prepared and distributed by the firm. They serve as summary measures of the state of the firm and its performance. Such summarization and condensation inevitably results in a loss of information which cannot be in the best interest of users unless the measure perfectly captures future firm value, or the costs of more detailed information exceed its benefits to users.

Given that the former is an unlikely prospect, the rationale for the current systems of disclosure is predicated on the basis that: a) users are assumed to be unsophisticated (the “widows and orphans” mentioned at the time the ’33 acts were passed) and incapable of processing more disaggregate information for themselves, and b) it is costly to prepare and report information on a more timely basis.

These conditions speak more of the 19th century beginnings of financial reporting than they do of the circumstances in which financial markets operate today. **Firstly**, technology enables the firm to manipulate data at low cost, meaning that there is no longer a compelling reason to restrict information disclosures to an annual basis. **Second**, the purpose of financial reporting has shifted from its original stewardship function toward valuation and comparative evaluation, which necessitates a broader, future oriented set of information. As these statements have proven to be insufficient for the needs of more sophisticated users, they have been expanded periodically in response to demand or the latest scandal, in a largely haphazard fashion. In some cases, the statements themselves have been reconfigured (for example, to allow mark to market accounting to reduce the dependence on historical cost) or else additional information has been provided outside the statements, as through the use of footnotes. But the centrality of the two primary statements has been retained, along with their underlying assumption that it is important to restrict the scope of information provided to users in order to avoid overwhelming them (akin to the recent proposals for a condensed and simplified version

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<sup>4</sup> Levitt, Arthur, Take on the Street, Pantheon Books, NY 2002.

of mutual fund prospectuses). The end result is a highly aggregate, episodic flow of information from the firm in which a small set of standardized information attempts to satisfy the widely varying needs of users.

This approach implies that auditing is also centered on the mandated financial statements. Thus auditing is also episodic and focused largely on whether the firm has correctly condensed and aggregated its information into those statements (which is what “prepared in accordance with GAAP” literally means). Validating information on a more concurrent basis is held to be outside the scope of the external auditor and assigned to the internal auditors instead. But it has also become steadily apparent that the mandated statements cannot be considered independently of the underlying data of the firm and the firm’s accounting and control infrastructure that gives rise to that data and records, manipulates and aggregates it. Thus, as with financial reporting, auditing has been periodically expanded, albeit also in a largely haphazard fashion, first to encompass general examination of controls, and with the passage of Section 404 of the Sarbanes/Oxley Act, to a detailed attestation of financial reporting controls.

With the financial reporting environment almost exclusively focused on the income statement and the balance sheet it is not surprising that the financial markets also have tended to view a firm largely through the prism of those documents. In an extreme, this can lead to forms of functional fixation, where form can seem more important than content, as when information in the statements themselves dominate the market’s reaction even when information in footnotes modifies or contradicts it. In turn, firms expend vast resources in fighting accounting changes that impact the income statement even if that same information is presented elsewhere and could be readily used to recalculate the reported numbers, as in the current debate over stock option expensing.

The continuing fascination with reported net income is not, however, due to the lack of sophistication of market participants. Financial markets today have today some professionals who are not only capable of handling highly disaggregate financial data and forming their own conclusions about it, but actively do so. Thus some analysts simply discard the financial statements issued by firms in favor of extracting specific information from them and inserting it, along with other external information, into their own models of firm performance. However, there are a some constrains including a) the focus of the financial reporting system on the mandated statements leaves them with few other options on which to base their analysis, and, flowing from that, b) the lack of other instruments of communication lead firm managers to use those statements to signal information, requiring a continuing focus on the form of those statements, independent of their content.; and of course, c) the assurance that is attached to those statements alone, requiring that they receive disproportionate weight, again regardless of their information value. The lack of other audited information has also resulted in auditors becoming insurers of last resort, as users who are forced to view the firm through those statements come to see the auditors as gatekeepers for the firm, and so hold them responsible not only for the preparation of those statements, but also for their content.

If the financial reporting system was being built from scratch today, it would likely be aimed also to the needs of these very sophisticated users than the “mother and orphans” type of investors predominant at the time of the ’30’s acts. In particular, there exists today a large group of financial intermediaries that work on behalf of these unsophisticated users, or who interpret information for them, (for example, mutual fund managers, financial analysts) so that there is no real need for these investors to personally assimilate financial information, obviating the need to pitch financial information at the lowest common denominator.

A reengineered financial reporting system would be predicated on two underlying assumptions: **First**, that technology has reduced the cost of preparing and reporting financial information with much finer detail on a more timely basis; and **Second**, that some very important users are much more sophisticated and capable of forming their own metrics for firm performance, rather than having to depend on the condensed and aggregate annual statements issued by the firm.

These two assumptions have to be applied against the financial process value chain of financial information which extends from the raw data of the firm at one end to sophisticated users at the other. Part of this chain takes place within the firm and part of it is external to the firm, with a handover of financial statements taking place at the boundary between the firm and its constituents. As the forces affecting the supply and demand of financial information have changed, it is surely time to ask whether the location of that boundary point is still appropriate. So the question becomes whether the firm should aggregate and condense information to such an extent before releasing it, or whether users can be assumed to be sophisticated enough to perform these functions on their own.

That is not to say that firms will not prepare income statements and balance sheets. After all, they already do so for their own internal management purposes. But there is no reason why users should be restricted to that one perhaps self serving and highly restrictive method of aggregation when users can be allowed to see how that report was created and either accept it as it is, or else use the underlying data as they see fit. Reducing the single minded emphasis on just the income statement and balance sheet will not only increase the information content in the marketplace about a firm, but would reduce the likelihood of functional fixation, since it would be clear that valuation is meant to be based on a broad set of information.

Questions that have to be examined are a) the degree of aggregation that will take place given the needs of users and the concerns of the firm about revealing competitive data, b) how much pre-processing of information will be undertaken before information is released and who is in the best position to do that processing, and c) how much validation will be provided with the information and who will provide that assurance.

These three are not independent issues, since aggregation is a form of information processing in which a great deal of information is lost. It also allows for those who have access to the raw information (i.e. the managers) to shape the degree and form of

condensation that suits their interests best. At present, managers constrained only by their ability to get their interpretation of GAAP through the auditor, direct their energies towards making one metric of firm performance, earnings per share, as favorable for them as possible. Reducing the degree of pre-processing and aggregation of information by the firm would presumably also reduce the ability of firm managers to manipulate that information.

Technology can be an effective tool in providing a richer flow of information to users, with tagging, as in XBRL, being a particularly promising technology. Tagging is particularly important because it makes information content independent of its presentation, thus reducing the tendency for functional fixation. Ultimately the latency between economic activity and reporting can be reduced, in order to bring the reporting frequency more closely in line with the dynamics of the business and the needs of users. A reengineered financial reporting system will also, of course, impact the role of auditing. With more information being issued more frequently, auditing will have to move away from an annual focus towards a more continuous auditing model. Moreover, with more disaggregate information being reported, auditing will also shift its emphasis away from verifying the way in which the firm aggregates and condenses its data, towards more data-level assurance. The degree of verification which users will demand from the broader set of data they receive will determine the extent to which data is actively audited, as opposed to being assured passively, for example, by threat of criminal liability or civil litigation.

## 1.4 The Role of Technology

In the new accounting environment, the firm's databases and ERP systems will play the same role the general ledger did in the old manual reporting world, with the difference being that the reporting system will require a monitoring and control layer, probably including a continuous assurance component, which will evolve from the systems being implemented for Sarbanes/Oxley 404 certification. It is likely that firms will progressively implement such monitoring layers for their own internal management purposes, the output of which could then be adapted for external reporting. Indeed, this would have the advantage of letting the market assess the adequacy of the firm's control systems. On the other hand, it can be argued that the reporting system will depend on the IT decisions of individual firms and so it is not clear what would compel a firm to implement the particular monitoring layer that is desired by users. In other words, the more sophisticated the infrastructure underlying the reporting system, the more difficult it will be to obtain cross sectional consistency, at least in the absence of regulation, which is unlikely in this context. This fact may constrain how extreme the new reporting systems can be, given their reliance on technology.

## 1.5 Paper Outline

Having defined the problem facing the financial reporting system and outlined the drivers of the proposed solution we now turn to an in-depth examination of the issues raised in this introduction. This examination involves details of the specific problem areas in accounting today and then a look at the changes impacting the business environment, and especially the technological infrastructure of the firm that both undermines existing reporting systems and provides the foundation for the creation of a new and more effective system.

## ***2. An Evolving Scenario***

### **2.1 The Intractable Problems of the Current Accounting and Reporting System**

#### **2.1.1 Consolidation**

Over the last two decades the standard setters have struggled with representing businesses with multiple segments that are not fully integrated, produce different products, and are in different geographies with differing currencies and methods of accounting. Large companies that have heavy industrial and financial components (e.g. GE and GM) blend into one measure very distinct types of numbers, which can tend to obscure financial performance rather than make it more transparent. The perennial problem of determining if two entities are one and need to be consolidated, or if they are different entities has been exacerbated by the development of Special Purpose Entities (SPEs). These are originally entities of very specific and narrow denomination which even 97% ownership did not create any co-dependency for the firm. This original definition was followed by a much larger set of usage by many businesses to the extreme abuse that Enron showed. While statistics on the existence and nature of SPEs are not available, they are much more widely used than generally understood and are applied by many of the most reputable organizations in the financial markets.

The evolution of organizations in the 21<sup>st</sup> century will lead to substantial deconstruction of business<sup>5</sup> where using internetworking technology will allow many functions to be outsourced, partnered, or turned over to the competition. While outsourcing could be a straight forward arrangement as when implemented by single independent firm, many forms of outsourcing will exist. Simply adding the component entities in a consolidation creates a very false sense of reality. These relationships are often more than their simple formalization. Xxx The core issues are ownership, inter and intra entity transactions, obligations for residuals and commitments over time even if not contractual. One of the reasons that the solution of the consolidation problem has eluded standard setting is that one of the motivations for consolidation is the obfuscation of individual unit performance. Consequently, standard setters never had the stomach to force substantial disclosure at the business unit level, nor the desire to force narrow business units of standardized form and standardized activity, reporting with the same accuracy and detail required from the consolidated entity. While the Jenkins report strongly suggested narrow

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<sup>5</sup> Greenstein and Vasarhelyi

and complete reporting at the line of business level, the changes effected by the FASB were limited and did not satisfy the real need that is emerging in the 21<sup>st</sup> century of creating dynamic standards and industry bench marks for online real-time business monitoring. Comparisons among organizations should be at the sector level not at the aggregate level where the addition of non-similar parts creates substantive obfuscation. A new type of aggregate entity should be invented and enough disclosure detail provided to allow for income calculation and asset allocation across and along the value chain.

### 2.1.2 Intangibles

The recent literature has started to pay increasing attention to intangible items. As discussed earlier, the new business measurement model must take into consideration a much wider set of assets such as intellectual property, human resources, brands, marketing investments, reputation and other items. However, many of these items should not be added to the traditional total assets figure, as their addition could result in a very misleading total assets figure. While we can estimate the value of cash fairly easily with a small expected variance, a much larger variance of the value can be estimated out of say inventory or property and a huge lack of reliability comes with the intangibles item of the balance sheet. Figure 1 illustrates the different levels of precision of the different items in the balance sheet and support the argument that these should not be added as this would lead to a total assets figure that is likely to be inaccurate..

Do we add them together?	
Business reporting item	Precision
Cash	99%
Receivables	95%
Inventory & PP&E	75%
Intangibles	Not specifiable

29

Figure 1: relative precision of balance sheet items

New types of reports, which aggregate data with similar levels of accuracy, must be created. Research is needed to help the reporting agencies come up with methodologies that would adequately incorporate heterogeneous reliability measures that specify their components. Many of these “intangible” items, some of which are currently disclosed in the balance sheet and others just described in the body of a financial statement or in a report to other agencies that are not financial in nature, must not only be disclosed but should also presented in some form of comparable metrics. In this work the idea of POC’s (point of comparison) is suggested for these non-financial variables. These POCs will serve as the basis for disclosed relationships that link financial and non-financial variables of different companies.

<b>Process or variable</b>	<b>Metric / point of comparison</b>
Human resources	Pension retirement matrix Summary of training and investment on HR
Brand	Brand value assessment and method
Intellectual capital	Number of patents granted and applied Expenses in R&D External valuation of IP Method of valuation and estimates
Marketing	<b>Market share</b> Industry ranking

**Table 1: Points of Comparison**

The creation of metrics that describe non-financial variables is fraught with concerns and potential inconsistencies. As it can be seen above many of the measures are estimates of a very soft nature which will share the same problems that current financial estimates possess. Intangibles will have different measurement and valuation bases and an entire non-financial GAAP must be developed for their disclosure.

### **2.1.3 Materiality**

The accounting profession has struggled for years with the concept of materiality. The audit opinion states that financial statements “fairly represent” the financial health of an

organization. The materiality threshold is in engineering jargon an indication of “allowable error in measurement.” Current audit practice relative to materiality has been in place for three decades. It represents a compromise between the cost of audit investigation in manual records and the benefit for stockholders of this investigation. Information technology has dramatically changed allowing for cheaper and more effective controls and investigation, unbalancing this archaic compromise. While the tradeoff between the accuracy of measurement and the cost of assertion continues to be real, the break even point has changed in reality but not in practice.

A likely and desirable change, the leveraging of technological change, is the justification of the audit turning towards the improvement of data quality at the client (Vasarhelyi and Cohen, 2005<sup>6</sup>) and providing a variable level of assertion depending on asserted process. Clients and auditors would agree on the assertion needed on different processes subject to minimal requirements set by statute. Business entities that have real needs of data quality and validation would decide where the optimum tradeoff would be and pay accordingly. This would create a much larger economic threshold for assurance services as companies already pay much attention to data quality. In the future world of a universal data bus and balkanized information being transferred among interoperable Web Services will create even larger concerns for data quality.

While the concept of financial statement audit will continue for a while, a new set of assurance types will emerge where auditors, or other assurors, will place an imprimatur on data at the tag level. This imprimatur can be at the data accuracy level (this data is 98% correct) or at the process level where effective controls that act on the data would be either listed or rated. Obviously these two approaches dovetail and can be used simultaneously. Furthermore, it must not be lost that a wider set of assurance service may emerge with classes such as wider audits, intervening audits, ubiquitous audits, control rating audits, causal audits, etc.

As continuous audit techniques, become more prevalent, the entire economics of auditing and financial report preparation will change. With the cost of automatic procedures becoming negligible in an ERP environment, so will the ability to conduct analytic procedures on a real time basis. The tradeoff between sampling and full population testing will shift akin to the change in the materiality threshold. More generally, the evolution and ubiquity of ERPs will fundamentally lower the costs of compliance and reporting. The basic cost of preparing a report that obeys a particular auditing/accounting standard will become slight as it is prepared by the ERP provider and pulled out as a standard product. Setup costs however, may vary among installations as the basic data for the new requirement may not be available

### **2.1.4 Stale, erroneous, and opaque information**

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<sup>6</sup> Vasarhelyi, M.A. & Cohen, E.C., “A Note on the emergence of data level assurance,” Rutgers Accounting Research Center, working paper, 2005.



Annual reports have turned to be major tools of public relations. Currently the idea of just publishing the “standard packaged in the ERPS” report is unthinkable. Annual reports are tools of “spin” While this is not a palatable thought for many it is clear that the future world is one of more and more regulatory compliance and consequently the organization provisioning substantively more information. The spin mentality must give way to multi-dimensional realistic reporting that is drawn directly off corporate systems and deposited or delivered to users without expensive (PR) manipulation. Specific reputational penalties must ensue from issuing stale, erroneous and opaque information. Today’s paranoid concern for breaches in competitive intelligence where competitors discover important economic facts about the reporting business must give way to a more **data cooperative attitude** where the society and the corporation benefits from the existence of comparison benchmarks in the many facets of business. Just like today entire sectors cooperate in the development of XML derivative standards to create interoperability between applications and data transitivity in the value chain these sectors must cooperate in the development of disclosure standards that can be compared and used for industry benchmarking. Competitiveness has to be preserved by fast ever improving processes, timely research and aggressive data sharing not by self-serving paranoid opacity that slows the progress of science and interferes in the natural economic optimizing process of allocation of capital.

### **2.1.5 The specification of contractual terms in the measurement model**

One clear shortcoming of today’s reporting model is its focus on realized operations and its ignorance of a large set of tacit and contractual obligations that often determine much of future economic activity. Organizations, their clients, their business partners, and suppliers are linked by a network of contracts that are formal and informal. Many of these contracts present larger liabilities for future operations than most reportable events. For example:

- a power utility may have a fuel supply contract that is 10% over current market price for the next 10 years
- a business concern may outsource most of its supply chain and as a result may have consensual obligations even if these are not contractual
- A business concern that has “return” agreements with their clients for inventory that is obsolete or cannot be used or sold
- Company with a long term practice of supporting local and communal projects to enhance the environment
- Company with many social welfare practices relative to the employees that cannot be stopped
- Company with passive obligations for environmental cleanup that are not recognized

These types of instances and the non-reported legal contingencies are often much larger than the liabilities typically reported in annual reports under contingencies. Only a probability-based system of contingency reporting can provide the necessary description

that is useful and realistic in this an information society. Where clear obligations (and benefits) are not available a deeper standard of disclosure applies where disclosure must be prepared such as:

- legal, operational, and contractual contingencies
- management compensation contracts at a much deeper level...(including a taxonomy of types of compensation)
- Hyperlinks to fuzzy contracts or non-standard financially engineered contracts
- Description of corporate litigation
- Description of government investigations
- Etc.

### 2.1.6 Valuation

The accounting profession due to a highly litigious environment and the inherent difficulties of probabilistic measurement has resorted to the more confirmable and less valid forms of modified historical based reporting. Furthermore with the increased consideration of non-financial measurements where organizations try to assess the value of their workforce, of their intellectual property, of their sustainable resources, etc the temptation is to go back again to historical values invested on these issues. For example valuing an employee based the company's investment on his/her education, professional training, etc. This is one of the examples of a very intractable set of problems. The standard to apply here is whether the information user will be better or worse served by being supplied verifiable (say historical cost based) investment information rather than estimates which may be more indicative of future value, but are less verifiable. If the estimate is used, will this information be more or less reliable than the old method? And can a structure be developed that users can download and perform their own analytics on this data?

The modern world is developing a wide of set live markets whose by-product is online real time valuation of many assets. Research is needed to understand how prevalent is this type of information and how expensive it is to harness it. Clearly the new economy has troves of transaction prices, valuation prices, indices, price lists and live exchange data available on a minute by minute basis. While the type of asset concentration changes substantially from sector to sector,<sup>7</sup> current values may exist for a substantive set of assets and temporal estimates (say weekly or monthly) of values may exists for many others.

- Some assets are to be measured in some form of high fluctuation transaction-based values following real-time indices xxxx
- An account for valuation changes must be created that allows for valuation changes not to flow thru income

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<sup>7</sup> For example it is clear that the consulting and audit firm businesses will be much more dependent on human resources valuation than a highly automated manufacturer.

- Income flow thru only should happen when asset realization occurs and this calculation should be using some form of inflation adjustment
- Where appropriate even future indices may be applied as long as the documentation is clear
- As today we keep depreciation schedules for major property items the new model should have valuation schedules for say the largest 100 assets of the corporation
- The economics of information today are such that constant evaluations of asset values should be doable, disclosable without prejudice of competitiveness, and usable by the user’s analytic tools
- Present value of any future income flow with allowance for best-estimators (and their variance)
- Processes, nature of account, inter-process controls and other lesser items determine reliability of numbers at the transaction, reporting aggregate, and general ledger levels among many.
- Assurance / audit processes change these values on a continuous basis (real time seal, alarms, control tickers, points of comparison)

### **2.1.7 Deterministic representation of stochastic phenomena**

The litigious nature of American society has led to poor compromises in the disclosure of data. The profession, stung by criticism and litigation, has often decided and set standards for single number disclosure on stochastic assessments. The profession has not issued attestation stating that a particular financial statement is reliable to the 95%, has not allowed for management earnings forecasts to be stated in ranges, and has not stated that most mineral reserves are of a certain value based on the commodity prices in the last 12 months. However it is pretty clear that statements of this type would be preferable for sophisticated users.

While many statistical estimates pervade annual reports (e.g. pensions, bad debt, etc.) these are stated in a deterministic format emphasizing the basic weakness of traditional reporting. When the distance between the report and its underlying stochastic reality gets too big, the credibility of business reporting disappears. If the variances around the values of estimates are very large the credibility of point estimates are very small.

The new business reporting model will have to rely on a wide set of disclosed probabilistic assessments for past results, current actions and future estimates. It is better to be about right than exactly wrong.

proposes a set of probabilistic oriented reports whereby all items in the traditional statements (BS, IS, & FF) are reported as point estimates with a variance measure. For example, the corporate cash level at 12/31/xx was 20m plus or minus 5%, and our best estimate for the value of inventories is 60m plus or minus 15%, and that our current estimate for P,P & E is 71m plus or minus 25%, and that the intangibles in our balance sheet originated by the merger with ABC corporation are 75m plus or minus 100%. Each of these numbers is composed of numbers from each division and each of these numbers has its intrinsic variance. As the public today glazes at the thought of point estimates and variances, a targeted educational effort could help significantly while the investment public can ultimately use the point estimate at a deterministic estimate if so desired.

Extending the reporting range for non-financial variables, key numbers in financial and non financial units would describe non-financial items and hyperlink to the bases of estimates using point of comparison indices developed by the specific industry relevant to the particular line-of-business. Assessments of quality control probability based scorecards would complement this picture.

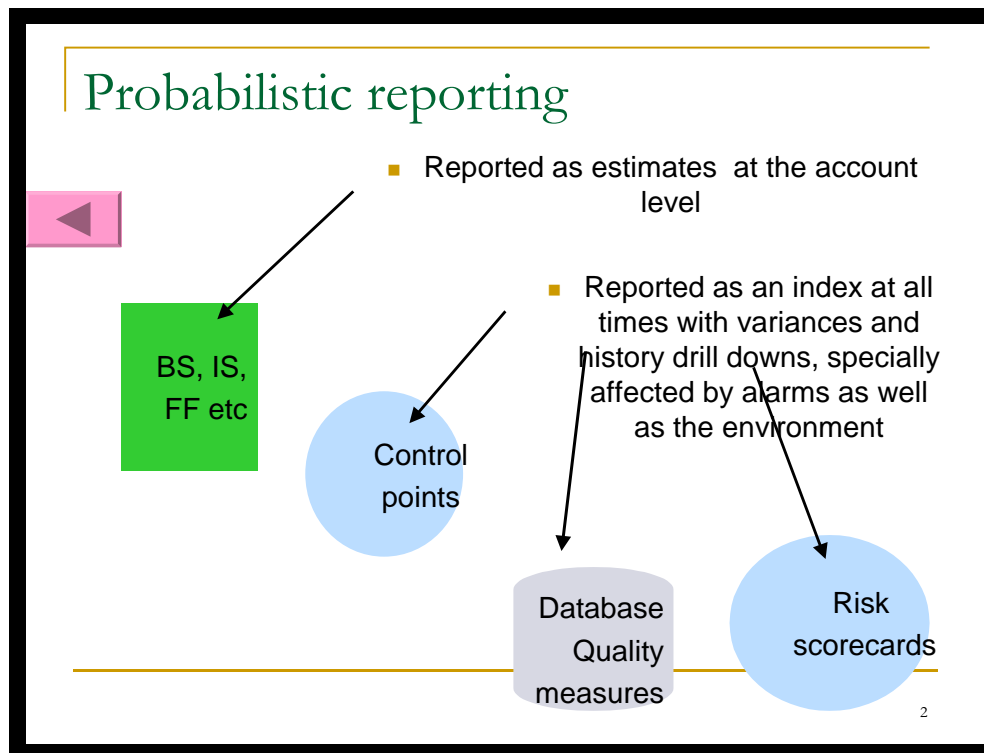


Figure 2: Probabilistic reporting

### 2.1.8 The disclosure of predictive information

Congressional hearings during the malfeasance crisis demonstrated deep skepticism about earnings projections by management. However management is clearly the one that can provide the best predictions of company performance and so the issue should be how to present and constrain this information to avoid spin and self-serving stock manipulation. If managers have stock options or stock holdings that are available in a short period of time they can overstate earnings to create a spike in valuation until results come in. The above supports the argument that a new process and requirements for predictive information must be developed

Figure 3 breaks down information relative to its time frame. Future information is there focused on 1) leading indicators and basic relationships and 2) forecasting and models. Consequently the emphasis is both on specific numbers and the structure that is driving these numbers.

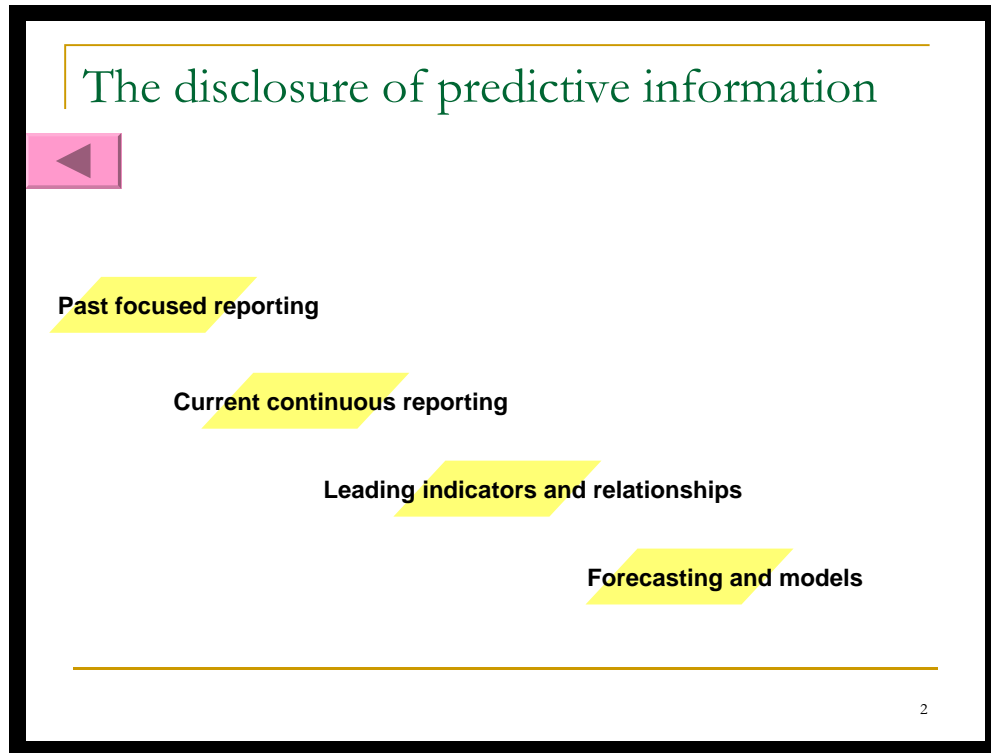


Figure 3: time frames of reporting

### 2.1.9 Semantic versus quantitative description of accounting phenomena

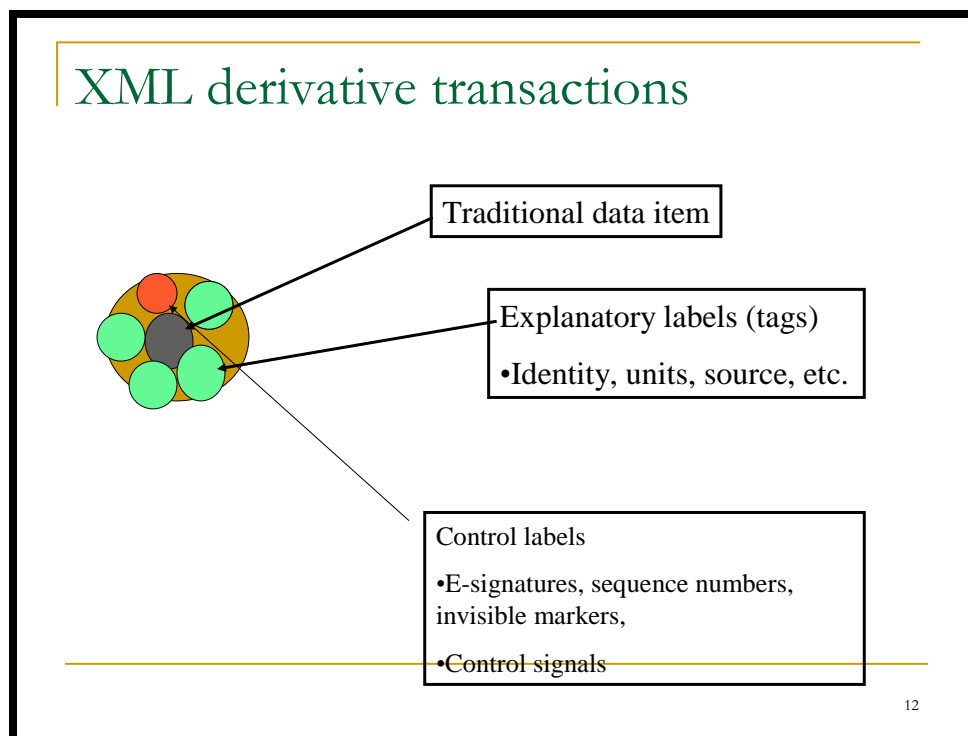
A company's annual report contains traditional financial statements, footnotes, and a wide set of textual materials. An entire information intermediation industry has emerged to extract, standardize and organize information for the final user. Large companies can acquire S&P's Compustat that contains most public US companies financial data normalized for use. The emergence of the XBRL standard may facilitate the utilization of data and comparison among companies at a more democratic level where individual users have an Excel add-on and harvest the information themselves without any data transformation. However, most information contained in an annual report or an SEC filing is not the formal information from Balance Sheet, Income Statement or Uses and Sources of Funds. It includes footnotes, comparative history and a wide array of soft information available from the annual report. New techniques will need to be developed to extract, categorize and disseminate the qualitative information contained in financial statements.

Overcoming these deficiencies in the current reporting system requires taking advantage of radical changes in the technological basis of business and an equally important shift towards a process perspective of the firm.

## 2.2 The Real-time economy: The Technological Basis for Reengineered Business Reporting

The real time economy requires dynamic adaptive models for its realization. The core objective of the real time economy is the reduction of latency between and within processes. Latency reduction will reduce capital occupancy costs by occupying assets (physical and labor) for less time. Technology now provides a public and common communication infrastructure, increasing information sensing for automatic measurement, and large integrative databases. The second major wave of Internet usage is beginning to take shape and now that there is inter-linkage of systems on a global and ubiquitous basis, the age of the interoperable applications is emerging. Interoperability means that applications that interact do not need to be closely coupled but share common data specifications which allows for independent applications to work together without major adaptations.

The W3C has proposed the XML (extensible markup language) as the tool for data standardization for interoperability.



**Figure 4: Basic XML transaction**

These information capsules, as described in Figure 4, will be routed through the value chain. For data transfer to be effective it is essential that data be self explanatory and that the applications managing the data use and transfer be able to ubiquitously understand the content of this data. The XML derivative for managerial accounting is XBRL / GL

(eXtensible Business Reporting Language / General Ledger) while closely associated to it XBRL is focused on external business reporting.

### 2.3 The Evolving Path for XBRL

While the adoption of standards for external business reporting is inevitable, by essence this process is a <sup>8</sup>dynamic road. Its original proposed structure will have to withstand the test of usage, while the standard itself changes over time to improve its usefulness. Most likely a series of problems will arise which include:

- Heterogeneous acceptance of the standard across countries and sectors.
- Some regional differences in the interpretation of the standard
- Some features of the standard will become entangled in local legislation and practice causing incompatibilities
- Some adoption will be statutory some voluntary
- A Babel tower of taxonomies will emerge before some simplification and mapping occurs
- The expansion of the standard to less specific (semantic) regions of business reports will be slow and confusing. For example the labeling of footnotes will evolve naturally.
- After some positive standardization of balance sheet, income statement and fund flow information is likely that there will be some progressive agreement on key disclosure items and performance indicators which will have specific tags. These agreements hopefully will be synchronized with the emergence of some consensus on EBRM. Furthermore, key elements of common footnotes and other non-financial data will be progressively tagged with specificity.<sup>9</sup>

Financial intermediaries will be in the cusp of this evolution adding structure to the evolving (and increasing) standard. For example, they will create databases of XBRL disclosures and add data integration with additional sources to decrease transaction costs to the users. Also, they will progressively incorporate the above mentioned key disclosure items and performance indicators into these databases, saving the users the need for data collection, manipulation, backward compatibility construction (creating time series) and model building. While the large financial shops will continue building their own models, smaller entities and committed investors will use templates provided by these financial intermediaries, increasing substantially the democratic nature of market information.

Furthermore, while the traditional domain of data will be expanded in search of transparency and made accessible and easily usable by XBRL, many sources of less traditional information will come to being. For example the FDIC is formalizing the usage of XBRL in the collection of call report data from banks and applying a large set of

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<sup>8</sup> EOL whitepaper on XBRL.

<sup>9</sup> AICPA's Special Committee on the Enhanced Business reporting is evolving towards a societal consortium ([www.ebrconsortium.org](http://www.ebrconsortium.org)) where many of these expanding reports have been proposed. Four illustrations of the direction of business reporting were provided by this group that can be found at the above web site or at <http://www.lintun.org/>, and at <http://raw.rutgers.edu/raw/galileo>.



business rules during the collection process both to decrease the potential of errors, as well as to allow analytic technologies weed out fallacious reports.

US corporations are subject to many reporting regulations such as the FCC, PGC, NYSE, OSHA, etc.. These regulations will eventually require reporting along a type of XBRL taxonomy and substantive convergence towards common requirements in an attempt to decrease the compliance burden. Financial intermediators will lead in the creation of these integrated databases and serve as a bridge towards common taxonomies and the creation of data streams that are backwards compatible. (go back and prepare data for periods prior to regulatory requirements)

XBRL as well as many of the other XML derivative standards will create a much more fluid path for data exchange. Figure 5 displays the interchangeability of internal and external value chains and the free flow of transactions of different nature (say labor, material, purchases, and services). These relationships, which are structural, can be modeled and controlled by the use of real time adaptable relationship models (continuity equations). Companies will choose the processes where they have competitive advantage and will outsource (create alliances, partner) the ones where they cannot provide improved margins. As a result, an entire new set of data integrity and ownership concerns will emerge.

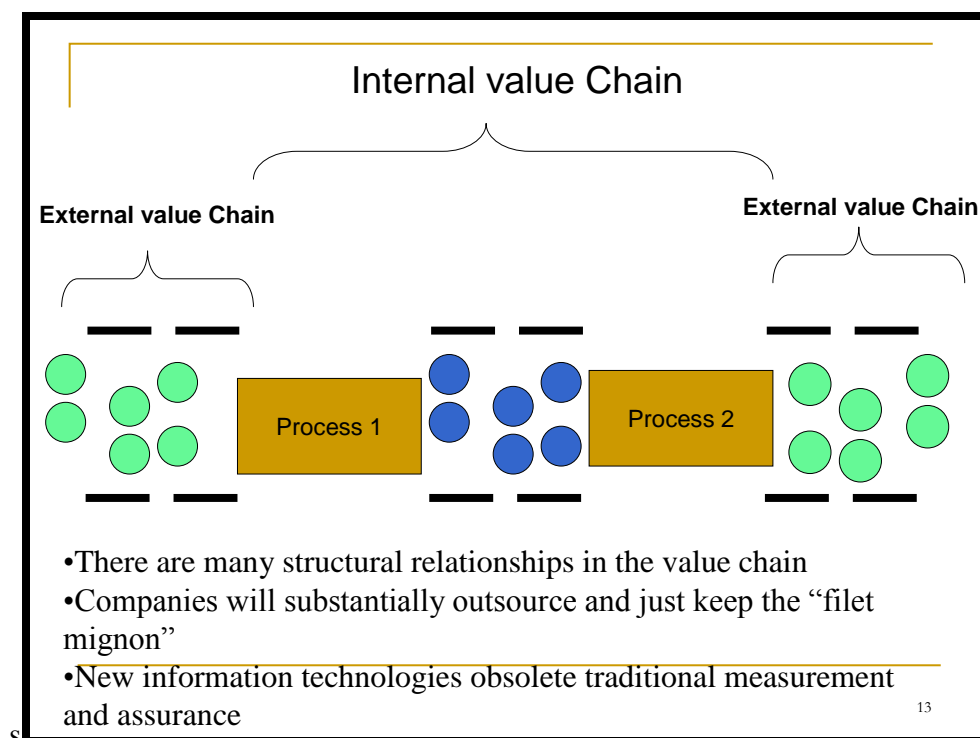


Figure 5: Data transfer chains

The flow of this data will allow a new form of automatic corporate reporting and management to evolve. The transactions flowing through the pipe will be constantly measured and accumulated to have online-real-time balances of transaction flows that may or may not be disclosed<sup>10</sup> to the public. Figure 6 illustrates the arrival of three different types of transactions that are accumulated into continuous “income statement type” reports .

Ultimately twenty first century reporting will focus on the monitoring and control layer where measurements of corporate processes will be compared with process performance models for the determination of variances. If these variances turn to be too large some form of management reaction will be necessary. In a real-time society much of this comparison and following management reaction will be automated thru some simple management bots (automated management actions) while some unusual events will be relayed to real managers or audit action. Transactions will be accumulated into detailed general ledger accounts (following an XBRL/GL – more detailed – taxonomy) and will be available in the company’s Enterprise resource Planning System’s database for extraction. These extracts will typically be very numerous (in the form of tens of thousands of electronic reports) and standardized from the particular version of the ERPS. A small subset of these reports will be extracted and carefully staged to represent the corporate “official” business reports. These business reports will encompass the corporate Balance Sheet, Income Statement and Funds Flow that are currently easily tagged into XBRL but will also serve as the basis of a wide cadre of footnotes, body of the financial statement and information releases to many different entities and stakeholders.

Further into the future some degree of semantic processing technology as well as the issuance of standards<sup>11</sup> will allow for progressive business report content to be narrowly coded into XBRL tags. Consequently, and finally, an increase in transparency, such as clear comparability, will be possible in the footnotes such as pensions, compensation, accounting policies, extraordinary events, contingencies, options warranted, marketing plans, intellectual property assets, human resources deployed, intangible assets owned, etc.

Corporate Management Accounting is now the owner of a wide set of information. In the modern world, state-of-the-art companies have much online / real-time information. For example, no bank could live without their current daily financial balance closing as they would not be able to apply it overnight, no manufacturing concern could live without real time inventory information as they would not be able to practice just-in-time manufacturing, and most companies would have great competitive difficulties if they did not have real time payables and receivables information to collect or provide discounts based on time characteristics.

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<sup>10</sup> Disclosure is not limited by technological factors but by competitive intelligence and fears of evaluation of management on multiple dimensions.

<sup>11</sup> Eventually there will be tremendous pressure on standard setters to issue “digitalizable standards” that can be automatically converted into computer code.

The monitoring and control process will eventually dominate corporate information processing with many of its components automated, as standards will evolve to provide interoperability. The next two decades will witness progressive development of management action algorithm using automatic (XML derived) data standards for accelerating the time delay (latency) of the performance of processes themselves and the transmission of data among processes. While current technology does not seem to be able to substantially accelerate trucks and airplanes to deliver goods between locations, to decrease lunch breaks of clerks, or increase/decrease the speed of consulting engagements, modeling and decision automation will accelerate dimensionally management action and bureaucratic information processing.



Figure 6: the reporting layer

The business reporting cycle will also suffer substantial acceleration. Recently Cisco and Motorola have announced their “virtual close.” This process brings the accounting closing to the daily cycle and allows for a substantial decrease in accounting adjustments and end-of-the-period earnings management. This process will also increase the volatility of results reflecting the realities of the real-life business process. While “continuous reporting” should be a process with NO CLOSINGS, and a constant set of balances, the “virtual close” has approximated its timing. Although in reality, real time reporting has its technological foundations available now for many companies, the business reporting, legal liability and management’s reticence for accountability at many dimensions, has effectively slowed down the adoption process.

The W3C consortium (Word Wide Web Consortium) has proposed not only a web infrastructure but also tool for Web development (SOAP) and the basic framework (XML) standards for data interchange. It has also formulated the philosophy of a progressive anonymity on the Web where data flows through the universal data bus (Internet) and applications can sniff it out and provide interoperable services. While this vision is still quite fuzzy it can be visualized in many domains and now is the venue of many starting commercial efforts.

An entire family of potential Financial Web Services that will cover the scope of many current services and prospective ones is represented in Figure 7. While today accounting functions are performed inside a series of software for large, medium and small companies, in the future many expensively updated functions (such as locality and state tax tables) will be served by Web Services. It is easy to envisage depreciation services, asset valuation services, intangible valuation services, option valuation services, transaction security and tracking services among many.

Today we already find many companies (say Boon) providing special reporting functions for example for the SEC and for the FDIC. Many layers of special reporting are possible and will eventually evolve to support business.

In the assurance arena we have currently a major standoff due to the emergence of the PCAOB (Public Company Audit Oversight Board) and the ensuing immobilization of the the AICPA, big accounting firms and other related market players. However the reality is that many different assurance needs are arising some of which are being satisfied by the accounting profession while many others are either being ignored or are being addressed by other professions. The AICPA<sup>12 13 14</sup> has reacted by creating the WebTrust and Systrust services which have not yet developed substantial traction. Eventually however, Web based assurance Services, more robust than the current Webtrust, Trust-E, etc will emerge to support Web site trust, transaction trust, valuation trust, data trust, etc.

Three other high potential financial services will involve analytic services (where the Web entity will provide models for the lower and middle markets), fraud detection services where transaction streams and balances will be continuously scrutinized and compared with fraud profiles, as well some form of data level assurance where each data will have a tag(s) indicating its level of reliability, its path, and the reliability of its underlying control processes.

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<sup>12</sup> <http://www.aicpa.org>

<sup>13</sup> <http://www.aicpa.org/webtrust>

<sup>14</sup> <http://www.aicpa.org/systrust>

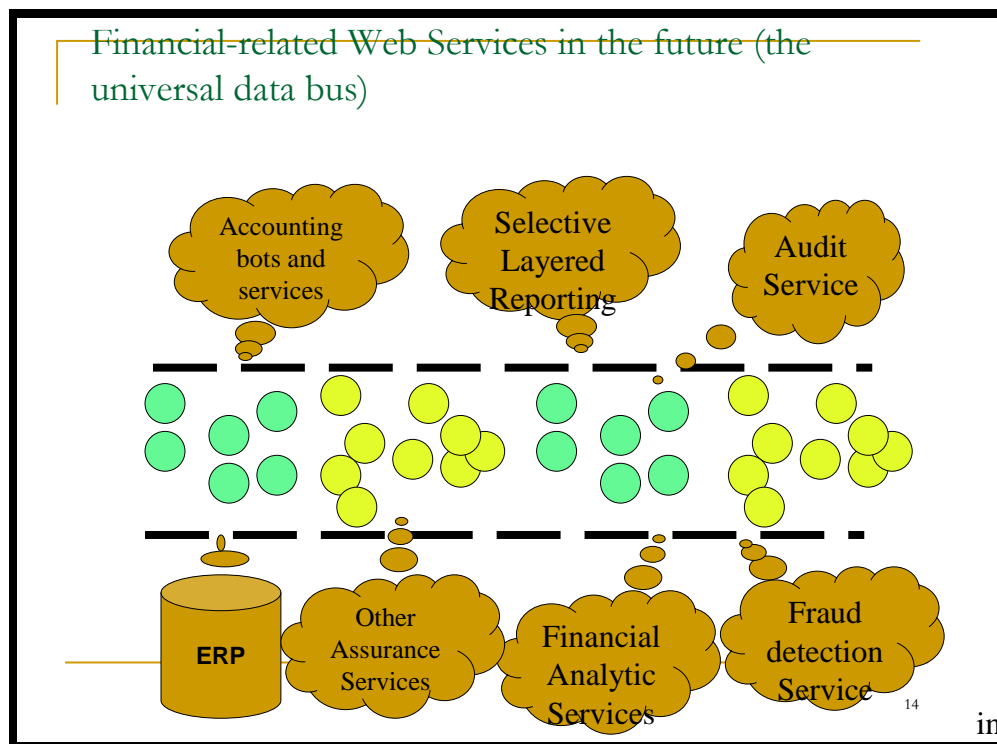


Figure 7: Web Services

## 2.4. Continuity Equations: The Conceptual Basis for Reengineered Business Reporting

In this economy business processes are measured on a continuous basis through different types of sensors that capture digital measurements of business metrics. This data are captured at a far finer granularity in time and detail than have ever been possible before.<sup>15</sup> Everything else provided by this ability for more frequent reporting, is a by-product of this fundamental change in the capability of data capture. What that data stream makes possible is measurement with an unprecedented degree of correspondence to underlying business processes. Furthermore the utilization of this data stream and its comparison with a new class of performance models that must be developed<sup>16</sup> will provide the basis for many automatic management decision models where the slowest element of the process, the human being, is excluded by automation. Figure 8 describes a formalization of these processes of data capture, comparison standards, exception standards, and meta-processes for measurement, control, management and assurance. Business processes, which are defined as “a set of logically related tasks performed to achieve a defined business outcome,” (Davenport and Short, 1990), are considered today to be the fundamental atomic elements that make up

<sup>15</sup> More details about this aspect of CA is provided in Vasarhelyi et al (2004) and Vasarhelyi and Greenstein (2003).

<sup>16</sup> Alles M., Kogan A., and Vasarhelyi, M. A., *Continuity Equations*, working paper, CARLAB, Rutgers Business School, Newark, NJ, September 2004.

a company.<sup>17</sup> Thus a company is now described by what it can do rather than by its assets. That changed mindset has yet to be incorporated into traditional management and its assurance. What is fundamental about the real-time economy is that it brings the process approach explicitly into management through the very prompt measurement of processes and the comparison of these metrics with dynamic benchmarks that represent prescribed levels of business performance.

Benchmarks that allow for the comparison of business process metrics with a standard (or model) will assume a much larger importance. The real-time economy discussed above, where processes are constantly monitored and their measurement compared with a benchmark for control purposes, requires highly dynamic adaptive models that can adequately represent the normative value that metrics must assume. Furthermore, in addition to basic benchmarking for first harmonic data comparison, second harmonic variance is also necessary for control purposes. Figure 8 illustrates this issue where processes are monitored and controlled by information systems, models, and management. When noteworthy exceptions occur adjusting management actions are effected. Some of these exceptions, are of (maybe also) assurance interest and are alarmed for audit purposes and directed to the audit “control” system.

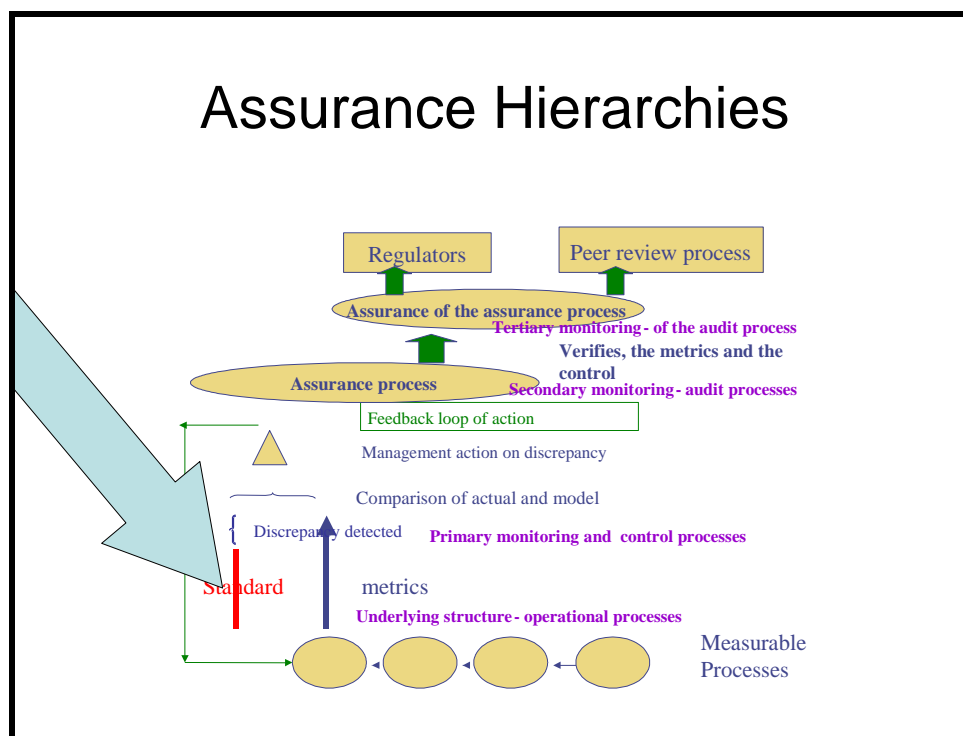


Figure 8: Meta-processes in measurement and assurance -data capture and control

<sup>17</sup> Porter (1996).

The monitoring and control of an organization's processes can be viewed as a 5 level set of activities as described in Figure 10. The structural level (processes) is measured and metrics extracted and captured for the data level. Data is stored at a high level of granularity, say, basic transaction level. This data history may be examined under many distributions (cuts) such as time period, division, product, function, originator, etc.

The third level encompasses the relationships perceived or prescribed among metrics, against which the organization performs control functions. For example, all flows from one process that reach the next one would constitute a one to one relationship and any differences would be exceptions. In general, to use metrics captured from level one in a control process it is necessary to have the measurement of the actual (metric), a model for comparison and a model of variance (which specifies the acceptable variation). The control process will compare the metric with the model, calculate the variance, and then decide if the variance is acceptable. If not, an alarm is triggered that may call for management action and/or assurance. The models may be very simple univariate levels to very complex multi-entity relationships like continuity equations. Among the types of models in CA we find:

- A fixed number (normative or empirically derived)
- An adjusted number with some form of analytic related to seasonality, hierarchy, or structure relationship

The structure relationships can be represented by continuity equations and may represent:

1. Reconciliation structures
2. Semi deterministic relationships
3. Structures across processes
4. Empirical relationships across processes
5. Empirical relationships of a high level among KPIs

The fourth level is the level of analytic monitoring and links very high level measures across processes. KPI (Key performance indicators) can be used to help understand process consistency as well as process performance. If measurements are not available at a lower level, this level serves to provide coarse alarms of major process difficulties.

The fifth level is a meta-process level where the actual control and monitoring functions are performed based on continuous measurement, monitoring and proactive exception handling.

Building on this model, the proposed solution is based on a view of a business in a real-time economy that would serve as a solution for some of the ailments encompassing the following factors:

- Creation of a multivariate measurement model that does not focus exclusively on earnings per share and allows users to predict and evaluate business'

performance on a multivariate basis even if these measurements are in different dimensions (apples and oranges)

■ Creation of a measurement model that is oriented not only to investors but to other stakeholders of the business

■ Creation of a measurement model that not only represents static measurements of business but also the types of relationships that represent the business. These relationships can be structural, relational, empirical or comparative in the form of sector benchmarks.

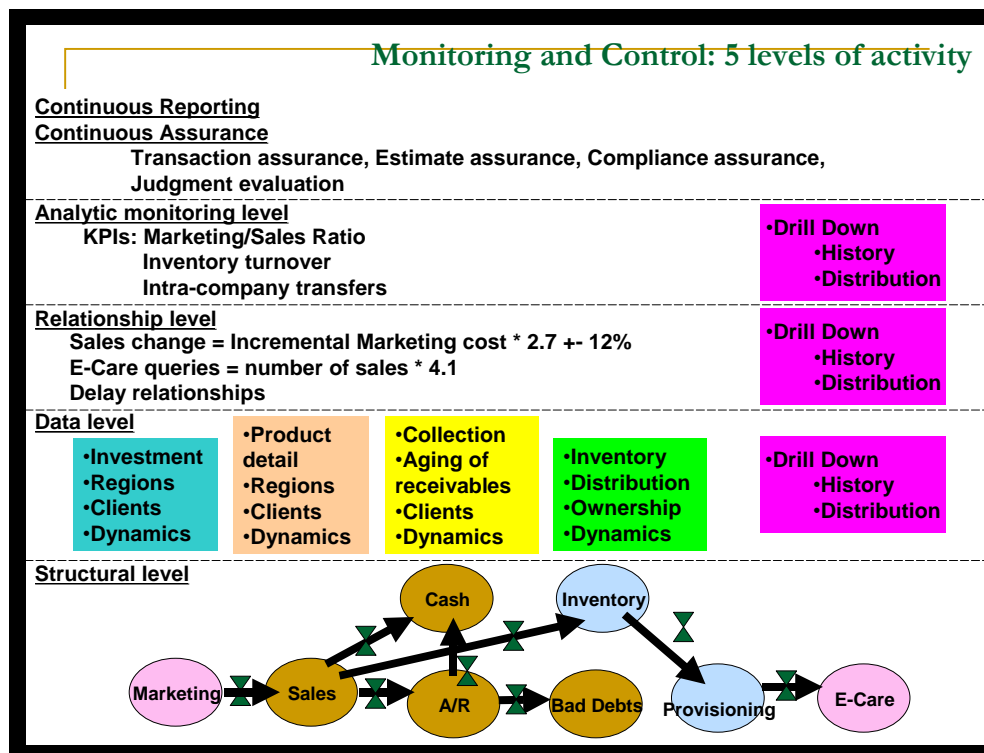


Figure 9: Galileo Enhanced Business Reporting Model

Based on the examination of the current reporting model (GAAP) under this framework it can be concluded that a dynamic world cannot be well measured with static measurements, and that the technology exists for a more dynamic method of measurement to evolve. The disclosure model is very disjointed when the economic status of a firm has to be shown on a piece of paper (flat) and with very wide discrete intervals. Furthermore, while markets seem to value firms on a wide range of non-financial assets, the GAAP-based model focuses on financial items. It is also concerning that the measurement process focuses on the physical assets of companies more typical of the industrial age, while the valuable assets of an information economy are neglected.



In an age where companies outsource many of their processes, suppliers carry the inventories of many companies, the RFID technology allows for specific identification of inventories, parts and assets, we still use FIFO and LIFO inventory valuation methods. In an age where dynamic markets exist where products are valued every minute we still focus on forms of historical cost as a substantive part of our business reports. In the days where it is well known that there is substantial leeway<sup>18 19</sup> of interpretation in every number that determines an entity's income we still focus on earnings per share.

Another irony is that in the last couple of years and supposedly the next few, the FASB and the IASC will be focusing on the convergence of standards, converging towards a set of standards that is irremediably obsolete.

If the measurement model is seriously compromised, progressively presenting less and less mapping with reality, the provisioning of assurance of these numbers is useless and is performed only for statutory purposes. It is not surprising therefore that accounting firms have progressively relied more in cursory analytical reviews and acted more like insurers than auditors. If the measures do not measure, even the best of the audits would just assure bad numbers that do not mean anything. Most litigation against auditors happens in failure situations, bad measures do not detect these, consequently good or bad auditing does not change much the auditing firms' risk profile. Under these conditions, any downturn will show the underbelly of weak firms that have stretched their reporting to the limit and in their demise will punish CPA firms for purposely “bad audits” or irrelevant numbers that had little representativeness of the firm's economic health.

### 2.4.1 Levels & Basic Concepts

The Galileo enhanced business representation model in Figure 9 entails 5 levels: 1) structural level, 2) data level, 3) relationship level, 4) analytic monitoring level, and 5) continuous reporting and assurance level. Furthermore we will define five main types of concepts<sup>20</sup>:

- **Metrics** – Metrics are defined as direct measurements of the system, drawn from reports, in the measurement stage. These metrics are compared against system standards. If a standard is exceeded, an alarm appears on the screen. For example, in the auditing of a billing system, the number of bills to be invoiced is extracted from a user report. The number of bills not issued due to a high severity error in the data is captured as well as the total dollar amount of bills issued. These three numbers are metrics that relate to the overall billing process.
- **Analytics** - Analytics are defined as functional (natural flow), logical (key interaction), and empirical (e.g. it has been observed that ....) relationships among

<sup>18</sup> Businessweek

<sup>19</sup> Swieringa, R., Accounting Magic ...xxxxx

<sup>20</sup> Vasarhelyi & Halper, Continuous Process Auditing, Auditing: A Journal of Practice and ....cxxx, Fall 1991, pp- xxx-yy.

metrics. Specific analytics, related to a particular system module can be derived from the auditor, management, user experience, or historical data from the system. Each analytic may have a minimum of three dimensions: 1) its algebraic structure, 2) the relationships and contingencies that determine its numeric value at different times and situations and 3) rules-of-thumb or optimal rules on the magnitude and nature of variance that may be deemed as “real variance” to the extreme of alarms. For example, a billing analytic would state that dollars billed should be equal to invoices received, minus values of failed edits plus (or minus) the change of the number of dollars in retained invoices. The threshold number of expected invoices for that particular day or week (allowing for seasonality) must be established to determine whether an alarm should be fired.

- **Alarms** – are exception conditions where a measure and its standard are compared and the ensuing variance is larger than the variance standard.

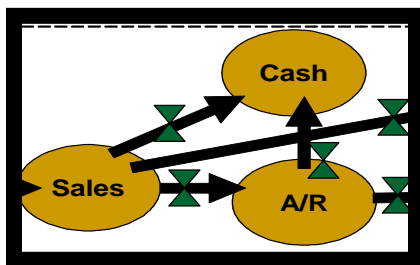
Actual experience with these issues indicates that several levels of alarms are desirable: 1) minor alarms dealing with the functioning of the auditing system, 2) low level operational alarms to call the attention of operating management, 3) higher level alarms to call the attention of the auditor and trigger “exception audits” and 4) high level alarms to warn auditing and top management of serious crisis. Establishing these alarm thresholds is a second harmonic development. The data and experience needed to understand the phenomena being measured to the level of specification of alarm standards are probably not available in most organizations.

- **Standards** or models represent the ideal state-of-the-world in a particular process. Any monitoring process requires the comparison of a metric to a model or standard to determine abnormal conditions. Furthermore, the magnitude of this condition is evaluated by a “standard of variance” in the decision on whether an alarm should be activated. Models of variable behavior over time in real-time systems must be developed in a way that would represent real-time behavior of dynamic systems. The evolution of real time monitoring needs adaptive models that take into consideration: seasonality, business trends, relationships between processes, timing between the processes, and flow of anomalous but legitimate transactions process to process.
- **Method of Measurement:** the method of data capture and classification is an important variable in the future system representation scenario. Continuously captured data can drive monitoring processes to real-time exception measurement and alarming.

The CPAS process captured data through report scrapping (Vasarhelyi & Halper, 1991) in electronic reports. Different monitoring processes are progressively capturing data in many more direct manners such as data sensing, queries to

databases or the utilization of intermediate data (Hume, xxx) between batch processes.

At the most basic level, the structural level, a number of transactions are taking place in various areas of the business, and there are time lags between each (illustrated by the hourglass shapes). In the new real time economy, there is decreased latency between these processes, which makes it possible to achieve real-time or near real-time reporting. Automation decreases the latency of processes by dimensions. The structural level represents a set of non-financial and financial processes that are interlinked in the generic process of wealth creation. There are physical, logical and statistical relationships between the processes and between the different metrics of these processes. Figure 10 is the lower level process where intrinsic relationships exist. Marketing drives advertising that drives sales. Once a sale is performed part of the transactions (40%) generate immediate cash while part of the transactions (60%) tend to become receivables 60% of which are paid within 30days, 20% within 60 days and 15% within 90+ days.



Five percent of the transactions become bad debt. Figure 11 represents a three period cash flow that comes from these transactions.

**Figure 10: sales to cash**

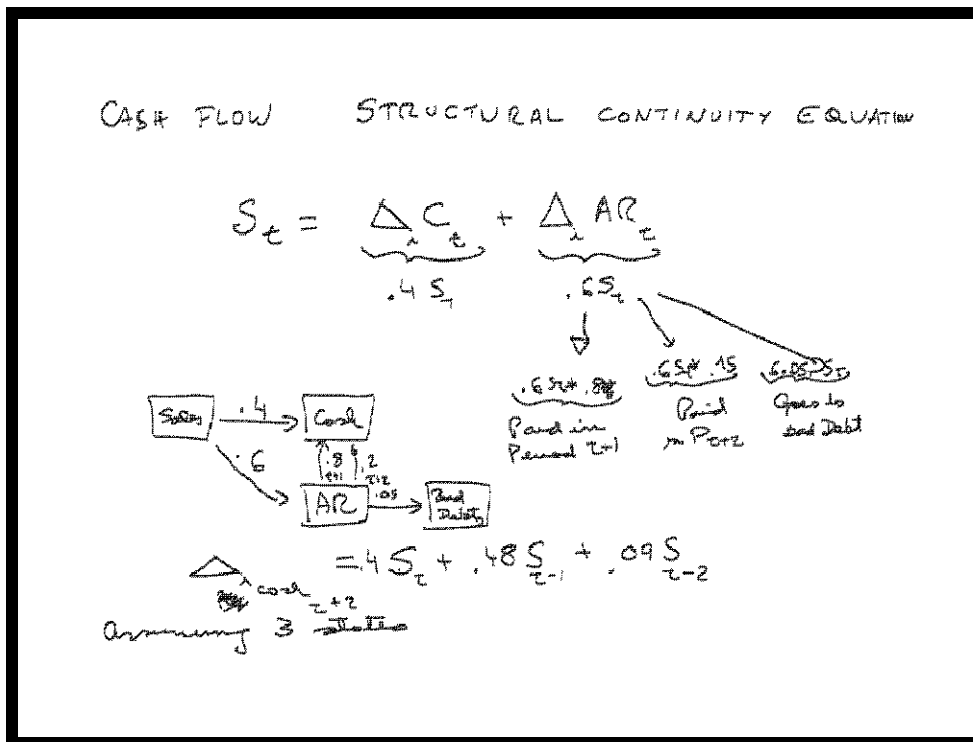


Figure 11: Cash flow modeling

While these transactions can get complex, the effects are very measurable and their study can help create models that are structurally-based. If sales are assumed constant a markov chain model can be used to model it and input levels will assume an ergodic state. However the structural linkages are more complex and the structural modeling can be extended to ensuing boxes.

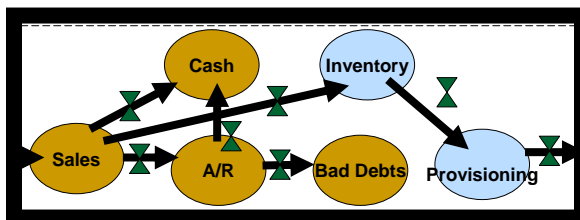


Figure 12: sales to cash inventory and bad debts

This representation can be modeled by now including the role of inventory payments in the depletion of cash and can be an input to the provisioning equations which drive inventory management and other functions. While this modeling focused on inflows of cash in a multi-period setting, assuming 3 period intervals, many different assumptions can be made. Figure 13 displays a more realistic set of flows for cash, a core variable that is worth modeling.

The model is expanded, still in structural nature by including the role of inventories and the role of provisioning into the process.

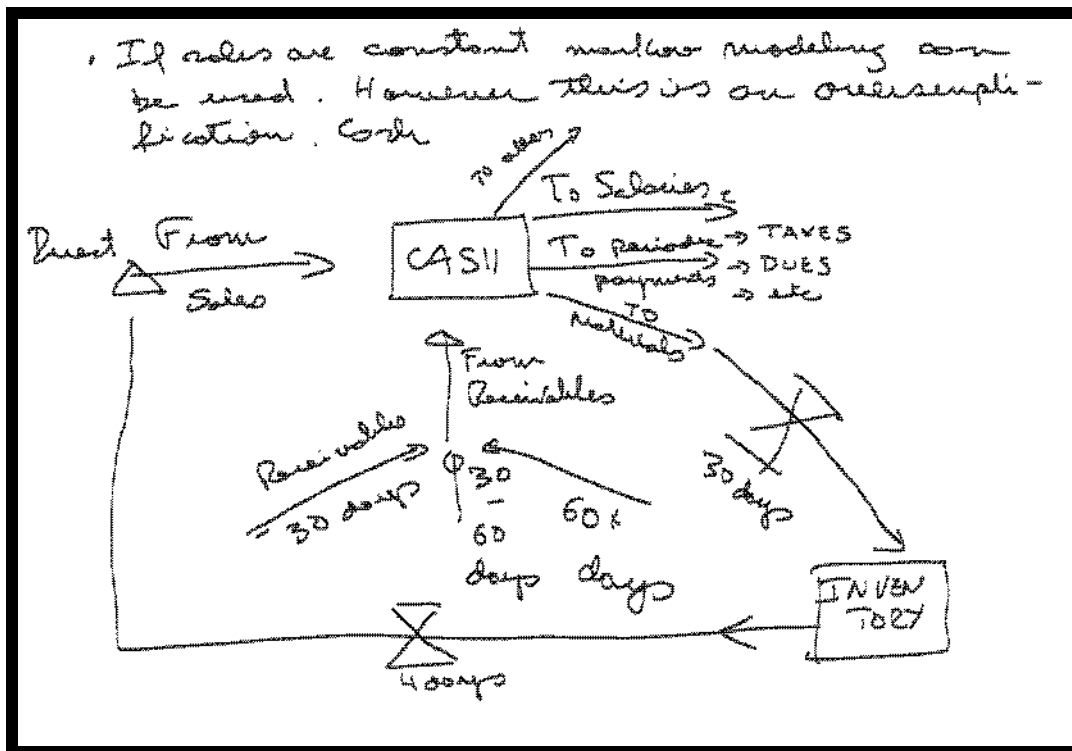


Figure 13: more complete cash structural model

However the structural level 1 includes processes that are not financial and not necessarily structurally linked such as inventory and provisioning (where physical factors such as obsolescence, shrinkage, and delays may have an effect), or even farther but still related processes such as marketing and CRM. For these, some stochastic continuity equations are to be built based on experience parameters. For example experience may say that for every dollar of advertising in the south region you generate 7 dollars of sales and in the northeast only 5.

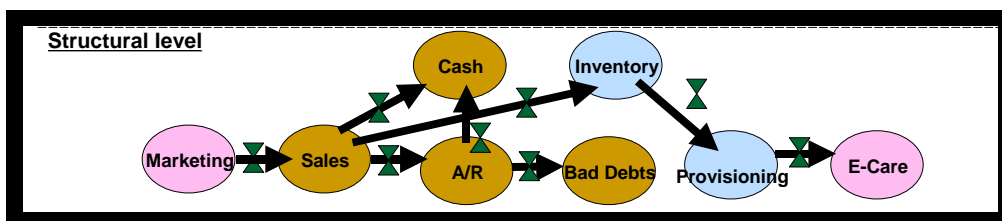


Figure 14: Level 1 - structural

The next level is the data level, where measurement of financial and non-financial indicators takes place, and individual pieces of data are reported with the ability to drill down to look at historical performance and compare data across business lines, products, managers, etc. Most companies do this internally today through some form of spreadsheet analysis, but given the capabilities made possible through new systems and

decreased latency between processes, which we discussed before, it is now possible through constant measurement to move to the relationship level.

### *The spreadsheet analogy*

A SPREADSHEET program is a good metaphor for describing the IT architecture (*and the measurement of business*) of a real-time enterprise. But such programs also demonstrate the extent to which companies and their employees are often still stuck in batch mode. The data they use in spreadsheets are often out of date and must be put in by hand. ....

In contrast, modern spreadsheet software is as real-time as it gets. To a layman these programs look like tables with many rows and columns of “cells”. (*the data level in the Galileo model*) But their most important feature—how these cells are related to each other—is invisible. (*the relationship and analytic monitoring levels in Galileo, and now necessary to present a non-obfuscatable view of business*) Often they are connected by simple operations such as addition or multiplication. Investment banks in particular, however, use more sophisticated spreadsheets in which the cells are linked by dozens of “macros”, sometimes quite elaborate sub-programs. If a user changes the data in one cell, many others are automatically recalculated.

To advocates of the concept, the real-time enterprise is a giant spreadsheet of sorts, in which new information, such as an order, is automatically processed and percolates through a firm's computer systems and those of its suppliers. Thus a simple inquiry such as, “When is my order being shipped?” can be answered immediately. Many consumers have already encountered real-time business without realizing it, for instance when they order a Dell computer. The firm's website allows customers to check the status of their order at any time.

Juice Software, based in New York, has developed a set of programs that allow users to turn their spreadsheet into living documents. With a few mouseclicks they can link a spreadsheet cell to a data source, for instance a corporate database. (*such a interconnection and tracing capability is very important in the reporting and assurance of the modern enterprise*) Smart software on a server in the network ensures that this cell is automatically updated whenever the information changes. Users can also connect their spreadsheets among themselves, so if one member of a project team changes a cell, the changes automatically appear in all the team members' files. (extracted from the Economist<sup>21</sup>, annotations in **bolded italics** added)

<sup>21</sup> Economist, The real time economy, January 31, 2002.

The data level in the modern enterprise as described in Figure 15 entails many measurements out of the processes as described above and as listed in the list of POCs for non-financial variables. Furthermore with the advent of databases, OLAP tools and style sheets, the “spreadsheet of measurement” of the modern enterprise incorporates the capability of drill-down (in finer details of the data structure, at the extreme into certain characteristics of a transaction such as amount or geography), accumulation of history not only of reported variables but also of desired aggregates (at the extreme say sales for a certain store) and distributional characteristics (ability to cut access parameters as geography, product or division).

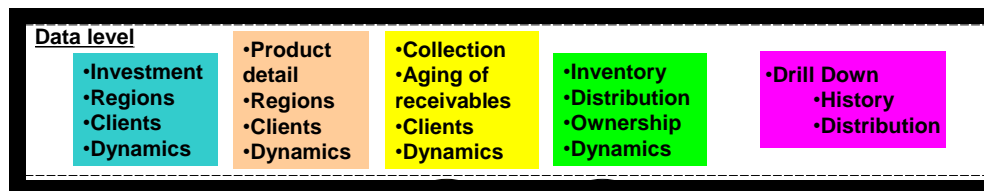


Figure 15: Level 2 data

In the relationship level between key variables (for instance), this allows the modern manager in a real-time society to make decisions based on current relationship models in addition to historic information. This, under the Galileo model allows a deeper level of disclosure that explains how the measurements of the data level are related to each other. The analogy is the formulae in a spreadsheet that exist in the background of the report. These relationships can be structural or stochastic as described above. In Figure 16 the relationships involve sales and marketing, care queries and number of sales, and potential delay relationships.

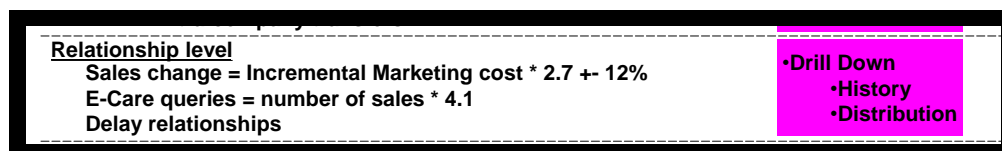
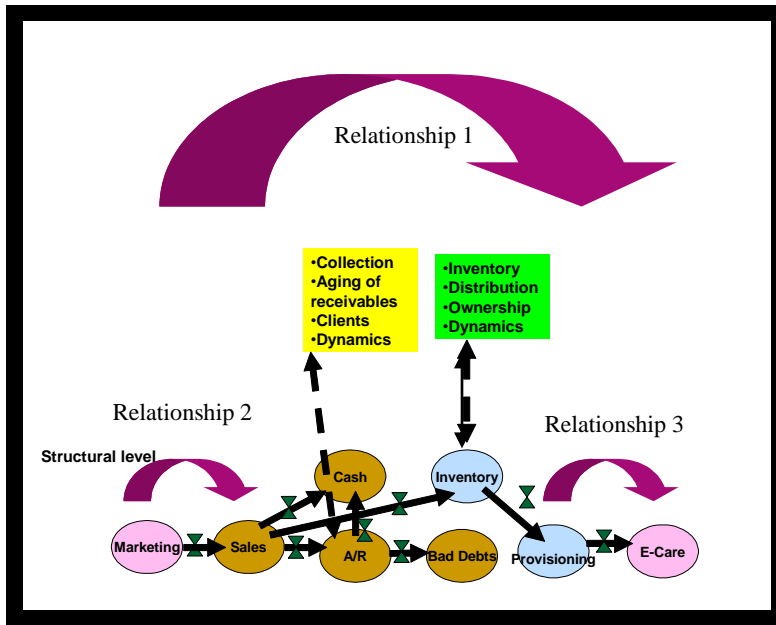


Figure 16: Level 3 – relationship

To further explain this disclosure level a balance sheet could be transformed in a Galileo reports (a la sustainability report) and presented in sheet 1 of a spreadsheet while a model relating some of the variables would be in the second sheet and the user could calculate the variances in the third sheet.

The disclosure of these relationships, in addition to being valuable in increasing reporting transparency and deterring reporting obfuscation would have valuable feed-forward effect motivating better modeling of business and improved self insight of causes and

consequences of business numbers. Figure 17 and Figure 18 introduce different representations of the relationship level.



**Figure 17: processes, measures and relationships**

In Figure 17 relationship 1 relates marketing to e-care. This is an obvious relationship which parameters must be examined and estimated with care. In this relationship increased marketing leads to increased sales which ultimately increases the demand for e-care contingent on the effectiveness of advertising and sales efforts, the quality of the products, and the accessibility of the care. The care effort also leads to secondary sales. Relationships 2 & 3 are narrower and more direct.



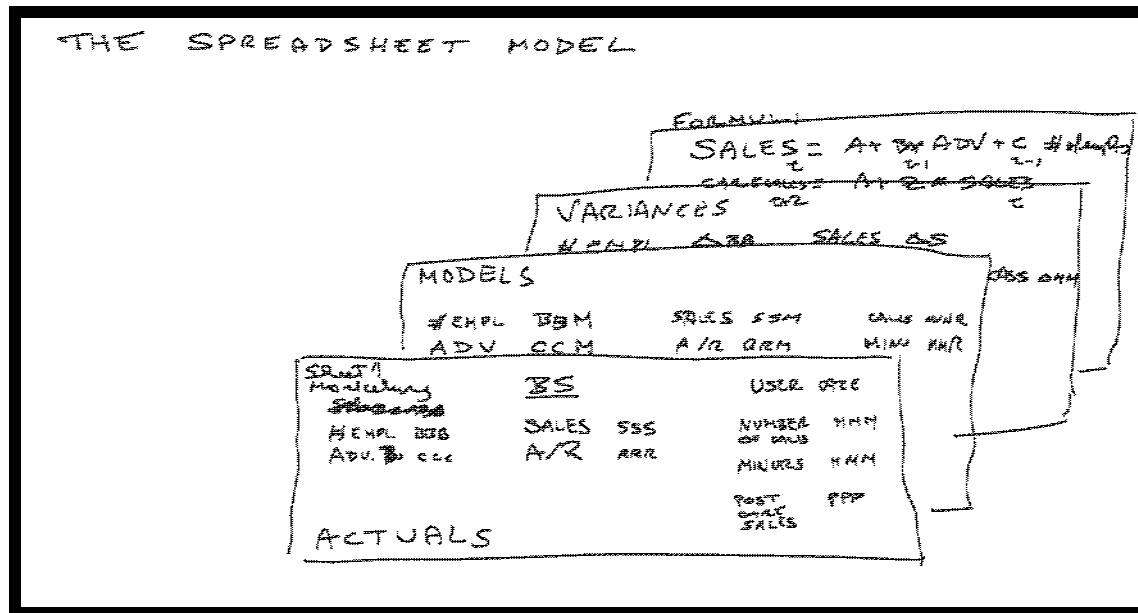


Figure 18: the spreadsheet disclosure model

While eventually most corporate systems will have extensive levels of detail and statistics enough to sustain substantial relationship-based monitoring, the Galileo model also has a higher level of relationship monitoring. This level is called analytic monitoring level and relies heavily on industry and company specific key performance indicators (**KPIs**). Level 4 (Figure 19) is both aimed at third party monitoring of corporate performance as well as internal monitoring in particular where information is not sufficient.

Companies monitoring their processes step by step may miss significant macro trends in their performance (missing the forest for the trees) and will benefit also for having the KPI monitoring level where better understanding of business is obtained. Strategic planning level managers will tend to focus on level 4, while management and operational control managers in Anthony's notation ( see Figure 19) will focus in level 3.

In analytic monitoring, significant deviations from the norm for key performance indicators can be identified. This may indicate that a process is out of sync (such as...) even if detailed support may not exist. The next step would entail detailed analysis to capture the reason of misbalance. And of course you still have drill down capabilities at these levels, which can be extremely powerful.



**Figure 19: Level 4 - monitoring level**

Finally, continuous reporting and assurance (Figure 20) ensure the reliability of your systems and data, through transaction assurance, estimate assurance (on mgmt projections), compliance assurance (comp. w/GAAP), and so on, which enables you to report important business information externally as well as internally with confidence...and so, what you have in the end, is a much more robust, automated reporting process that tells you much more about the effectiveness of management, specific divisions, etc..., providing accurate and useful data on a real or near real-time basis.

Furthermore, XML tagging will enable interoperability, making it possible for connections across internal and external partnering entities.



**Figure 20: Level 5 continuous reporting and assurance**

Figure 21 displays three types of XML tagged transactions flowing into the organization, which can be metered by some form of continuous reporting that would display cumulative levels of flows in a chosen time period. For example, all labor purchases (even if not yet paid) for the first 44 days of the year. This data being delivered to the system carries some form of data level assurance (for example a measure of the reliability of its generating systems, or an encrypted tag with an auditor's assurance) or relying on other forms of assurance of system integrity (e.g. systrust). This data is delivered to the corporation's ERPS under some form of XBRL/GL schema of reasonably fine chart of accounts. The accumulated data can, at any time, be queried for some form of level reporting (e.g. balance sheet) on a continuous or variable time basis. The ERPS support a large multitude of internal report, semi-internal reports and external reporting schema. Corporate processes under continuous assurance support: 1) transaction assurance (as described earlier), 2) estimate assurance, 3) rule assurance and 4) key judgment on process control assurance.

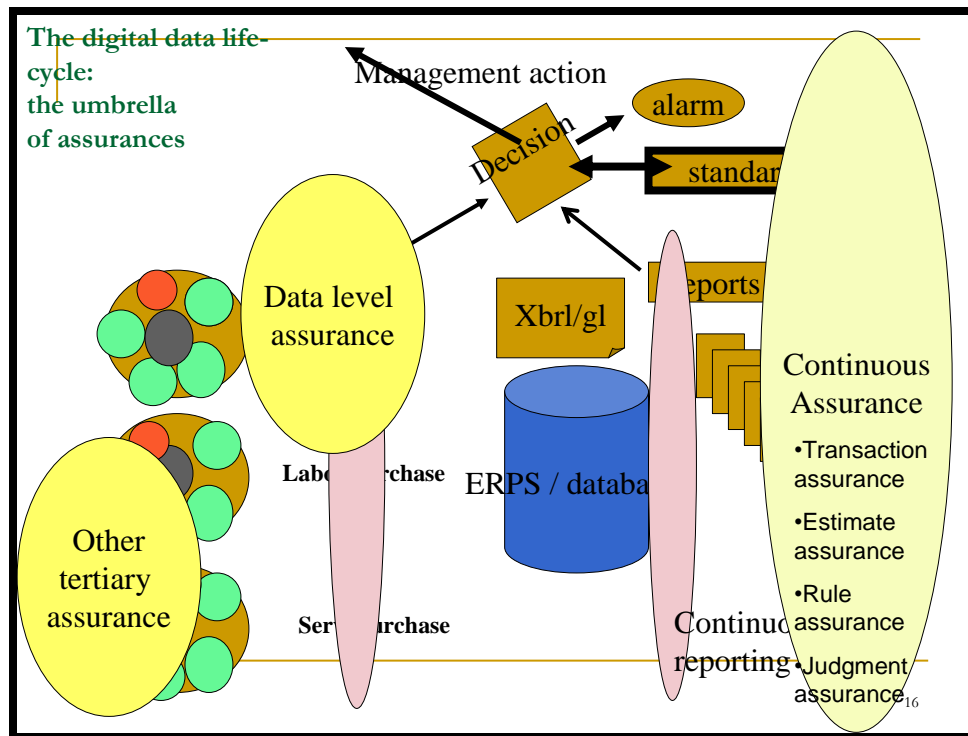


Figure 21: Continuous reporting and assurance

In order to create a process that reports on a wide set of financial and non financial variables, key POCs need to be defined. For example these could be:  
(talk about pocs of accounting variables)

### 3. The Proposed Solution

The “Galileo” model is being developed in order to accomplish some of the above objectives and address the types of problems hereby raised.. This model does not aim to be an incremental solution but aims to show the potential of applying the computer and reporting technologies of modern age to the problems of corporate measurement. This “extreme accounting” model is not expected to be implemented as proposed but to be used as the extreme benchmark while also offering the types of social compromises that are necessary to enhance the business reporting model.

#### 3.1 Objectives and Constraints

The first part of this document described a set of problems that has plagued the business measurement world since its inception and the new technologies and conceptual understandings that can serve as the basis for a new business measurement process.

Our key objective is to create a business measurement and communication methodology that is:

**1. Effective measurement of business:** In general, the current accounting model does not measure adequately a business environment where most assets are intangible<sup>22</sup> neither does it recognize as investments the longer term financial commitments to these items. Measures that are more relevant to the different aspects of business, representing its static value as well as its dynamic characteristics must be developed where their values are not point estimates, where they represent a wide range of corporate assets, where they explain the variances of the value of the measurements, and where they serve a wider range of decisions. Furthermore the over-emphasis on deterministic rules of measures must give way to probabilistic estimates with clear time series disclosure of methods, bases, and values.

**2. Highly resilient to manipulation:** financial statement users focus heavily on the earnings figure which is easily manipulated with slight (and acceptable under GAAP) accounting measure changes<sup>23</sup>. Remarkable strings of nearly constant returns like GE and Merk in a cyclical economy lack credibility in their accuracy. An extensive literature of earnings management and multiple articles in the popular press support this view. A set of business measures must be developed with myopic interpretability, low variance and high disclosure and accountability in estimates, and highly representative in content.

**3. Appropriate to the different stakeholders:** the securities act of 1933/34 originated much of the basis for current business measurement and attestation. While the motivation here was to support the investor, it lacked the understanding or motivation to support other constituencies that use business reports, which arguably are just as important or even more important than investors. Business employees, localities, long term suppliers, large long-term customers, insurance companies and banks are users of financial statements and a plethora of other special reports, some statutory other operational, however, none obtain reports that are appropriate to their needs. The economics of reporting have changed to the point that re-use of ERP-based information is close to a free good and a substantive rethinking of disclosure needs must be performed. Important constituencies include:

*Employees:* detailed disclosures on work force composition, employment plans, investment in skills, pension and medical provisioning. Much of this information already exists in corporate intranets to support individual needs but is not aggregated and presented in a comprehensive way to support employees' needs.

*Localities:* need to better understand the synergies, interactions, and dependencies of businesses including the local tax base, the effect of

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<sup>22</sup> Baruch Lev....

<sup>23</sup> Vasarhelyi discusses the “cookability index” that attempts to measure the propensity to manipulation of financial statement items. The current emphasis on “principle based accounting” conceptually increases this manipulability.

employment plans on this basis, infrastructure needs in terms of transportation, environmental impact, water, garbage, etc.

*Long term suppliers and long term clients:* need to better understand production and marketing plans of business partners in order to facilitate supply chain management.

*Regulators and Government Agencies:* in a global world, firms face multiple regulators (in particular, those in the US and in the European Union) who may have differing reporting standards. For example, until convergence is obtained, firms will have to be ready to prepare reports both in GAAP and IFRS. The post 9/11 world also sees firms caught up in the war on terror, with stringent requirements to avoid money laundering and the use of firm assets as weapons.

To achieve these core objectives a new business reporting system must have these operational characteristics:

1. **Be drawn directly from operational and cross-sectional information:** decrease the level of intermediate manipulation of data to allow users to draw the data and apply the models of their selection.
2. **Provides measures of all subunits, and links to related ones:** consolidation of data obscures relationships in sub-units that focus on different lines of business. Data, qualitative and quantitative, financial and non-financial must be provided discriminated at the sub-unit level. Links to related units and clarifying information (say inter-company transactions, joint ownership, agreements) must be provided. These measurements must be “Consolidatable” across any structure of entities.
3. **Measurements that reflect underlying stochasticity:** provision of data that clarifies the nature of its estimate with values such as best estimate, standard deviation of the estimate, reliability of its controls, dependency on other measures.
4. **Data supportable at the atomic level:** modern systems allow for the accumulation of transaction detail in corporate data stores and for the tagging of this information (e.g. XBRL) to make it self-explanatory. These corporate systems therefore allow for the drill down to the transaction level and some access, when needed, to this level of data must be facilitated in particular when this is public information or non-competitive threat information.

A new reporting system will never emerge however, if the many sources of resistance to change are not countered first. These include:

1. **Revealing competitive intelligence:** The most often mentioned reason for limiting disclosure is the provisioning of anti-competitive information or information that would facilitate competitors to enter markets, decrease their costs, appropriate customers. While there is some basis for this argument much of it is made very narrowly on the basis of the information the financial statements reveal, ignoring the fact that a great variety of information is disseminated in other ways, both through voluntary or mandated disclosures, for example through industry trade associations, environmental impact statements and the like. It may well be the case that the argument of competitive harm is overstated for this reason.
2. **Threat of litigation:** US companies are very reluctant to provide voluntary disclosure of additional (non-required) data for fear of litigation. On the other hand European companies are more willing to provide extra information including Web only -based information. While this type of concern may be warranted for future oriented information the disclosure of factual past information (supportable) does not pose substantial litigation danger. Lev quote xxxx This type of problem has been raised often and standard setters have resorted to issuing safe harbor protection for experimentation and maybe initial disclosure.
3. **The cost of disclosure:** Setup is expensive repeated disclosure is cheap. Rule E1 above states: “The evolution and ubiquity of ERPSs changes basically the costs relative for compliance and reporting. The basic cost of preparing a report that obeys a particular auditing / accounting standard becomes negligible as it is prepared by the ERP provider and pulled out as a standard product. Setup costs however, may vary among installations as the basic data for the new requirement may not be available.”
4. **Better information disclosure may force better internal management:** ERPs enclose best practices of many companies. Compliance with extended requirements that include some of these best practices may promote better management and improved comparability between companies.
5. **Increased accountability of management:** It is arguable that the main reason corporations resist increased disclosure is the fact that currently they are accountable for the bottom line and with increased disclosure there will be substantive accountability for many other variables. Personnel changes, inventory management, marketing mistakes, lack of intellectual property, would become more transparent and consequently management much more accountable. This reason is probably the stronger of the reasons for management disclosure resistance, more than litigation threat, cost of disclosure, or competitive threat.

### 3.1 Axioms of a New Reporting Paradigm

The business measurement and reporting domain presents a wide set of challenges that represent the heterogeneous nature of its objectives and sometimes the impossibility of performing its task. The ensuing proposed extreme solution is based on a series of axioms that are considered as basic. While for the purpose of this document they are axiomatic, they eventually must be the subject of substantial concern and wide forms of societal dialogue:

**Axiom 1: The extreme accounting model here presented is not the proposed solution but an input on ranges of potential solutions**

This “extreme accounting” model is not expected to be implemented as proposed but to serve as the extreme of the benchmark and create the types of social compromises that are necessary to enhance the business reporting model. The database drilldown model will be strange to users and the idea of multilayered reporting while the current reality is not commonly recognized. In addition to technical development substantial education and evolution must happen for their inevitable adoption. Web-based reporting, a product of the nineties, would not have been even conceivable in the 20<sup>th</sup> century but it is now part of the basic skills of the majority of information users and presents substantial improvement over the traditional paper based model. The corollary to this axiom is that any new reporting model must be dynamic, with deliberate built in obsolescence, so that it is continually updated as technology changes. By contrast, with no such mechanism associated with the existing reporting system, there has been great difficulty in changing it in response to technological advances.

**Axiom 2: When in doubt of valuation, disclose the facts**

This is the founding principle of the new reporting paradigm. It is based on the assumption that consumers of financial reports are not unsophisticated “widows and orphans” with limited ability to process financial information. Rather, users are financial intermediaries, such as analysts, fund managers and institutional investors whose main problem is a lack of information, not information overload. Moreover, these are parties who frequently have their own perspectives on how managerial performance should be evaluated and firms valued. Today these parties often have to disaggregate financial reports in an effort to obtain the more detailed information, they want in the first place. A new reporting system must start with this reality and ensure that while the needs of those consumers who only want the summary now provided by the mandated financial statements continue to be met, the needs of the more sophisticated users are also catered to by providing more disaggregate information not processed by the firm or screened through a GAAP filter. Another advantage of this increased reliance on rawer data is that it avoids delays in the release of information until a consensus can be reached on the “best” way to process the information, which almost inevitably results in a common denominator approach that reduces the usefulness of the disclosures.

Valuation is a very subjective process. The literature makes distinctions such as exit value valuation, current cost, market value, replacement cost new, and now fair value. While these are different measures they typically relate to particular decisions or business status or the entity. If a corporation has a going concern qualification its valuation, say at fair value, has to be reconsidered towards some form of exit value. While much of the traditional balance sheet have focused on valuation of items and currently uses some form of modified historical method, with inflation or just the passing of time, its accuracy has decreased. Furthermore with the evolution towards an information society, the most valuable assets tend not to be valued on the reports. In order to present a more relevant economic measurement, society will have to evolve to a more complex and stochastic approach.

Analogous to what happened to GAAP, the new set of standards will have to be progressively adopted and refined. Many of these measurements will be inexact and potentially very difficult to value or more likely presenting different values for different usages. Consequently, where valuation is difficult we will suggest disclosure at a level of granularity which will allow users to make their own assessment of value or apply the valuation model they prefer. Most users will typically state that they rather get the basic data not a data that is pre-computed and manipulated /obscured by management. In other instances where valuation is very specific to a particular type of situation we suggest valuation and disclosure.

In Figure 22 we illustrate the downstream use of disclosed facts that can be used for corporate valuation as well as just comparative disclosure. Models, typically in a spreadsheet, will constantly be pointed at the source of data. This source can be one or more companies financial statements, third party data say like auditing benchmarks and



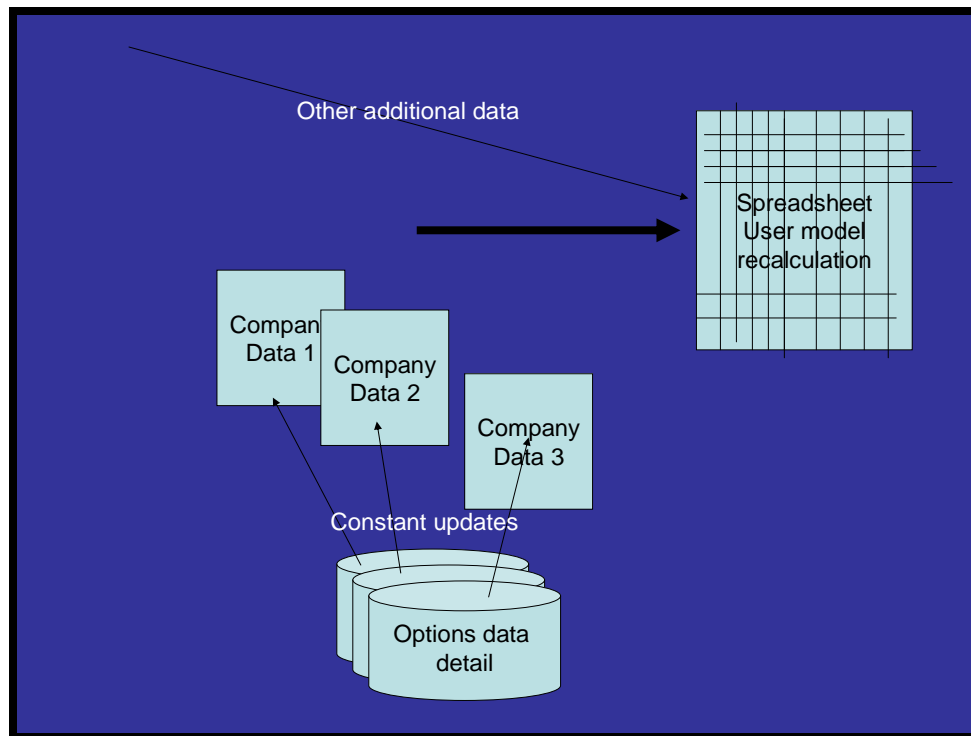


Figure 22: Storing detail data and updating models

### Axiom 3: Support estimates

This axiom is a natural corollary to the one above. Making estimates for too long has been considered to be an art form and not a science, and therefore not subject to examination. But in a competent reporting system, estimates which, after all, are what distinguishes net income from cash flows, cannot be used unless their basis can be detailed and justified. Some systematic process must be used to form estimates and that process needs to be known to all users. All estimates must hyperlink to both the basis of the estimate as well as the method of the estimate, including a comparative table of how the particular estimate was performed in the past. The data necessary for the recalculation of the estimate must be made available to the user. The model for the estimate must be clearly specified.

### Axiom 4: Raw, not processed data, panoramic view of details

This axiom too is an obvious corollary of the earlier ones, and indeed, illustrates the basic difference between the new and old reporting systems. It is predicated on the assumption that users should have the opportunity to process data as they see fit, rather than having to accept a one size fits all method chosen by the firm or by accounting standards.

In principle the reporting model should present raw supportable data (e.g. inventory layers not FIFO or LIFO). One of the main difficulties of options accounting has been the limitations of option models as predictive of the cost of options. However, options are discrete numbers with no substantial competitive intelligence implications consequently they can be placed on a public relational database as a disclosure and some model used for valuation in financial statements that is constantly updated. Furthermore if sufficient granularity is provided to the data, users may recalculate it at their volition. This illustrates the mixing of analytic and computer technology to improve the reporting model in ways that were not even conceivable a decade ago.

### **Axiom 5: Standardization of form and substance of transactions**

The progressive adoption of XML extensions in the data distribution world creates the need for a defined set of “accepted” standard contractual financial instruments that can be represented in standard form. The use of tagging to facilitate information transmission and processing is so basic in a new reporting system, that new types of reports and financial structures will have to be subordinated to that need.

While the United States and most other countries have allowed free evolution on the nature of financial instruments, the schemata of corporate compensation and the contractual terms of formation of organization it is quite clear that financial engineering, creative compensation schema, and legal contractual flexibility create substantial variation on the meaning of any measurement and makes standards nearly impossible to apply.

We anticipate taxonomies of financial instruments each with a “standard” set of contractual terms and careful tagging of each financial instrument data representation that presents all the facets of the instrument which could be obtained in a standard library and the parameters from the tag and data “filled in.” A new and creative instrument would have to undergo a review and be approved and have the nature of the tags / parameters standardized. Once this happens it would be added to the library of allowable instruments and when represented this would be using this definition. The aim is not to prevent firms from developing new and innovative financial structures or information, but to require that a tagging taxonomy for them be developed and standardized before the product is deployed. In turn, the XML community would have to develop the infrastructure to approve such taxonomies in close to real time and to protect the intellectual capital of firms in the meantime.

Analogous processes would have to be developed for forms of business organizations and their ownership as well as structures of corporate compensation. While this would create limitations on the creativity of instruments and other entities this would only be, in most cases, a temporary effect until it is

defined and accepted by the regulatory and measurement standards community. Furthermore just as in XBRL taxonomies organizations could have their exception taxonomies that may or may not have to undergo regulatory approval.

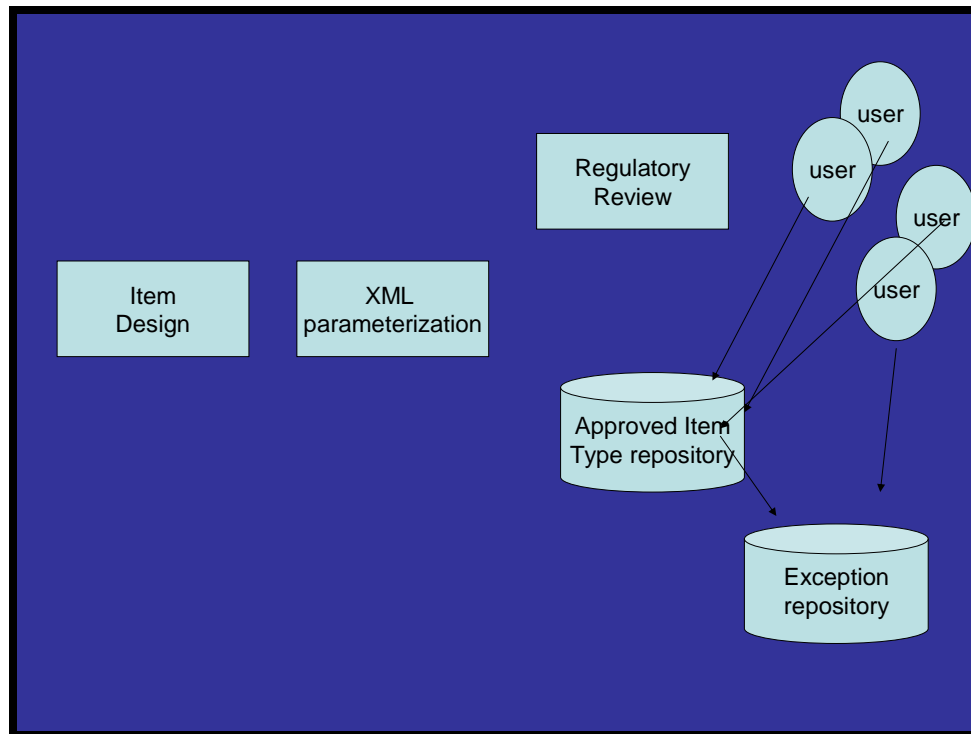


Figure 23: Standardized instruments, organizations and compensation

### Axiom 6: Multiple-model disclosure

As discussed above, sophisticated users typically ask for data to be delivered at a granularity level that they can perform their analysis. For that purpose raw data that is sufficiently granular and with the data elements necessary for model building must be disclosed. Data intermediaries and credit entities have over the years evolved their own types of bottom line calculations that are different than the ones provided by companies. For example, S&P uses an additional calculation to take out the effect of stock options granted prior to the calculation of earnings per share. Furthermore, the large financial entities create their own models and either use them for internal purposes or to support / sell to clients. While it is clear that the more complex financial intermediation markets will evolve such data integration, sector-based benchmarking and sets of add-on analytics it is not clear that these will be democratizing or highly supportive of the large entities. Consequently, to fully capitalize on the data interoperability revolution, the larger population has to be provided comparable data as well as some pre-computed (and

disclosed data supported) estimate models. Here, it is being assumed that alternate disclosure models and their supporting data will be required. For example, eventually the stock option disclosure requirement will mandate a database of employee categories and the timing and value of their options. Furthermore the calculation of say the binary and Fisher Black models would be supported and disclosed, and a granularly separate disclosure of the effect of one of these values, upon the financial statements.

### **Axiom 7: Digital standards – not principle-based**

The malfeasance crisis has prompted a rush towards the concept of “principle-based” reporting as a panacea for financial engineering-based malfeasance. Axiomatic of the proposed model is the fact that structuring and limiting forms of financial instruments is necessary as well as an additional set of complications. The FASB, SEC, NASDAQ, NYSE, FCC, FTC, and many other regulatory entities sets complex rules each with a different set of objectives. While the FASB and SEC focus on protecting the investor, NYSE and NASDAQ for example emphasize good functioning and liquidity of markets while other regulators emphasize different objectives. While much thought has been given to the reduction and rationalization of standards, it is inevitable that the economy will become more complex and regulation even more complex. Although research on the subject does not yet exist, here it is assumed that standard setting organizations will have to formulate their standards in some very formal manner and in a way that they can be parsed for coordination and conflicts among standards for diverse entities. We expect the eventual development of a formal representation language that will allow analytical parsing and comparison and integration of standards. Eventually laws, legal interpretations, regulations and accounting standards will be formulated and specified in this vernacular, and automatically integrated into system software such as SAP and Oracle Applications. Standard implementation monitoring of quality and of taxonomy exceptions will automatically emerge from these systems and provide statute homogenization and improvement feedback. However, it needs to be always kept in mind that principles based standards are preferred now for behavioral reasons, because it is hoped that they are less susceptible to manipulation than rules based standards. That has yet to be proven, and moreover, there is a tendency for principles to transform themselves into rules over time, as users request guidance on how principles are to be applied to specific situations. That suggests that it may be better to adopt explicit digital standards, with the content and context rather than form of standards being relied on to ensure accuracy.

### **Axiom 8: Data level assurance (due to the balkanization of data)**

It is also axiomatic that each data element measurement has to be associated to some form of quality / reliability assessment. Many standards and bases for measurement are being progressively stated as some form of estimate and this estimate has to have some form of data distribution and reliability measurement. It is hereby assumed that each data, each account, each process, and each element of a report will have some form of

assurance measurement associated with it. This associated measurement will either focus on the distribution of the data, on the quality of its underlying supportive processes, or on the stochastic assessment of the reliability of a particular report.

While there is substantial investment in the traditional audit model and the assurance of financial statements, a substantively different set of assurance models must emerge. For the purposes of this paper some form of data level assurance (DLA) is being assumed as effective for reporting.

### **Axiom 9: Information provisioning is a continuum from internal to external information**

Traditional reporting technology has created a very narrow scope of corporate reporting due to the high incremental cost of any disclosure and the tremendous pressure that the fear of litigation poses. A new order of progressive disclosure from detailed internal operational data to very high level aggregate naïve investor oriented data will be emerge. In this order the new realities of information economics, multiple partners of business, a new set of stakeholders to whom to report, and eventually some relief from the rigidities of the current model will take root.

**Information economics:** with ERPS the incremental cost of creating a report automatically is neglectible once this report is established. The cost of information storage and retrieval is small. The access to the information is ubiquitous. The information user, with modern technology tools, can competently extract his/her needs.

**Multiple partners of business** from elements in the supply value chain, customers also in the supply value chain, users of the provided information (intermediators), outsourcers and outsourcees, employees, bankers, insurance companies, activist groups on sustainability, etc will have to be provisioned with the allowable and appropriate information set.

**New set of stakeholders** to whom to report are arising from the change of the business model from an industrial to an information society. In this society physical assets are less important than intangibles and new methods of measurement must be developed even if less objective (but maybe more accurate) than historical values.

**Some relief from the rigidities of the current model.** The disclosure model attempts to create an even playfield for the individual naïve investor. It mis-understands, in the information society, the complexities of value chain information needs (supply and information transformation), partners, outsourcers and outsourcees.

## 3.2 Required Technology Infrastructure

### 3.2.1 Medium/Technology

Reported information should be delivered in an electronic format. Current reporting schema leads to financial statements that are either displayed on paper or in electronic format. Currently, all publicly traded companies are required to file a digital copy for their financial statement with the SEC. However, these types of filings are done using documents that are formatted in either plain text or HTML, both of which do not facilitate automated parsing by computers. Consequently, this technology inherently supports the current one size fits all financial statement. We propose a flexible alternative to the current reporting technology that will facilitate the distribution of disaggregate information, on a need to know basis, in variable format, and in short time intervals so that each one of the company's stakeholders will get their choice of presentation. This technology has two main components, the back end and the front end part of the technology. The back end contains the corporate database (Online Transaction Processing System) and the data warehouse (Online Analytical Processing) of the company. It is unlikely that most users will get access to the organization's OLTP. Given the current trend of creating one central data repository for the entire organization, access to the OLTP can introduce a substantial overhead. Therefore, it is likely that most users will interact with specialized dedicated computers that will use OLAP type of techniques to extract and aggregate data.

Users of the information will be able to retrieve information in multiple formats. Conceptually, we see two potential approaches, namely, XBRL type of reports and user driven reports. Using the framework of XBRL it is possible to facilitate numerous types of reports that can efficiently be parsed by computers. Alternatively, custom reports could be generated by users by gaining access to the specialized reporting data warehouse. Users should be able to extract as detailed data as they wish and display this data in a OLAP cube. Several types of reports that could be created by users in real time are illustrated later in this document.

#### *3.2.1.1 Impounding Technology into the reporting Process*

Error! Reference source not found. **present a technologically enabled reporting model that expands the current disclosure model. The utilization of technology expands the improves the representational capabilities of business reporting. Such a report should have the following characteristics:**

- Not on paper – a flat static model on paper cannot adequately represent the characteristics of an ongoing business. The model must be dynamic in presentation, able to show variable hierarchies, and able to be re-organized across the user needs.

- The usage of a Web display, with active Web pages, allows for the ongoing presentation of data in a database, and its current value
- Direct connection to a database containing corporate information allows for the continuous update of transaction data and organizational accounts
- Based on the integrated view of the corporation, drawing on integrated corporate systems (ERPSs), legacy systems and Web facing systems. On top of these a monitoring and control layer (Figure 24) aimed at comparing corporate measures and corporate performance models.

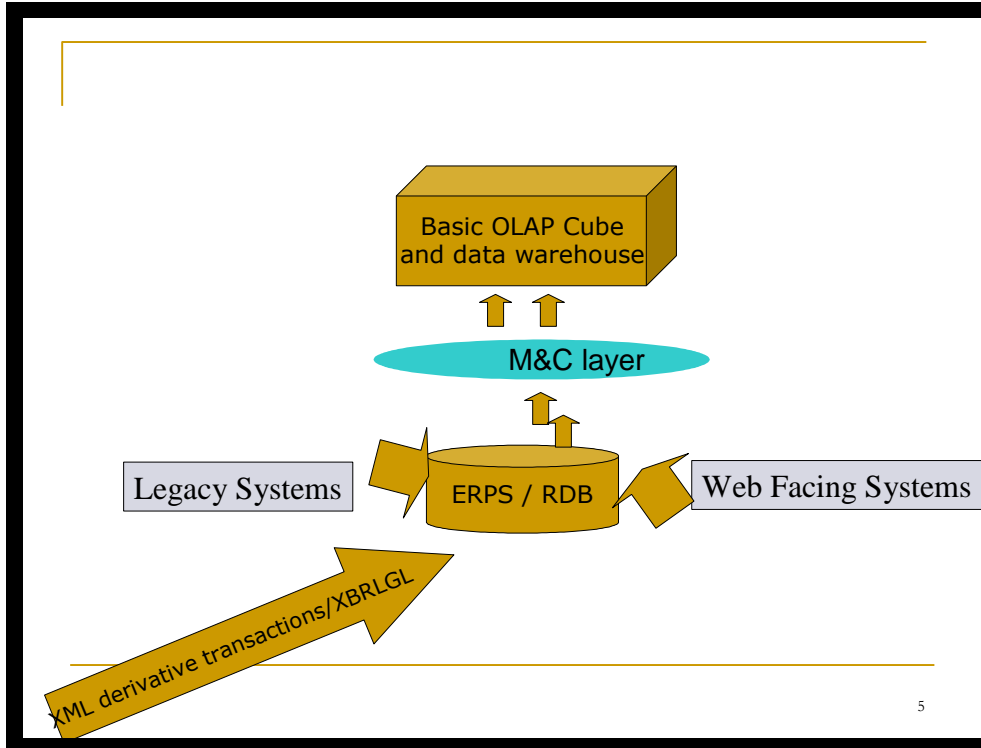


Figure 24: The monitoring and control layer

- An OLAP<sup>24</sup> (Online Analytical Processing) cube display allows for the aggregation of large quantities of data and display along with the many pre-processed data
- The different users of business measurement can benefit from a wide set of information support, **rich in visuals such as graphs** and other forms of corporate representation including Web enriched video and audio explanation of key issues
- Given that the business reporting model will be usable by a wide variety of stakeholders, for that purpose **style sheets** a la XBRL will allow for pre-prepared reports for a variety of stakeholders.

<sup>24</sup> OLAP reference xxxxx

- External reports are to be **XBRL – XML – enabled** for intra-company and inter-company interoperability as well as easy flow down the data value chain.
  - XBRL/GL enabled general ledger accounts
  - Enriched footnote with tagged content
  - Taxonomies of key types of footnotes
- Transactions are fed **tagged in a XML** derivative language to corporate systems. In this process flow data is continuously collected and accumulated into real-time online reports and some flow level at discrete periods
- **Blogs** of the audit describing key issues and observed anomalies should be maintained by management as the auditing black box<sup>25</sup>
- **Blogs** of comments of management relative to current noteworthy events as well as perceived events, risks, as well as emerging contingencies.

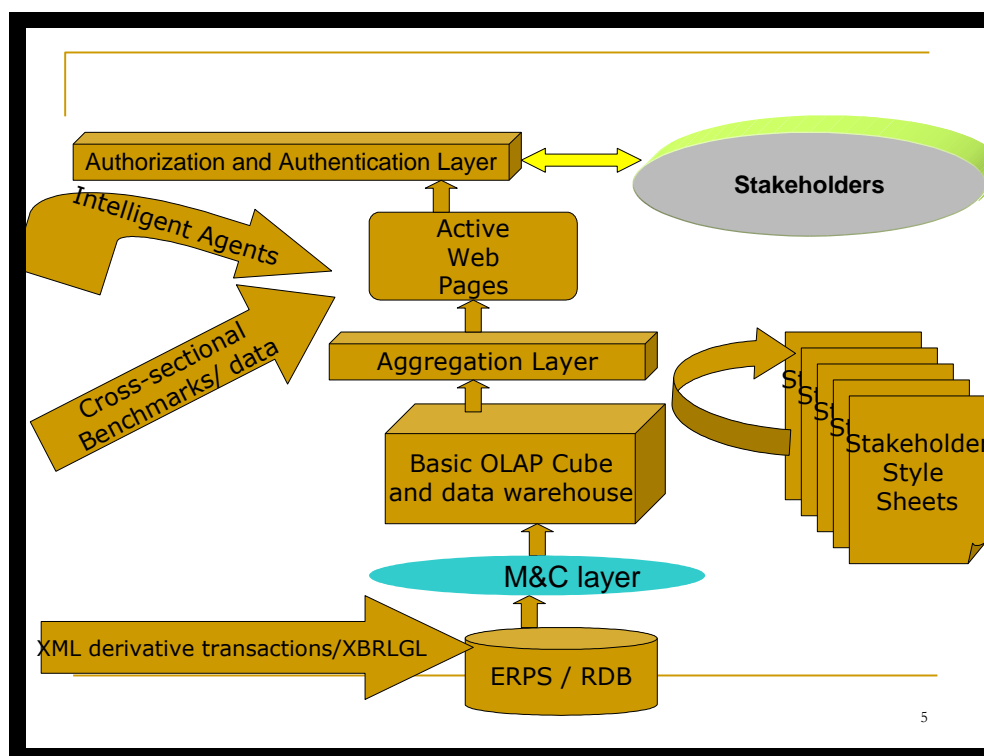


Figure 25: Basic Stakeholder Driven Disclosure Technology

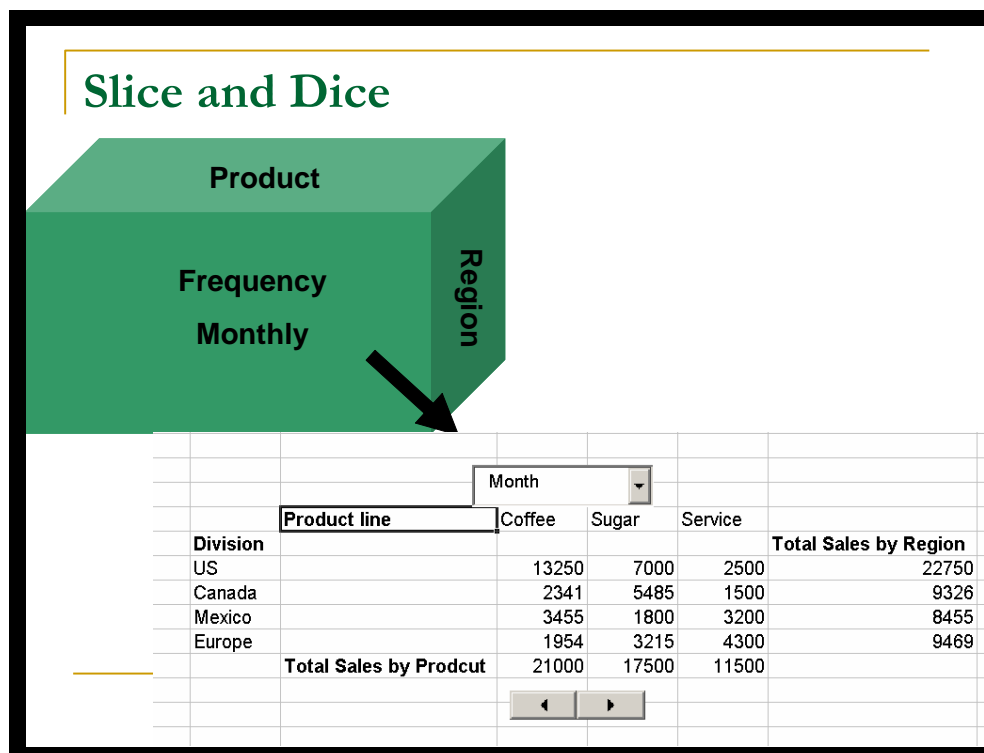
### 3.2.2 Slice and Dice

The OLAP layer allows for the extraction from corporate systems of an aggregate multidimensional view whereby, for example, sales figures can be drilled down into sales by department, sales by product, sales by program or sales by job function. Figure 26 shows a three dimensional display of sales by month, product and region. The “virtual cube” could be composed of many dimensions (more than the three in Figure 26) by

<sup>25</sup> Black box reference xxxx.



improved visualization or by the display of multiple tables, for example with a three dimensional cube for each division for the four divisions of a company.



**Figure 26: OLAP breakdown of data**

The traditional report, even with segment reporting, is notoriously unrevealing and probably deliberately so. The key issue is the degree of data atomicity and ability of the user cross-tabulate among variables and to drill down to details. The reporting database (most likely not the company’s ERPS nor its monitoring and control layer) is imagined in Figure 26 to be driven by an OLAP engine (e.g. Brio) which is designed to allow revealing relationships among variables. In order to support this level of relationship a e increase in data detail is necessary. For example Table 2 illustrates the level of detail needed for this disclosure

Sales	Sales Div A	Product 1	North	January
				February
			South	January
				February
			East	January
				February
			West	January
				February
		Product 2	North	January
				February
			South	January
				February
			East	January
				February
			West	January
				February
	Sales Div B			

**Table 2: OLAP reporting and data detail (finesness of information)**

### 3.2.3 The power of the drill-down

While the basic concepts relative to drill-downs are trivial, their actual capabilities can substantially improve the corporate measurement and disclosure. Drill-downs allow the user to disaggregate information provided as an aggregate. For example yearly sales could be drilled down / parsed to sales by month, by division, by product and all the way down to a specific transaction, and this transaction scrutinized in relation to its contractual terms, timing, levels of approval, and controls.

Such a drill-down parsing is the contextualization of the measurement function. Traditional reporting is organization driven with all disclosure choice done by the discloser. A form of **top down** reporting where the user has no choice and the discloser engages on a manipulation game towards a desired story, within the context of a set of flexible as well as ill defined rules. The drill-down capabilities change dramatically the business measurement method by having the discloser provide a large set of basic data aggregated along key choices that the discloser makes. On the other had, the user has the option, within the limits of the information made available, and the toolset (e.g. OLAP, style sheets, spreadsheet downloads, aggregation functions, hyperlinks) to choose a set of views of the business entity not necessarily anticipated by the measured entity. Conversely, the **user driven** disclosure presents a very different set of premises where the disclosure turns to be context driven, in particular directed to the users' needs and his/her competencies.

The scenarios below in Table 3 illustrate this point.

<b>Objective</b>	<b>Contexts</b>
Performance evaluation	<ul style="list-style-type: none"> <li>• See high level reports of the company</li> <li>• Find the same type of comparable reports</li> <li>• Compute key performance indicators that give early warning and are of easy comparability</li> </ul>
Cash flow availability	<ul style="list-style-type: none"> <li>• See summary cash flow</li> <li>• Identify transactions that should be excluded from cash flow such as pledging of receivables, acceleration of collections, delay in supplier payments</li> <li>• Exclude these out of cash flow</li> <li>• Break cash flow generation by sub-units</li> <li>• Exclude /separate cash flows from financial subsidiaries</li> <li>• Extract cash flows from loans and other forms of indirect financing</li> </ul>
Malfeasance issues <ul style="list-style-type: none"> <li>• Round trip transactions</li> <li>• Front-ending on contracts</li> <li>• Inappropriate capitalization</li> </ul>	<ul style="list-style-type: none"> <li>• Drilling down, by auditors, into transactions using analytical filtering- e.g. large transactions, end of quarter transactions, transactions with certain partners</li> <li>• Identifying the nature of transactions through their documentation</li> <li>• Tying transactions to their documentation</li> </ul>
Malfeasance issues II <ul style="list-style-type: none"> <li>• Burying results into mergers</li> <li>• Reasons for a big bang</li> <li>• Evaluating performance of subsidiaries and related entities</li> </ul>	<ul style="list-style-type: none"> <li>• Separating sub-entity results</li> <li>• Clearly identifying inter sub-entity activity</li> <li>• Drilling down to details and support of reserves</li> <li>• Cut business reports by segments</li> <li>• Look at segments as individual entities, apply analytics to compensate for consolidation</li> </ul>

- Understanding regional markets
  - effects
    - Have access to these consolidation effects
    - Cut business report by segments
    - Cut segments by region
    - Obtain results by region and by product

**Table 3: Context based user driven disclosure**

### 3.2.4 The power of Hyperlinks

With Web technology objects can be linked through Web addresses of other objects. Hyperlink technology allows for linking objects of different nature and this addressing can be used for establishing, delimiting and determining different types of relationships. For example, XBRL instance documents can be pointed towards the taxonomies that define data relationships, Web pages can incorporate links to related pages, and transactions can be hyperlinked to remote databases bases with supporting documents.

Using these technologies allows business reports to be a user-driven dynamic instrument, with automatic updating, based on the life-cycle of the process. As described in **Error! Reference source not found.** business processes are measured on a continuous basis extracting data to be stored at level 2. This data contains the history of these **metrics**<sup>26</sup> and sufficient relationships for creating analytical hypercubes. The third level, like the back logic of a spreadsheet, entails the relationships among the metrics which are types of **analytics**. These relationships are to be updated automatically while empirical relationships evolve. The fourth level encompasses empirical key performance indicators (**KPIs**) that also have linkages and represent higher level relationships.

In the modern world of process deconstruction<sup>27</sup>, alliances and competitor cooperation, data linkages span organizations, processes, and individuals. These can be brought together through supra-organizational hyperlinks. The KPIs represent empirical and subjective relationships that can serve to create forecasts, serve as monitoring models in the case of lack of detail data, and allow for the monitoring of non-defined process interlinkages. These subjective models are postulated to be reasonably stable and also allow for cross-industry comparisons and the inference of existing relationships.

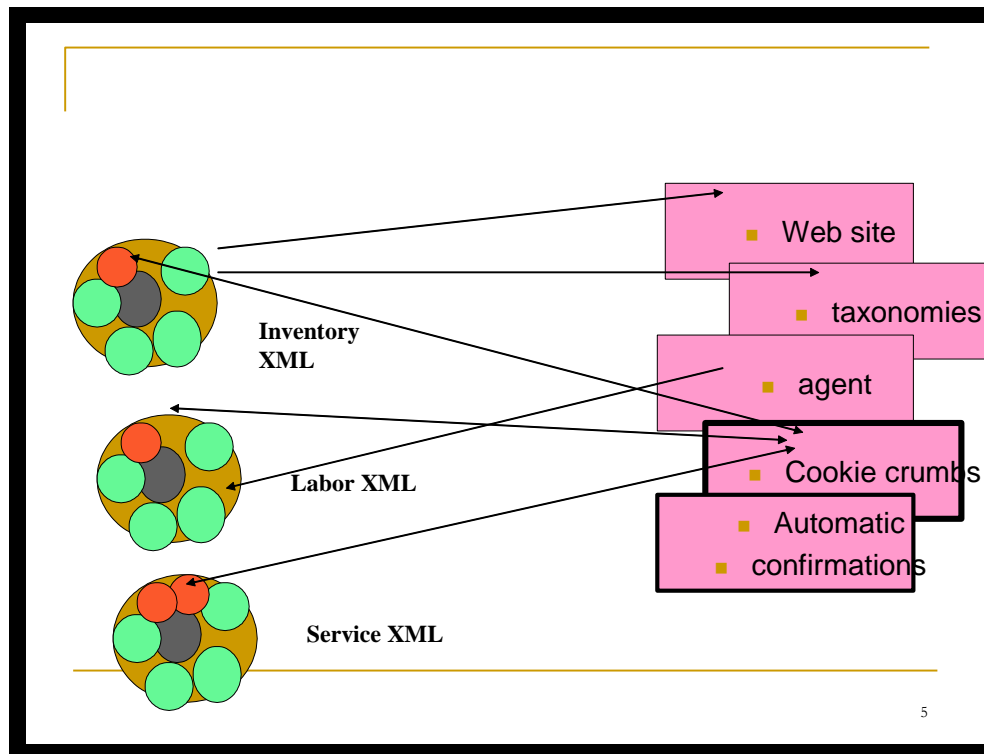
**Error! Reference source not found.** reflects a view of the world where most transactions are represented through some type of XML derivative standards and served across organizations as tagged data. These tags explain data parameters a la XBRL<sup>28</sup> but eventually these standards will include other information such as hyperlinks to Web sites (containing for example taxonomies, linkbases, and other information), hyperlinks to

<sup>26</sup> Vasarhelyi and Halper, 1991.

<sup>27</sup> Vasarhelyi and Greenstein, 200xxxxx.

<sup>28</sup> XBRL.org.

intelligent agents using the information to activate processes, links to cookie crumbs<sup>29</sup>, and other facilitating processes such as automatic confirmations.



**Figure 27: The power of the Hyperlinks**

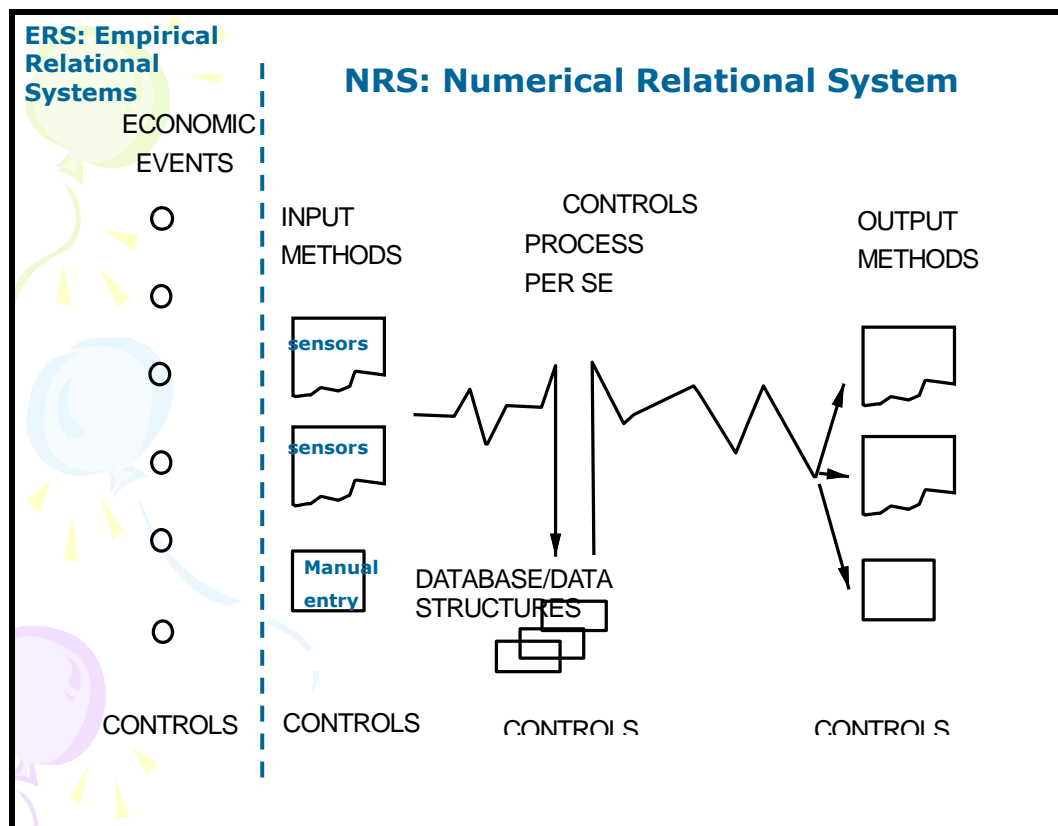
The utilization of these technologies aims to provide a wide set of information for management along many informational characteristics. These informational characteristics are discussed in the next section.

### 3.3 Information

Mock<sup>30</sup> discusses corporate measurement relating the empirical relational system (ERS) with the Numerical Relational System (NRS) which represents the traditional accounting system. These are represented in **Error! Reference source not found.** but they do not represent the complexities of the multi-entity deconstructed organization of the modern age.

<sup>29</sup> Vasarhelyi, 2005.

<sup>30</sup> Mock 19xx measurement monograph.



**Figure 28: ERS and NRS**

These days the traditional NRS encompasses databases and extracted reports. In many instances, companies compile numerous reports both, for internal use and for external parties. These reports reflect the need to measure the performance of companies, as well as to comply with regulatory requirements. In this section we describe our views regarding the use of external and internal data to generate reports, as well as the nature of these reports. Moreover, we also discuss external and internal data sources that can potentially be used to generate reports.

We start our discussion by looking at external sources for information. With the imminent requirement for XBRL based reporting, data from many organizations will become benchmarkable in real time. The current reporting mechanism is structured to report data from computers to individuals. This approach enables individuals to read and understand electronic and paper based reports. XBRL can facilitate reporting of information that is generated and understood by computers. With XBRL, companies could potentially probe peer companies' websites, detect new reports, parse these reports, and analyze them in real time. Such publicly available data could be used for both external and internal purposes. For internal purposes companies are likely to utilize external data in the form of XBRL tagged financial reports, industry wide variables, economic wide variables and other important external variables. Conversely, external information is less likely to be used by the company for external reporting. The company

should provide its stakeholders with the tools and the raw data to benchmark its performance against any predefined criteria. These criteria could be the above discussed benchmarks but also could be a wide range of model<sup>31</sup> types or a priori set targets. However, it is beyond the scope of the entity's reporting goals to provide added value services to its stakeholders. It is likely that a new breed of information intermediaries will step in to provide benchmarking solutions. Information intermediaries are likely to morph into value added information providers rather than data aggregators.

While it is beyond the company's reporting scope to provide information on its peers, it is expected that linkages of information and limited information regarding business partners will be provided by the entity. The entity is transacting with many businesses, some of which are not bound to similar reporting requirements. The entity should enhance the understanding of its stakeholders of the nature of relationships and dependencies between its operations and its business partners. After all, these dependencies exist and are often a contributor to a company's success or failure. If legal relationships exist (such as the ones in SPEs) companies need to be forthcoming and explain the nature of their relationships with these parties.

Under the Galileo framework companies will report both financial and non-financial information and exogenous and endogenous information. Financial data should include traditional financial statement items as well as information that are more relevant. For example, companies could potentially report the market value of their assets including inventory and fixed assets. Similarly, companies should report the market value of obligations such as warranty obligations. These types of financial items could be reported and supported by the evaluation of independent third parties. For example, an independent provider can assess the market value of a warranty obligation if the warranty is assumed by a third party. Though it is not the responsibility of companies to report data that is external to their organization, the reporting format should enable users of the data to conveniently benchmark the performance of the company to its peers as well as incorporate plentiful of industry and economy wide data.

Companies could report on the nature of their relationships with their customers and providers. In a tightly integrated supply chain environment, the success of the company is highly dependent on the performance of its business partners. Therefore, a complete picture regarding the future performance of a company can never be achieved without due consideration for these dependencies. It is highly desirable for users to know the level of dependency between a firm and its most important business partners, their service level, product quality, financial solvency and their delivery performance. This should be especially valuable for business partners with various levels of reporting requirements. Examples of such information include lead time, percentage of goods supplied/provided to/from a particular business partner, financial solvency measures for business partners, and total risk assessment for the portfolio of partners that do business with the organization. Obviously, companies should also provide sufficient information about related parties that are not consolidated (SPEs), and any other non-consolidated

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<sup>31</sup> Kogan, Alles, WU and Vasarhelyi, Continuity Equations, Working paper, Rutgers University, 2005.  
xxxxx

entities. The same type of information that is currently used for determining if a particular entity is to be consolidated should be disclosed in the case of SPE including but not restricted to: percent of the company owned, volume of the transactions with the external entity, significant transactions and contractual relationships, etc.

Information should be reported on a timely basis. Currently companies release limited information to the market during the earnings announcement dates. Such information is lagging and is limited. The substance of the information is reported by organizations to the public through filing their financial statements with the SEC. Companies are operating in a dynamic environment that requires them to analyze and use timely information. If such information is widely available to companies' employees it is conceivable that some of this information should be made available to the public.

Annual static lagged reports are a product of manual accounting systems. Most publicly traded companies have implemented some mechanism to digitally perform their accounting cycle. This enables companies to report more frequently and provide users with flexible sliced data. High frequency reporting should be coupled with a mechanism that increases the perceived and the actual accuracy of the data. This should be done by continuous assurance processes with various levels of assurance for different financial and non-financial items.

### 3.3.1 External Data (Exogenous)

Accounting Standards and reporting practices are unavoidably a product of compromises that have to be made between the value (and intrusiveness) of information to be provided and its cost. While with the change of technologies these tradeoffs have become a thing of the past, the rigidity of the standard setting process and the resistance to change have created an anachronistic model, as discussed earlier. Table 4 presents a series of evolving technologies and some of their effect on disclosure and standard setting.

Technology	Effect
Personal Computers	<p>Personal computers added a level of analytic power to the generic information user.</p> <ul style="list-style-type: none"> <li>• It has allowed, particularly with Internet interconnectivity, the decrease of latency between information provisioning and information utilization.</li> <li>• Further democratize of analytic functions by bringing to smaller market players some of the capabilities that only the large and rich investment houses have had in the past. <ol style="list-style-type: none"> <li>1. These effects will result in a new set of articulated disclosures to explain the balance</li> </ol> </li> </ul>



sheet, income statement and funds flow; to show the potential linkages with footnotes, and to allow users to play “what if” games with company data.

2. Furthermore it is possible to classify corporate assets along categories and value them on an ongoing basis using asset classes and published market indices.
3. Users can continuously scan their sources for updates on corporate financial disclosures, news pieces, and activities in corporate stock.

## ERPSs

**Enterprise Resource Planning Systems integrated corporate applications and outsourced much of the system analysis and programming**

- Consequently the ERPS vendors will have most of the onus of impounding reporting practices and statute changes into the corporate feeder systems. Assuming that corporations do not try to think with outcomes to achieve economic targets, the cost of changed regulation and practices will be small, fixed cost in nature, and shared by a wide set of users that have purchased that type of software (e.g. SAP)
  - There will be much more interchangeability between internal and external reporting, with a wide set of stakeholders needing business reports and being fed by existing internal data part of the day-to-day management of the organization.
1. Sarbanes Oxley #409 (real time reporting) will require alarms be issued in a public forum if certain covenants are violated, certain types of litigation occur, and certain business events (such as the find of an oil reserve, approval of a drug by the FDA, etc.) take place.
  2. Eventually, standard setting organizations will work with ERPS vendors by providing “digital standards” that can be easily incorporated into software. The proliferation of standard setting entities (governments, localities, stock exchanges, health / environment/ intellectual-property oriented entities, etc.) makes it necessary for the development of digitally oriented standards: 1) to facilitate their impounding into implementation / enforcement software, 2) to create taxonomies of standards that control for antithetic / archaic standards, and organize

these standards into coherent taxons, 3) to allow for query into these standards for regulatory guidance and 4) to link standards with instances of their implementation for guidance and benchmarking.

#### Web Disclosure

**The WWW is now a ubiquitous platform that integrates different forms of data (numerical, textual, graphic, audio, and video) with neglectable marginal provisioning costs**

- Each printed statement had marginal printing and mailing costs... these are not there any more
  - The printed mode was not able to provide improve more explanatory disclosures using video, audio, and variable data that occur over time
  - Web disclosure can allow user driven comments in a public forum where users discuss the disclosures and complain of lack of transparency. While these manifestations of user activism are now restricted to financial chat rooms, eventually regulation will require public fori associated to business reports.... probably stockholder activists will create parallel web sites if corporations do not allow for these expressions of democratic opinion... organizations will try to control these utterances... there is an argument for this control as if chatrooms are an example much garble flows in the middle of some form of expression.. **information intermediaries** probably will grab this role.
1. Disclosure rules placed a premium in succinctness due to the incremental cost of disclosure, eventually the prize will be for depth of information and articulation with the business reporting story
  2. Automatic measurements will become the regular story of business reporting where business reporting sensors will pass values directly to online real-time reports as well as to the ERPS applications
  3. Alarm reports will exist in each set of disclosures set at levels that will activate (fire) at regularly observable levels. Some of these alarms will relate to Sarbanes Oxley #404 controls, others to operations and others to financial reports.

#### XML/ XBRL

**The current generation of XML derived data interchange standards will eventually create substantial interoperability among cooperating**

### applications

- **Consequently users of financial information will be able to be closely interlinked to disclosers as well as to substantive validation numbers on the Internet in the form of sector benchmarks, interest rates, portfolio rates of returns, corresponding entity balances, etc.**

This interlinkage and Internet connectivity will create interesting applications with problem/opportunity warning systems, add-on analytics for spreadsheets, spiders collecting information on a continuous basis, etc.

- Most of the opportunities result from the availability of an enormous amount of information both in tagged (and easily identifiable) and non-tagged (which must be pattern scanned and semantically analyzed) form emanating from governmental, for profit, and non-profit sources.
  - Government filings at the federal, state and municipal level collected thru Web interfaces and
1. **Information will be tagged automatically and may be provided under different reporting standards (e.g. GAAP, IFRS)**
  2. footnotes will have their own taxonomies and will be tagged and articulated to the main statements
  3. Several areas of business reporting (environmental, health and safety, intellectual property, marketing, etc) will have taxonomy-based tagged reports with minimum disclosure standards and articulation to other statements.

**Table 4: Technologies and their effect on information availability and disclosure**

In consequence of the new technology of reporting some new information related economic facts have emerged

- The technology of conducting business became virtual, distributed and progressively automated while the reporting technology has remained somewhat stagnant
- What is expensive is the system setup not the creation of repeated reports (that are not massaged)
- Eventually most of the newly proposed reports will be impounded into ERPSs
- For the purpose of valuation and reporting many variables that were important in the industrial economy have limited value on the real-time information economy
- e.g. inventory and plant

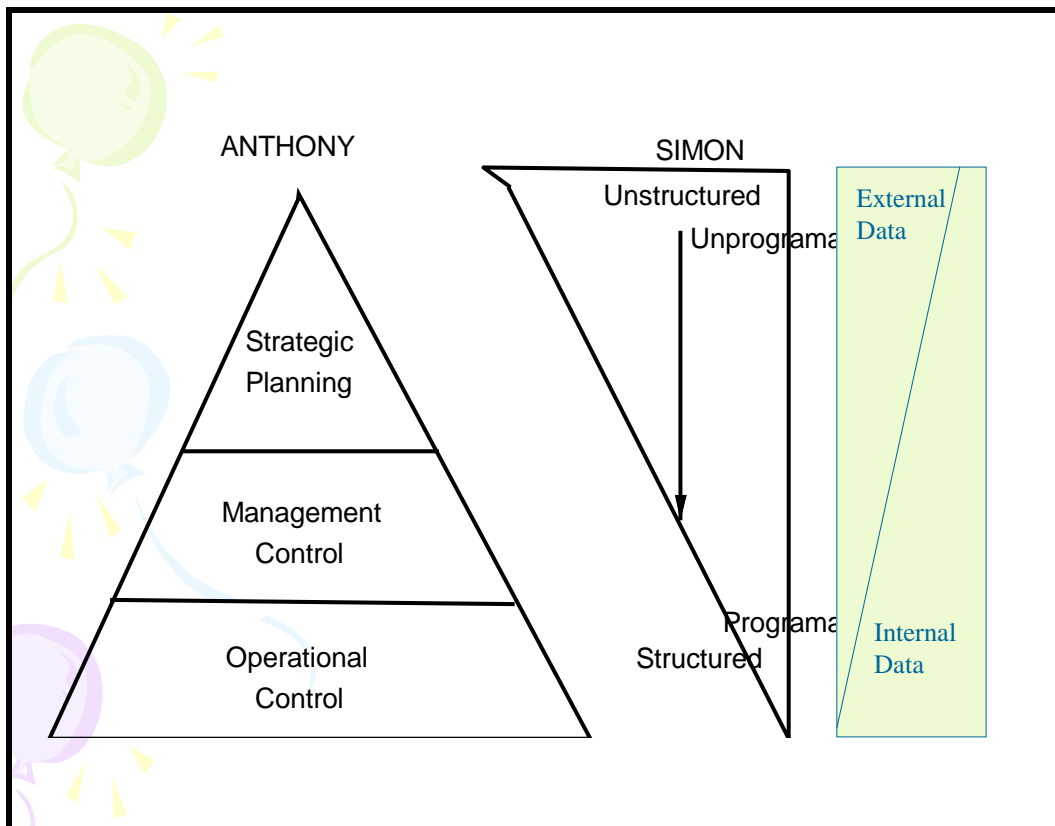
Figure 29 joins Anthony's<sup>32</sup> view of the world to Simon's<sup>33</sup> in a view of information utilization by corporations. Anthony divides corporate planning and control into three levels, strategic planning, management control and operational control. Simon argues that higher corporate decision processes are less structured and un-programmable. Consequently the higher the corporate functions the more important is the role of many types of external data in their performance. With twenty first century technologies the nature and content of external information is evolving. Corporate strategic thinking uses large amounts of structured and unstructured information including: 1) information about the customers, 2) information about suppliers, 3) information about business partners, 4) information about competitors and their customers, suppliers, and business partners, 5) macroeconomic data, etc.

Thus, the information revolution largely expanded the scope of the information set simply by making the cost of providing and sharing information much lower. Furthermore, with the changes in the information storage and retrieval costs much data formerly considered of marginal value, vis-à-vis its cost, is now being formalized and made available commercially. For example there are commercial products that list corporate directors, find corporate information, find information about individuals, etc.

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<sup>32</sup> Anthony, R.N., “A Framework for Planning and Control,” Harvard Business Press, xxxxx

<sup>33</sup> Simon, H., “The Science of the Artifact,” or “Behavioral Model of the Firm,” xxxxx



**Figure 29: Nature of Information usage and its Programmability**

## Plentiful of external data

Large amounts of information will change the nature of information provisioning and the needs of information users. Axiomatically some main effects will apply:

- Dimensional changes in information availability and access
- There will be many sources of information with different levels of publicity
- XML / Web services protocols will allow informational intelligent agents<sup>34</sup> to purchase information as needed to activate certain analysis or action. For example, with the activation of a news-piece of a particular set of firms being rumored of merging an agent can acquire detailed information sources not usually scanned, perform an opportunity analysis, and activate a purchase or sale order all in just seconds.
- Data items will flow over the information value chain and be enriched by different processes and information sources
- Information queries will flow through the information value chain in both directions

<sup>34</sup> Vasarhelyi, M.A. & Hoitash, R., in Vasarhelyi vol 6, 2005.xxxxx

- Each data in the data flow will have some information on its level of reliability through an assessment of its generating process, or through the result of an audit, or modified by intermediate processes that provide it with changes, or increase its reliability.
- Most data will be created automatically through sensing devices
- Most data will be transmitted automatically by the sensing devices in XML-type form through a series of tcp/ip channels to other devices that will accept and interpret the information. While much information today goes from person to person in the future most information will be collected automatically, tagged, routed, filtered, screened, stored, and used automatically.

Figure 30 presents a Taxonomy for external information with its primary dimension being the nature of the source: Government, Corporation, Other Entities, and Individuals. This information is also cut across time period (minute, hour, day, month, year, variable), relevant decision model, Benchmarks, Summary Statistics, Industry, Country, etc..

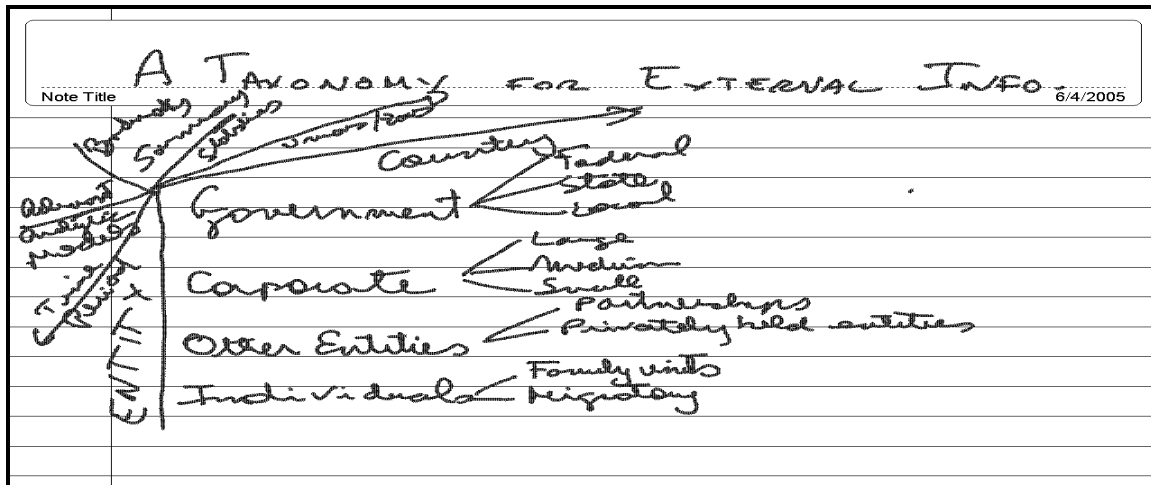


Figure 30: A Taxonomy of Exogenous Information for Corporate Reporting

Within the above schema much information will become available for strategic planning and analytic purposes. Furthermore several different classes of data will arise often as a secondary source of income from process owners. It is possible, if not likely, that corporations will sell finer data about themselves<sup>35</sup> than what is available in public disclosures to third parties. Among some evolving sources of information we find:

**XBRL enabled real-time comparative benchmarks:** one of the most promising disclosure related innovations is the increasing potential for benchmarking with some degree of accuracy. While current reports consolidate entities of different types (say industrial and financial subsidiaries) where the aggregate has little meaning, sector-based (SIC 4 digit code) benchmarks can serve as valuable comparison standards. If monthly or daily data can be procured the benchmarking would be even more valuable.

**Links to vendors and suppliers** (enrich the value chain information) can create a joint view of the value chain and help on the assessment of its joint competences.

**Information on the markets of the product lines**

<sup>35</sup> as with many of the other issues in this paper statutory clarification and relief must occur. The FD rule of the SEC causes difficulties to this model. Clearly, disclosure of data with very fine granularity in addition to traditional data could improve corporate transparency and work towards the objectives of the SEC.

**Database Integration;** The financial intermediation industry will focus on database integration in particular with the understanding and summarization of data expressed in words (semantic data) without a standardized structure.

### Public databases of analytic models

### 3.3.2 Internal data (Endogenous)

The representation of corporate activity can be substantially improved with a few changes on the nature of the information

The multi-layered report: a set of financial statements with different audiences and levels of aggregation

1. for the non-professional investor- a simplified representation of articulated data with key financial variables and a representation of the effect of disclosed footnotes
2. for the analyst – access to a drill down database with main component values of major reports?
3. for the bank, insurance company, and other interested parties - separate special reports with restricted access to authorized users
4. a representation of the value chain, links to vendors and suppliers (enrich the value chain information) can create a joint view of the value chain and help on the assessment of its joint competences. (internal and external information)
5. aggregate results broken down by rational line of business (forced 4 digit SIC code)
6. relationship level continuity equations<sup>36</sup>
7. disclosure of perceived causalities, empirically based continuity equations
8. disclosure of significant (material) alarms
9. continuous reporting
10. different timing for different data
11. significant events disclosed emphasis on management comments on strategic moves
12. estimates and their parameter history

### 3.3.3 Dimensions of Disclosure

In order to better understand the essence of disclosures we shall resort to some of the basic concepts of information theory (Shannon and Weaver, yyyy ; Marshak, xxxx).

Figure 32 displays many dimensions of information that are relevant to business measurement and disclosure. The main variables are defined next:

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<sup>36</sup> Kogan, Alles, Vasarhelyi & Wu, “Continuity Equations,” working paper, Rutgers Accounting Research Center, April 2005.



1. **Publicity**- how public is the information- for example corporate filings on Edgar are available to all and today these filings have lost even the impedance of physical availability and copying. On the other hand personal and corporate tax returns, increasingly electronically filed, are not available on an individual basis but on aggregates for statistical purposes. The issue of publicity was often finessed by poor physical handling and support facilities. Public utilities doing business in the State of New Jersey have to file yearly annual reports which are summarized by the state. These reports, however, are many years late. Furthermore the law provides for individual access to filed reports.

These reports are on paper and their storage and access facilities are inadequate. This example is typical to many required government filings that are theoretically “public” but in practice impossible to use unless by preferred users. Progressively much of these filings will be electronic and the clumsiness of the process will be reduced.

2. **Granularity** – the level of detail of information is obviously of great import. Data can always be aggregated but cannot be dis-aggregated. Data provisioning at the atomic level creates substantial need for aggregation computing power. For example recalculating the 80 billion phone calls that the ATT phone network used to provision and cutting this data across attributes is more than a daunting task. Many corporate ERPSs resolve this problem by creating controlled redundancy, providing pre-calculated information at different levels of aggregation.

Furthermore, analytic needs by managers and users require ‘cuts’ in an OLAP fashion that reports on say daily aggregations of transactions by switch, product, and organization.

These ‘cuts’ and their combinations expand data storage needs substantially, even at intermediate levels of aggregation. Coarse information set (very aggregate) tend to be more desirable for external reporting while fine information set maybe with atomic level of granularity are more usable for operational control. Intermediate levels of aggregation may be found that may not be “information adequate” (Marshak, xxx) for certain decisions. For example, if phone calls are aggregated across states these summaries are not adequate for switch load estimates as some switches span more than one state.

3. **Frequency** –Initially, corporate reports were annual, then quarterly, and now most firms have monthly closing for internal management and keep selected accounting on a close-to-real time basis. Just-in-time requires real time inventory keeping, while cash applications overnight need cash management on a day to day basis. The management of discounts requires daily monitoring of receivables and payables. Consequently applications work at their own rythm and there is no overarching perfect frequency for

measurement and reporting. The nature of the business processes and the decisions to be made drives the optimal frequency of reporting and disclosure.

4. **Dimensions** – The discussion of OLAP-based data provisioning often encompassed the idea of a data cube that may be more than three dimensional, whereby cells of the cube are values related to particular dimensions. Typical cube dimensions are division, product, geography, time, categories of sales volume, etc.
5. **Fields/Variables** – data attributes may serve as dimensions of the OLAP cube but many other fields and variables are not adequate for cut dimensions. For example, signatures, contracts, unit costs, etc may be variables to be stored in databases and be displayed in cells but not serve as dimensions for OLAP. Modern IT environments consist progressively of inexpensive storage and cycles leading to an increased number of dimensions and variables being stored. The accounting external reporting model has not yet incorporated this basic economic change and the disclosures have a very narrow domain with pre-computed values that have little meaning by itself and can cause substantial reporting aberrations. For example, inventories can now be measured in a continuous basis and often be attributed very realistic values. LIFO and FIFO<sup>37</sup> have known aberrations of income and assets.
6. **Nature of Use:** use of information and, most importantly, the decisions that it is going to support can be the final determinants of necessary information sets. For example, corporate valuation can be on the maintenance of capital, on expected future cash flows, on historical value of assets or on liquidation value of assets. Each one of these bases is more relevant to a particular type of decision.
7. **User sophistication** is key to the provisioning of relevant information. The one information set fits all model of financial reporting ignores the needs of different business report users. With the evolution of the tradeoffs between information provisioning costs and its benefits, a multi-layered reporting structure is essential. This multi-layered reporting structure, associated with powerful report rendering tools, will be the backbone of the future of reporting. Standard setters in the twentieth century have focused on the details of the methods of disclosure, in particular how to calculate coarse information values using often obscure methodologies. Standards setters of the future will eventually focus on the information sets provided and leave the aggregation function, and the decision-making to the users and their user models.
8. **Articulation with other information,** articulation and reconciliation are very important tools for the less comparable business reports of the future. Users

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<sup>37</sup> Swieringa, R., Accounting Magic, xxx

will have to be provided with enough information to understand the business and to make sense of the flow of resources into and out of the business. Furthermore, unreported parts of the business like the Enron SPEs and the offshore entities that AIG used for many functions will have to be reported and articulated with the reporting entity. The business entity is a very nebulous mechanism with unclear boundaries and great potential for result manipulation. Decades of increasingly sophisticated financial engineering made this manipulation the norm, rather than the exception. Earnings management is often performed by accounting adjustments, exploration of GAAP flaws, and operations outside the boundaries of the business entity.

In the US, privately held organizations, partnerships and other entities do not have to report publicly, name their owners, or list their transactions with other organizations. Consequently in dealing with publicly owned companies, travesties such as the ones recently found at AIG can exist. Many large US organizations have SPEs and extensive dealings with offshore entities where ownership and business reporting are opaque at best. Eventually most organizations, as observed in some Nordic countries, will have to disclose much more information, in particular if they do any dealings with public companies.

As an illustration the following extract from the New York Times<sup>38</sup> describes the relationships of A.I.G. with two supposedly independent offshore companies

“The deals described yesterday supplement the outline of impropriety disclosed by A.I.G. last week. On March 30, the company conceded that it had wrongly accounted for a number of deals, including those with the two offshore insurers, disclosing that the “known errors and changes in accounting estimates” could eliminate \$1.7 billion from its net worth, or roughly 2 percent.

A.I.G. said that \$1.1 billion of that total would come from consolidating the results of Union Excess, an insurer domiciled in Barbados, onto its financial statements rather than maintaining, as it had, that Union was a separate company. Before disclosing the accounting errors, A.I.G. had also told New York State insurance regulators that it had misled them as to the true relationship between A.I.G. and Union Excess.

According to the people briefed on the matter, A.I.G. hid its control of the offshore companies by inviting other insurers to invest in them and simultaneously having one of its affiliates agree to buy back their stakes at the purchase price, should the investors want out.

The deals were structured as put options, requiring that the A.I.G. affiliate stand ready to buy back the stakes from the investors at any time.

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<sup>38</sup> [GRETCHEN MORGENSON](#) and [JENNY ANDERSON](#), AIG Is Said to Have Secretly Backed 2 Offshore Insurance Companies ,April 7, 2005, New York Times.T

Chris Winans, an A.I.G. spokesman, declined to comment. The company is cooperating with the investigation.

A spokesman for Munich Re could not be reached last night.

Under the arrangements described to prosecutors, A.I.G. appeared to have no direct stake in either Union Excess or Richmond. This allowed A.I.G. to gain favorable insurance accounting for any deals it did with either company and let it offload troubled insurance portfolios from its own books.

But by awarding the shareholders of Union Excess and Richmond the right to convert their shares into shares of an A.I.G. affiliate, A.I.G. was in fact backing the offshore companies. As a result, A.I.G. should not have recorded favorable accounting treatment on its deals with the companies and it should not have jettisoned the problematic insurance portfolios from its own books.

According to a person briefed on the matter, Union Excess had between 6 and 10 shareholders, all reinsurance companies. Under the terms of the put options, three years after the investors deployed their capital, Astral Insurance, a subsidiary of Starr International, stood ready to buy most of their stakes.”

Astral was dissolved three years ago, according to the person. Upon its dissolution, Starr became the guarantor of the put options.

Starr International is a private company that is registered in Panama and based in Bermuda and is used primarily as a compensation vehicle for A.I.G. executives. The company, which owns 12 percent of A.I.G.'s stock, is controlled by Maurice R. Greenberg, who was forced out as chief executive of A.I.G. on March 14.

Regulators are examining whether Starr International was used simply to dole out long-term compensation to A.I.G. officers and directors or to conduct insurance business of its own from which its private shareholders would benefit.

About a week ago, Mr. Greenberg removed nine Starr board members who are also currently A.I.G. executives and directors, including Martin Sullivan, A.I.G.'s chief executive; Donald P. Kanak, executive vice chairman and chief operating officer; and Edmund Tse, senior vice chairman for life insurance.

While all the facts are not out and with many yet to transpire, AIG's business affairs have strong shades of ENRON but with a major difference: AIG was not a failing business and much of the alleged manipulation was mainly for window dressing and to increase management compensation. It seems that AIG had a series of compounding effects that add a major methodology into income manipulation.

- Offshore entities were used extensively for compensation
- US and offshore entities were used for off-balance sheet financing

- An offshore entity was used as a compensation piggybank. It is unclear if that part of the compensation was disclosed in the 10K. Possible that many components of compensation were not disclosed with the argument that it came from other (private) organization
- The same internal directors (largely) ran AIG and Star International

Informationally the boundaries between AIG and many of its partners were very fuzzy, having been designed by lawyers to conform with a particular aspect of regulation but to violate the spirit of the law / regulation aimed at presenting an aggregate view of the business set of entities.

A symbolic Venn diagram with some of the features of the relationships of AIG and its related organizations is presented in **Error! Reference source not found..** Clearly the difficulties that the APB and the FASB had in conceptualizing the concepts of independent and related entities as well as creating rules for ownership representation were explored by AIG’s lawyers and financial engineers. Turns out that:

- AIG as an organization is a fuzzy set as its boundaries are not defined
- Indirect ownership where party A owns part of party B which owns part of party C, therefore not having a direct link from A to C and consequently not recognized as a direct influence
- Informal (implicit or verbal) agreements are not recognized by the formal measurement system and therefore are ignored
- Public and private entities can be combined into a structure that violates the intentions of regulations
- Offshore entities are much less regulated than US entities
- Many of the large US companies have hundreds of CPEs. This is a dirty little secret that by itself does not matter as most of these entities are pretty legitimate in purposes. However their lack of transparency makes the potential for malfeasance dire.
- Many US banks, investment banks, and insurance companies had entire departments dedicated to create financial engineered loans, insurance policies, investment instruments to bypass regulation
- AIG and Enron had many similar artifacts of earnings management

The above measurement related factors lead to some of the “solutions” presented later in this document.

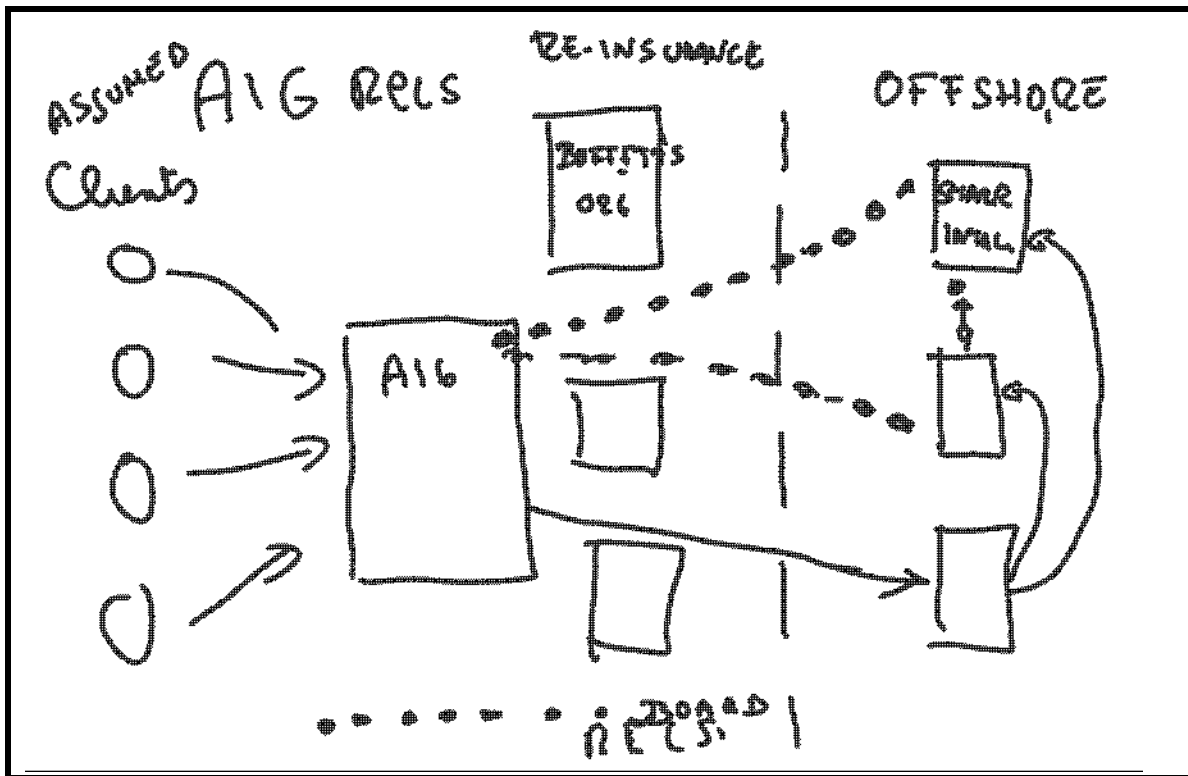
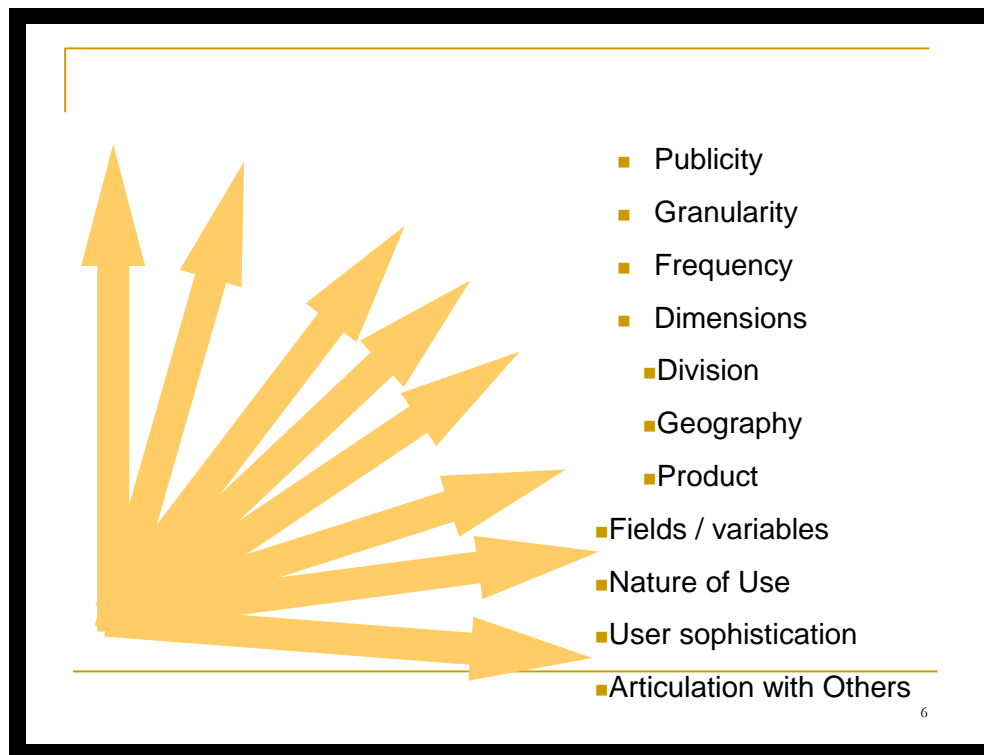


Figure 31; Symbolic representation of AIG and related entities

**Figure 32: Dimensions of Information Disclosure**

### ***3.2.1.1 Continuous reporting***

The real time economy is paradigmatically different from traditional reporting and consequently real time reports are progressively emerging (see Figure 33, Figure 34, and Figure 35 that illustrate some forms of real-time external reporting that could emerge.) While much of the literature discussion has focused on external real time reporting current management needs already drive the existence of some types of real-time reports for operational purposes. For example real-time inventory reports associated with automatic reordering and scheduling algorithms drive just-in-time manufacturing.

Most likely real-time reports are emerging being mainly internal or directed towards a specific external stakeholder (e.g. covenant monitoring). These reports associated with adaptive modeling (where corporate processes are modeled and these models adjusted to the current circumstances), automation of decision processes, and dashboards<sup>39</sup> will be the core of the real time economy monitoring and control management. Furthermore this is closely linked to continuous assurance level process by process. To support the real-time economy information needs to be managed in access and aggregation

<sup>39</sup> Reference on dashboards

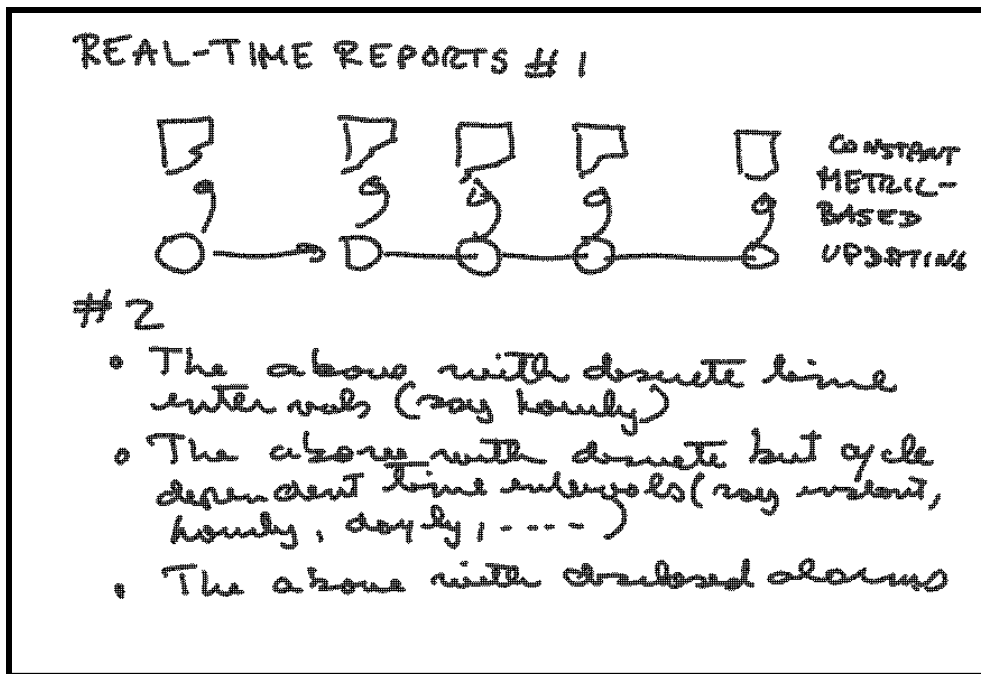


Figure 33: Potential real-time reports

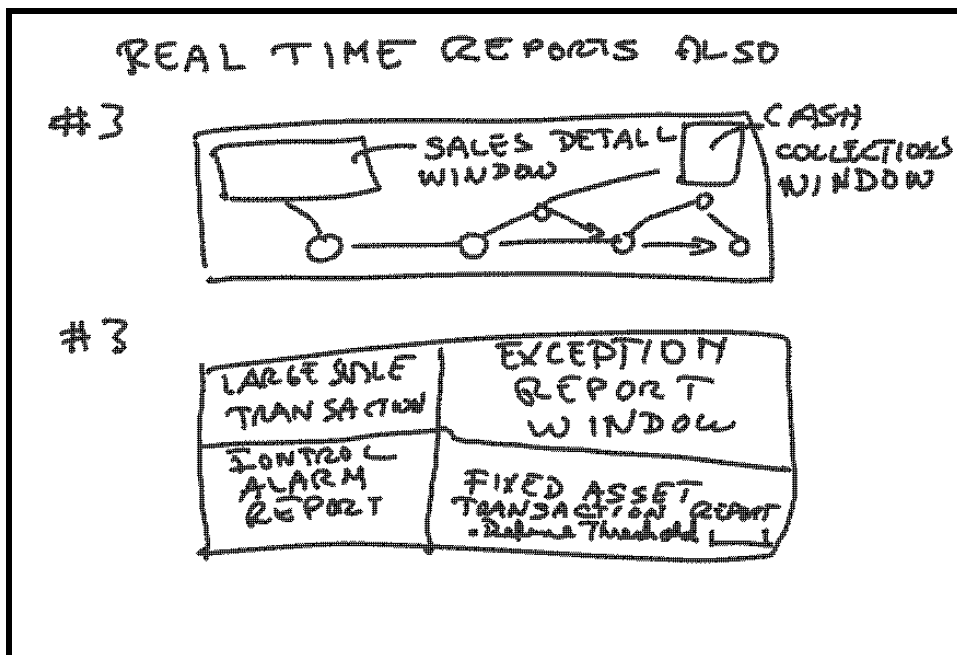


Figure 34: Real-time reports with continuous data windows



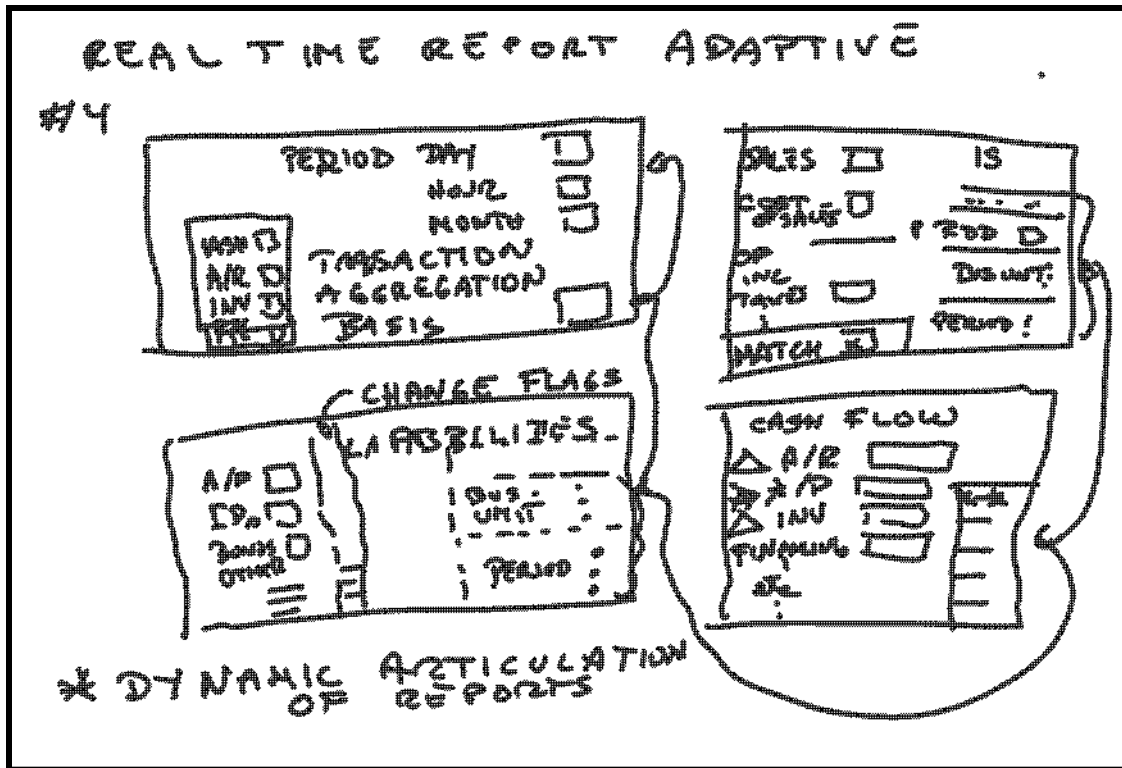


Figure 35: Highly tailored real time reports

Figure 36 displays three types of products, for three geographic regions, aggregated over a selected time interval. Such a report is often used by internal consumers of information and it is therefore also valuable to external users.

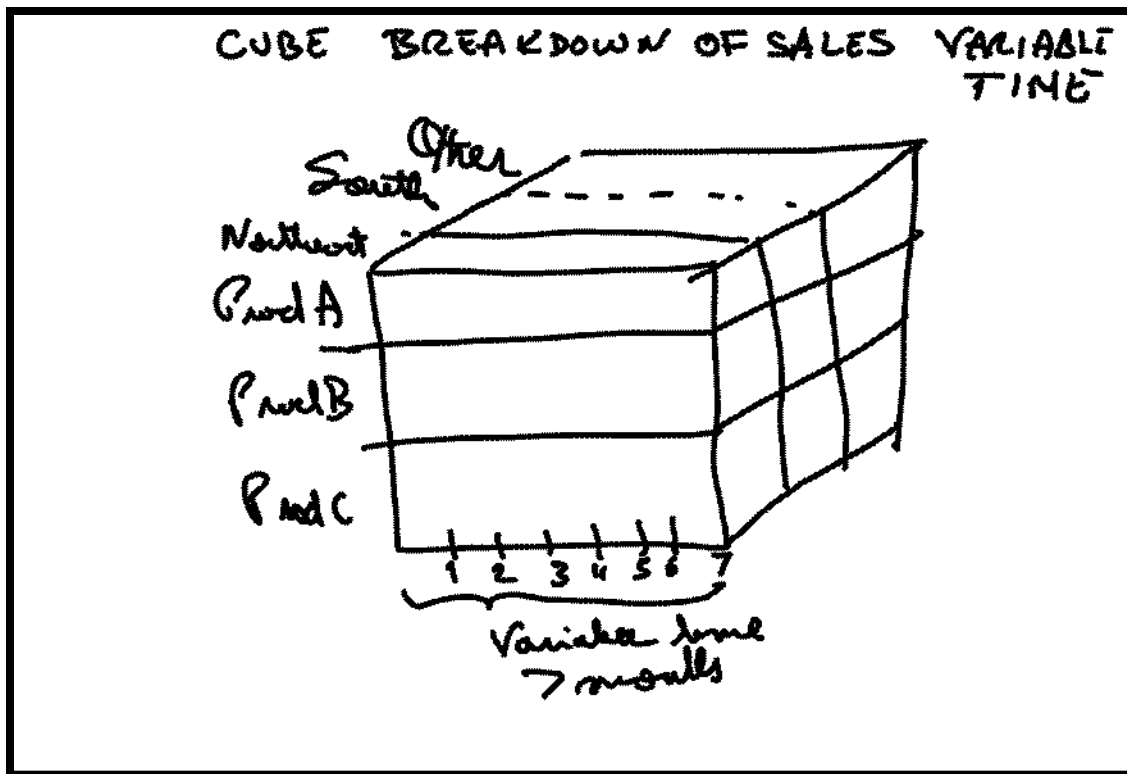


Figure 36: Cube display of data in variable time

It is important to note that users will be able to access information strictly based on their level of permission. Furthermore one serious form of lack of transparency is the plethora of time frames that are natural to the business process. Companies bury many important pieces of information into consolidated reports with different year ends or projects that span several years. For example, Halliburton performs a wide variety of projects for the US government that span several years. The company has been accused of using the percentage of completion methods for manipulative advantage providing front end compensation to executives for results that were optimistic at best.

Time selected reporting, as described in Figure 37, requires an infrastructure of data that is not available today to investors but is not much deeper than extant information but decodes time frame obfuscation. Many reports similar to the current ones but provisioned on a monthly basis would probably allow for time selection. These reports would have to be dimensioned along variables such as product, project, region, etc using a OLAP structure.

The generic idea of reporting on an instant basis raises many different issues that have not been explored in the literature.

- First, one tends to dismiss the generic idea that an investor or another stakeholder would trade on an instant transaction unless that transaction was of astronomic proportions such as a half a billion round trip by Enron.
- Second, one tends to think about the revelation of private trade secrets by watching transactions flowing thru a company's pipelines (even if securely anonymous) being matched by intelligent software agents with other companies' instant reporting, leading to major breaches of corporate intelligence.
- Third, one tends to think about the prohibitive cost structure to be able to provide this support and the limited benefit that it could bring.
- Fourth, we tend to understand the substantial outcry and stiff arming that would ensue from a proposal in this direction, as management would on a continuous basis, be micro-managed by investors and analysts being penalized by high human resource turnover rates, write downs, bad inventory management, wasteful real estate transactions, etc
- Fifth, most interesting things about the future of a business happen much before any transaction is measured. For example, an agreement between XYZ corporation and Microsoft is being negotiated, an international re-sale agreement is being negotiated, a competitor finds oil, there is a coup in progress in Zanzibar, the results of a drug trial are starting to look promising, the SEC sends a questioning letter on a particular set of transactions.

On the other hand some interesting considerations arise:

- First, these days, traders very often trade on an intra-day basis by paying attention to graphic patterns in day-trading, rumors, innuendo, and highly doctored press releases (that are mentally placed within a specialized industry context) ,etc....
- It is arguable that an acceleration of the reporting process would substantially improve the resource allocation efficiency of the markets bringing some rationality to the “invisible hand”
- It is also arguable that a more complex information structure, linking continuous reporting to industry groups (benchmarks) and issues in demand and supply, would substantially improve the efficiency of the value chain. Furthermore much information of exchanges between organizations already exists and is being evolved in corporate extranets.
- It is possible that substantially improved transparency in contacts, negotiations, contracts, flow of goods, payments, inventory delivery, and support transactions would substantially improve the inefficiencies that information and process latency create.
- The most interesting consideration is the mapping between transactions and management actions and market valuation. It turns out that current market measurement tools say efficient market mapping between earnings and market valuation are very tenuous. Real-time technology should improve corporate measurement and transparency but will create untenably exposed positions to de-facto corporate owners that are managers. These will, on the basis of economics, resist fervently deeply revealing disclosures. It is possible that real-time technology will form different forms of business organizations (as opposed to corporations, LLCs, LLPs, partnerships) that are more prone to allow disclosure.

Increased costs of disclosure and “publicity” are inevitable but these are the costs of creating markets that are closer to efficient.

1. Imagine if a flow diagram of all transactions between two entities could be obtained online.
2. Imagine if a schedule of outstanding payments could be obtained online
3. Imagine if the location of all employees at a certain time could be harvested and they could be reached by a click of a mouse
4. Imagine if all potential suppliers of a particular good could be found in a table
5. Imagine if all goods being transported could be represented in a plot
6. imagine if a substantive part, say the seven larger categories, of all sales could be monitored online and disclosed to selected parties
7. Imagine if different levels of transparency could be protocolled where certain information would only be available to the related employee, certain information to its management, certain information to audit and compensation committees, certain information to other stakeholders, certain information to information competent investors, certain information for government entities, certain information the world.

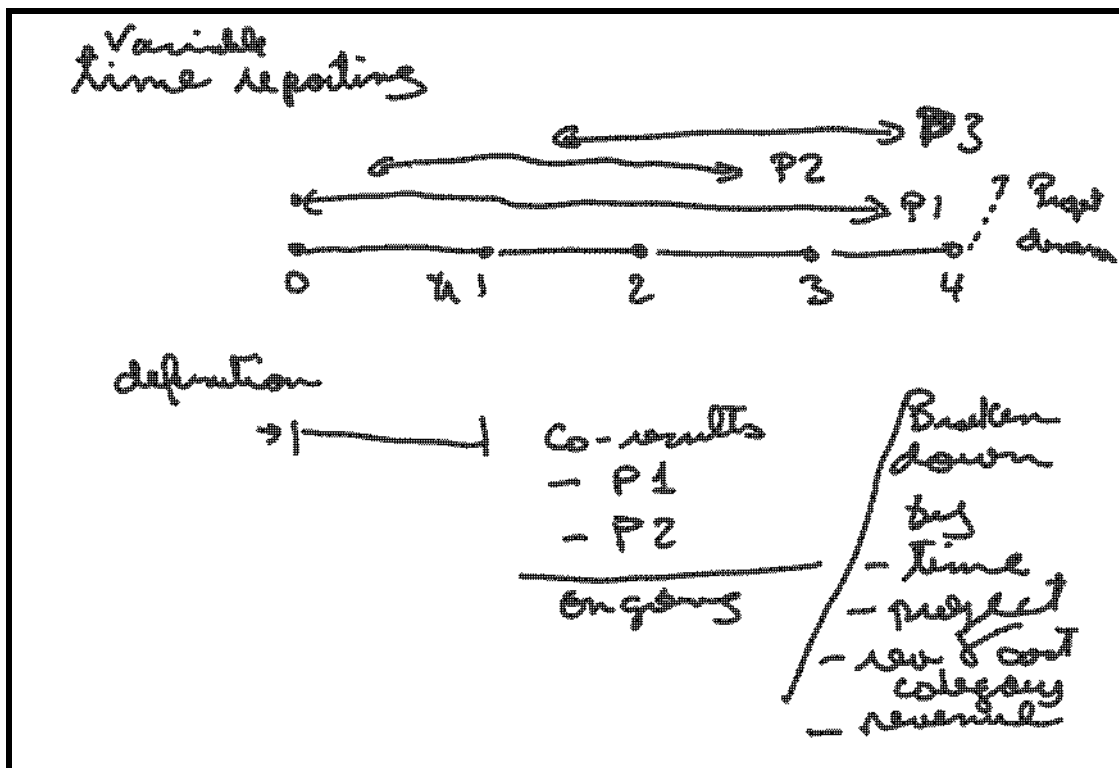


Figure 37: Time selected reporting

### 3.3.3.2 *Stochastic reporting alternatives that are context dependent*

While disclosure at the atomistic detail has some deterministic characteristics, its measurement is still stochastic in nature. The more aggregation and manipulation is used the more stochastic the described number will be. For decades academics have argued for a better form of reporting where the distributional characteristics of reported numbers would be supplied. For example, a number would be reported for the mean of a distribution and the standard deviation of the population would be associated to it.

Many alternative reporting schema have been proposed in the literature to support forms of stochastic reporting. Some of these ideas are briefly described in Table 5.

Type of reporting	Description / Example
Best estimate reporting	Report only on a description like mean, maximum likelihood, mode, etc.
Best estimate and variance range	In addition to the above report on a variance associated with the measures
Report Range	Just report a range with say a 95% reliability
Report probabilistic estimates for component variables not for aggregates	Report on mean and standard deviation of component variables and just the result in aggregates
Report in discrete ordinal ranges	Reporting on Sarbanes Oxley controls as very good, good, etc

Table 5: Probabilistic Reporting Schemi

### 3.3.3.3 *Frequency*

Continuous reporting methods have a natural measurement cycle related to the intrinsic nature of each business process. These may be yearly, quarterly, monthly, daily, hourly, on demand, variable or continuous. Contingent on key process characteristics the most appropriate timing will arise. With the development of real-time technology a new dimension on relevant disclosure has risen. The frequency of disclosure just as the dimension, units, and aggregation has become important. This dimension **frequency** can be :

- **Yearly:** certain disclosures, while useful in an annual basis, may be too static or too non measurable for more frequent reporting than a yearly basis. For example, sustainability reports (see Appendix xxx) may not be measurable on a differential basis in shorter time periods. Depreciation, amortization, and some estimate calculation as artifacts of artificiality may add little for moment to moment changes.
- **Quarterly:** the SEC now requires a limited set of disclosures on a quarterly basis. While this timing frequency is neither intuitive nor natural, it is a legal requirement and may be of use in variables that adjust through the year but are not particularly dynamic.
- **Monthly:** most corporations will have monthly closings and often some month related adjustments in quotas, targets, and ongoing rates.
- **Daily:** certain corporate processes such as billing close on a day to day basis or say a 20 cycles month.
- **Hourly:** certain processes, for example, data downloads from switches, may be performed on a pre-set hourly timing, and comparison on a instant atomicity may be irrelevant for comparison purposes.
- **On demand:** occasions such as acquisitions, dramatic market changes, or investor needs may require reporting not only on a cumulative basis to that point but also special one time reports extracted from different variables and articulated across processes and reports.
- **Variable:** while most traditional reports are of a fixed time period (say yearly or monthly) certain occasions may relate to variable timing to help in the evaluation
- **Continuous:** some variables add immediate information value to corporate management and other information users such as investors and regulators. For example, surges on sales, unexpected events, and changes in the valuation of events have characteristics that may decrease latency in the value change, improving the ability of arbitrageurs<sup>40</sup> to adjust their trading strategies to real value.

Consequently a large number of varied frequency reports will be in the EBRM. The types of these reports will vary in user needs and statutory requirements. A new type of report will focus not on alarms but on alarm summaries as shown in **Error! Reference source not found..**

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<sup>40</sup> Arbitrage situations denote market inefficiencies. Provisioning information that reduces these inefficiencies improves markets in general and particular processes in specific.

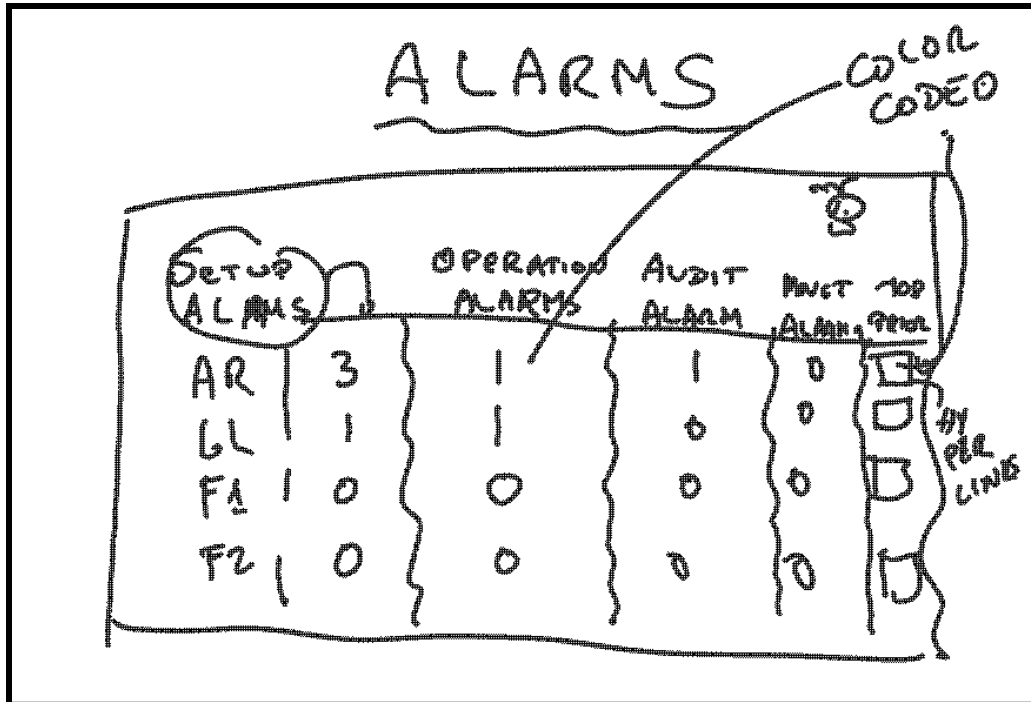


Figure 38: Alarm Summary

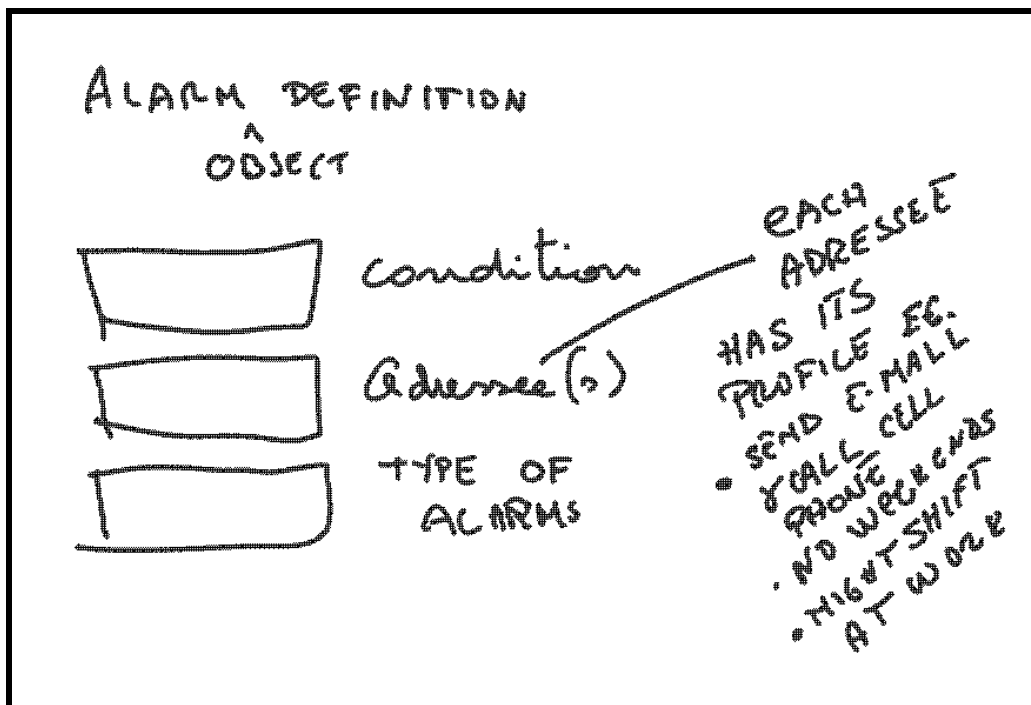


Figure 39: Alarm profile definition

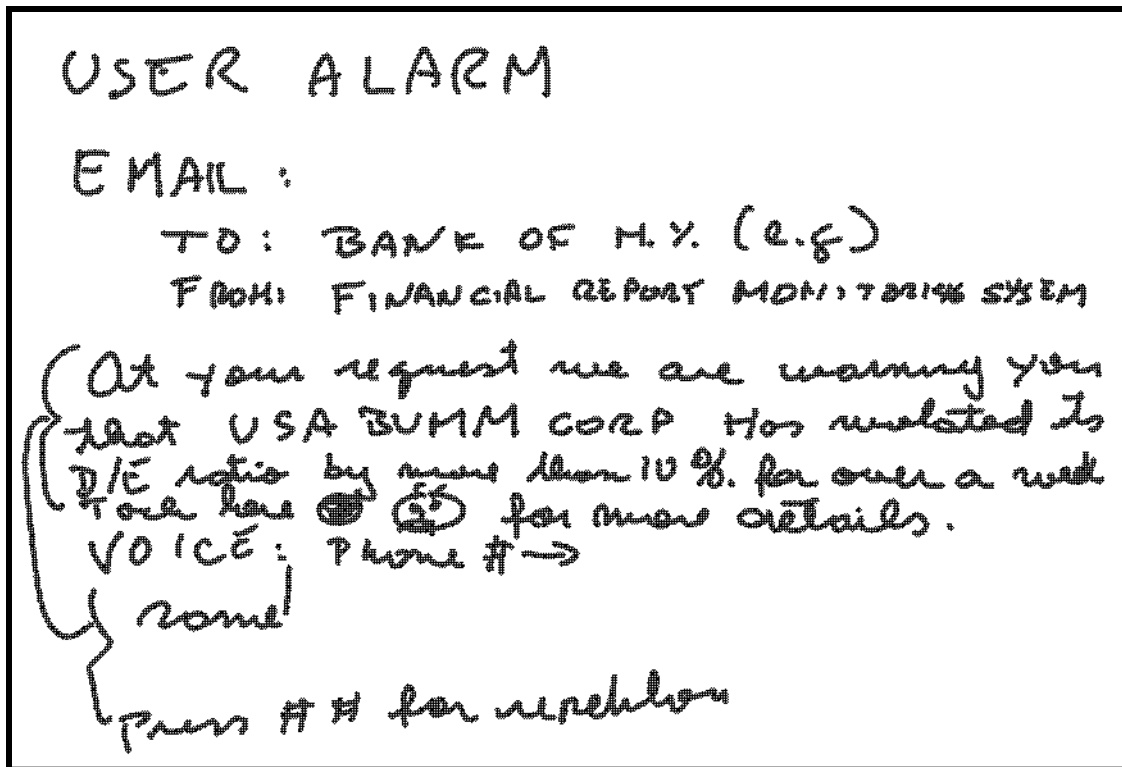


Figure 40: Example of User-based alarm

Many reports will be alarm type reports, either summaries or actionable alarms of different types. Some alarms will create automatic reactions such as stopping processes, enabling emergency actions, while others will be informational integrating into management dashboards, or informing different parties. Most reports will be directed at a specific audience.



### 3.4 Rules of Measurement (Accounting)

The proposed Galileo model has three basic components: 1) technology, 2) information and 3) rules of measurement. Inevitably there are some connections among the three elements. The first two were discussed above and this section will propose the rules of measurement that support the model. Each rule of measurement has to be seen as a basic process that may be applied at some relevant level of aggregation, and often at several levels of aggregation. The application of the rule of measurement at the different levels does not necessarily imply a disclosure (internal or external) at that level but may also be used for analytical support or restricted internal disclosure.

In the earlier section the concepts of drill downs and hyperlinks were discussed. The drill down concept refers to the user's ability to choose a number and “Drill down” to the component parts of this number. For example, the user can see sales for a particular month and drill down to its component divisions and drill down to the largest 5 transactions of that division. This drill down process can be a selective one where an OLAP structure is used to drill down by division (as above), by geography or by product. The drill down also can be directed to be selective in nature, with rules such as for example listing the five most recent transactions, the five largest transactions, and transactions with no control tag.

The business report being proposed in this work will have to represent a business as a live entity with component parts. Businesses and their processes are dynamic entities with rhythms of their own. Yearly or monthly reports present an entire set of artificialities which lead for misleading accruals (adjustments) and other aberrations. The well measured organization must be able to issue its internal and external reports automatically without Public Relations or Management's plastic surgery .. Most of the essence of the business will be a set of (measurements) its component parts and a methodology to allow for user chosen aggregation. Furthermore, the proposed reporting will be continuous, assured, representative, extended, business integrative, multileveled, comparable, and stochastic.

**The business report being proposed in this work will have to represent a business as a live entity with component parts**

These characteristics can be defined as:

**Continuous:** reporting will capture transactions and changes in the business' status up to the moment of the report's construction

**Assured;** data, aggregates, and estimates will be tagged with some form of assurance relative to the reliability of the item in question

**Representative;** presents measures in units that represent adequately a particular process. The representation may be in many types of units such as dollars, hours, units, etc.

**Extended:** relative to all processes that are part of the business value chain which include many of the difficult to measure (and impossible to value) intangibles.

**Business integrative:** discloses the firm’s view of the relationships among processes and the dynamics of its business model.

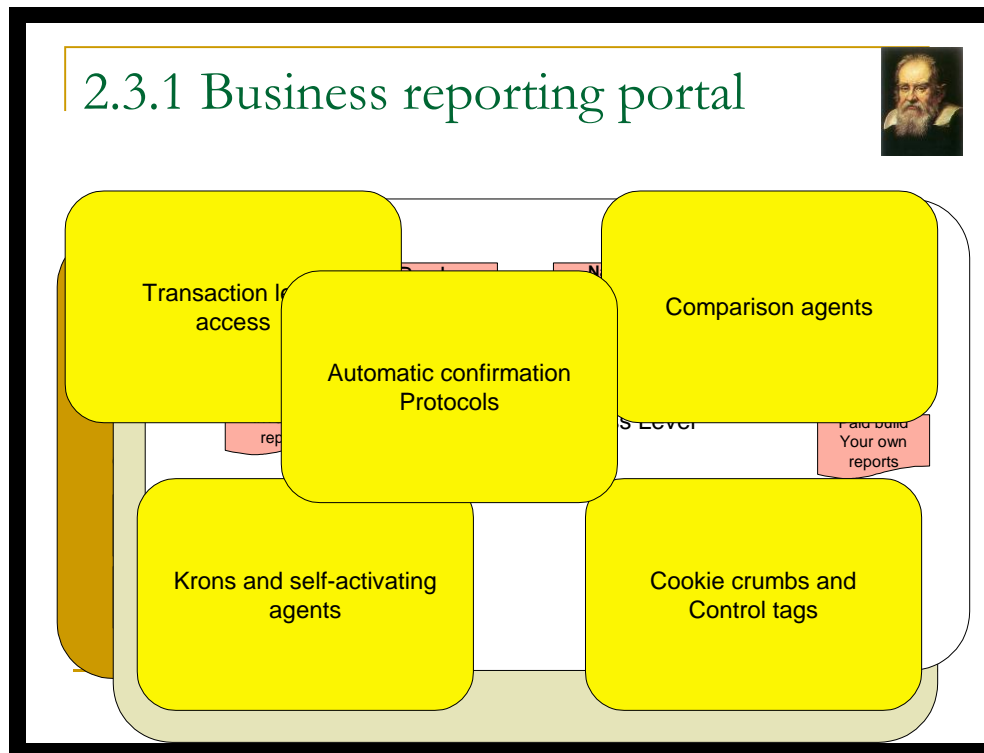
**Multileveled:** discloses not only aggregates but also views at different levels including high level KPIs of the business drivers.

**Comparable:** industries agree on key points of comparison on financial and non-financial variables and industry organizations agree on benchmarking rules or on the disclosure of benchmarks. This role also could be taken by the AICPA or financial information intermediators.

**Stochastic:** data as discussed above would be “assured” in some form,. Furthermore, as many types of business eventualities are not deterministic they would be stated in the form of probabilities or ranges and sometimes in the form of contingency tables. In organizational activities there are many forms of fuzzy activities and situations where the structure, the action, or the outcome are not deterministic, consequently its measurement has to express this stochasticity.

### 3.4.1 Business reporting portal

Business entities are living things that evolve rapidly and are composed of many elements of substantive complexity. Their representation on a static paper model is intrinsically inadequate. Figure 41 consists of four layers where the top layer provides application functionality, the second layer provides access to a variety of style sheets for multiple reports as well as a user friendly build-your-report feature, the third layer provides a security layer and the fourth provides the actual data contents with a wide set of content as described later in this section.



**Figure 41: The Information Portal**

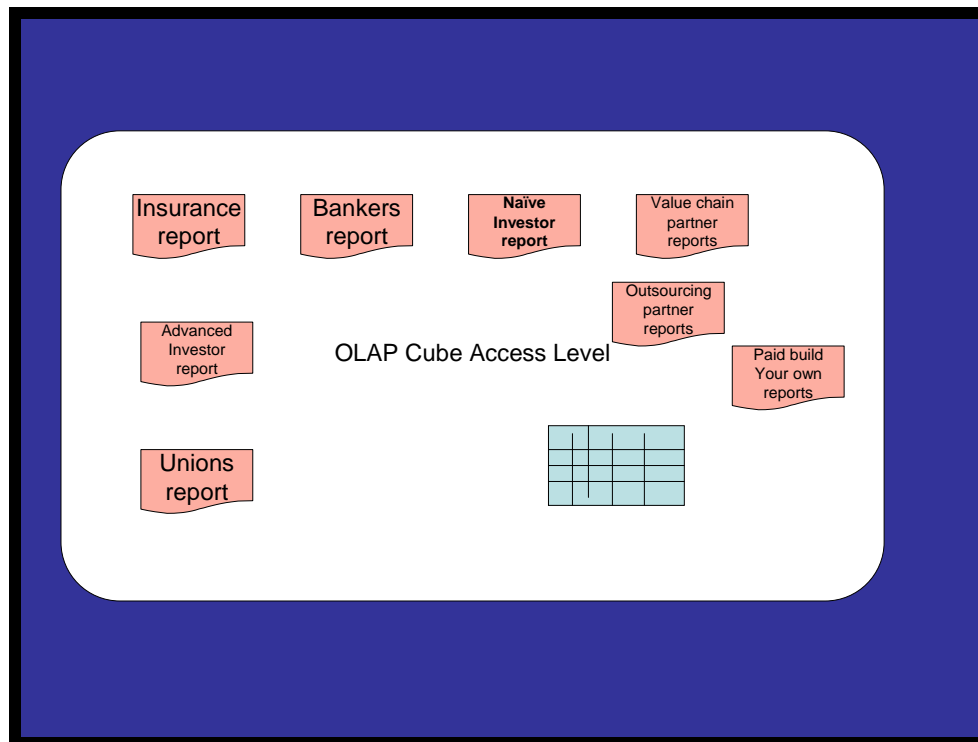
Among the applications from layer one (Figure 42) we will find a set of intelligent applications enabled for the new internet environment including:

- Krons and Daemons (self-activating agents): both users and the firm will have the ability to activate reporting processes based on time (Krons) and particular conditions (Daemons). For example, the firm can activate a balance sheet type report every hour or a bank creditor can activate a warning alarm if the conditions of a covenant arise.
- Comparison agents can be constantly active to compare a segment of a business with a set of pre-determined benchmarks. This comparison can be activated by a user or displayed upon a change of conditions.
- Transaction level access drilldown can be requested by a user towards an aggregation by geography, product or division or in certain cases down to a particular transaction. For competitive intelligence reasons fields may be blanked out or amounts aggregated. Drill-down capabilities will be enabled / limited by the access control matrix / layer.
- Cookie crumb and control tags: Vasarhelyi (2004) proposes the usage of control tags and residual traces (cookie crumbs) to authenticate the legitimacy of transactions.
- Automatic confirmation protocols: corporate systems will interface through a pre-established protocol contractually authorized or accessible without a contract. These confirmations may be at the transaction, account or customer level.



**Figure 42: the overlaid application level layer 1**

Layer 2 (**Error! Reference source not found.**) uses capabilities a la XBRL to provide pre-set reports for the different stakeholders of the business. These style sheets would both be static as well as dynamic being presented in screens and passing tokens (say for example for alarms) to the layer 1 applications. While the existence of special reports for many stakeholders is a fact of today's reality, the SEC will have to deal with some clarification of some issues concerning regulation FD in a more advanced reporting model. Analyst conferences as well as public relations releases are not part of the everyday world of financial reporting. The SEC will need to clarify and expand the rules to better understand the video and audio media. The figure also presents the access permission matrix which will be a reflection of regulation as well as of the companies' privacy and security policies.



**Figure 43: reporting layer 2**

The second layer will use some form of an OLAP cube ([xxx hyperlink to demo](#)) as a medium of disclosure where the allowable information set is facilitated access by an analytical database that can be equated to create pivot tables. Organizations are progressively using more and more data warehouses and OLAP cubes to help in the constant evaluation of their strategies. The OLAP cube (in one sense a misnomer as it is a multidimensional table that can be displayed in many different dimensions) is an extraction of the corporate databases /data warehouse that summarizes to the desired level of information and facilitates access and manipulation of the information.

**The third layer** is more of a filter and security layer where corporate information protection, security and other factors are considered. While traditionally the world of accounting is divided into managerial and financial accounting, it is reasonable to think of them as complementary with external (financial) reporting being a selected subset of the entire set. Furthermore it is reasonable to think that even internal individuals and agents should have only selective access to many elements of corporate information for many different reasons without this being an impingement on report transparency and disclosure. On the other hand, the natural evolution from manual to computerized systems, and the fact that corporate information represents power and that restriction of information reflects dominance, has left internal and external reporting with a very ineffective and often anti-productive set of rules of information access and disclosure. These rules have to be reengineered for more transparent corporate disclosure and well as better management of corporations. The OLAP cube is typically an artifact for improved

and more efficient access to data, but should not be a block to selected drill down to the transaction level. The ensuing considerations may apply in relation to the access and aggregation control matrix.

- The technologies to selectively allow access information exist and are not cost prohibitive.
- Most of the considerations in the access control equation are political, strategic and privacy not technical
- The security of the data access is of great importance as access restriction is contingent on a secure structure. It is useless to create sophisticated access protocols if the structure is insecure and users can obtain un-permitted access
- Many considerations of personal privacy (e.g. salaries, benefits, etc) must be taken in account, in particular in the drill down capabilities.
- Many of the traditional access restriction rules and data provisioning structures were based on the benefits and cost tradeoffs of manual systems. Modern tools and IT economics have changed this tradeoffs.
- Fears of litigation, and conservatism still drive many access considerations and must be reviewed. For example the operational benefits of extranets, where a company gives access to selected business partners to part of its Intranet, are tremendous and have overshadowed former access restriction rules.
- The advent of inexpensive and efficient drill-down to the transaction has been shown with applications like package tracking and customized account information. This potential has not yet been exploited in corporate disclosure systems for increasing transparency.

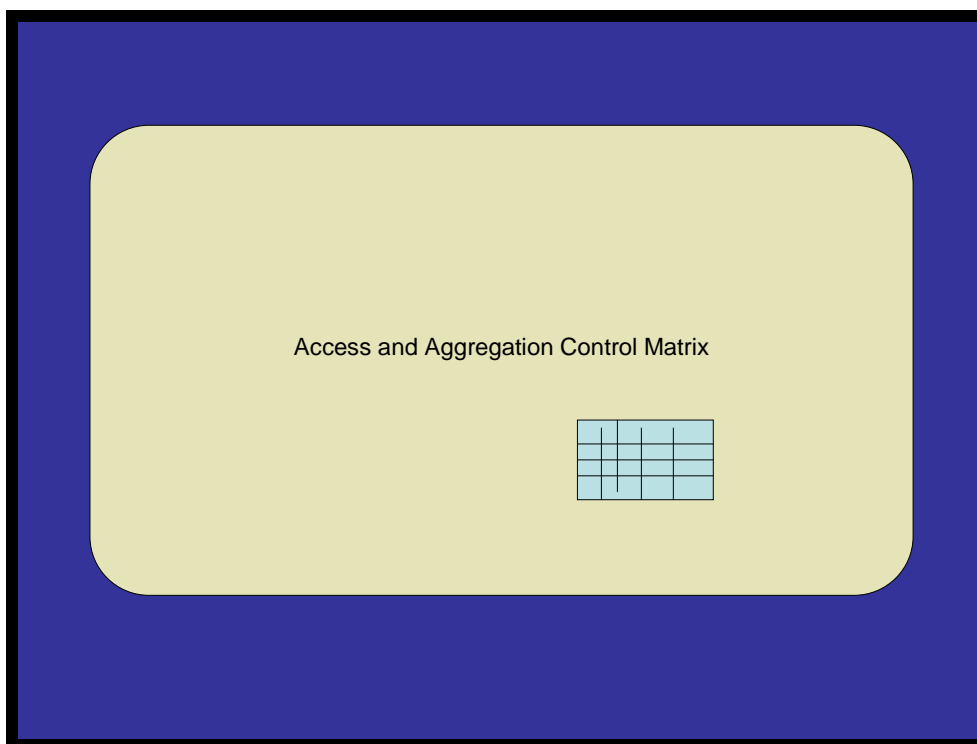


Figure 44: Layer 3 – access control

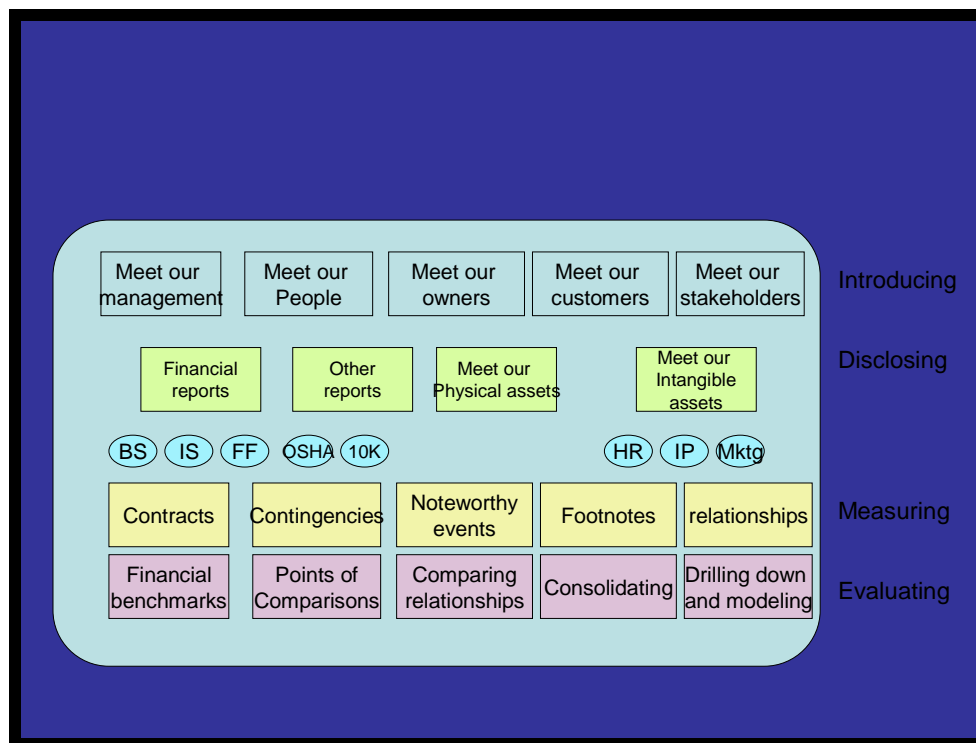
The fourth layer (Figure 45) creates a much more comprehensive set of information not typically pre-templated but focusing on areas of information. Pre-programmed special reports described in the second layer will use this layer of information in pre-organized structures. The data is organized along four dimensions: 1) introduction, 2) disclosure, 3) complex measures and 4) company provided analysis.

The **introduction** aims at providing a wide set of information about the individuals / entities that deal with the business and its value chain. Much of this information is already in SEC filings and other public sources of information. The value of this disclosure is to facilitate user access, provide a comprehensive view of who is who in the business, and provide a basis using XML derivative data for public databases. Consequently, the collection of this information will provide a coherent view of what the business is, the corporate chain of ownership, the related parties, and whether there are relationships with private entities that have non-disclosed relationships with the organization. While the SPE issue of ENRON got great disclosure, the steps taken to remedy the problem were mediocre to say the least. An organization can still own 90% of another (private) entity, be 100% of its trade relationship and be considered as separate for consolidation purposes. Within this related organization, with absolutely no similar disclosure requirements to a public company, prices can be set on a preferential basis,

extra compensation can be paid to executives, debt can be held to make the company look better, etc.

The **disclosure area** adds to the traditional financial statements a comprehensive set of disclosures of physical and intangible assets to a much restricted traditional information set. Figure 45 breaks the disclosure area into four elements: 1) traditional (enhanced) physical reports, 2) additional reports that already exist (but may be rationalized), 3) enhanced description of physical assets that may be able to support different valuation bases, and 4) a substantially expanded view of corporate intangibles<sup>41</sup>

**Figure 45: Information disclosure layer 4**



The measurement level would delve into an even softer set of business factors which are largely ignored in today's reporting which would incorporate the corporate business contracts, legal environment, business relationships, events of importance and ongoing

<sup>41</sup> Lev makes a strong point for a substantially enhanced disclosure of intangibles. The information society, with its mainly virtual characteristics, created many forms of corporate investment such as brand, employee education, affiliations, partnerships, intellectual property, etc. SFAS # 5, probably one of the most anachronistic accounting rules, forces the current expensing of most R&D expenses. The information society creates many other intangible assets of long term benefit such as R&D. Corporations increasingly invest in these assets aiming a much longer range benefits and current expense these investments. It is not surprising that the market value of corporations (which includes but disclosed physical assets but also perceptions of intangible assets) is further and further away from disclosed total assets. Consequently, to fill this gap, the EBRM has to include a wide set of intangible disclosures.



relationships. A wide range of materials exists in corporations regarding these matters which are kept internally. Particularly disturbing is the lack of disclosure of formal and informal contracts with suppliers and customers as well as emerging legal issues that may be detrimental to stock valuation. Corporate compensation based on stock price and achievement of profit goals often creates dis-functional behavior by managers. With their eye on bonus and compensation, managers legally hide legal threats; and create illusory current profits by trading the future for a current windfall and by creating relationships with trading partners, banks, insurance companies, and SPEs that are opaque, dysfunctional, and short-term oriented. Four new statements that need to be created are:

1. Statement of significant legal contingencies
2. Statement of significant contracts
3. Statement of significant events
4. Statement of significant relationships

The advent of a series of derivative XML languages dealing with the labeling of semantic items such as news pieces, PR releases, and legal events allow for the creation of a continuous reporting system that accumulates these semantic pieces in a meaningful manner.

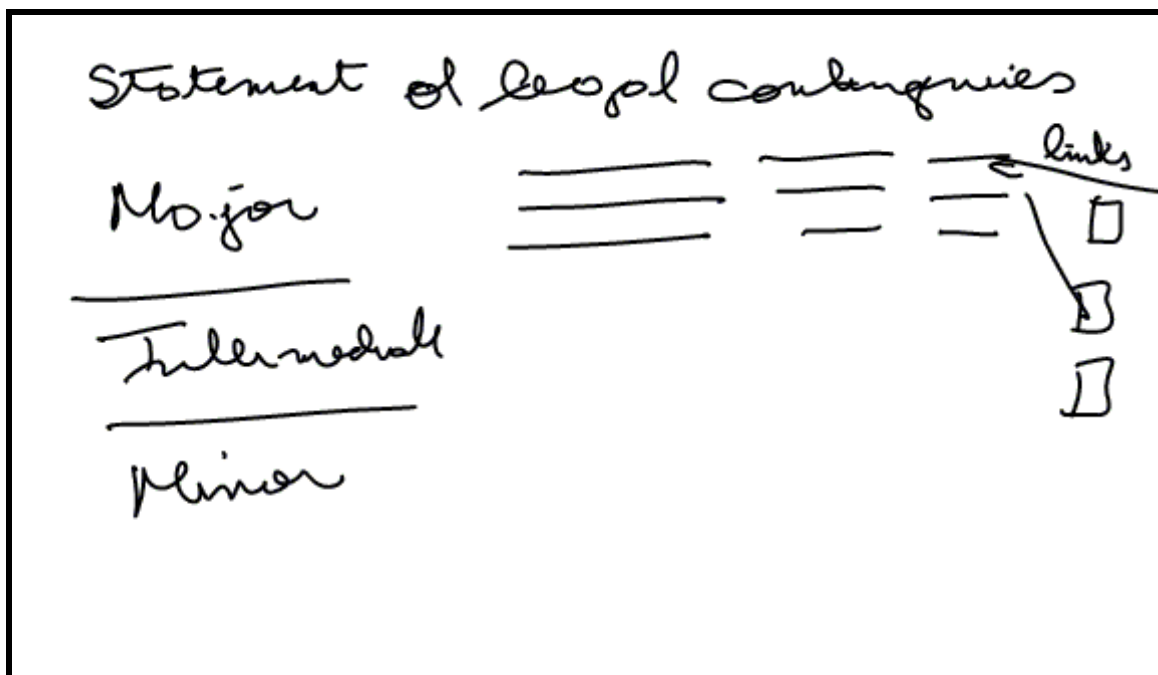


Figure 46: Statement of Legal Contingencies

Schedule of SIGNIFICANT CONTRACTS

TAXONOMY OF CONTRACTS	Value	Risk Profile	Nature
Contract 1			
Contract 2			
Set of medium size contracts			
Aggregate of small contracts			

\* Contracts of xxx nature are not included  
 \* See contracts in progress in  
 schedule ABC [hyperlink](#)

Figure 47: Statement of Significant Contracts

- Galileo incorporated opens offices in Tokyo
- James Peters promoted to corporate counsel
- Galileo acquires real estate to create a corporate recreation center
- Local 375 in meetings with corporate management for contract renewal
- Patent for new hierarchical reporting model filed by Galileo Inc.
- Etc.

**Figure 48: Statement of noteworthy events**

Both the areas of intangible measurement and disclosure as well as the areas of disclosure of relationships and contingencies require substantial research and experimentation. Companies can also use the portal as a communications device with its stakeholders to create a continuously updating Website to announce issues such as:

- Major contracts
- Important sales
- Personnel movements
- Corporate presence at selected events
- Litigation / litigation progress
- Relationship with the community
- Sustainability issues

These additional statements could be interpreted also as new types of footnotes that can be automatically built over the corporate conduct of business. Historically, paper based business reports contained formalized numeric reports, unstructured semantic footnotes and a wide set of management and particularly public relations information. This was the result of limited technology, the historical development of standards and management's natural desire for reporting opacity. Technology has dramatically changed the cost x benefit tradeoffs as well as the feasibility of other forms of disclosure. Footnotes traditionally were the product of a need for further disclosure or new disclosure requirements. However, footnotes suffer from a lack of easy comparability and often substantial opacity.

For example the ensuing text is part of footnote 16 of ENRON's year 2000 financial statement.

- In 2000 and 1999, Enron entered into transactions with limited partnerships (the Related Party) whose general partner's managing member is a senior officer of Enron. The limited partners of the Related Party are unrelated to Enron. Management believes that the terms of the transactions with the Related Party

- were reasonable compared to those which could have been negotiated with unrelated third parties.
- In 2000, Enron entered into transactions with the Related Party to hedge certain merchant investments and other assets. As part of the transactions, Enron (i) contributed to newly-formed entities (the Entities) assets valued at approximately \$1.2 billion, including \$150 million in Enron notes payable, 3.7 million restricted shares of outstanding Enron common stock and the right to receive up to 18.0 million shares of outstanding Enron common stock in March 2003 (subject to certain conditions) and (ii) transferred to the Entities assets valued at approximately \$309 million, including a \$50 million note payable and an investment in an entity that indirectly holds warrants convertible into common stock of an Enron equity method investee.

The above text is clearly not understandable by a common investor and does not have sufficient information to resolve questions related to conflict of interest, the materiality of the transaction and the nature of the entity.

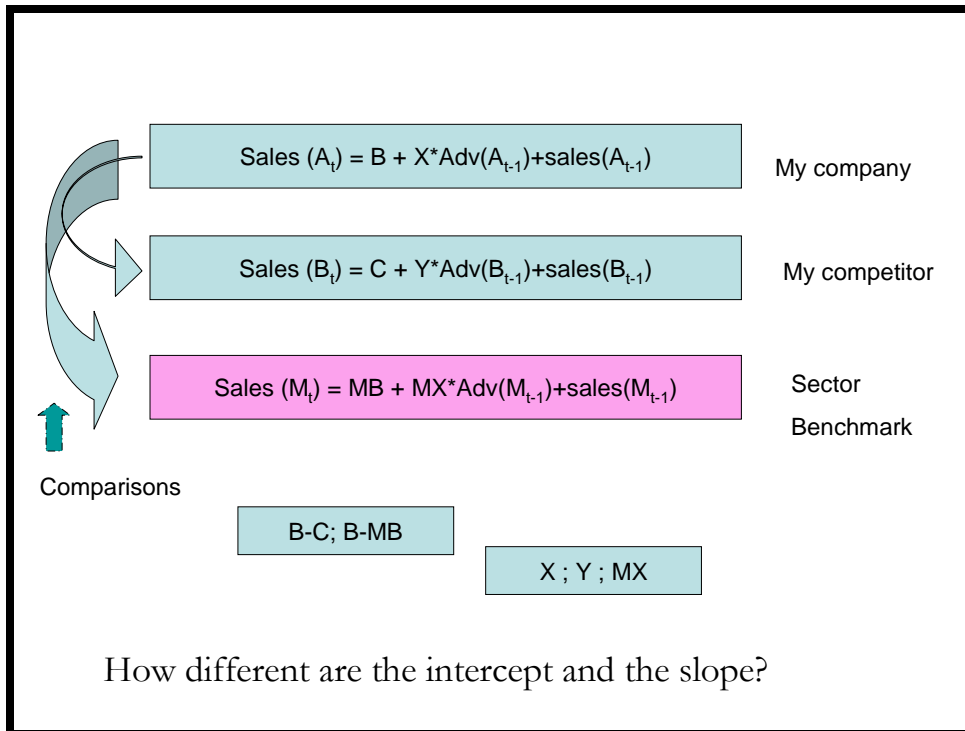
The future business report will not be on paper, will not be constrained by paucity of information, and will benefit from improved semantic parsing and tagging technologies. A taxonomy of types of footnotes, similar to the above discussion of allowable forms of organization or financial instruments is needed. Any departures from the existing taxonomy (extensions) must be submitted to financial reporting standards entities that will specify minimal information content, some basic semantic and some basic required tags. These will tell a minimalist story and create points of comparison for corporate benchmarking. Additional clarifications by semantic expressions may be allowable. This form of structured semantic disclosure will fit well into XML type tagging and will allow some degree of automatic semantic tagging. The above mentioned “measuring” level statements, such as the statement of noteworthy events, falls in this category of semi structured footnotes.

The final level of layer 4 of the reporting portal includes the concept of “evaluating” the corporate performance and the information being provided. While much of the evaluation functions can be provided by public markets, future business reports will also offer evaluation numbers and facilities. Clearly social costs are reduced and information democratization improved if corporations disclose calculations that would often be performed privately by financial players. Current disclosures of ten-years history, stock price, and some ratios are just the beginning of a wide range of evaluation numbers and tools that can be disclosed.

Financial benchmarks: classical financial ratios for each the company’s line of business on a short period basis and links to providers of comparative benchmarks.

Points of comparison: comparative benchmarks and measurements of non-financial measures such as the ones proposed later in this section. These numbers could include productivity per employee, number of employees, patents awarded, office space used, number of hires and resignations, etc.

Comparing relationships: Figure 49 proposes a level of disclosure that represents key process relationships in the organization. This analytic disclosure would allow the comparison of the operations of different organization including advertising efficiency, research efficiency, quality of receivables collection, etc.



**Figure 49: Key process relationship comparison**

Consolidating: tools for bringing together the different corporate related sectors, suppliers and related entities. This topic is further discussed later in discusses virtual entities.

Drilling down and modeling: OLAP capabilities on top of a relational database allows stakeholders to enter into some details of the organization operation and also perform “what – if” analyses as well as model along the relationships disclosed and data drawn from the user analyses.

The Business reporting portal described in this section uses technological capabilities to better describe the economic entity. It must be mentioned that it is the social compromises that ultimately determine the ultimate model. However the current mix of regulatory disclosure requirements from different entities as described in Figure 50

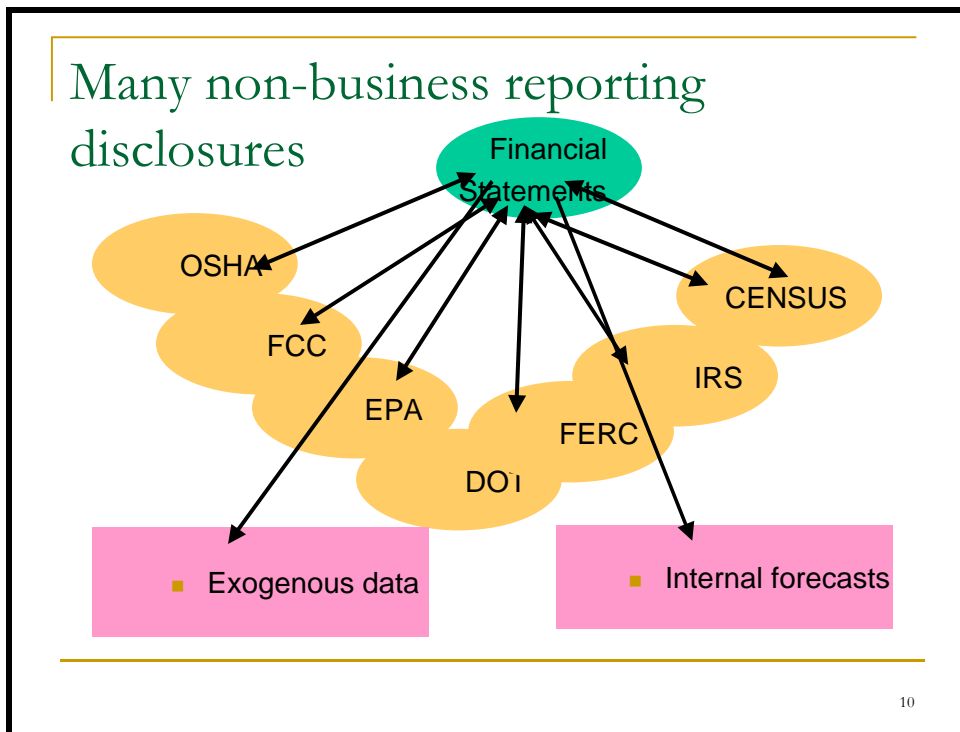


Figure 50: Multiple sources of reporting requirements and many reports

### 3.4.2 Virtual Entities

As discussed earlier, over the last 20 years accounting standard setters have tried to study and propose a coherent set of rules of consolidation (C) of the parts of a business. Listed below are some of the many problems encountered:

- Apples and oranges problems – large companies with heavy industrial and financial components (e.g. GE and GM) which blend two very distinct types of numbers into one measure with very little meaning.
- Single or multiple entity problems: -the perennial problem of determining if two entities are one (and need to be consolidated) or are different entities has been exacerbated by the development of SPEs. While statistics on the existence and nature of SPEs are not available, they are of much wider use than generally understood and are commonly used by many of the most reputable organizations in the financial markets. Many SPEs were very specifically created to separate components of a business and to manage financial reporting or risk. Much of their existence depends on contractual terms and estimates of mutual interdependence which the current accounting model is incapable of reporting.

- The ownership problem – typically the percentage of ownership of an entity has been used to determine if two entities should be consolidated. With the complexity of current financial instrument and ownership structures, where voting rights are not proportional to ownership and where many layers and types of stock exist, contractual or market relationships between two independently owned firms can make them a de-facto single firm with two reports.
- Across value chain interdependencies problem - the evolution of organizations in the 21<sup>st</sup> century will lead to substantial deconstruction of business<sup>42</sup> where using internetworking technology many functions are outsourced, partnered, or passed over to the competition. While the clean arrangement is that a very independent unit performs the outsourcing, many forms of outsourcing will exist. Adding parts creates a very false sense of reality and security as relationships are often more than their formalization.
- The consolidation method problem – once lines of business and entities to be consolidated are defined how to perform the consolidation. Traditionally based on the percentage of ownership the method of consolidation or accounting for participation varied.
- The “fuzzy nature” of organizations problem – where organizations are extended by SPEs, have intricate relationships with privately held companies, have relationships with companies in different countries with different organizational charts, different legal obligations, and lax law enforcement environment.

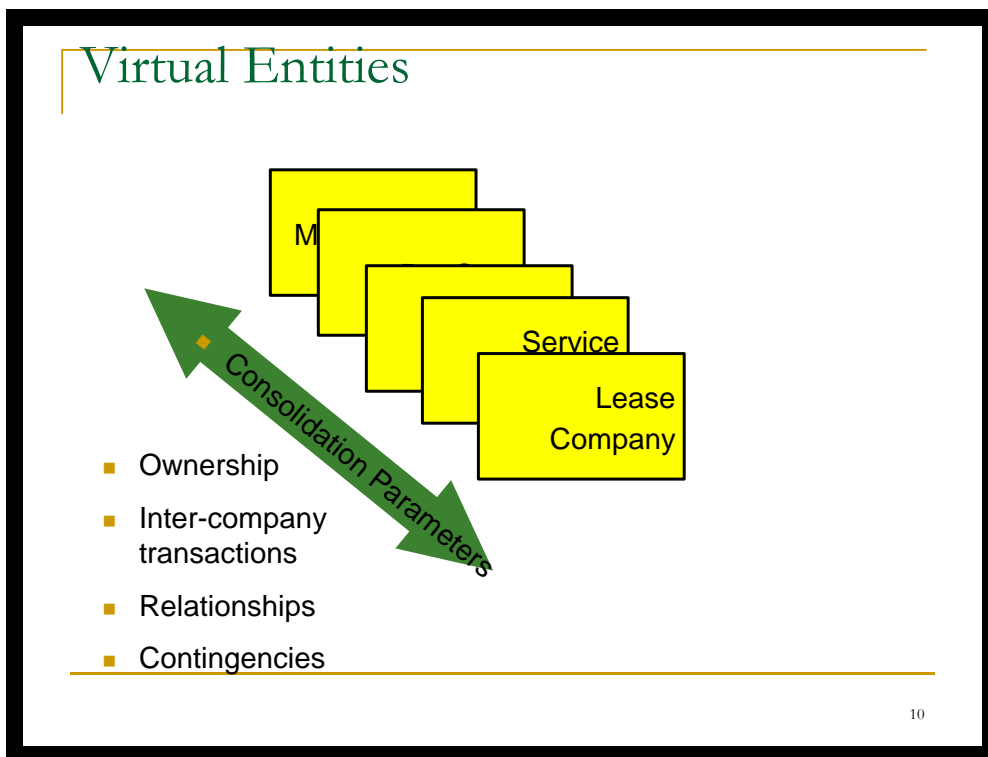
The core issues are ownership, inter and intra entity transactions, obligations for residuals and commitments over time even if not contractual. One of the reasons that the solution of the consolidation problem has eluded standard setting is that the problem is multidimensional in nature and the classic solution has focused on ownership. Furthermore is that the classic solution does not work in the information society. It could be argued that ENRON SPEs problems are both a consequence of a bad measurement model as well as a deliberate obfuscation by the firm. Enron, with its army of 600 CPAs, Arthur Anderson, McKinsey and xxx and Foster as advisers had the best minds to use a fallacious measurement model to maximize its representational deficiencies.

This problem was clear in the mind of the Jenkins Committee, and while the Jenkins report strongly suggested narrow definition and complete reporting at the line of business level, the changes effected by the FASB were limited and did not satisfy the real need of creating dynamic standards and industry bench marks for online real-time business monitoring. Comparisons among organizations should be at the sector<sup>43</sup> level not at the aggregate level where the addition of non-similar parts creates substantive confusion.

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<sup>42</sup> Greenstein and Vasarhelyi

<sup>43</sup> The concept of sector is also fuzzy at the best but in a narrow construct provides still the best segmentation basis for reporting and comparison. Just as an illustration of the sector characterization



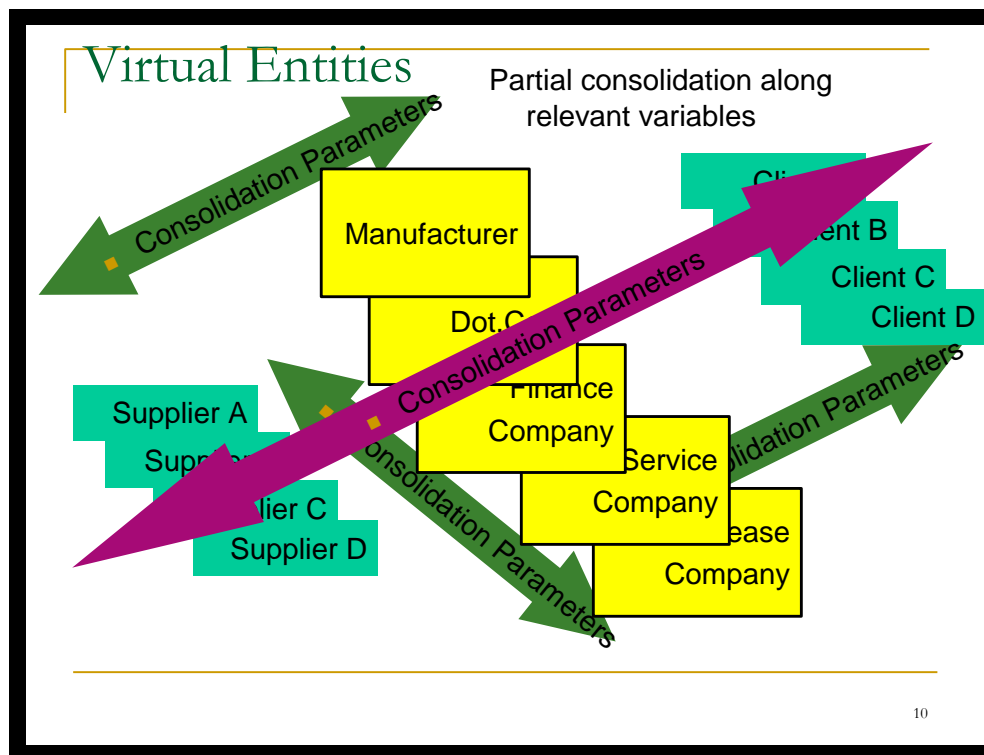
**Figure 51: The multiple entities of a business**

A new type of aggregate entity should be invented and enough disclosure detail provided to allow for income calculation and asset allocation across and along the value chain. Figure 52 represents this problem which is intractable in the modern information society.

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imagine the comparison of two computer manufacturers one with extensive manufacturing capabilities and other that out sources most of its functions except marketing and sales.





**Figure 52: Related entities along the value-chain**

“Value-chain related consolidation”(VCRC) and “consolidation of outsourcers”(COO) should not be confused with traditional financial consolidation under the equity method of accounting. New methods of understanding the deconstructed organization, supplier managed inventory, cooperating B2B chains, B2B marketplaces, and integrated supply-chains must emerge to provide these complex consolidation models. The traditional model of consolidation mainly focused on ownership relationships while current relationships are more complex and often less formalized. For example we find:

- Slave organizations, privately held, that only serve the corporate master but are not consolidated due to some form of third party ownership
- Suppliers that carry corporate inventories for which the corporation is ultimately responsible
- Outsourcers that are responsible for one main corporate process (say IT) and do not have any other source of business
- Transportation companies that serve only the corporate master
- Insurance companies and financial agents (say leasing) that are privately held and have partial ownership by the corporation or some of its owners
- Companies that have substantive holdings of company stock or in other form have correlated destinies

What is being proposed here are tools and an information infrastructure to support these tools that will allow corporate stakeholders, users of business reports to create their own **C, VCRC, COO** or other forms of consolidation. For this purpose we need:

A fine enough information structure with several dimensions associated to each cell (e.g. divisional data classified by month, cost class, revenue class). Note as described in

Sales	Sales Div A	Product 1	North	January
				February
			South	January
				February
			East	January
				February
			West	January
				February
		Product 2	North	January
				February
			South	January
				February
			East	January
				February
			West	January
				February
	Sales Div B			

- Table 2 that the combinations of this cross-classification explode very rapidly
- Public company like disclosure for privately held entities that do ‘significant’ business with the reporting entities
- Fine description of inter-company (virtual entity) transactions, relationships, contingencies
- Organizations that follow traditional formalized structures
- Public documentation of key contingencies

### 3.4.3 Points of comparison (POCs)

Core to the concepts of disclosure and information theory is the concept of comparability. Traditional financial accounting standards have focused on providing the investor with measures that can be cross-sectionally and time-series comparable. For that purpose there is standardization of unit, effort of separating the entities being reported and often the requirement of re-statement of results in a way that a time series measure can be obtained.

#### *Points of Comparison/benchmarking*

In the current scheme benchmarking can result in limited added value, the reasons are twofold:

- The reporting scheme is too aggregate, allowing companies (Intentionally, or unintentionally) to mask underline data.
- Companies have substantial discretion regarding the classification, accounting treatments and accounting estimates.

The solution is to allow stakeholders to benchmark companies based on XBRL-GL types of transactions. Doing so, will permit users to take a particular type of financial transactions and create a comparison with peer companies at a reasonable level of aggregation. This kind of aggregation can facilitate the use of models that are recalculated contemporaneously allowing stakeholders to evaluate the performance of the company and/or the reliability of the reported numbers.

To achieve comparability in a world of widely diverging reporting and process aggregation key POC metrics are to be defined

- **These will be compared time-series and cross-sectionally at the virtual entity level**
- **POCs will be single metrics, ratios, KPIs and a wide set of relationships**
- **POCs will be the key elements for analytic monitoring**
- **XBRL/GL will have to be granular enough to satisfy industry-based mandated POCs**

### *Points of comparison – POCs (as statutes)*

#### POCS

- For each major process
- For some basic assets
- For the basic liabilities

For relationships

As numbers, ratios, relationships and KPIs

helps to explain how continuous auditing and reporting enhances the capabilities of these processes. At the most basic level, the structural level, you have a number of transactions taking place in various areas of the business, and there are time lags between each (illustrated by the hourglass shapes). In the new real time economy, there is decreased latency between these processes, which makes it possible to achieve real-time or near real-time reporting.

The next level is the data level, where measurement of financial and non-financial indicators takes place, and individual pieces of data are reported with the ability to drill down to look at historical performance and compare data across business lines, products,

managers, etc. Most companies do this internally today through some form of spreadsheet analysis, but given the capabilities made possible through new systems and decreased latency between processes which we discussed before, it is now possible through constant measurement to move to the relationship level and automate the reporting of relationships between key variables (for instance),...this allows the modern manager in a real-time society to make decisions based on current relationship models in addition to historic information. The next level is analytic monitoring, where you can monitor and signal significant deviations from the norm for key performance indicators, which would indicate that a process is out of sync (such as...). And of course you still have drill down capabilities at these levels, which can be extremely powerful. Finally, continuous reporting and assurance make it possible to ensure the reliability of your systems and data, through transaction assurance, estimate assurance (on mgmt projections), compliance assurance (comp. w/GAAP), and so on, which enables you to report important business information externally as well as internally with confidence...and so, what you have in the end, is a much more robust, automated reporting process that tells you much more about the effectiveness of management, specific divisions, etc..., providing accurate, useful data on a real or near real-time basis. Furthermore, XML tagging will enable interoperability, making it possible for connections across internal and external partnering entities.

**THE SOLUTIONS<sup>44</sup>** For now, investors are left largely to their own devices to make sense of companies' numbers. Auditors -- the first line of defense against financial shenanigans -- are under scrutiny by a new oversight board, which is rewriting audit standards. Other accounting reforms have yet to take effect. The requirement in the Sarbanes-Oxley Act of July, 2002, which compels executives and directors of big companies to establish internal controls on bookkeeping and valuations underlying financial reports, won't be in full force until next year. And while the SEC's Corporation Finance Div. has started prodding companies to disclose more of their critical accounting estimates in public filings, the results so far are spotty, and many disclosures are buried in dense text. FASB is talking about revamping the income and cash-flow statements, but not for at least a couple of years.

There's plenty that regulators could do now to improve the quality of financial information. FASB should put aside some of its less pressing projects and turn its full attention to making it easier for investors to get behind companies' earnings numbers. If the form and presentation of financial statements were cleaner and more consistent, investors would be better able to spot accounting tricks. For example, earnings statements could be recast to distinguish between profits that come from selling products from those that come from ever-changing estimates. "You want to understand the subjectivity involved in these different numbers," says the CFA Institute's Walters.

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<sup>44</sup> Henry, J., "Fuzzy Numbers," Businessweek October 2004.

The statement of cash flow needs a lift, too. Regulators must change the mirror-image presentation in which increases in cash show up as negative numbers and decreases as positive. They also have to define more clearly what constitutes an operating, investing, or financing item.

And FASB should make it easier for investors to make reliable comparisons. An obvious and simple step would be for companies to present their statements of cash flows for the same periods as their earnings statements. Even better would be to show the cumulative earnings and cash flows for the previous four quarters as well. Now most companies simply compare the latest quarter's earnings with those for the same quarter a year before, but present a year-to-date statement of cash flows without a comparison. Many financial analysts rearrange company data to highlight meaningful comparisons, but they have to build special spreadsheets for the task, and they need a library of past reports to feed into them. Companies should also clearly display in tables -- not just in text -- the changes they make in reserves.

With better and more consistent information in financial statements, investors would be able to reward and punish companies based on the quality of their accounting. "Then [investors] would start providing some discipline by discounting stocks when they aren't sure what the numbers are going to be," says Lynn E. Turner, a former SEC chief accountant and now research director at Glass Lewis. What's more, auditors would be on increased alert knowing that investors are looking over their shoulders.

Because companies will be using even more estimates in the future, they'll have even more opportunities to hype their results. To avoid future blowups, investors need a clear picture of a corporation's finances. Investors shouldn't have to wait for another Enron for regulators to tackle these issues. (pp xx)

Required disclosure of related parties like dependent SPEs if not consolidated (a requirement of disclosure even for **private companies** that are SPElike and non-consolidated...) --research needed to understand all types of related entities that are of this type and are not consolidated

### 3.4.3 Non-Financials

Financial measures are a consequence of the multiple business processes of an organization. Many of the recent malfeasance events presented a substantial disconnect between process measurement and disclosed financial results. If disclosed and closely

scrutinized they would reveal weak or impossible relationships between non-financial and financial numbers. Furthermore the high level of options in financial reporting created an environment of earnings and reporting management that is often not consistent with accurate and consistent measurement. In order to keep consistency in check, a much wider set of variables must be reported in the key processes of the organization. Much research is needed to understand which processes are key drivers of other processes, what are the expected relationships, what disclosure is reasonable to make, and what variables are key in each narrowly defined industry.

The FASB in its Kolton report<sup>45</sup>, examined company *voluntary disclosures*<sup>46</sup>, electronic reporting and overlap between FASB and SEC requirements. Among their conclusions and recommendations we find:

- “Many leading companies are voluntarily disclosing an extensive amount of business information that appears to be useful in communicating information to investors.
- The importance of voluntary disclosures is expected to increase in the future because of the fast pace of change in the business environment.
- Voluntary disclosures related to matters that are important to the success of individual companies are very useful, particularly disclosures of management’s view of the company’s “critical success factors” and trends surrounding those factors.
- Although some disclosures were found about unrecognized intangible assets, **additional data about those assets would be beneficial** because of the importance of intangibles to a company’s value. Intangibles include not only those resulting from research and development but also human resources, customer relationships, innovations, and others. ...
- The metrics used by companies to manage their operations and drive their business strategies often are very useful voluntary disclosures. Those metrics should be explained and consistently disclosed from period to period to the extent they continue to be relevant to a company’s success. However, a decision to make a voluntary disclosure in one period does not obligate a continuation of that disclosure if it is no longer relevant or if a better metric becomes available.” (selections of the management overview, highlights added, p. v)

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<sup>45</sup> FASB, 2001, Improved Business reporting; Insights inot Enhancing Voluntary Business Disclosures, Paul Kolton chairman.

<sup>46</sup> For the Kolton Report, “the term *voluntary disclosure* describes disclosures, primarily outside the financial statements, that is not explicitly required by GAAP or an SEC rule. However, it is recognized that many of these “voluntary disclosures” are made to comply with the SEC’s requirements concerning description of a business and management’s discussion and analysis of financial condition and results of operations.” (p.4)

While the emphasis of the Kolton report is on “voluntary disclosure” its identifies a set of information viewed as valuable for better business reporting that companies are disclosing.

**“ Examples of business data disclosed regarding *sales* are:**

- Details of growth in market share in all major regions and countries (Automobiles)\*
- Table of monthly orders broken down by strategic business unit and by product category (Computer Systems)
- Information about the company’s sales and marketing teams, including number of experienced professionals, backgrounds, sales force productivity, and image (Pharmaceuticals)
- Discussion of change in approach to an important overseas region’s sales strategy (Foods).

\*The company’s industry is identified in parentheses.

**Examples of business data disclosed regarding *products* are:**

- Information about the rollout of new products and the expansion of high-growth product lines (Computer Systems)
- Quarterly changes in physical volume of product by business group and by geographic location of customer, expressed as percentages (Chemicals)
- Description of products in development and product agreements with strategic alliance partners (Pharmaceuticals)
- The number of physicians prescribing specific products, the total number of prescriptions written for specific products, and the number of patients currently being prescribed for specific products (Pharmaceuticals).

**Examples of business data disclosed regarding *operations* are:**

- Quarterly capacity utilization of production facilities (Automobiles)
- Plant capacities by product, including the past year’s additions to those capacities and the additions scheduled for the upcoming year (Chemicals)
- Productivity gains over several years in terms of sales per employee and earnings before interest and taxes (EBIT) per employee (Chemicals)
- Initial production rates from new fields and test flow rates for new exploration wells (Oil— Integrated Domestic)
- Discussion of expanded presence in international locations through joint ventures (Food)
- Description of labor contracts in the United States and Europe (Automobiles)
- The percentage of garments sewn offshore (Textile—Apparel)
- The reduction in full-time employees during the year and the number of full-time equivalent employees at year-end (Regional Banks)
- The percentage of non-interest operating costs “taken out” after integration of the operations of new acquisitions (Regional Banks)

**Examples of business data disclosed regarding *financial performance* are:**

- Graph depicting the resiliency of earnings per share to price changes over several years that demonstrates the company’s ability to maintain earnings in the face of price volatility (Chemicals)
- Company’s percentage return on invested capital compared with that of the industry, and information about stock price performance as compared with certain competitors (Computer Systems)
- A good discussion of actions taken and expected outcomes by a company in a financial “turnaround” situation (Computer Systems).” (p.6-8)”

The key aspects of the Galileo model are its use of a technologically aided reporting system and a wide range of non-financial variables related to the more traditional disclosures. Much information of this type is already disclosed in one of the many required corporate disclosures. However, since the reporting organization has substantially evolved in nature, functions and business processes it needs to be represented in a different form. Among the examples of non-financial variables that may be disclosed in the Galileo model may include many of the factors discriminated in appendix A. However it is important to note that the most important of these variables are the ones that can be somehow related to financial values, timing, as well as some measurement of relationships. However it is quite likely that the ERS corporate valuation model includes a substantial number of nominal or ordinal measures that respond to the buyers or sellers of shares, the providers of loans and other market factors. The Galileo model includes many of these variables encompassing a minimum of disclosures (points of comparison discussed below) and content on the industry being considered.

### *Sustainability*

In general terms the GRI<sup>47</sup> has laid out a very detailed framework for sustainability reporting<sup>48</sup>. It has also discussed the boundaries between financial corporate reporting and sustainability reporting. This discussion is presented in Figure 53 from the GRI reporting guidelines.

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<sup>47</sup> Global Reporting Initiative, Reporting Guidelines.

<sup>48</sup> [http://www.globalreporting.org/guidelines/2002/gri\\_2002\\_guidelines.pdf](http://www.globalreporting.org/guidelines/2002/gri_2002_guidelines.pdf)



### Selecting Additional Content Through Engaging Stakeholders

Compared with financial reporting, which is targeted primarily at one key stakeholder—the shareholder—sustainability reporting has a large and diverse audience. Stakeholder engagement plays an important role in helping to ensure that a report achieves its primary purpose: providing information that meets the needs of the organisation’s stakeholders. GRI reporters are expected to use these *Guidelines* (Part C, Sections 1 to 3 and core indicators from Section 5) in addition to sector supplements (if available) as the basis for their report.

The reporting elements and indicators in the *Guidelines* were developed through an extensive multi-stakeholder, consultative process. However, the inclusion of information (including performance indicators) identified through stakeholder consultation is a critical additional step in furthering the utility of an organisation’s sustainability report; it is also one of the fundamental principles underlying GRI reporting (see Part B on Inclusiveness).

Since stakeholder consultation often involves a range of parallel discussions with different constituencies, it is important to document the interactions that result in the organisation’s selection of indicators and to explain these in the report. While GRI emphasises the importance of stakeholder feedback in drafting reports, it does not offer specific guidance on how to conduct stakeholder engagement. Many guidance documents and case studies on this subject are available elsewhere.

**Figure 53: GRI’s recommendation relative the audience of sustainability reporting**

GRI prescribes a set on information principles analogous to the ones discussed above in this paper. Their set, while not based on information theory includes

- Transparency
- Inclusiveness
- Auditability
- Completeness
- Relevance
- Sustainability context
- Accuracy
- Neutrality
- Comparability
- Clarity
- Timeliness

The GRI framework is a very comprehensive information set which must contain:

- vision and strategy
- profile of the company
- governance structure and management systems
- GRI content index
- Performance indicators
  - Economic performance indicators
  - Environmental performance indicators
  - Social performance indicators

Hundreds of organizations have prepared “sustainability reports” along these guidelines which are not un-similar to the Galileo principles.

However Galileo and GRI have substantive differences:

#### Limitations

- GRI does not attempt to create an integrated framework to relate the different processes of the business
- GRI has also turned to be the regular PR exercise that financial reporting is with glossy pictures and rich in platitudes. ☺

While GRI is making an effort to create some form of technical protocols (

- Figure 54) it is still very early in this process and has not clearly embraced either the XML standard, nor XBRL, nor has dealt with the problems of creating usable taxonomies, or defining points of comparison.
- GRI is very technology poor facing the same problems of paper based reporting of the amorphous, ill boundaried reporting entity
- GRI, while not forbidding it, does not present a framework for user to manage their information and use it in their analysis (databased, OLAP)
- GRI has a one solution for all stakeholders not multiple reporting schemata facilitated by technology
- GRI does not deal with the problems generated by “legal and financial engineering”
- GRI has not addressed some of the key reporting problems that are not only financial, for example the reporting entity (SPEs, foreign subsidiaries, related-entities with no formal ties).

#### Contributions

- GRI has expanded substantially the scope of reporting to non-financial variables
- GRI has understood the need to expand the scope of report addressees from investors (sec act of 33/34) to stakeholders

- GRI specified a much needed set of information parameters from which information theory considerations can be drawn ☺
- GRI managed to get a large set of corporations to report on a somewhat related basis. From these reports some form of empirically based environmental reporting taxonomy can be drawn, or using GRI as a framework taxonomies for basic processes, point of comparisons could be specified.

### G3 Update On: Technical Protocols

20 April 2005

The development of a standard format in which to present Technical Protocols is one of the objectives of the G3 plan, and involves preparing a common set of background information for all the indicators regarding the technical aspects of answering each one. The need to have a complete set of Technical Protocols was identified in order to bring reporters to a more similar understanding of each indicator, thus helping to improve report credibility and consistency. This will:

- Lead to greater report comparability
- Increase the ease of auditability of reports

A complete set of Technical Protocols to accompany the indicators will go a long way towards helping reporters to better understand and use the Guidelines, both by providing direct advice and by creating a more methodologically rigorous framework.

Currently, first drafts of Technical Protocols for all the existing GRI indicators are now feeding into G3 activities, specifically the Clarity and Purpose of the Indicators working group that is part of the Guidelines Innovation workstream.

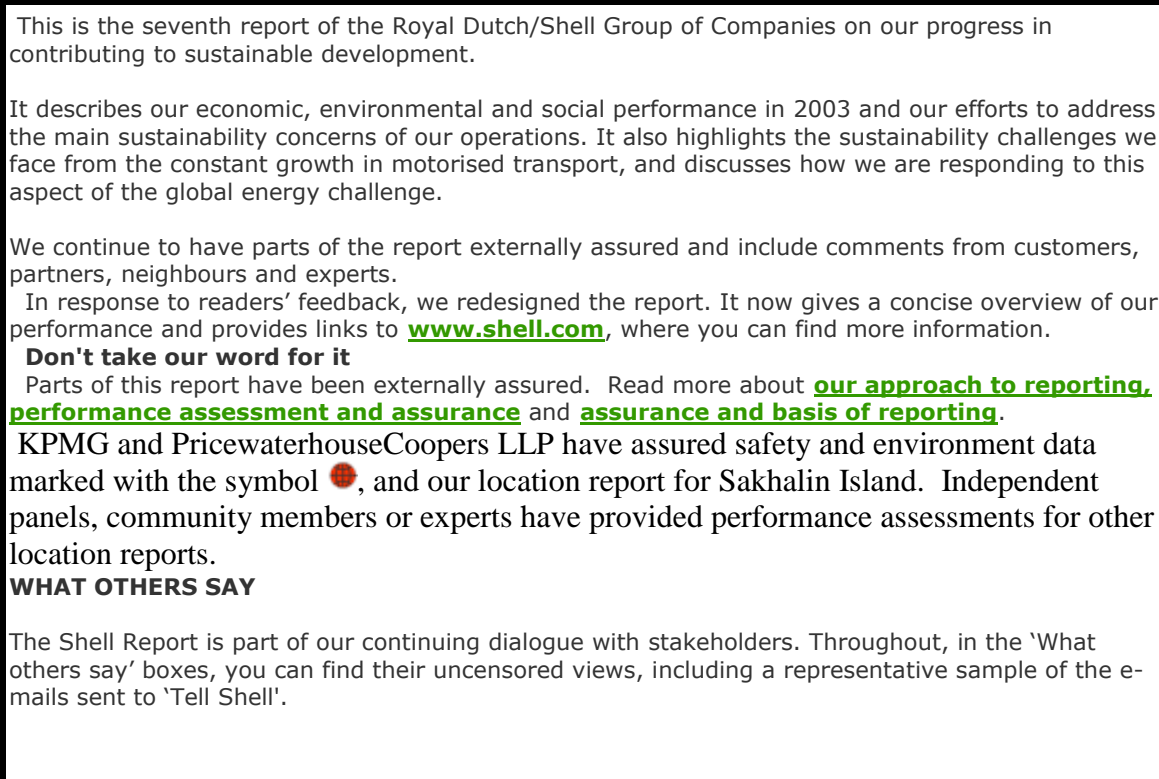
The draft Protocol template that is now being considered has sections on the following:

- Scope/intention
- Sustainability/business relevance
- Definitions
- Compilation Methodology
- Presentation
- Documentation

For more details on what these sections will include, and to download a sample draft Technical Protocol please visit the new G3 Technical Protocol webpage by using the link to the right.

**Figure 54: GRI technical standard**

GRI has also brought to light the need for assurance of non-financial information and most of all awareness of companies need to assess their environmental impact.



**Figure 55: Cover of the Shell Sustainability report 2003**

While the sustainability reporting issue may be over-arching all other concepts of non-financial reporting it is desirable to focus down of some of these concepts as additional items that eventually may or may-not be included into a sustainability (a la GRI) reporting framework. The ensuing non-financial variables are mentioned as a wide set of possible disclosures.

### ***A Methodology for determining disclosures and points of comparison***

For a more specific set of Galileo related variables specific studies for each of the reported areas must (will) be performed. Each of these studies should:

- Survey corporate annual reports for a sample of outstanding disclosures to be listed and to serve the basis of a reporting taxonomy.
- Construct a table of reported concepts and variables with the variables and concepts in the rows and companies in the columns (a la Appendix C)
  - Relationships between these would be formalized by creating a hierarchical taxonomy still with the table format. In particular, hierarchical

relationships should be identified such that employees in a geographic area roll up to total number of employees or the total numbers on the cells of an employee tenure and age table would roll up to total employees.

- Experts would be consulted on the requirements by regulatory organizations
- Reports to these organizations would be tabulated and their requirements tabled to this effort
- Key reporting values (numbers and concepts) would be identified with hierarchies of importance. These values could be nominal, ordinal, cardinal, or ratio variables depending on the nature of the process. For example number of employees, job categories of employees (e.g. welders, line foremen, engineers, etc.), cleanliness of the workplace (dirty, clean, spotless), etc.
- Key required POCs would be suggested

### *Conceptualization of the Building Blocks*

Under the more encompassing concept of sustainability, narrower processes and concepts can be measured and specified. As discussed earlier the objective of including additional financial variables can be summarized as:

1. Creating a more objective valuation model of the firm, where the current quantitative models can be defined as:

**MARKET VALUATION**

$$MV = f(a + B_1 a_1 + B_2 a_2 + \dots + B_n a_n) \quad \text{traditional}$$

$$MV = f(a + B_1 a_1 + B_2 a_2 + \dots + B_n a_n + \underbrace{B_{n+1} b_1 + B_{n+2} b_2 + \dots + B_m b_m}_{\text{Non Financial POC}})$$

where

$MV \rightarrow$  Market value of the entity

$a_i \rightarrow$  Financial Accounting Variables (selected)

$b_j \rightarrow$  Non-financial Variables (selected) (Points of Comparison)

There is substantial empirical evidence that the market valuation of companies have been less and less related to financial disclosures<sup>49</sup> over time (lev, xxx)., There is also some evidence (xxx what) that the large remainder on non-financial variable explained

<sup>49</sup> Most recent studies had less than 10% of the valuation of companies explained by financial variables.

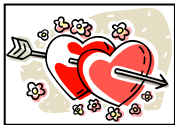
variance is explained both by systemic measures of the firm (objective data from different reports, insider information, news-pieces) as well as external variables relative to the industry and international events.

The emergence of a more systematic approach to multi-process measurement can have two complementary effects: 1) increase the consensus on the value of variables judged intuitively by investors and analysis leading to 2) a more rationality and less variance in the market valuation of stocks.

2. Allowing for the creation of a third and fourth level of reporting as described in Figure 9 that link the different wealth generation processes of the entity

Consequently the different business processes must have their own set of measurements (POCs) that are representative of the process and there will be relationships among these processes.

### ***Sample Non-Financial Process Measurements***



This are of the paper needs to be researched and built up into a comprehensive list of potential non-financial measurements that is gets too large has to go into an appendix.  
Add Kotler variables

### **Marketing**

- Channels and their contribution
- Supplier managed inventory – chain of supply
- Marketing capitalization
- Distribution sales and marketing strategy
- Advertising per product line
- Expected relationships per product line

### **Contractual parameters**

#### *Formal contracts*

- A taxonomy of contracts
- Breakdown of contracts by taxon and amount

#### *Non-contractual contingencies*

**Reserves**

Natural resource reserves

Other types of reserves?

**R&D**

Product R&D strategy

IP owned

Other R&D investment

Products under development

Intellectual Property

FASB # 2 left a major vacuum in information about corporate research and development. The basic assumption that R&D is a current expense is basically flawed. Companies would not invest in R&D if they thought that there were no benefits and the basic

**Manufacturing**

Customer base

Markets

Federal regulations environmental compliance

Plant capacity

Quality indices

**Human resources**

# of Employees

Employee tenancy matrix from pensions

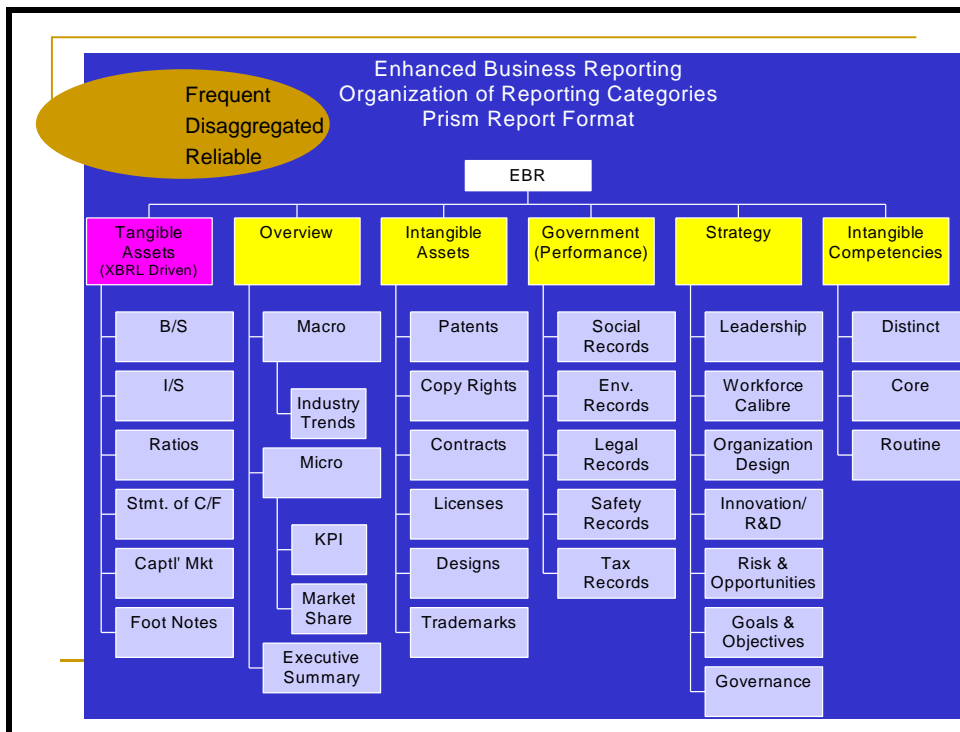
Employee competency matrix

Investment in employee education matrix

Employee promotion matrix

The inclusion of non-financial variable into the structure of reporting and the advent of real-time (internal and /or external) reporting creates an entire new domain for analytic technologies that affect not only external reporting and assurance but specially management through real-time monitoring and control. Some of these possibilities are shown in **Figure 63**.

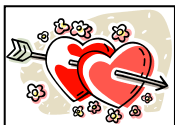




**Figure 56: Non- financial data**

Many of the non-financial measurements here discussed are today part of the large set of reports that corporations need to manage its business and often are required by local, state or federal regulation. (Figure 57) For example the filings with the PGC (check this fact xxx) closely relate to the corporations pension disclosure and offer much data that would be part of the non-financial human resource data. OSHA disclosures may have some overlap with the advocated sustainability reports. Other state and local requirements contain some of the suggested non-financial data also related to the environment,

Here we need to substantially expand this part of the study. We maybe able to draw on the findings of the reporting duplication task force and we may have to go seriously into a survey of certain companies to understand: OSHA, PGC, FCC, FTC, IRS, Census, NYSE, NASDAQ, state and locality disclosures. A taxonomy of required disclosures, its contingencies (who discloses, how often, level of aggregation, segment breakdown requirements, state related required disclosure). This is a huge study worthwhile even without the Galileo context. However very very boring ☹.



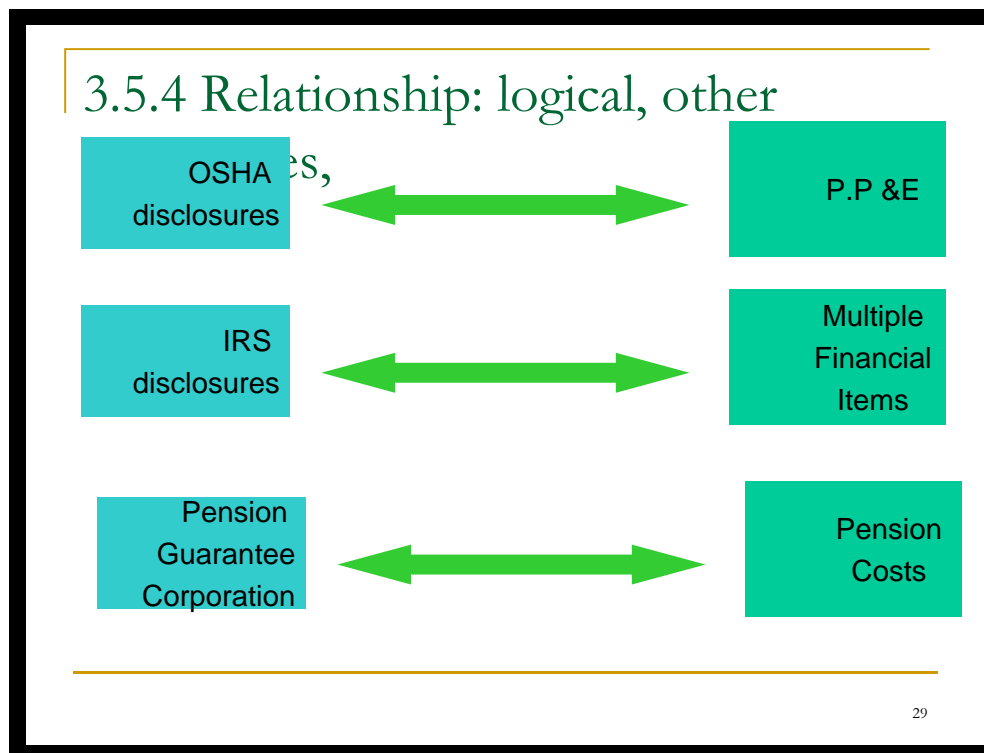


Figure 57: statutory requirements as inputs to non-financial disclosures

Different alternatives exist for dealing with redundant requirement from different sources<sup>50</sup>.

1. The most desirable (but unlikely) would be to enact a major reformulation of all local, state, federal, international, inter-agency requirements.
2. A second approach would be to implement individual efforts to create universal taxonomies of disclosure which would at least create homogeneous requirements in terms of aggregation, level of disclosure, treatment of variables, etc.
3. The third approach would be to use web technology to have a core reporting platform as proposed in this study through the xxxxxx.

The inclusion of non-financial variables into the structure of reporting creates a broad set of new reporting alternatives and ratios that have their own structures of logic. For example:

1. Pension liabilities, workforce size, personnel turnover ratios, pension funding, return on invested assets, health benefits, post employments benefits
2. Inventories, cost of goods sold, manufacturing ratios, etc
3. Supply chain, inventory of the suppliers and client
4. salesman report on leads and progress on sales, advertising, sales, deliveries, post-sale care, care based sales
5. sales, accounts receivables, bad debts, cash collections, deliveries

<sup>50</sup> The fact that the FASB has set in motion an effort of on standard organization and rationalization (need the official FASB title for the effort) support the perception that, even only in the accounting domain, there is substantial overlap and disorganization on the plethora of reporting requirements.

6. cc
7. ccc
8. cc

Figure 58 (pensions) and Figure 59 (supply chain) illustrate these new reporting alternatives

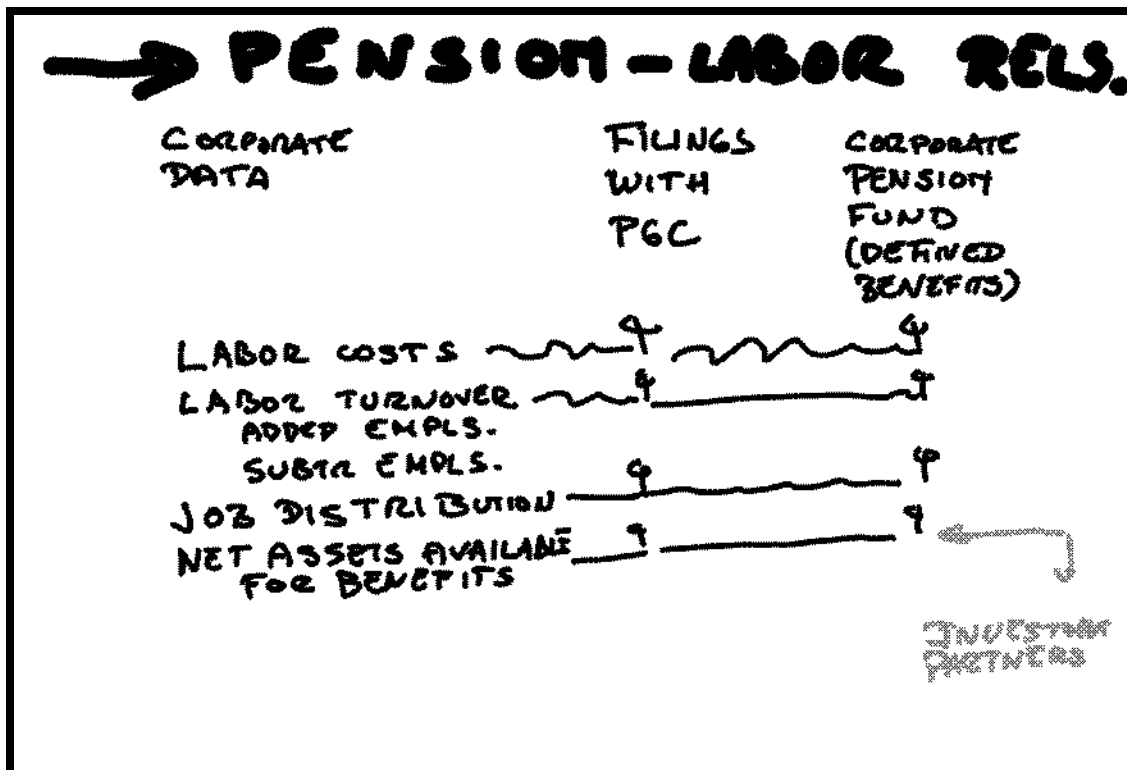
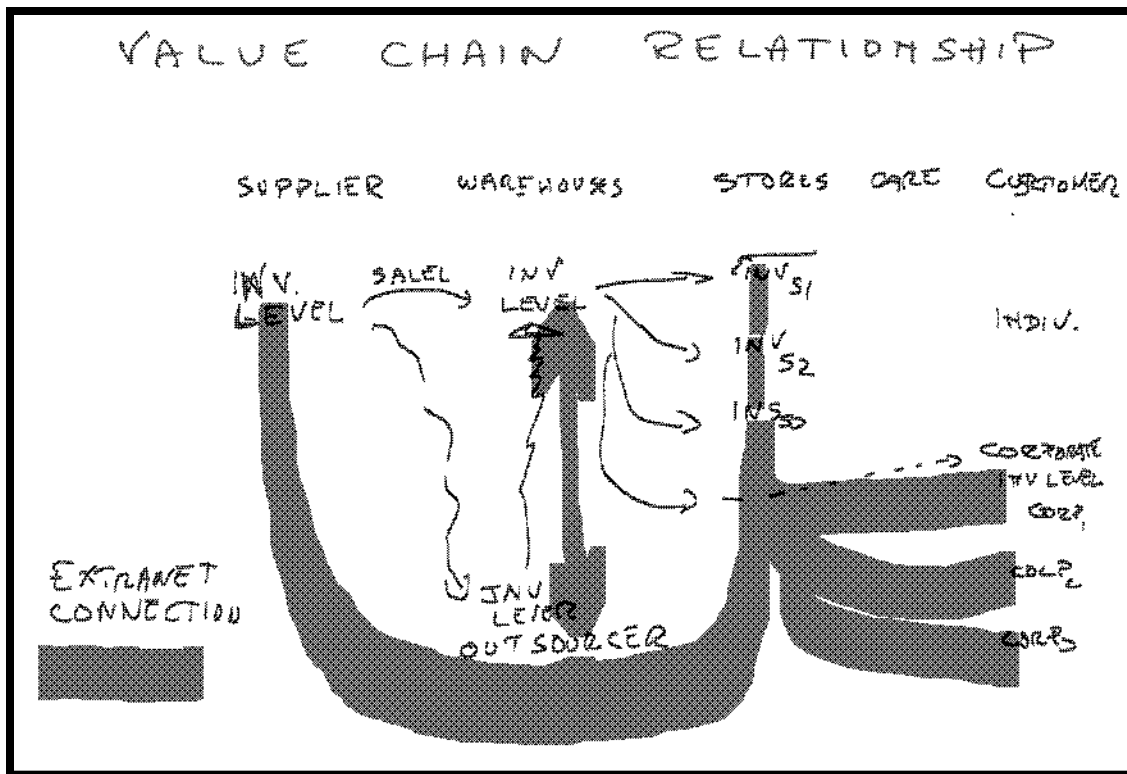


Figure 58: pension financial non-financial relationships

In addition to non-financial variables the advent of real-time (internal and/or external) reporting also creates an entire new domain for analytic technologies including alarming, that affect not only external reporting and assurance but specially management through real-time monitoring and control. For example:

1. real-time reporting of orders already helps supplier managed inventories being controlled by suppliers. A layered report, with more detail than Figure 59, explaining inventories at the different stages of the supply chain including outsourcers, suppliers, different manufacturing facilities is illustrated in Figure 61
2. real time reporting on human resources elements a la displayed in **Figure 63**



**Figure 59: Financial x non-financial relationships across the value chain**

Some of these possibilities are shown in **Figure 63** however focused on real-time analytics and its relationships taking real time analytics across processes. The richness of exploring relationships cannot be lost on focusing on external disclosure reports. As discussed earlier, essential for a monitoring and control view of the world and a technologically enriched disclosure model, is a continuum of business measurement to be used mainly for internal management, internal controls, and statutory recording. Progressively, however, certain reports are to be used in some externally shared functions such as data sharing on extranets (inventory levels, project progress and synchronization, cash management, transaction confirmation, etc.), some confidential reports to banks and insurance companies, some reports to other outsource and consulting relationships, some private reports to government (e.g. pension, census, internal revenue, state taxes, etc.) and then a certain degree of information sharing across many dimensional cuts to external parties of various types controlled by style sheets and user queries to a certain degree of drill down. A different view of the world must be derived where layer 3 of the information portal (Figure 44) controls access thru secure access technology, protocols of allowable disaggregation, protocols of allowable dimensional cut (for example certain suppliers will only be able to see cuts focusing in one geographic dimension, and data from the last 24 months but to the aggregate inventory of individual SKU level), and other access and information dimension controls are performed. For this to be possible

Managerial and financial accounting are progressively blending into a continuum of information being provided on a need-to-know basis to stakeholders of business

some degree of reformulation and/or clarification of SEC's regulation FD must be issued. While regulation FD aimed to prevent private disclosure of information to preferred parties modern information technology is essentially about sharing information, and managing what information is shared, among partners in the value chain. One of these value chain partners is the investors (naïve and sophisticated) but there are many other stakeholders that must be eventually fed with data. Furthermore the Managerial and financial accounting are progressively

blending into a continuum of information being provided on a need-to-know basis to stakeholders of business

It is important to understand the multi-dimensional continuum of atomistic to aggregate reporting as also going from our current managerial reporting to the traditional financial reporting now enhanced by the GDM.

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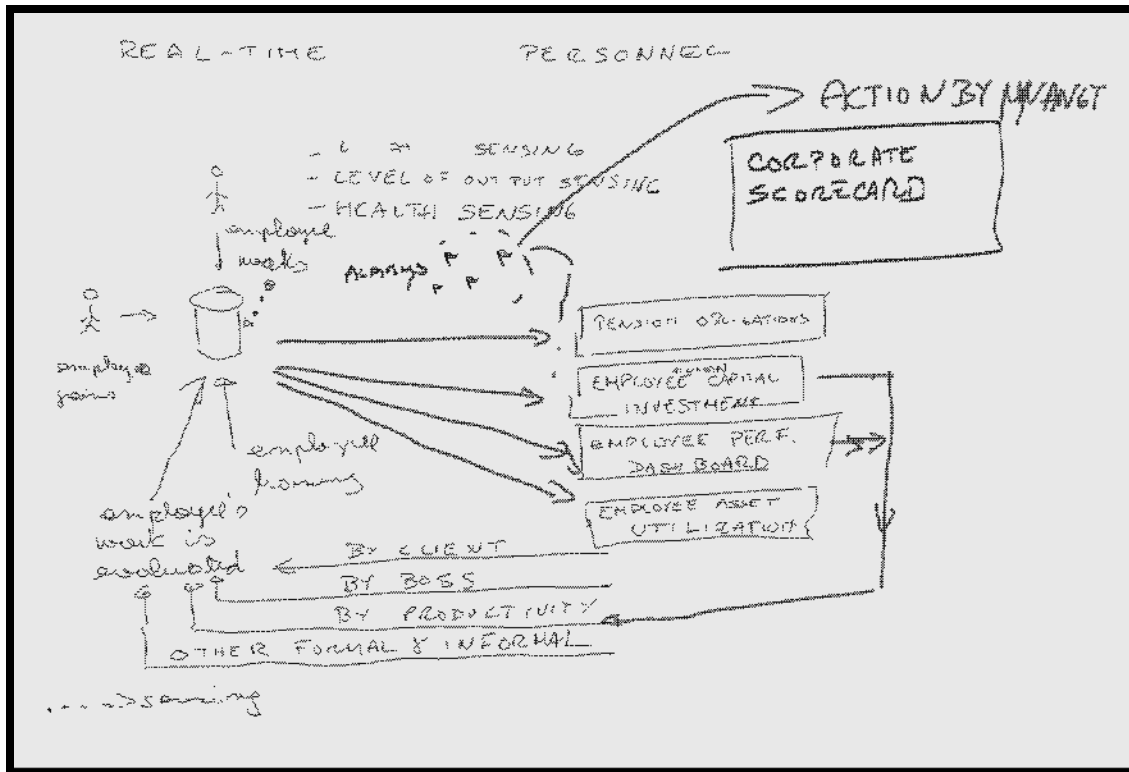


Figure 60: Real-time HR relationships

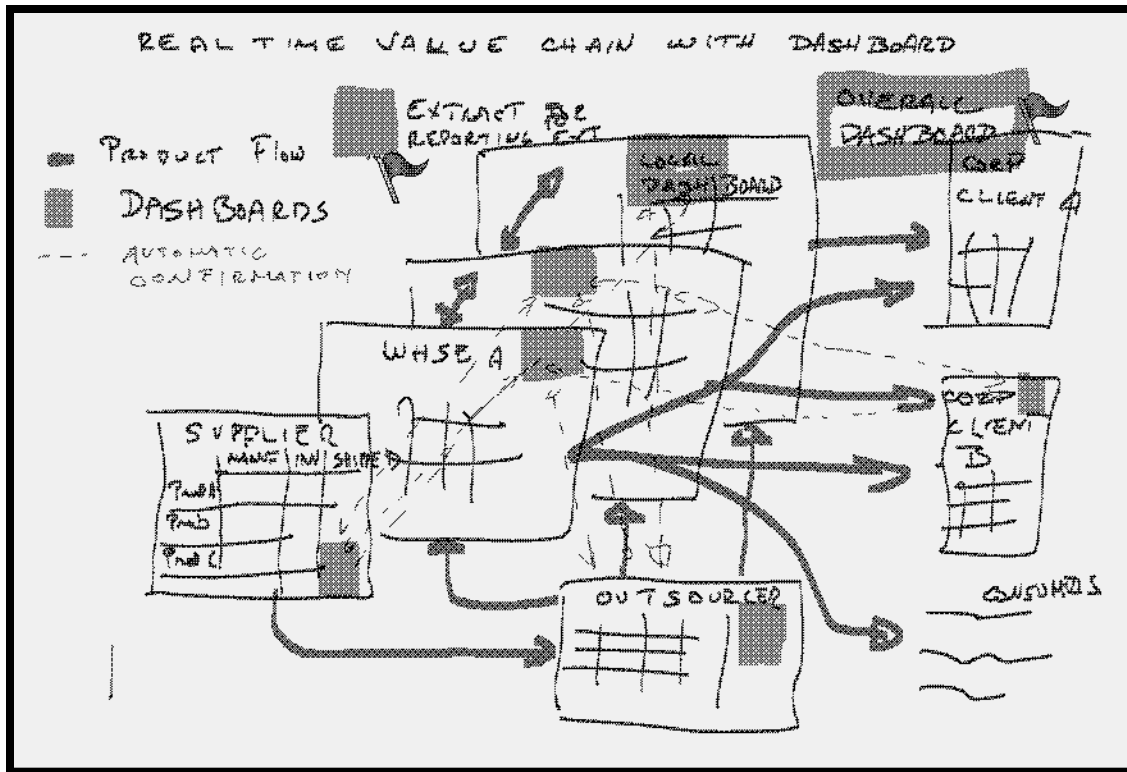


Figure 61: Real-time inventory value chain with dashboard

### 3.4.5 Relationships Reporting<sup>51</sup>

The two major content enhancements of the business reporting model being proposed are 1) a multitude of non-financial variables and 2) the disclosure of relationships between variables that can be imagined as the formula level of a spreadsheet.

#### 3.4.5.1 Internal and External relationship Disclosure

The GDM has two levels of disclosure that focus on relationships but the overarching view of this type of disclosure encompasses endogenous and exogenous relationship generation. **Internal source relationship disclosure (ISRD)** implies that the business organization calculates, supports, and discloses relationships relevant to the business report. **External source relationship disclosure happens (ESRD)** when third parties

<sup>51</sup> This discussion is loosely based on Kogan, Alles, Vasarhelyi & Wu, Continuity Equations, Working Paper, CARLAB, Rutgers Business School, 2005.

disclose perceived relationships such as industry benchmarks, value chain structures, or observed spurious relationships.

While it has been argued that it is not the role of the business entity (ISR) to disclose relationships that are observed, it is clear that there are substantial advantages to doing so, particularly for the availability of internal information as well as for the insight on the nature and calculation of its estimates.

Information intermediaries (ESR) on the other hand will piece together information from many sources to disclose some relationships, in particular benchmarks or across entity views of business.

Obviously mixed disclosures that include externally (and independently) derived relationships with external benchmarks will also evolve.

### ***3.4.5.2 Types of relationships***

These relationships can be structural, empirical or comparative in the form of sector benchmarks.

**Structural relationships:** represent actual physical relationships between process elements. For example:

$$AR_t = AR_{t-1} + \text{sales on credit}_t + \text{collected receivables}_t + \text{written down debt}_t$$

Where  $AR_t$  is account receivables in period  $t$

**Empirical relationships:** represent observed relationships between variables most likely statistical in nature. For example:

$$\Delta \text{Cash}_{ts} = 0.4 * \text{Sales}_t \text{ and } \Delta AR_{ts} = 0.6 * \text{Sales}_t$$

Where  $\Delta \text{Cash}_{ts}$  is change in cash attributable to sales

Where  $\Delta AR_{ts}$  is change in accounts receivable attributable to sales

**Comparative relationships:** where relationships are defined in terms of benchmarks or comparisons

$$\beta \text{ AdEf} = \sum \text{AdEf}_i / n$$

Where **benchmark advertising efficiency** (AdEf) equals the summation of the advertising efficiencies of the companies in the sector divided by  $n$  the number of companies in the sector.

Models of relationships (analytics) can be of many forms:

- A fixed number (normative or empirically derived)



- An adjusted number with some form of analytic related to seasonality , hierarchy, or structure relationship
- A statistical representation
- A nominal characteristic (e.g yellow)
- An ordinal relationship (e.g.  $AdEf < 1.0$  )
- A binary representation (e.g. 0 or 1; yes or no)
- Etc.

Structural relationships can be represented by continuity equations and may represent:

1. Reconciliation structures
2. Semi deterministic relationships
3. Structures across processes
4. Empirical relationships across processes
5. Empirical relationships of a high level among KPIs

Continuity equations are used as modeling methods both at levels 3 and 4. A continuity equation must be measurable if it is to be of use in reporting, and because a business process is a set of related activities, and not a description of an activity in isolation, the continuity equation must indeed be an “equation” in the sense of relating various business metrics to each other. The metrics represent the auditor’s ways of measuring the underlying activities, while the continuity equation is a model built representing the relationship between those activities as given by the business process. As we shall see, continuity equations may have to be combined into systems of equations in order to try and capture the complexity of interrelated business processes

**Continuity Equation:** A measurable representation of a business process used as a benchmark in order to provide assurance about the integrity of that process.

### *3.4.5.3 Types of Structural relationships*

There are an infinite number of business processes that can be defined, and the auditor cannot model all of them using continuity equations, and indeed, does not need to. Business reporting focuses on the examination of the key processes that define a business, and these, in turn, will depend on the company’s strategy, its product space, competitive environment and current financial condition and history. For example, many companies have now implemented Balanced Scorecards that attempt to provide an overall strategic map for the company, linking such internal measures as employee training and innovation to external measures such as customer satisfaction and, ultimately, to profits. These companies have already made a determination of their

critical processes and relationships, and so business reporting can simply make use of that analysis.

In particular, it needs to be kept in mind that while certain important indicators of business processes can be implicit and conceptual (for example, “customer satisfaction is important because it ultimately drives profits”), continuity equations are meant to be used in tests of actual evidence. That measurement aspect of continuity equations is why they are not synonymous with a business process, but only a measurable representation of one. In other words, the continuity equation relates the metrics, while the business process (level 1) is the underlying set of activities, and so the continuity equation is a function not only of the characteristics of that business process, but of the way in which that process is measured.

Let us first examine the different types of business processes. These can be classified on a variety of dimensions, which together form a classification matrix:

**Endogenous or Exogenous:** Endogenous processes are ones determined by underlying technological or institutional constraints, and so are under the control of the company, while exogenous processes are ones whose outcomes depend on the actions of other parties. Thus the production function is an endogenous process, while company strategy is based upon hypotheses about why a consumer would purchase the company’s products. Accounting principles determine many endogenous relationships between financial transactions, such as reconciliations across accounts. Outsourcing relationships and SPE’s muddled the clarity of this classification.

**Degree of Uncertainty:** Closely related to the prior classification is the degree of uncertainty of the process. We define uncertainty over a continuum because there are very few processes that are entirely certain. Even such endogenous processes as production functions will have normal variation in output, while exogenous processes are hypothesized relationships to begin with, and so have inherent uncertainty. Business process uncertainty will carry through to the continuity equation built upon it, and the nature of that process will also affect the level of measurement uncertainty of the continuity equation itself.

**Financial or Non Financial:** Continuity equations based on the accounting relationships, such as reconciliations, are financial in nature, by definition. While an important task in the audit is establishing the reliability of accounting numbers (especially given the requirements of Section 404 of the Sarbanes-Oxley Act), there is now a widespread recognition that managing the company requires looking beyond the financial numbers to the underlying non-financial variables and processes. Thus, the Total Quality Control movement pointed out that quality only improves when it is measured directly, on a per-unit basis, rather than at the aggregate cost of quality level. The challenge facing auditors today is incorporating the analysis of non-financial drivers of company performance into their examination of financial measures of profit.

**Domain and Range:** The importance of supply chain management and globalization emphasizes the need for modern companies to take a broad view of the scope of their

businesses, looking beyond functions, departments and even the company itself. Thus the value chain is extended upstream, to important customers (for example, WalMart for many consumer goods companies), and downstream, to suppliers (who are increasingly, global).

#### ***3.4.5.4 Continuity Equations Modeling***

The fact that a continuity equation is a representation of a business process means that they also can be classified according to the categories listed above. Moreover, other classification schemes may be useful, depending on the environment and the needs of the auditor. But the continuity equation is not synonymous with the underlying business process, because it has to be measurable, and this constraint adds its own characteristic. Even if the underlying business process is conceptually certain, the continuity equation representation of it could be uncertain because the measurement of the data takes place within bounds of precision and time.

Let us consider an extremely simplified example of a system of continuity equations that capture the relationships between major metrics of a company's purchasing processes. If the company has a strictly enforced business rule that no deliveries are to be accepted without a cross reference to a purchase order, then one can infer the existence of a deterministic continuity equation between the counts of purchase orders (PO's) sent and of shipments received:

# of shipments received = # of PO's sent.

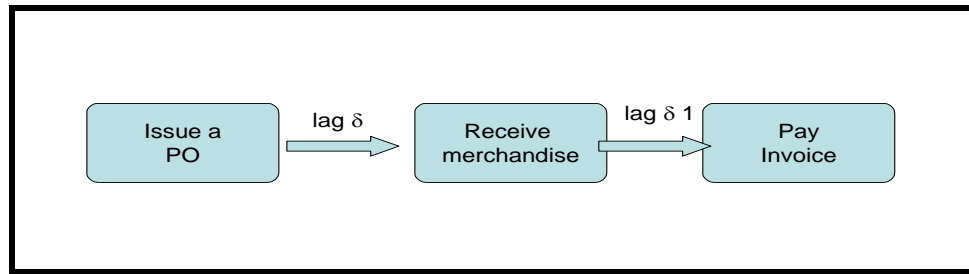
Even this seemingly trivial relationship raises a number of important questions. The first one concerns the level of aggregation of the metrics related in the equation. Time is usually the most critical dimension of aggregation. Are the counts aggregated over a year, a quarter, a month, a week, a day, an hour, or a minute? Clearly, in most settings, aggregation over a minute, or even over an hour, makes no business sense, while daily counts can be readily available in modern ERP (or even most legacy) environments. Business processes have a natural time-clock, for example certain billing cycles accumulate for a month, certain shipping processes promise to ship the same day, and certain payable processes require daily review to take advantage of discounts.

Another important dimension of aggregation is business subdivisions. Should the counts be aggregated over the whole company, or over its major subdivisions, or only over individual facilities? Similarly, aggregations can be restricted by vendors and/or products.

The more disaggregate the metrics are, which are related by the continuity equations, the more precisely the equations represent the underlying business processes, and consequently, the more accurately likely problems can be pinpointed. On the other hand, highly granular processes tend to have less stability and may respond say to a Poisson process as opposed to their more aggregate counterparts. Furthermore, there are some logical tests that can only be performed with granular information (e.g. edits) or comparing granular information (e.g. round tripping detail tests). The constraints of the traditional audit technology typically limit the analytical procedures to the highest level of aggregation (corresponding to the general ledger accounts). The major innovation of

CA consists in enabling the application of analytical procedures to the intermediate levels of aggregation. In our example, the counts of PO's and shipments can be daily aggregates corresponding to a certain geographic region.

The second important question raised by the continuity equation above concerns the **lag** between the time periods of the aggregates. Most business processes are not instantaneous, i.e., they have non-zero latency. For example, it usually takes at least several days before a shipment is delivered on a PO.



**Figure 62: Processes, Structures and Lags**

This has to be reflected in the equation by the explicit introduction of the time lag  $\delta$ . If we index the daily aggregates by  $t$ , then the resulting equation should look as follows:  
 $(\# \text{ of shipments})[t+\delta] = (\# \text{ of P.O.'s})[t]$ .

What is the value of the time lag  $\delta$ ? This is an empirical question, and before a continuity equation can be set up, the time lags have to be determined from the past data. However, a closer look at the past experience will typically reveal that not all the received shipments had exactly the same time lag. Therefore, the only possibility is to estimate the time lags statistically, e.g., as the average latency of the corresponding business processes<sup>52</sup>. However, the variations in the process latency imply that the continuity equation above may not hold in the deterministic sense since some shipments are delivered earlier while some others are delivered later than the average value of  $\delta$  used in the equation. Therefore, the only option is to view the continuity equation above as holding only in the statistical sense, i.e. up to a random residual  $\varepsilon$ :

$$(\# \text{ of shipments})[t+\delta] = (\# \text{ of P.O.'s})[t] + \varepsilon.$$

<sup>52</sup> Modern systems allow in some instances the time stamping of processes or their components. Telephone switches time stamp the beginning and the end of a call for billing purposes and these stamps can serve for many forms of evaluation (Vasarhelyi and Halper., 1991). Some auditors use time delays as an indicator of fraud. For example if a particular vendor is often paid rapidly out-of-cycle this may be a heavy indicator of fraud.

Even this probabilistic continuity equation may not be very realistic if the business rules allow partial deliveries on purchase orders. In such cases the total number of shipments usually exceeds the total number of purchase orders. However, on the average, one may still expect to find a statistically stable relationship between the number of shipments and the number of purchase orders:

$$(\# \text{ of shipments})[t+\delta] = \alpha * (\# \text{ of P.O.'s})[t] + \varepsilon.$$

This same equation may hold in a situation where not only partial deliveries are allowed, but also where vendors may aggregate multiple P.O.'s in their deliveries. Then one cannot have any prior expectation about whether the coefficient  $\alpha$  should be greater than or less than 1. This coefficient  $\alpha$  should be estimated from past data. If the auditor's attention is restricted only to the relationship between the counts of P.O.'s and shipments, then simple linear regression can be used to estimate the coefficient and assess whether the relationship was statistically stable in the past. Note that the choice of the value of the time lag  $\delta$  will critically affect the estimate of the coefficient and the stability of the relationship. While, as mentioned above, the average latency may be a good starting point as the value of  $\delta$ , some experimentation may be needed to determine the value of  $\delta$  which results in the most stable relationship

The analysis of the single continuity equation presented above does not reflect the reality of interrelated business processes. In the example above, purchasing does not exist in isolation, but eventually leads to paying vendors on their invoices. Therefore, purchasing metrics should be related to payment metrics. More specifically, one can expect a stable statistical relationship between the number of shipments received and the number of payment vouchers processed after a certain time lag. The continuity equation expressing this relationship has to be combined with the equation above to form the following system of simultaneous equations:

$$(\# \text{ of shipments})[t+\delta_1] = \alpha_1 * (\# \text{ of P.O.'s})[t] + \varepsilon_1,$$

$$(\# \text{ of vouchers})[t+\delta_2] = \alpha_2 * (\# \text{ of shipments})[t+\delta_1] + \varepsilon_2.$$

Since the auditors have to examine the business processes as a whole, they have to model the interrelated metrics of the processes using a system of simultaneous continuity equations. While the auditors are used to applying analytical procedures one relationship at a time, a system of simultaneous equations like the one above cannot be broken up into individual equations. The coefficients  $\alpha$  have to be estimated jointly. Simple linear regression is not an appropriate technique to estimate the coefficients since it ignores the fact that the equations form a system, and the left-hand-side variable in one equation will be typically present among the right-hand-side variables of other equations (as the number of shipments in our example). There exist a number of standard statistical techniques such as maximum likelihood and generalized least squares, for estimating the coefficients of a system of simultaneous linear equations. These techniques are widely used in econometrics and psychometrics, see e.g., Hausman (1983), and are implemented

in standard statistical software such as SAS. To estimate a simultaneous equation model, one has to specify which of the variables are exogenous (i.e., determined outside the system of equations) and which ones are endogenous (i.e., determined by the system of equations) – these categorizations should not be confused with the exogenous and endogenous business processes as defined in a previous section. In our example, the number of P.O.’s is the exogenous variable, while the numbers of shipments and vouchers are both endogenous.

#### ***3.4.5.5 Modeling real-time Analytics***

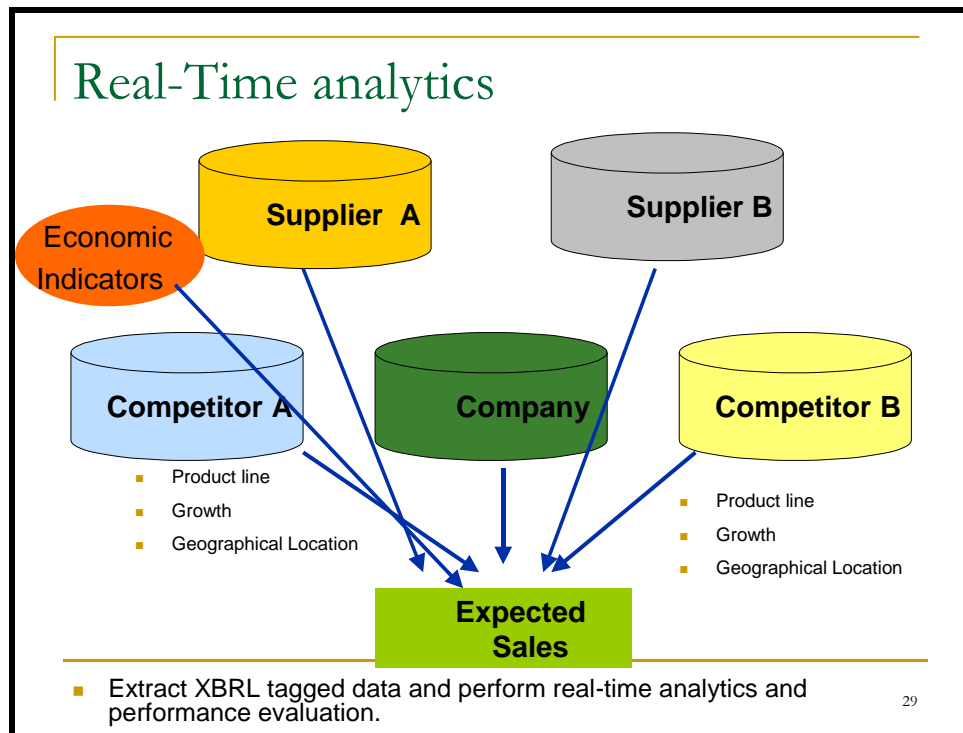
In summary the monitoring and control environment requires the existence of models (first harmonic standards) in order to compare actuals with standards. The discrepancy between these two elements provides the first order variance which will be compared with some model of variance to decide on whether an alarm should be issued. Just like first harmonic standards, standards of variance also can be modeled statistically and made contingent on a wide variety of factors. Figure 8 discussed processes and meta-processes in reporting and assurance.

**Figure 63** represents the evolution of discrete time analytics to real-time analytics across different entities in targeting the creation of a mixed (internal and external) based sales forecast. This model could be represented as expected sales as a function of: economic indicators, sales of competitors A & B, sales of suppliers A & B (delayed say 3 days), internal corporate functions, and economic indicators. The production functions of both competitors would encompass intrinsic functions and variables derived from internal and external data provisioning.

While this type of modeling is complex it is realistic to expect it to eventually be realistic with XML derivative standards creating great interoperability between processes and XBRL as well as XBRL/GL providing financial data interoperability along the value chain.

Today’s models suffer for the lack of interoperable data, and for the usage of very discrete data. Obvious analytical review tools such as regression analysis never really caught on due the sparsity of data and its very long time periods (annual and quarterly data). The challenge for the usage of real-time analytics is the development of models that can use data that is very discrete as well as close to continuous data together in a graceful manner. While some business processes have well behaved data (such as a well planned production line) many processes have spurious components confused by cyclicity, inter-linkage of processes, and a large random component. One large sale at the entry of the process can cause a rampage of alarms across the process as long as the transaction flows through the cooperating value chain of partners in business. Good controls can force high level approvals at the entry and then adaptive models could avoid sequential firing of alarms. The contravening argument is that large “round-tripping” transactions with no economic substance would also be neutralized if approved by top management at entry.

This demonstrates the progressive need of more complex analytics and more complex controls that have secondary logic outlets. For example, all approved “large” transactions would undergo extensive automatic analytic scrutiny verifying if the product flows, invoices and partner databases actually registered the transaction.



**Figure 63: The Power of Real-Time Analytics modeling from many cycles**

Furthermore, a set of soft non-financial controls/measures monitored at the relationship and KPI level would have some form of secondary indications that would require multi-party acknowledgement. Some of these typical soft measures may include, Quality of Output, Customer Satisfaction/Retention, Employee Turnover, Employee Training, R&D Productivity, Environmental Competitiveness, and Company-specific measures.

### 3.4.6 Dynamic Valuation (Inventory, PP&E, depreciation, others)

Historically corporate financial statements contain the value of assets that are owned by the company. This valuation has been the subject of extensive literature and many bases

have been proposed. The historical base of valuation offers objective valuation at the cost of relevancy with the passage of time. Better comprehension of the key issues requires the discussion of:

**Alternate bases of valuation:** the valuation of an asset is highly contingent on the basis of this valuation. Over the last decades many forms of accounting besides the pure historical method have been proposed among which SEC ASR 190 (replacement cost new) and SFAS # 33<sup>53</sup> <sup>54</sup>(current value accounting). With the decrease of the levels of inflation in the US these standards were set aside with the implicit assumption that with low inflation rates the cost of these statutes was larger than the benefits. Another likely but un-mentioned factor is that the information generated by these statutes was not very useful due to a multitude of reasons. Typically confounding factors in this quest for valuation included:

treatment of sale transaction cost

value of the asset new or used

treatment of improvements to the asset

the basic “unit” of the asset – is it the paper pulp plant, its component parts, or the entire factory?

**Why is valuation needed?:** financial statements tend to be used for many different purposes such as for valuing the assets of a corporation as an input for market valuation (an ongoing value), for valuing the assets of a corporation to understand the cost of a competitor to enter the market (ongoing value), for valuing the corporation for liquidation (exit value), for understanding the corporation’s ongoing production ability (productive capacity), etc. The literature is rich with these reasons for valuation.

**Impairment of value over time:** new assets become used assets over time and eventually lose their entire value. This natural process is confounded by a multitude of factors in addition to the basic ones of basis of valuation and decision motive of valuation. Assets devalue over time but this utilitarian devaluation of productive capacity can be mitigated by good maintenance (jet engines), ongoing improvements of technology (long distance network switches), market forces that make it sparse, market forces that change technology and productive efficiency, etc.

The above confounding factor led to an uneasy set of compromises and accounting standards relative to the basis of value and the impairment of value over time as well as the assumption that certain items did not get per-se impaired (land) but had other value changing effects.

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<sup>53</sup> H. Goodman, A. Phillips, M. Vasarhelyi and J. Burton **Analysis and Illustrations of Disclosures of Inflation Accounting Information**, (with), Financial Reporting Survey 23, AICPA, 1981.

<sup>54</sup> M. A. Vasarhelyi and E. F. Pearson, “Studies in Inflation Accounting: A Taxonomization Approach”, *Quarterly Review of Economics and Business*, Spring 1979.



**Change in monetary value:** the relationship between the economic value of an asset (its command over goods) and its monetary value is not a constant. Inflation, as discussed above, is a normal factor in most economies and typically invalidates the meaning of the “retained earnings” account which is an accumulation of values measured in different units. While the economy was reasonably stable and the technical difficulty and the cost of recomputing the value of asset was prohibitive, this value was considered acceptable. Retained earnings today are a fudge factor which allows for flow results to be pumped into the level equations.(see hyperlink 1)

### New forms of valuation in a real time economy

With the change of technology new needs and solutions as well as a different set of costs and benefits for disclosure have appeared. In general asset lives became shorter and value changes became less linear. A progressively growing set of global markets allows for many types of assets to be valued on a continuous basis. But this basis is much less stable than traditional price lists. Several main types of data sources have become much more common:

lists of used items (e.g. E-Bay and B2B vendors)

Price lists of items and parts for sale ( and price comparison agents)

Databases of actual transactions with much detail about these transactions (as a new source of income to sellers, B2B markets, and infomediaries)

Real-time market indices to act as a proxy for specific asset classes.

There are many issues that must be resolved to understand how dynamic valuation can work. However, it is very likely that with or without EBRM progressively many business decisions will be driven by dynamic valuation. Furthermore, information intermediators and online markets will eventually jump at the opportunity of providing online market valuation services. Some key issues are:

- What is the level of atomicity of the basic valuation item?



This question will depend on the decision being supported and on the type of information available. For example for inventory valuation issues replacement cost new of the inventory will matter most. However, for valuation of exiting inventories in a store sale situation wholesale values may apply. Asset classes may substantially simplify certain valuation decisions. Furthermore information availability may determine the level of disclosure and update.

- What is the effect of dynamic valuation changes on income?

Changes in the value of inventory (and PP&E) are a direct charge or increase in corporate income. However this may generate fluctuations too frequently.



It may be desirable for companies to prepare online schedules explaining the value of their assets, the source of their valuation and create a separate inventory and PP&E valuation account that

flows into retained earnings and is layered with the history of changes. While instant depreciation numbers have little information value for investor decisions inventory valuation changes are rich in detail for internal corporate management. Schedules of this information, rich in details for internal reporting and summary for investor information and other stakeholders will bring new dynamicity of business reporting.

- What is depreciation in dynamic valuation?



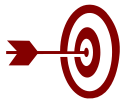
Depreciation is an artifact on the change of value of a particular asset. This change in value has both the base of physical erosion of the item, the aging of the asset, its usage, and market conditions. Depreciation theoretically should be a flow number of negative income equivalent to the change in the value of the asset.

- What items can be dynamically valued?

Over the years a larger and larger percentage of assets will be real-time valued due to the expected increase in available data and the evolution of the business models to provision this information. If each item of information per ping of valuation becomes very expensive the approach will not be feasible and eventually market forces will prevail. The technology of “micro-payments” must evolve to “atom-payments” to make this feasible.

Most likely disclosures will be much more detailed than today’s and broken down between dynamically valued items and valuations

- What happens to “lower cost or market” or “mark to market”?



These and other forms of valuation will progressively be replaced by market valued items. There are many items that current technology and infrastructure already have that could potentially enable market valuation. However, these have not yet been incorporated into the business reporting model due to the model’s inherent rigidity, the lack of innovation in the profession, and most of all the lack of desire by organizations to reveal internal information.

For example, the market value of securities held by organization can easily be ascertained through the online market reports published by brokers or just trading information from the exchanges. Current accounting rules discriminate between assets held for different purposes as an artifact for difficulty of valuation and desire of opacity. Desire existing, the disclosure is easy and of low cost.

There are of course intrinsic difficulties with any type of new measurements. For example, companies tend to hold large blocks of stock particularly if these are held for control purposes. These blocks do not trade at market prices but much information exists on discounts and contingencies of large block trading. Investment banks have valuation models that take into consideration the competition, the size of the block and other factors to value a block of stocks. These models could be made available under Web Services for valuation purposes.

- How frequently will the items be valued?  
Depends on the nature of the item and on the data source for valuation. The updating of the earnings account is a costless endeavor in the case of revaluation but probably for simplicity sake discrete intervals such as daily or weekly may be desirable.

### **Paradoxes in asset valuation:**

Different categories of assets cannot be valued the same way, therefore their addition is nonsensical. Adding tangible and intangible assets makes little sense.

- Processes, nature of account, inter-process controls and other lesser items determine reliability of numbers at the transaction, reporting aggregate, and general ledger levels among many.
- Assurance / audit processes change these values on a continuous basis
- Depreciation is very misleading – must be abandoned for new measures

### **3.4.7 KPI's and Analytical Monitoring**

Most US businesses have internal use of KPIs for management reporting. These indices are used by management to gage corporate performance ahead of published financial reports. Many of these indices and other indices to be developed can also be used to provide information users with a similar level of insight into performance. Furthermore, these indices can be used for level 4 (analytic monitoring) purposes. applying the following guidelines:

1. Use similar KPIs that managers typically use in the industry
2. Survey for wider industry KPIs
3. Create predictive models that link KPIs to different types of corporate performance (financial, operational, human resources, marketing)
  - a. Models that deal with large transactions
  - b. Models that link processes to detect discontinuities
  - c. Models that compare with computable industry KPIs
4. Create KPI standards and KPI variance standards a la continuous monitoring
5. Establish the types and natures of alarms to be issued
6. Specify the nature and characteristics of alarm objects
7. Simulate the event of alarms and detect their diagnosticity
8. Create a managerial structure for KPI monitoring including management and auditing



Among many specific industry KPI's we can find:

- Airline industry  
Plane seat occupancy  
By route  
By day  
With partners  
PREDICTS MONTHLY INCOME
- Computer Industry  
Sales of PCs  
PREDICT TECH SUPPORT CALLS
- Hospitals  
Hospital Bed Occupancy  
PREDICT HOSPITAL RESULTS

### 3.4.8 Future Oriented Information

Future oriented information has always been very controversial in business reporting. Its usage is consistently a tenuous balance between the desire by users to have management's view of future results and prospects versus the potential for manipulation of investor expectations and stock price. In conformance with Galileo axiom, “when in doubt disclose the facts” the following guidelines should apply to future oriented forecasts:

- Management should have a consistent form and content of forecasts over time
- If forms of corporate reorganization occur forecasts must also be presented in an over time consistent form
- Forecasted values should be parsed along accepted XBRL taxonomies for local and international comparability
- Support worksheets with the basis for the forecasts should be disclosed on a corporate website hyperlinked to the forecasts / predicted values provided. Forecasts / predictions should have some form of statistical confidence expression associated to their values.
- Comparative reports with comparisons of predicted and achieved values for recent years
- Continuity equations / relationships that existed over time and that will prevail in the predicted period. Explanation for the qualitative / quantitative reasons for changes.
- Progress reports using continuous reporting technology since the latest audited annual statement.

The Kolton report offers a good glimpse at US corporations' attempts to provide future oriented information:

**“Forward-Looking Information****Examples of forward-looking information disclosed about *sales* are:**

- Forecast of unit sales for the coming year in each major country (Automobiles)
- Discussion of the growth opportunities in the company’s four major customer categories (Computer Systems).

**Examples of forward-looking information disclosed about *products* are:**

- Discussion of a product whose patent protection will expire and the potential impact on the product’s revenue stream (Pharmaceuticals)
- Plans for expansion and particular brand introductions into specific international regions (Food).

**Examples of forward-looking information disclosed about *future operations* are:**

- Next year’s targets for growth in revenues, net income, and gross margin and for reducing the ratio of expenses to revenues (Computer Systems)
- Five-year projections of reserve additions and lifting costs by region (Oil—Integrated Domestic)
- Projected cash flow, oil production, and gas sales for five years (Oil—Integrated Domestic)
- Report on the company’s effectiveness during the past year in meeting its beginning-of-year performance targets, which included vehicle unit sales, sales and revenues, net income, and capital expenditures (Automobiles)
- Management discussion of projects and previous years’ goals and milestones, those not achieved and those to be deferred to future periods (Oil—Integrated Domestic).

**Examples of forward-looking information disclosed about *financial performance* are:**

- Projected earnings and free cash flows by segment (Chemicals)
- Projected five-year earnings growth for the company versus peers (Regional Banks)
- Percentage growth goals for revenue, EPS, and ROE by line of business for two years (Regional Banks).” (page 9)

Figure 64 illustrates the key proposed structure for the presentation of future oriented information and the concept of progress report using continuous reporting.

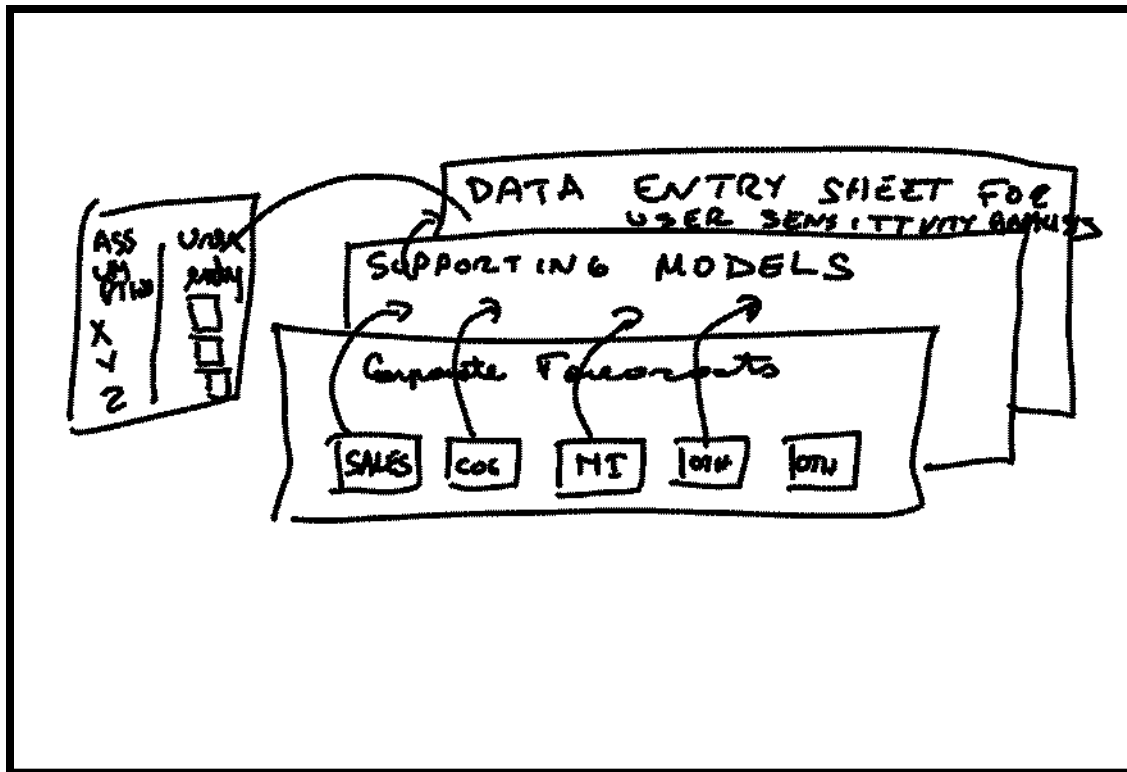


Figure 64: Structure for future oriented reporting

### 3.4.9 Formalization of Business Artifacts

#### 3.4.9.1 Fuzzy Organizational Structures actions and outcomes

The recent debacle about Enron was caused by undefined proprietorships, relationships, and data as much as by other factors. Sophisticated accountants, managers, and consultants took decisions with the sole purpose of taking advantage of idiosyncratic characteristics of accounting rules in a deterministic measurement of stochastic relationships. The Special Purpose Entities rules at that point specified that that certain circumstances 3% external ownership on the entity allowed it to be considered as independent and not being consolidated into the company. While the rules were originally derived to allow for non-consolidation of highly collateralized assets where the entity was not co-dependent of the main organization. Once specific guidance was issued the 3% number became the guiding point and qualitative factors became neglectable. As a response to these issues, substantial attention has been paid to “principles based accounting,” where specific guidance would not be provided. Since this guideline by the

FASB the most recent rules have been less specific much to the distress or information preparers and users. Another issue is that computer technology generates analytics that deal very well with numeric guidance but very poorly with semantic guidance. “Principle Based” accounting<sup>55</sup> eventually would cause great inefficiencies in the measurement of the majority of non-controversial entities and transactions to great damage of the current system.

Another more interesting solution to this type of problem is the disclosure of “soft” information in problematic structures, transactions and operations as well as stochastic disclosure of estimates. If Enron’s Raptor SPE would be disclosed in a database of the hundreds of Enron related SPE’s, created solely for the benefit of Enron, with only Enron as a client/partner and a questionnaire filled for each SPE where related party ownership and other revealing items of interest like how many clients Raptor had and the objectives of its establishment would be disclosed then users of financial information and semantic software agents would rapidly flag its dubious characteristics.

### ***3.4.9.2 A taxonomy of business Financial Instruments***

On another venue some **financial instruments** are now issued under conditional terms and, depending on their circumstances, their outcome is different. While many accounting principles wait for realization with the change in circumstances the expected value of the instrument changes. Clearly users would be served better with a disclosure of these factors that is not even limited by materiality. With the change in technology space and depth of disclosure are not an issue any more. While a layer of information may be desirable for the naïve user, analysts and others may need deeper information and more qualitative. This can be provided at very little cost and prevent substantial obfuscation. Obviously if the intent is obfuscation then these provisions would be very objectionable.

While this is a very difficult problem the enactment of limitations / standardization of forms of organization, forms of compensation and nature of contractual transactions as well as stochastic – object oriented disclosure would go a long way to deal with these problems. Figure 65 illustrates in a symbolic manner this proposed approach. In this [BUS OPPORTUNITY (taxonomy of litigation and probabilities)] figure there is a disclosure of litigation types (classified by a standardized litigation code) and a probability assessed to the loss of the lawsuit. In table A there is only a best estimate while in table B a range of financial outcomes is obtained and in table C a distributional view is provided with a [hyperlink](#) to similar cases, their resolutions, and history.

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<sup>55</sup> Shipper. K accounting horizon

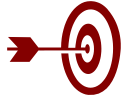
<b>Statement of Contingencies (A)</b>			
Case	Type	Probability Of Loss	resolution of action Class (K \$)
ABC corp. vs Miller	AA	.030	\$ 100
ABC vs NYS	AC	.090	\$ 100
ABC vs Class Action Z 2000	DA	.210	\$
<b>Statement of Contingencies (B)</b>			
Case	Type	Probability Of Loss	resolution of action Class (K \$) Range
ABC corp. vs Miller	AA	.030	\$ 50-150
ABC vs NYS	AC	.090	\$ 0- 200
ABC vs Class Action Z	DA	.210	\$ 0-5000

<b>Statement of Contingencies (C)</b>				
Case Distribution	Type	Probability Of Loss	resolution of action Class (K \$) Range	
ABC corp. vs Miller HCN	AA	.030	\$ 50-150	Normal
ABC vs NYS HLB	AC	.090	\$ 0- 200	Binomial
ABC vs Class Action Z HLP	DA	.210	\$ 0-5000	Poisson

Figure 65: Statement of Contingencies



### 3.4.9.3 Structuring and Formalization of MD&A



Recent statutes and the Sarbanes Oxley act has used the MDNA as a catchall for all the things that a financial report cannot be expected to measure well ,or measure at all. Managers are expected to disclose other issues and to discuss what in their minds (maybe self-servingly) and to express projections and their view of business. In Hyperlink 9 the MD&A of a NASDAQ public company, Edgar Online (EDGR) is presented. This report is rather factual and gives a candid management view of corporate business and its forecasts. It also discussed financial statements, risks and other issues. The edgar-online business is rather straightforward and relies strongly on subscription income, Its MDNA is conservative and does not reveal much beyond what is already in other part of their 10K statement. the user would however benefit from being able on a click of a mouse compare their MDNA with their competitors. Other companies however, with complex business structures are very difficult to analyze and extract substantive information. In light of the emergence of XBRL, for the purpose of comparability, downstream analysis, and integration with other data sources, new approaches are needed. These include:

- Formalization of the content of MDNA.
- Creation of a taxonomy of MDNA events
- The creation of POCs to relate the different firms in an industry or in any industry
- A prioritized view of risks with probability assessments
- A stochastic estimate of forecasts.
- Key performance indicators, their tagging, and management rating
- Usage of KPI's to link to relationships and the company forecasts
- Comments, based on industry and company KPIs on the future with standardized ratings

The study to create the taxonomy of MDNA should be empirically-based and aimed to create most of all comparability.

### 3.4.10 Structured support of Estimates

One of the worse problems that users of financial information have is the nature and support of estimates. While there is little competitive intelligence reason to limit support and disclosure of the nature of estimates these are usually given terms with no support and substantial manipulability. Some of these parameters have been blatantly misused in the past for example estimates of bad debts and assumption of return on assets in pensions. The GDM addresses this problem in three ways:

- Usage of POCs that require that certain common estimates be disclosed together with key variables
- Hyperlinks to spreadsheets with the exact method of calculation of the estimate and the highlighting of any fixed parameters used. All the key parameters must be clearly tagged and their source specified. Wherever possible and of interest real-

- time or fixed time (also with clear tagging) adjustments to the variables must be performed.
- Parameter estimate reconciliation sheet showing values, bases and time contingent valuation of the parameters (BUSINESS OPPORTUNITY: Tables for the public usage and valuation of estimates). For example a parameter estimate reconciliation sheet (PERS) would should the values used over the last 5 years for pension asset return estimate.
  - Bottom line effect sheet showing the effect on one of the forms-of-income of the above estimate changes
  - Provide a simulator spreadsheet for user sensitivity analysis with some guidance to user

## **4. Illustration**

### **4.1 Basic Stakeholder Driven Disclosure Technology**

The Galileo approach follows a pull rather than push approach for business reporting. Under this scheme stakeholders of the company are able to access frequent audited data and pull specific information about the company. This approach calls for more frequent reporting and more disaggregated data, and business reporting rather than the limited financial reporting. Specifically, each company will provide access to part of its database (limited access permission to audited data) and stakeholders could tap into this resource. Some of the information should be disaggregated to the extent that it allow users to view the granular data or aggregate the data based on a number of given standards, assumptions and estimates. The following section provides a description of the technology described in Figure 25.

The Galileo model has a number of layered technological components. The first lower layer components comprises of the OLTP (Online Transaction Processing System) which is layered on top of a central enterprise relational database management system. An ERP system is an example for such application that provide cross functional integration for companies. The term Enterprise Resource Planning (ERP) refers to systems that typically span the entire enterprise and address all of the enterprise's resources. In addition to being able to handle multiple currencies and languages, a key feature of ERP systems is cross-functional integration. ERP systems are based on the so-called client-server architecture that is comprised of three tiers (or layers) that segregate: 1) the user interface (Presentation Layer), 2) the application processing component (Application Layer), and 3) the database system (Database Layer). Every ERP system has one central database that is accessed by all application servers. This central database is accessed by all ERP users, regardless of which module they use.

The enterprise ERP system and the relational database provide companies with the ability to generate and use real time data. This operational data is continuously assured using continuous auditing techniques such as embedded audit modules, parallel simulation and controls tags. Once the assurance is done this data is periodically migrated into the corporate data warehouse. A data warehouse is a repository storing integrated information for efficient querying and analysis. Due to its non-transaction oriented

nature, data warehouse allows for efficient storage and extraction of information. Because the data warehouse is separate from the corporate operating environment it is possible to use sophisticated indexing techniques to facilitate efficient data retrieval. Using OLAP (Online Analytical Processing) it is possible to extract summarized data and to drill down to the needed level of detail.

Therefore, the next layer in the stack is the OLAP engine which allow for data aggregation and disaggregation. The OLAP engine can create cubes of data based on predefined attributes and enable detailed representation based on numerous sub-attributes and categories. An OLAP interface engine would allow unsophisticated users to use this powerful tool based on their level of permission. In other word, an authorization and authentication layer would exist on top of the OLAP engine layer to provide users with the appropriate access into the data warehouse. An access control metrics will be devised based on a need to know basis and the level of publicity of the data. Specifically, and anonymous permission will be given to any un-identified user wishing to access the least restricted form of financial information. Other forms of access controls will be assigned based on some predefined criteria<sup>56</sup>. The OLAP engine is going to be masked so that users will not have to interface with the underlined infrastructure. The next layer is the aggregation layer, this layer interacts with the OLAP engine assisting in defining attributes and level of aggregation of the data. The aggregation layer will comprise of but is not limited to rules and standards such as GAAP and IGAAP by which data can be aggregated and models and estimates that the company uses. Again, users will not interface directly with the aggregation layer, users will logon to a secured website and will have a number of functionalities based on there authorization level. Users will use active web pages to request for specific data. All the data items that will be displayed with be made available in XBRL format as well. Data can comprise of an entire consolidated financial statement or a breakdown of detailed information about particular account in any of the virtual entity.

## 4.2 Valuation

Valuation has always proven to be a challenging task. One of the objectives of the existing accounting model is to make it possible to depart from historical cost based accounting and facilitate market valuation of assets. For this purpose the Galileo model proposes to disclose assets based on both historical based and market value based. For that purpose it is proposed that independent third party valuation service will be established. Independent third party value assessors will have to establish valuation techniques based on objective publicly available data. Each company should obtain valuation from at least two independent providers and valuation estimates for each asset category should be provided in a range format, i.e machinery for subsidiary A is valued between xx,xxx and xxx,xxx.

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<sup>56</sup> This predefined criteria can defer across industries and users. However permission based reporting does not necessarily contradict regulation FD which is intended to democratize the information propagation process.

In today's environment there is substantial amount of information that is publicly disclosed. There are enormous databases that contain recent real estate sales of properties. Thousands of transactions are taking place on eBay on daily basis. Historically, valuation of assets was a controversial issue. The objectivity of asset valuers was impaired by virtue of receiving compensation for these valuations. In today's digital world, it is possible to use publicly available data to objectively value assets. Models can be developed to extract data from such source and apply predefined valuation technique to many assets that companies own. This process can be done with no human intervention and consequently provide an objective reliable way to supplement historical based accounting.

As an illustration, a company might own the following item “Catalyst 6500 Cisco Switch” as part of its inventory or as part of its operations. An independent service can digitally receive price quotes for such item from numerous vendors (some price comparison websites such as “MySimon” provide similar data), and observe recent sales at eBay. Subsequently a valuation algorithm can be applied to compile this data and calculated the estimated market value for that asset. In a similar manner many inventory items and other fixed assets can be valued.

## **5. Conclusions**

### **5.1 The environment**

The original business measurement model was developed for the industrial organization of the 19/20<sup>th</sup> century under a regime of limited to non-existent information technology. While business organizations have changed substantively towards an information organization whose main assets are not physical in nature, the measurement model has not evolved and so it is poorly equipped to deal with the emerging information organization.. Furthermore, a bad measurement environment and audit technologies consisting of pencil and paper do not help the assurance process. Consequently, new and improved accounting and reporting requirements and mechanisms are needed to meet our commitment to the user/public marketplace of the 21st century. This document is one of several models prepared to support the Public Company Task Force of the Special Committee on the Enhanced Business Reporting Model of the AICPA ( the Starr committee). Examining the feedback from members of the Jenkins committee on a new business reporting model combined with the very negative current view of the accounting profession by the public in general and by regulators clearly revealed to the committee that the accounting profession was in no condition to create a new business reporting model by itself. Consequently, the Starr Committee is evolving into a societal consortium (EBRC) that is embracing a much larger set of players and addressing a wider audience in order to respond to the above concerns.

The GDM (Galileo Disclosure Model) aims to take advantage of an entire new set of technology and their ensuing economics to measure organizations in the information economy.

These new technologies are the core of the new real-time economy and encompass four main elements: 1) an ubiquitous carrier layer, 2) an integrated corporate application software 3) pliable and accessible user interfaces and 4) a powerful database technology. With the above technologies a new method of business measurement can emerge which we call continuous reporting. It takes advantage of a continuous data flow to display corporate levels and flows at variable time frames that are contingent on the natural rhythm of the application and on the decision frame of the user.

Already exists internally in certain forms

It is paradigmatically different from traditional reporting

### **a. The Axioms**

A series of axioms were presented to start the debate and development of the GDM. The state: 1) the proposed model is the basic “extreme” model used as a basis for discussion not a proposal for statutory rules, 2) when valuation is difficult, disclose basic facts that can lead to user judgmental valuation, 3) support any estimate with its calculation basis, 4) provide raw not massaged data with panoramic level of details, 5) standardize the states-of-the world to avoid financial / organizational engineering, 6) if a model is used to summarize / extrapolate information to provide more than one model or the basis for these computations, 7) statutes should be composed of digital standards that can immediately be impounded into software not vague principle –based standards, and 8) provide data level assurance in addition to other forms of statement / process based assurance and 9) Information provisioning is a continuum from internal to external information.

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## **5.3 The Proposed Model**

The proposed model focuses on three main dimensions: 1) impounding technology into the reporting model, 2) providing an updated information economics improved reporting model and 3) changing many principles of reporting disclosure.

Technology:

Changing the medium of the report, capturing transactions at the XML atomistic level, using databases for reporting, OLAP technology, drill downs, hyperlinks, style sheets, etc.

Information:

Substantial changes in external and internal data content and in the attributes of data in particular frequency, timeliness, level of aggregation, publicity of data,

Rules of Measurement

Business reporting portal, virtual entities, points of comparison, non-financials, relationship reporting, continuity equations, real time analytics, dynamic valuations, KPIs

and analytical monitoring, future oriented information, formalization of business artifacts, formalization of MDNA.

## 5.4 Takeaways

The GDM is basically electronic and user-driven, with style sheets as pre-set structures. It recognizes multiple stakeholders by providing a multi-source based set of pre-set reports and a wider set of drill down granularity.

While it is difficult to create statutes in this direction, the GDM aims to report without public relations adjustments or embellishment, and without management of data by executives. The continuous nature of the data flow and the recommendation that reporting structures be extracted directly from ERPSs through style sheets, changes the nature of management adjustments.

The GDM can be seen as the dashboard of all external reports that includes virtual entities/segment reporting/ subsidiaries breakdown/consolidation of commitments to suppliers.

A complex layer of technology facilitators that is still evolving in business usage exists. The supporting technology of the GDM has to evolve accordingly.

## 5.5 Miscellaneous Issues

Many research issues arise with this study. It is envisaged that this document will be frequently enhanced by comments and additional studies using the same type of technologies that are proposed for the GDM

- Relationships: logical, disclosures, modeling, information content
- Real-Time analytics
- Extract XBRL tagged data and perform real-time analytics and performance evaluation.
- Models that are adaptive and responsive to conditions such as spikes, cyclicity and process relationships
- Models that can be updated constantly and are executed automatically
- Models that are applied at a non- “cookable” level (say validated transactions)
- Disclosure of key risk factors

- Quantification of some of these factors

## Appendix A: Real time economy: Dynamic Systems and Continuous Assurance<sup>57</sup> -

Figure 66 represents a symbolic view of the support of decision processes in a real-time economy. The key objective of these processes is the reduction of latency within processes (time taken to perform a process) and reduction of latency (delay) between processes. For this reduction four key technologies will assume major roles in addition to the basic needs for broadband internetworking. These technologies are: 1) sensors (automatic to detect economic events), 2) ERPSs (to integrate processes), 3) XML and XML derivatives to enhance interoperability and 4) Dashboards to serve metrics / analytics and alarms. Furthermore it will take substantial changes in processes facilitated by the deconstruction of business<sup>58</sup>, increased system integration and the reengineering of processes.

A variety of data processing systems (legacy, ERPSs, Web facing and other special systems) will present an integrated view through a monitoring and control platform. This platform may be an independent piece of software or part of the ERPS.

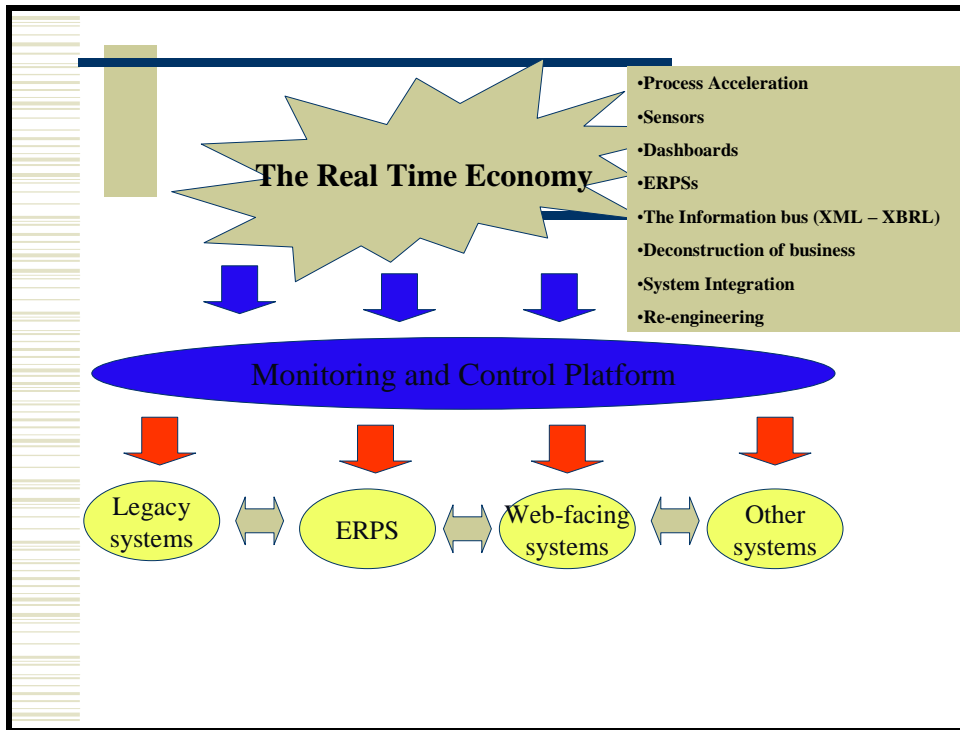


Figure 66: The monitoring and Control Platform on diverse IT systems

<sup>57</sup> This appendix was largely drawn from examples of the economist article mentioned next.

<sup>58</sup> Vasarhelyi & Greenstein, op cit.



This platform will serve to perform the processes and meta-processes described earlier in Figure 8 that will serve to modulate the business activities. Processes are monitored through their measurement and comparison with standards. Results are either displayed in dashboards for management evaluation and feedback action or treated automatically by decision models progressively developed by the company. Clearly, human intervention increases latency but most systems and situations still do not have sufficient automation for cyber-decision-making.

Figure 67 revises the earlier picture of the real-time economy now focusing on the assurance process. The reason for continuous monitoring and control in a real-time economy is to decrease latency and improve **management processes**. However the same technology can be used for providing **assurance services** that could have management, internal audit, external audit and governmental entities as clients. The continuous assurance process is an instantiation of the more generic continuous management process. This management process is typically the reason for creating the infrastructure and progressing the utilization of the meta-process (continuous management monitoring and control)

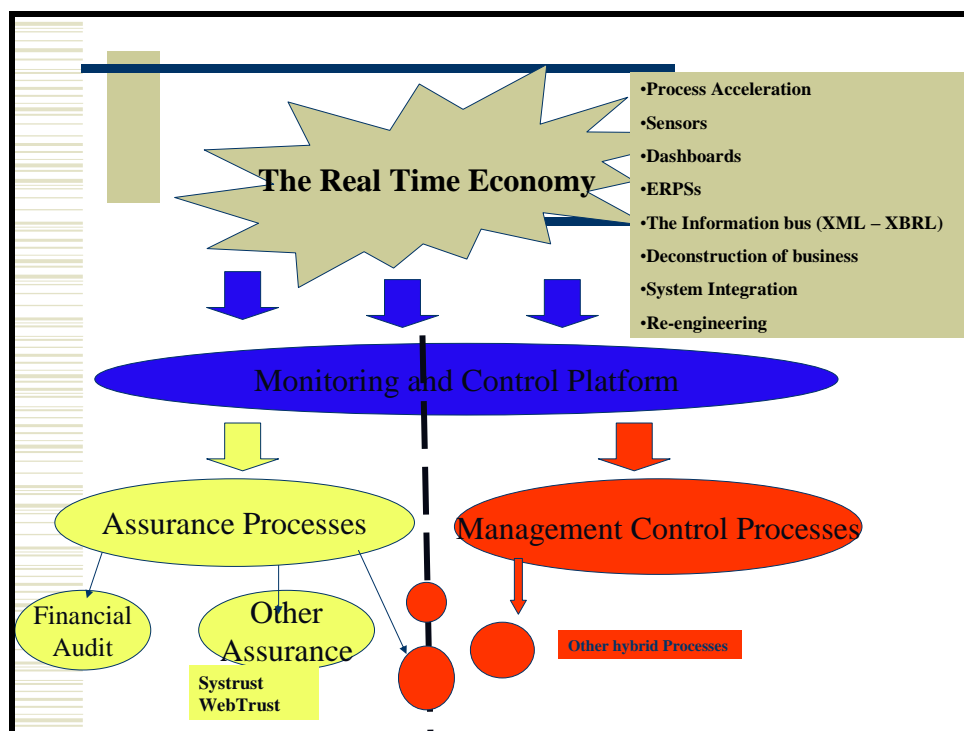


Figure 67: Assurance as a Control Process

As discussed earlier, ideally many management processes are to be automated to reduce latency however this is just a very small set of the processes. Furthermore management has often the need for ad hoc queries and visualization of the events and of composite processes. The systems literature has discussed Executive Information Systems for over two decades but now with integrated software (ERPSs) and the measurement of many processes pretty much automated, dashboard are starting to appear in many businesses.

Figure 68 displays GE’s digital cockpit that joins a series of features (message center, graphics, downloads to PDA’s) with a view of divisional performance broken down into sell, make and buy.



Figure 68: GE dashboard

We shall now further discuss some of the components of the real-time economy infrastructure.

## ERPS

The progressive deployment of Enterprise Resource Planning Systems (ERPSs) integrating parts of a business and creating integrated data silos is often a painful but necessary exercise. The idea is to use a unified database to make sure that different programs, say for financial planning or human resources, work with the same information. This data and program integration also facilitates information to be closer to real time and to flow effortlessly between applications.

## Sensors

Sensors are nothing new in expensive machinery, where an unexpected breakdown can be costly. What makes them so much more useful is that they are increasingly connected. General Electric has long been equipping some of its aircraft engines, turbines and locomotives with all kinds of sensors, but until recently the data were not available in real time. Now all the information is regularly transmitted via satellite to a GE remote-monitoring centre. If there is something wrong with a jet engine, for instance, the facility identifies the likely cause and tells the airline about it.

## Remote monitoring

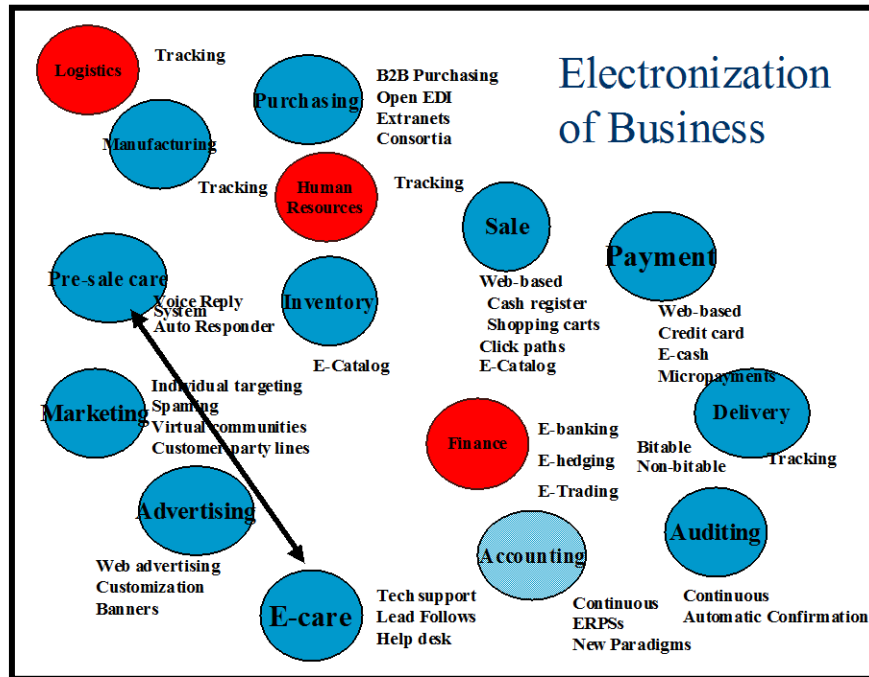
Remote monitoring allows many companies to deliver high-tech services. For example, SKF, a Swedish bearing manufacturer, uses sensors to measure the vibrations of machinery at strategic positions and feed the data into analysis software that can determine when a bearing is about to fail. Sensors in “Ice Factories”, operated by Dallas-based Packaged Ice, are able to obtain real-time data on dozens of conditions. Similar systems are set to become ordinary parts of cars, air conditioners and household appliances.

However, all these small sensors and tags need software to make sense of the data they deliver. Just knowing that a piece of machinery is running hot does not help much. GE uses sophisticated statistical methods and historical data to decide whether it is a clogged fuel filter or just bad weather that has reduced a locomotive's horsepower. Similar tools tell a railway company how many of its locomotives need servicing at any one time so that it can schedule the work at its maintenance centers. All these sensors will generate a phenomenal quantity of data, and the potential of information overload. Improvements in databases, interoperability, machine to machine communication and automatic processes are necessary.

These concepts and technologies come together for applications of real-time economy to financial systems through the electronization of financial processes.

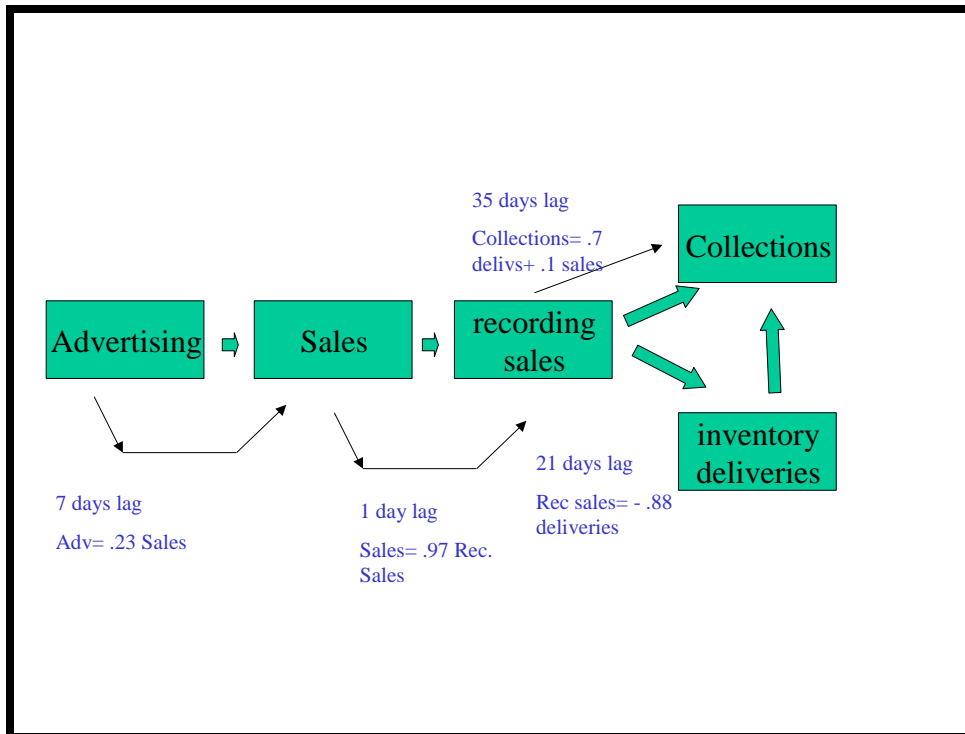
### ***Electronization of financial processes***

Figure 69 characterizss the electronization of business involving the five major processes: e-commerce, e-care (CRM), supply chain management, financial processes, and other. It also breaks down financial processes into: payments, finance, accounting, auditing and control. The concept of electronization is the impounding of technology into the different elements of the business process. This appendix discusses conceptually key effects and then focuses down on the two most immediate and compelling effects: continuous reporting and continuous assurance.



**Figure 69: Electronization of Business**

Financial processes more than any other cycle closely interlink to other e-business elements. For example marketing, purchasing of raw materials, and R&D all encompass a financial counter-activity and a financial view of the business. Furthermore, corporate business processes are interwoven in a complex set of relationships which understanding leads not only the improved analytical capabilities of a continuous audit's “continuity equations” (to be discussed later in this chapter) but to increased tactical and strategic management understanding and capabilities in the business. Figure 70 display a symbolic view of these relationships and their insight into both management and auditing processes.

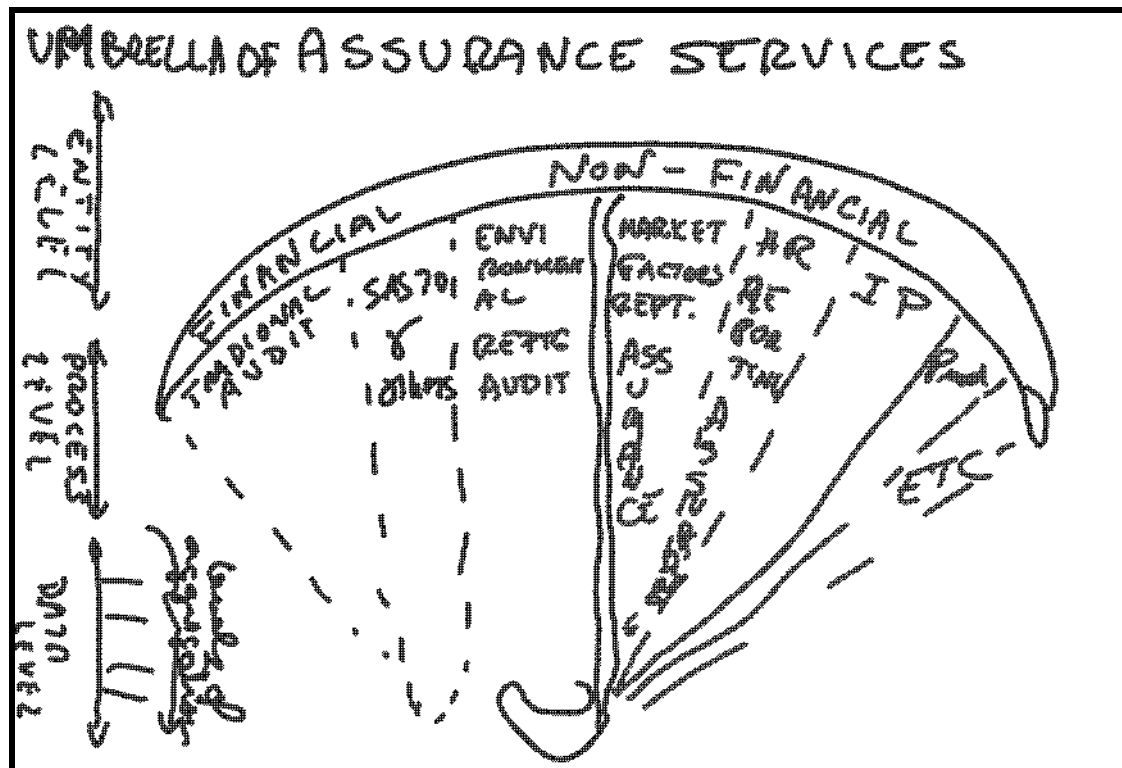


**Figure 70: structural relationships**

The understanding of the relationships of the type depicted in Figure 70 has management and assurance implications. In a dynamic view of business management understands that its ability accelerate processes and change their nature provides substantive competitive advantage. Michael Dell<sup>59</sup> describes his company's business advantage in terms of the acceleration of the cycle of business. Continuous monitoring of a business implies close scrutiny of process relationships, its misbalances and proactive management action to either correct these misbalances or take opportunity of a particular structural change. For example production delays at a competitor may provide changes in the relationship of advertising to sales and consequent business opportunities.

<sup>59</sup> Reference to Dell case

## Appendix B: The umbrella of assurances



**Figure 71: Umbrella of Assurance Services**

Assurance is a basic function of human life and economics. Even the primitive men assured important functions such as home safeguarding and review of assets. The modern audit process is a very narrow form of assurance inspired by the statutory push of the securities act of 33 and 34. It encompasses a wide set of compromises made to accommodate the economics and technology of the nineties that do not necessarily provide for the best or more efficient form of assurance for financial information in the twenty first century.

With the Sarbanes Oxley act basically disenfranchising the AICPA of its standards setting role in regards to auditing, it also has unshackled the AICPA to get its membership on a much wider set of assurances and into processes made prohibitive by a slow regulatory change process. Figure 71 illustrates this point by displaying a wide umbrella of assurance services with the traditional audit covering only a narrow spectrum of the potential services. While it is not clear that current auditors have the skill-set to fulfill the wider set of assurance services, clearly they have the advantage in the financial domain and maybe in the set of services that relates to an undercarriage of IT services.

This wider scope of services fits well within the GDM as a much wider set of variables is to be presented while it is not yet clear the demand for its assurances. Current audit

practice has already created additional services in the form of SAS # 70 engagements, WebTrust and Systrust engagements as well as others. A wide set of societal providers has stepped in for functions such as sustainability reporting, environmental audits, networking assurances, and also competing with SysTrust on IT assurances.

Basic to a disclosure model is the need of assurance of its elements. An un-assurable disclosure model is not a viable proposition. Figure 71 also shows a dimension of data assurance that specifies the specificity of the data being assured. The XML derivative era is creating another dimension of computer services that may be highly prone to malicious intervention. With the progressive increase of interoperability the data flows among organizations will be prone to interference and falsification. Methods to increase integrity control and assurance of data reliability at the data level are going to become more and more essential. The accountant if is to play in this arena, must be able to provide close to automated assurance at the transaction level as well as be able to deal with very abstract forms of assurance to assure certain parts of sustainability reports.

## Appendix C: Non-Financial Disclosures: Key Variables

### Business

COMPANY	Accenture	Cisco	Cont. Air	Disney	EDS
Description by segment	x		x	x	x
Product R&D -strategy	x	x			
Key capabilities	x				
Dist. Sales & Mktg - strategy	x	x	x		
Manufacturing		x			
Products under development					
Customer base	x	x	x		x
Markets	x	x			x
Raw materials					
Acq. Inv., alliances, reorg	x	x	x		x
Backlog		x			
Federal regulation			x	x	
Environ compliance/regulation	x				
Competition	x	x		x	x
Employees	x	x	x		x
Intellectual property	x	x		x	x
Description by segment	x	x	x	x	x
Product R&D -strategy	x	x	x	x	
Key capabilities					
Dist. Sales & Mktg - strategy		x	x	x	x
Manufacturing		x	x	x	
Products under development				x	
Customer base		x	x	x	
Markets		x	x	x	
Raw materials	x	x			
Acq. Inv., alliances, reorg		x		x	
Backlog	x				
Federal regulation	x		x	x	x
Environ compliance/regulation	x	x		x	
Competition	x	x	x	x	x
Employees	x	x	x		
Intellectual property	x	x	x	x	



## Appendix A: Non-Financial Disclosures: Key Variables Risk Factors

### Risk factors

General

X

### Risk factors - Detailed Breakdown

Seasonality

X

Challenge to bus model/Oper  
controls

X

X

X

X

Intellectual Property rights

X

X

X

Unauthorized disclosure of source code

New Pdcts / technology

X

X

X

Litigation/claims

X

X

X

Security

X

Demand fluct/contract term.

X

X

X

X

X

General eco. and geopol. risk

X

X

X

X

X

Product dev. schedule

Competition

X

X

X

X

X

Taxation - Legislation

X

X

Access to funding

X

Bus. disrupt - catastrophic event

X

X

Industry consolidation

X

X

X

Raw materials/ inputs

X

X

Security costs

X

Recoverability of intangibles

X

Performance of inv

X

X

Regulation - Fed /Industry

Public pressure

Environmental Liabilities

Rate/currency fluct

X

X

X

X

X

X

Share price volatility factors

X

Adequate Hum. Resources

X

X

### Properties

Description

X

X

X

X

X

X

### Legal Proceedings

X

X

X

X

X

X

## Appendix A: Non-Financial Disclosures: Key Variables Risk Factors B

### Risk factors

General X

### Risk factors - Detailed Breakdown

Seasonality				X	
Challenge to bus model/Oper controls	X	X	X	X	X
Intellectual Property rights		X	X	X	
Unauthorized disclosure of source code		X			
New Pdcts / technology		X	X	X	X
Litigation/claims		X		X	X
Security		X			
Demand fluct/contract term.	X	X	X		
General eco. and geopol. risk	X	X	X	X	X
Product dev. schedule		X	X	X	X
Competition	X	X	X	X	X
Taxation - Legislation		X			
Access to funding					X
Bus. disrupt - catastrophic event		X			
Industry consolidation				X	
Raw materials/ inputs	X		X		
Security costs					
Recoverability of intangibles					
Performance of inv					X
Regulation - Fed /Industry				X	X
Public pressure				X	
Environmental Liabilities			X	X	
Rate/currency fluct	X	X	X	X	X
Share price volatility factors					
Adequate Hum. Resources					

### Properties

Description	X	X	X	X	X
-------------	---	---	---	---	---

### Legal Proceedings

	X	X	X	X	X
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## List Of Figures

Figure 1: relative precision of balance sheet items .....	14
Figure 2: Probabilistic reporting .....	21
Figure 3: predictive information .....	22
Figure 4: Basic XML transaction.....	23
Figure 5: Data transfer chains .....	25
Figure 6: the reporting layer .....	27
Figure 7: Web Services .....	29
Figure 8: Meta-processes in measurement and assurance -data capture and control .....	30
Figure 9: Galileo Enhanced Business Reporting Model.....	32
Figure 10: sales to cash .....	35
Figure 11: Cash flow modeling.....	36
Figure 12: sales to cash inventory and bad debts.....	36
Figure 13: more complete cash structural model.....	37
Figure 14: Level 1 - structural .....	37
Figure 15: Level 2 data .....	39
Figure 16: Level 3 – relationship.....	39
Figure 17: processes, measures and relationships.....	40
Figure 18: the spreadsheet disclosure model .....	41
Figure 19: Level 4 - monitoring level .....	42
Figure 20: Level 5 continuous reporting and assurance .....	42
Figure 21: Continuous reporting and assurance.....	43
Figure 22: Storing detail data and updating models .....	49
Figure 23: Standardized instruments, organizations and compensation .....	51
Figure 24: The monitoring and control layer.....	55
Figure 25: Basic Stakeholder Driven Disclosure Technology.....	56
Figure 26: OLAP breakdown of data.....	57
Figure 27: The power of the Hyperlinks.....	<b>Error! Bookmark not defined.</b>
Figure 28: ERS and NRS .....	<b>Error! Bookmark not defined.</b>
Figure 29: Nature of Information usage and its Programmability .....	69
Figure 30: A Taxonomy of Exogenous Information for Corporate Reporting .....	71
Figure 31; Symbolic representation of AIG and related entities .....	78
Figure 32: Dimensions of Information Disclosure .....	79
Figure 33: Potential real-time reports .....	80
Figure 34: Real-time reports with continuous data windows .....	80
Figure 35: Highly tailored real time reports .....	81
Figure 36: Cube display of data in variable time.....	82
Figure 37: Time selected reporting .....	84
Figure 38: Alarm Summary .....	87
Figure 39: Alarm profile definition.....	87
Figure 40: Example of User-based alarm .....	88
Figure 41: The Information Portal .....	91
Figure 42: the overlaid application level layer 1 .....	92

Figure 43: reporting layer 2 .....	93
Figure 44: Layer 3 – access control .....	95
Figure 45: Information disclosure layer 4.....	96
Figure 46: Statement of Legal Contingencies.....	97
Figure 47: Statement of Significant Contracts.....	98
Figure 48: Statement of noteworthy events .....	99
Figure 49: Key process relationship comparison.....	101
Figure 50: Multiple sources of reporting requirements and many reports.....	102
Figure 51: The multiple entities of a business .....	104
Figure 52: Related entities along the value-chain.....	105
Figure 53: GRI’s recommendation relative the audience of sustainability reporting .....	113
Figure 54: GRI technical standard .....	116
Figure 55: Cover of the Shell Sustainability report 2003 .....	117
Figure 56: Non- financial data .....	121
Figure 57: statutory requirements as inputs to non-financial disclosures.....	122
Figure 58: pension financial non-financial relationships.....	123
Figure 59: Financial x non-financial relationships across the value chain .....	124
Figure 60: Real-time HR relationships .....	126
Figure 61: Real-time inventory value chain with dashboard.....	127
Figure 62: Processes, Structures and Lags.....	132
Figure 63: The Power of Real-Time Analytics modeling from many cycles .....	135
Figure 64: Structure for future oriented reporting .....	142
Figure 65: Statement of Contingencies.....	144
Figure 66: The monitoring and Control Platform on diverse IT systems .....	152
Figure 67: Assurance as a Control Process.....	153
Figure 68: GE dashboard .....	154
Figure 69: Electronization of Business .....	156
Figure 70: structural relationships .....	157
Figure 74: Umbrella of Assurance Services .....	158

***List Of Tables***

Table 1: Points of Comparison .....	15
Table 2: OLAP reporting and data detail (fineness of information) .....	58
Table 3: Context based user driven disclosure .....	60
Table 4: Technologies and their effect on information availability and disclosure.....	67
Table 5: Probabilistic Reporting Schemi .....	85

## Hyperlink 1: economic Performance Indicators

### Economic Performance Indicators

Core Indicators	Additional Indicators
DIRECT ECONOMIC IMPACTS	
<i>Customers</i>	
<p><b>Monetary flow indicator:</b>  <b>EC1.</b> Net sales.            As listed in the profile section under 2.8.</p> <hr/> <p><b>EC2.</b> Geographic breakdown of markets.            For each product or product range, disclose national market share by country where this is 25% or more. Disclose market share and sales for each country where national sales represent 5% or more of GDP.</p>	
<i>Suppliers</i>	
<p><b>Monetary flow indicator:</b>  <b>EC3.</b> Cost of all goods, materials, and services purchased.</p> <hr/> <p><b>EC4.</b> Percentage of contracts that were paid in accordance with agreed terms, excluding agreed penalty arrangements. Terms may include conditions such as scheduling of payments, form of payment, or other conditions. This indicator is the percent of contracts that were paid according to terms, regardless of the details of the terms.</p>	<p><b>EC11.</b> Supplier breakdown by organisation and country.            List all suppliers from which purchases in the reporting period represent 10% or more of total purchases in that period. Also identify all countries where total purchasing represents 5% or more of GDP.</p>
<i>Employees</i>	
<p><b>Monetary flow indicator:</b>  <b>EC5.</b> Total payroll and benefits (including wages, pension, other benefits, and redundancy payments) broken down by country or region.            This remuneration should refer to current payments and not include future commitments.            (Note: Indicator LA9 on training also offers information on one aspect of the organisation's investment in human capital.)</p>	

***Hyperlink 2: GRI measures***

Integrated measures are generally of two types:

1. Systemic indicators; and
2. Cross-cutting indicators.

**Systemic indicators** relate the activity of an organisation to the larger economic, environmental, and social systems of which it is a part. For example, an organisation could describe its performance relative to an overall system or a benchmark, such as a percentage of the total workplace accidents found in the sector within a given country. Similarly, an organisation could present its net job creation as a proportion of the total number of jobs created in a region.

Absolute systemic indicators describe an organisation’s performance in relation to the limit or capacity of the system of which it is a part. An example would be the amount of air pollutants of a given type released as a proportion of the total amount allowable in a region as defined by a public authority.

In general, systemic indicators provide an understanding of the degree to which the organisation’s performance may influence the performance of a larger system. These types of measures are most useful for organisations that operate within a relatively narrowly defined geographic area.

**Cross-cutting indicators** directly relate two or more dimensions of economic, environmental, and social performance as a ratio. Eco-efficiency measures (e.g., the amount of emissions per unit of output or per monetary unit of turnover) are the best-known examples (further guidance on ratio indicators can be found in Annex 5). Many organisations have proposed standardised sets of environmental efficiency indicators that measure various types of resource use or pollution emissions against an economic or productivity measure. Cross-cutting indicators effectively demonstrate the size of the positive or negative impact for each incremental change in another value.

In developing and reporting cross-cutting indicators, care should be taken to:

- ▶ draw, where possible, on information already reported under these *Guidelines*;
- ▶ ensure that the indicators use ratios derived from normalised measures and, when possible, from internationally accepted metrics; and
- ▶ supplement, not replace, non-ratio indicators.

## ECONOMIC PERFORMANCE INDICATORS

The economic dimension of sustainability concerns an organisation’s impacts on the economic circumstances of its stakeholders and on economic systems at the local, national and global levels. Economic impacts can be divided into:

- ▶ direct impacts; and
- ▶ indirect impacts.

These impacts can be positive or negative. Broadly speaking, economic performance encompasses all aspects of the organisation’s economic interactions, including the traditional measures used in financial accounting, as well as intangible assets that do not systematically appear in financial statements. However, economic indicators as articulated in the *Guidelines* have a scope and purpose that extends beyond that of traditional financial indicators.



## ***Hyperlink 3: relationships in GRI***

**3.5** Linkage between executive compensation and achievement of the organisation’s financial and non-financial goals (e.g., environmental performance, labour practices).

**3.6** Organisational structure and key individuals responsible for oversight, implementation, and audit of economic, environmental, social, and related policies.

Include identification of the highest level of management below the board level directly responsible for setting and implementing environmental and social policies, as well as general organisational structure below the board level.

**3.7** Mission and values statements, internally developed codes of conduct or principles, and policies relevant to economic, environmental, and social performance and the status of implementation.

Describe the status of implementation in terms of degree to which the code is applied across the organisation in different regions and departments/units. ‘Policies’ refers to those that apply to the organisation as a whole, but may not necessarily provide substantial detail on the specific aspects listed under the performance indicators in Part C, Section 5 of the *Guidelines*.

**3.8** Mechanisms for shareholders to provide recommendations or direction to the board of directors.

Include reference to any policies or processes regarding the use of shareholder resolutions or other mechanisms for enabling minority shareholders to express opinions to management.

### ***Stakeholder Engagement***

Stakeholder engagement activities should reflect the organisation’s stakeholders as identified in the Profile section.

**3.9** Basis for identification and selection of major stakeholders.

This includes the processes for defining an organisation’s stakeholders and for determining which groups to engage.

**3.10** Approaches to stakeholder consultation reported in terms of frequency of consultations by type and by stakeholder group.

This could include surveys, focus groups, community panels, corporate advisory panels, written communication, management/union structures, and other vehicles.

**3.11** Type of information generated by stakeholder consultations.

Include a list of key issues and concerns raised by stakeholders and identify any indicators specifically developed as a result of stakeholder consultation.

**3.12** Use of information resulting from stakeholder engagements.

For example, this could include selecting performance benchmarks or influencing specific decisions on policy or operations.

## ***Hyperlink 4: Structure and Governance in GRI***

### ***Structure and Governance***

- 3.1** Governance structure of the organisation, including major committees under the board of directors that are responsible for setting strategy and for oversight of the organisation.  
  
Describe the scope of responsibility of any major committees and indicate any direct responsibility for economic, social, and environmental performance.
- 3.2** Percentage of the board of directors that are independent, non-executive directors.  
  
State how the board determines “independence”.
- 3.3** Process for determining the expertise board members need to guide the strategic direction of the organisation, including issues related to environmental and social risks and opportunities.
- 3.4** Board-level processes for overseeing the organisation’s identification and management of economic, environmental, and social risks and opportunities.

## ***Hyperlink 5: stakeholders in GRI***

### **2.9** List of stakeholders, key attributes of each, and relationship to the reporting organisation.

Stakeholders typically include the following groups (examples of attributes are shown in parentheses):

- ▶ communities (locations, nature of interest);
- ▶ customers (retail, wholesale, businesses, governments);
- ▶ shareholders and providers of capital (stock exchange listings);
- ▶ suppliers (products/services provided, local/national/international operations);
- ▶ trade unions (relation to workforce and reporting organisation);
- ▶ workforce, direct and indirect (size, diversity, relationship to the reporting organisation); and
- ▶ other stakeholders (business partners, local authorities, NGOs).

## Hyperlink 6: GRI Disclosures

### 1.1 Statement of the organisation’s vision and strategy regarding its contribution to sustainable development.

Present overall vision of the reporting organisation for its future, particularly with regard to managing the challenges associated with economic, environmental, and social performance. This should answer, at a minimum, the following question:

- ▶ What are the main issues for the organisation related to the major themes of sustainable development?
- ▶ How are stakeholders included in identifying these issues?
- ▶ For each issue, which stakeholders are most affected by the organisation?
- ▶ How are these issues reflected in the organisation’s values and integrated into its business strategies?
- ▶ What are the organisation’s objectives and actions on these issues?

Reporting organisations should use maximum flexibility and creativity in preparing this section. The reporting organisation’s major direct and indirect economic, environmental, and social issues and impacts (both positive and negative) should inform the discussion. Reporting organisations are encouraged to draw directly from indicators and information presented elsewhere in the report. They should include in their discussion any major opportunities, challenges, or obstacles to moving toward improved economic, environmental, and social performance. International organisations are also encouraged to explicitly discuss how their economic, environmental, and social concerns relate to and are impacted by their strategies in emerging markets.

### 1.2 Statement from the CEO (or equivalent senior manager) describing key elements of the report.

A statement from the reporting organisation’s CEO (or equivalent senior manager if other title is used) sets the tone of the report and establishes credibility with internal and external users. GRI does not specify the content of the CEO statement; however, it believes such statements are most valuable when they explicitly relate to the organisation’s commitment to sustainability and to key elements of the report. Recommended elements of a CEO statement include the following:

- ▶ highlights of report content and commitment to targets;
- ▶ description of the commitment to economic, environmental, and social goals by the organisation’s leadership;
- ▶ statement of successes and failures;
- ▶ performance against benchmarks such as the previous year’s performance and targets and industry sector norms;
- ▶ the organisation’s approach to stakeholder engagement; and

## Hyperlink 7: Indicators in the GRI framework

### Indicators in the GRI Framework

GRI structures performance indicators according to a hierarchy of category, aspect, and indicator. The definitions used by GRI within this hierarchy are aligned with international standards, but adapted to the GRI framework. Indicators are grouped in terms of the three dimensions of the conventional definition of sustainability—economic, environmental, and social. Annex 5 contains further information on GRI’s approach to indicators.

In the 2002 *Guidelines*, the hierarchy is structured as follows:

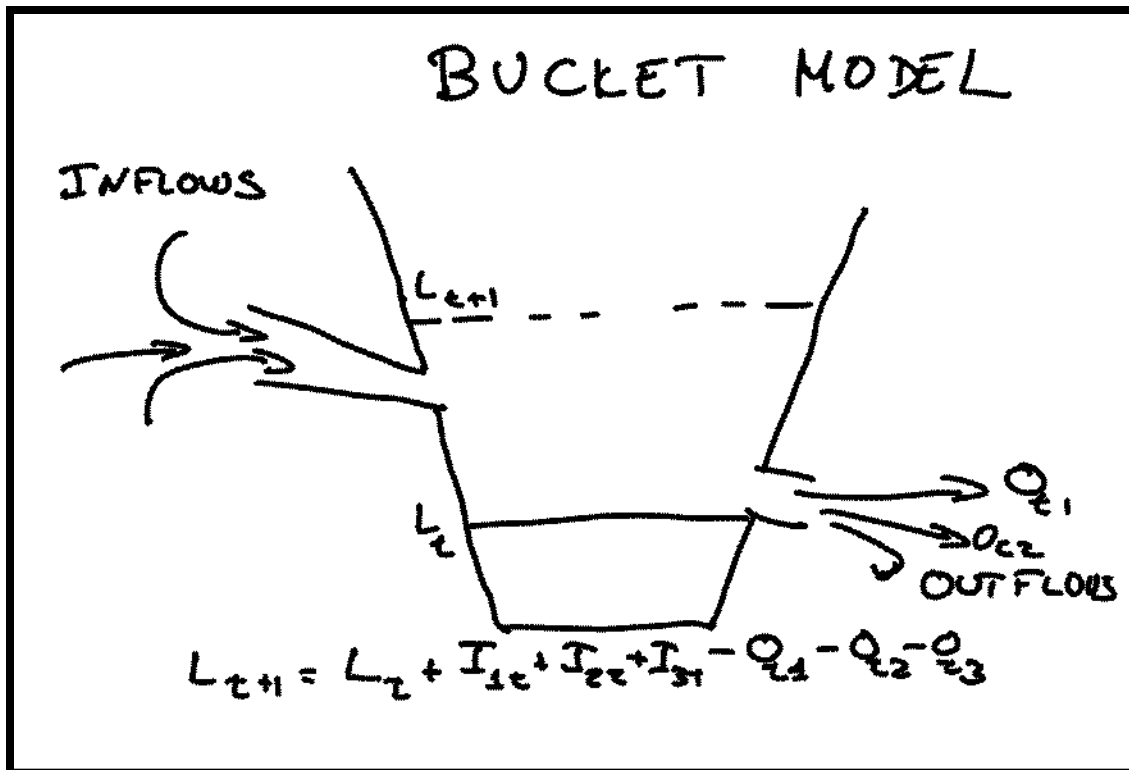
	CATEGORY	ASPECT
ECONOMIC	Direct Economic Impacts	Customers Suppliers Employees Providers of capital Public sector
	Environmental	Materials Energy Water Biodiversity Emissions, effluents, and waste Suppliers Products and services Compliance Transport Overall
SOCIAL	Labour Practices and Decent Work	Employment Labour/management relations Health and safety Training and education Diversity and opportunity
	Human Rights	Strategy and management Non-discrimination Freedom of association and collective bargaining Child labour Forced and compulsory labour Disciplinary practices Security practices Indigenous rights
	Society	Community Bribery and corruption Political contributions Competition and pricing
	Product Responsibility	Customer health and safety Products and services Advertising Respect for privacy

## Hyperlink 8: GRI notes

### General Notes

1. *Boundaries:* Organisations using the *Guidelines* may have complex internal structures, multiple subsidiaries, joint ventures, and/or foreign operations. Particular care should be taken to match the scope of the report with the economic, environmental, and social “footprint” of the organisation (i.e., the full extent of its economic, environmental, and social impacts). Any differences should be explained.
  2. *Use of technical protocols:* In reporting on indicators contained within the *Guidelines*, reporters should use GRI technical protocols whenever available. Drafting of protocols for a limited number of GRI indicators began in 2002, and drafts in progress can be found on the GRI website ([www.globalreporting.org](http://www.globalreporting.org)). GRI recognises the need for continued development of protocols, and the current set represents the first of many that will follow in coming years. If, for any reason, a reporting organisation does not use an existing GRI protocol, it should clearly describe the measurement rules and methodologies used for data compilation. For situations where a formal GRI protocol is not yet available, reporting organisations should use their professional judgement, drawing on international standards and conventions wherever possible.
  3. *Metrics:* Reported data should be presented using generally accepted international metrics (e.g., kilograms, tonnes, litres), calculated using standard conversion factors. When other metrics are used, reports should provide conversion information to enable international users to make conversions.
  4. *Time frames and targets:* Wherever possible, reports should present information for all performance indicators in a manner that enables users to understand current and future trends. At a minimum, reporting organisations should present data for the current year.
- However, if absolute data are provided, users will be able to compile their own normalised analysis using information from Section 2 of Part C (Profile). Nevertheless, GRI does recognise the utility of data presented as ratios. Ratio data may be useful in conjunction with absolute data for communicating performance trends or articulating performance across two or more linked dimensions of sustainability. When ratios are included, organisations are asked to make use of normalising factors from within the report, and from Section 2 of Part C, if appropriate. See Annex 5 for more information on ratios.
6. *Data consolidation and disaggregation:* Reporting organisations will need to determine the appropriate level of consolidation (aggregation) of indicator data. For example, indicators could be presented in terms of the performance of the organisation worldwide or broken down by subsidiaries, countries of operation, or even individual facilities. This decision requires balancing the reporting burden against the potential additional value of data reported on a disaggregated (e.g., country or site) basis. Consolidation of information can result in loss of a significant amount of value to users, and also risks masking particularly strong or poor performance in specific areas of operation. In general, reporting organisations should disaggregate information to an appropriate and useful level as determined through consultation with stakeholders. The appropriate level of consolidation/disaggregation may vary by indicator.
  7. *Graphics:* The use of graphics can enhance the quality of a report. However, care should be taken to ensure that graphics do not inadvertently lead readers to incorrect interpretations of data and results. Care is needed in the selection of axes, scales, and data

### ***Hyperlink 9: The bucket model of accounting***



The world is composed of level accounts and flow accounts. Level accounts measure the accumulated amount of that item in a particular moment of time. Balance sheet, human resources, reserves, accumulated education are level accounts.

Flow accounts measure continuous / discrete events that are accumulated over time. A level account is always relative to a time period.. Income statement, HR training, investment in public relations and flows of funds are flow types of accounts.

All level accounts relate to a set of flow accounts that feed and de-penish it over time.

## ***Hyperlink 10: MDNA Edgar Online***

### **ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS.**

You should read the following discussions of our financial condition and results of operations in conjunction with the financial statements and the notes to those statements included elsewhere in this annual report. This discussion may contain forward-looking statements that involve risks and uncertainties. Our actual results may differ materially from those anticipated in these forward-looking statements as a result of certain factors, such as those set forth under "Risk Factors" and elsewhere in this annual report.

#### **OVERVIEW**

We are a financial and business information company that specializes in providing information contained in SEC filings in an easy-to-use, searchable and functional format. We launched our EDGAR Online website in January 1996 and began selling our subscription services and establishing contractual relationships with business and financial information websites to supply EDGAR content. Our primary focus was generating sales leads and building brand recognition.

We went public in May 1999. In September 1999, we acquired all of the outstanding equity of Partes Corporation, owner of our Freedgar.com website, for \$9.9 million. The purchase price consisted of the issuance of common stock, stock options and warrants, the assumption of liabilities and acquisition related expenses. In October 2000, we acquired all the outstanding equity of Financial Insight Systems, Inc. for approximately \$28.1 million. The purchase price included the issuance of common stock, a cash payment, issuance of notes and acquisition related expenses.

We have never operated at a profit and our revenues have decreased from a peak of approximately \$17.1 million in 2001 to approximately \$14.3 million in 2003. This decrease is primarily due to a \$4.0 million decrease in technical services. We have, however, generated positive cash flow from operating activities since the year ended 2001 by increasing seat-based subscription revenue by \$2.6 million and by reducing many of our operating expenses. Specifically, we have reduced our workforce, which, in turn, has reduced our costs of sales, development costs and general and administrative expenses.

We are continuing to focus on growing our subscription revenues and corporate data sales and expect to continue to generate positive cash flow from operations by offering the following products and services:

**Subscription Services.** Our subscription services include EDGAR Online Pro, EDGAR Online Access and FreeEDGAR. EDGAR Online Pro is sold by our sales force and is available via multi-seat and enterprise-wide contracts. Sales leads are primarily provided



from the traffic to our subscription websites from Yahoo! Finance and Freeedgar.com and from the migration of users from EDGAR Online Access. In 2004, we expect to increase sales leads to our services through our relationship with Microsoft. In January 2004, after we added new databases and functionality to EDGAR Online Pro, we raised the price of a new subscription from \$50 per month or \$600 per year to \$100 per month or \$1,200 per year. Additional fees are applied when the customer requests additional, specific content such as conference call transcripts and global annual and interim reports. Our mid-tiered service, EDGAR Online Access, is available for \$180 per year and is purchased annually or quarterly in advance with a credit card. Revenue from subscription services is recognized ratably over the subscription period, which is typically three or twelve months.

**Digital Data Feeds.** Through EDGAR Online Explorer, we license services that integrate our products into our customers' existing applications. The price for a digital data feed ranges from as low as \$1,200 to as high as \$180,000 per year. Prices vary depending on such factors as the quantity, type and format of information provided. Revenue from digital data feeds is recognized over the term of the contract, which are typically non-cancelable, one-year contracts with automatic renewal clauses, or, in the case of certain up-front fees, over the estimated customer relationship period.

**Other Services.** We provide technical services to Nasdaq. Several of our technical and non-technical contract employees operate, maintain and support the Nasdaq Online website. We also generate ancillary advertising and e-commerce revenues through the sale of advertising banners, sponsorships and through e-commerce activities

## 20

such as marketing third party services to the users of our websites. Revenue from technical services, consisting primarily of time and materials based contracts, is recognized in the period services are rendered. Advertising and e-commerce revenue is recognized as the services are provided.

## RESULTS OF OPERATIONS

The following table sets forth the percentage relationships of certain items from our Consolidated Statements of Operations as a percentage of total revenue.

	YEAR ENDED DECEMBER 31,		
	2001	2002	2003
Total revenues	100%	100%	100%
Cost of revenues	26	16	14

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Gross profit	74	84	86
Operating expenses:			
Sales and marketing	14	14	15
Product development	13	14	12
General and administrative	49	48	50
Restructuring and severance costs	6	(1)	5
Amortization and depreciation	28	18	17
	---	---	---
Loss from operations	(36)	(9)	(14)
Interest and other, net	(4)	(2)	(1)
	---	---	---
Loss before cumulative effect of change in accounting principle	(40)	(11)	(15)
CUMULATIVE EFFECT OF CHANGE in accounting principle	-	(58)	-
	---	---	---
Net loss	(40)%	(68)%	(15)%

## COMPARISON OF THE YEARS 2003, 2002, AND 2001

### REVENUES

Total revenues for the year ended December 31, 2003 decreased 11% to \$14.3 million, from \$16.2 million for the year ended December 31, 2002. The net decrease in revenues is primarily attributable to a \$1.5 million, or 35%, decrease in technical services revenues, a \$628,000, or 46%, decrease in advertising and e-commerce revenues, and a \$547,000, or 10%, decrease in data sales which were partially offset by a \$806,000, or 16%, increase in seat-based subscriptions.

Total revenues for the year ended December 31, 2002 decreased 5% to \$16.2 million from \$17.1 million for the year ended December 31, 2001. The net decrease in revenues is primarily attributable to a \$2.5 million, or 37%, decrease in technical services revenues, a \$112,000, or 8%, decrease in advertising and e-commerce revenues, and a \$36,000, or 1%, decrease in data sales which were partially offset by a \$1.8 million, or 52%, increase in seat-based subscriptions.

### Seat-based Subscriptions

	YEAR ENDED DECEMBER 31,		
	2001	2002	2003
	----	----	----
REVENUES (IN \$000S)	\$ 3,387	\$ 5,148	\$ 5,953
Percentage of total revenue	20%	32%	42%
Number of subscribers	23,500	26,500	27,000
Average price per subscriber	\$ 144	\$ 194	\$ 220

The increase in seat-based subscription revenue in 2003 and 2002 is primarily due to an increase in the average price per seat as well as an increase in the number of seat-based contracts and individual accounts. During

21

2003 and 2002, we sold over 2,000 and 4,700 subscriptions, respectively, for our premium product, EDGAR Online Pro. The increases in premium subscriptions were offset by cancellations and user migrations from our mid-tiered service, EDGAR Online Access, to EDGAR Online Pro. In late 2003 and early 2004, we expanded our telesales and account management capabilities in order to sell EDGAR Online Pro to new customers, reduce cancellations and capitalize on the Microsoft relationship. With an expanded sales team we expect to increase seat-based subscriptions and our average price per subscriber.

### Data Sales

	YEAR ENDED DECEMBER 31,		
	2001	2002	2003
REVENUES (IN \$000S)	\$ 5,416	\$ 5,380	\$ 4,833
Percentage of total revenue	32%	33%	34%
Number of contracts	215	191	220
Average price per contract	\$25,191	\$28,168	\$21,968

The decrease in data sales in 2003 from 2002 was \$547,000. This decrease was primarily attributable to the fact that two of our largest customers reduced their purchases by an aggregate of \$1.0 million. We were able to offset these significant contract reductions by adding a number of new customers and by expanding the scope of services with our existing customers. In 2003, these two customers represented 10% of data sales and 3% of total revenue. In 2004, the data sales from these two customers are expected to remain approximately the same as in 2003. The decrease in data sales in 2002 from 2001 was due to the overall decrease in the number of contracts.

### Technical services

	YEAR ENDED DECEMBER 31,		
	2001	2002	2003

REVENUES (IN \$000S)	\$6,782	\$4,287	\$2,805
Percentage of total revenue	40%	27%	19%

The decrease in technical services revenue in 2003 from 2002 is primarily due to decreases in the services provided to Nasdaq, the sole client to which we provide technical services. In May 2003, the Nasdaq-Online.com website, that we previously hosted in our Rockville, Maryland facility, was moved out of our data center and into Nasdaq's facility, significantly reducing our technical services revenue during the second half of 2003. In 2004, Nasdaq further reduced their technical services contract and we expect technical services revenue will be approximately \$200,000 per quarter. The decrease in technical services revenue in 2002 from 2001 is primarily due to contract terminations with two other consulting clients.

### Advertising and E-Commerce

	YEAR ENDED DECEMBER 31,		
	2001	2002	2003
REVENUES (IN \$000S)	\$1,467	\$1,355	\$ 728
Percentage of total revenue	8%	8%	5%

The decrease in advertising and e-commerce revenues is primarily due to the decrease in advertising rates and impressions due to the migration of many of our users to our premium service that does not support ads. In 2002, the decrease was partially offset by an increase in e-commerce activities such as list rentals and sales of third party data.

### COST OF REVENUES

Cost of revenues consists primarily of fees paid to acquire the Level I EDGAR database feed from the SEC, content feeds, salaries and benefits of operations employees and the costs associated with our computer equipment and communications lines used in conjunction with our websites. In addition, for each period, online barter advertising expense is recorded equal to the online barter advertising revenue for that period.

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Total cost of revenues for the year ended December 31, 2003 decreased \$653,000, or 25%, to \$2.0 million, from \$2.6 million for the year ended December 31, 2002. The decrease in cost of revenues is primarily attributable to a decrease in the cost and number of content feeds and communications lines, as well as the workforce reduction effected March 31, 2003.

Total cost of revenues for the year ended December 31, 2002 decreased \$1.8 million, or 41%, to \$2.6 million from \$4.4 million for the year ended December 31, 2001. The decrease in cost of revenues is primarily attributable to a decrease in content feeds and barter expense as well as the reassignment of certain previously billable employees to the development team due to lost technical services revenue.

## **OPERATING EXPENSES**

**Selling and Marketing.** Sales and marketing expenses consist primarily of salaries and benefits, sales commissions, advertising expenses, public relations, and costs of marketing materials. Sales and marketing expenses for the year ended December 31, 2003 decreased \$149,000, or 6%, to \$2.2 million, from \$2.3 million for the year ended December 31, 2002, due to a reduction in our discretionary advertising spending and marketing campaigns as well as the workforce reduction effected March 31, 2003. Sales and marketing expenses for the year ended December 31, 2002 decreased \$87,000, or 4%, to \$2.3 million, from \$2.4 million for the year ended December 31, 2001, due to a reduction in our advertising spending and marketing campaigns offset by the addition of sales people in 2002.

**Development.** Development expenses for the year ended December 31, 2003 decreased \$545,000, or 24%, to \$1.7 million, from \$2.2 million for the year ended December 31, 2002. The decrease in development expenses is primarily due to the workforce reduction effected March 31, 2003. Development expenses for the year ended December 31, 2002 increased \$96,000, or 4%, to \$2.2 million, from \$2.1 million for the year ended December 31, 2001, primarily due to the reassignment of certain previously billable employees from cost of sales to the development team which was offset by a reduction in expenses resulting from closing our Kirkland, Washington office.

**General and Administrative.** General and administrative expenses consist primarily of salaries and benefits, insurance, fees for professional services, general corporate expenses and facility expenses. General and administrative expenses for the year ended December 31, 2003 decreased \$535,000, or 7%, to \$7.2 million, from \$7.8 million for the year ended December 31, 2002. The decrease in general and administrative expenses was primarily due to the workforce reduction effected March 31, 2003. These decreases in 2003 were offset by costs incurred in association with a terminated proposed transaction. General and administrative expenses for the year ended December 31, 2002 decreased \$658,000, or 8%, to \$7.8 million, from \$8.4 million for the year ended December 31, 2001 primarily due to a decrease in personnel and general corporate expenses.

**Restructuring Costs.** In the first quarter of 2003, we effected a 17% workforce reduction in response to an expected decline in Nasdaq revenues in the second half of 2003. In addition, we negotiated payments under a Separation and Release Agreement with our former President and Chief Operating Officer. We accrued \$783,600 of related severance costs in the first quarter of 2003.

During the second quarter of 2001, we recorded a \$912,000 pre-tax charge associated with closing our Kirkland, Washington office. These costs include severance payments, non-recoverable lease liabilities, loss on fixed assets, and the cost of non-cancelable service contracts for operating expenses such as phone lines and equipment leases. We recorded an additional \$84,000 in September 2001 related to severance expenses for certain employees of Financial Insight Systems, Inc. In 2002, approximately \$182,000 of these charges were reversed as contract terminations were re-negotiated.

**Depreciation and Amortization.** Depreciation and amortization expenses include the depreciation of property and equipment and the amortization of definitive lived intangible assets. Depreciation and amortization for the year ended December 31, 2003 decreased \$377,000, or 13%, to \$2.5 million, from \$2.9 million for the year ended December 31, 2002 due to several fixed assets becoming fully depreciated in 2003. Depreciation and amortization for the year ended December 31, 2002 decreased \$1.9 million, or 40%, to \$2.9 million, from \$4.8 million for the year ended December 31, 2001 due to the adoption of SFAS 142, "Goodwill and Other Intangible Assets," which requires that goodwill no longer be amortized, as well as the retirement of assets associated with closing our Kirkland, Washington office.

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## 23

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Eliminating the goodwill amortization deduction resulted in a decrease in amortization expense of \$1.6 million or \$0.11 per share for the year ended December 31, 2002.

**Cumulative Effect of Change in Accounting Principle.** As required by SFAS No. 142, which we adopted effective January 1, 2002, we performed a transitional assessment to determine whether there was an impairment of goodwill at the effective date. Based on this assessment, we recognized a \$9.3 million non-cash charge, measured as of January 1, 2002, as the cumulative effect of a change in accounting principle for the write-down of goodwill to its fair value. The impaired goodwill was not deductible for tax purposes, and as a result, no tax benefit has been recorded in relation to the charge.

## **SELECTED QUARTERLY REVENUE RESULTS**

The following table sets forth unaudited revenue results for each of our last eight fiscal quarters. In the opinion of management, this unaudited quarterly information has been prepared on a basis consistent with our audited consolidated financial statements and includes all adjustments (consisting of normal and recurring adjustments) that management considers necessary for a fair presentation of the data. These quarterly revenue results are not necessarily indicative of future quarterly patterns or revenue results. This information should be read in conjunction with our financial statements and the related notes included elsewhere in this annual report.



In connection with the transaction, we paid a transaction fee equal to 4.625% of the gross proceeds and issued a four-year warrant to purchase 40,000 shares of common stock at an exercise price of \$2.50 per share.

On March 28, 2003, we entered into a Separation and Release Agreement with Tom Vos, our former President and Chief Operating Officer. Under the agreement, we were required to make payments to Mr. Vos of \$340,000 in 2003, and are required to make payments to Mr. Vos of \$170,000 in 2004, and \$42,000 in either 2005 or 2006. We have also paid or are obligated to make three payments of \$60,972 to a deferred compensation plan for the benefit of Mr. Vos, one payment per year in 2003, 2004 and 2005. On March 31, 2003, we effected a plan to align our cost structure with current business conditions. These conditions include an anticipated reduction in technical services revenues related to the Nasdaq contract, which began in the second half of 2003, by approximately \$2.4 million annually. The plan entailed a reduction in workforce of 17%,

24

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which was effected in March 2003. We anticipate that this action will reduce operating expenses on an annualized basis by approximately \$1.2 to \$1.3 million. We incurred severance charges of \$783,600 in the quarter ended March 31, 2003 associated with the work force reduction and the Separation and Release Agreement with Mr. Vos.

In connection with our acquisition of Financial Insight Systems, Inc. in October 2000, we issued \$6,000,000 in promissory notes to the former owners of Financial Insight Systems. The notes were originally scheduled to mature on October 27, 2002. In March 2002, we extended the maturity date of the notes such that the holders of \$5,700,000 in principal amount of the notes agreed to amend and restate their notes to provide for, among other things, the following schedule of principal payments: \$1,900,000 on April 1, 2002, \$1,900,000 on April 1, 2003 and \$1,900,000 on January 2, 2004.

At December 31, 2003, we had cash on hand of \$3.9 million. We believe that our existing capital resources and projected cash generated from operations will be sufficient to meet our anticipated cash needs for working capital, including the note repayment, and capital expenditures for at least the next 12 months. Thereafter, if cash generated from operations is insufficient to satisfy our liquidity requirements, we may need to raise additional funds through public or private financings, strategic relationships or other arrangements. There can be no assurance that such additional funding, if needed, will be available on terms attractive to us, or at all. The failure to raise capital when needed could materially adversely affect our business, results of operations and financial condition. If additional funds are raised through the issuance of equity securities, the percentage ownership of our then-current stockholders would be reduced.

Our future contractual obligations at December 31, 2003, in thousands, were as follows:



	2004	2005	2006	2007	Total
	-----	-----	-----	-----	-----
Notes payable and interest	\$1,926	\$ --	\$ --	\$ --	\$1,926
Operating leases	835	730	313	56	1,934
Severance payments	251	103	--	--	354
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	\$3,012	\$ 833	\$ 313	\$ 56	\$4,214

We intend to fund these obligations from our cash on hand at December 31, 2003, as well as through future operating cash flows and funds raised in this offering.

## CRITICAL ACCOUNTING POLICIES AND ESTIMATES

The discussion and analysis of our financial condition and results of operations is based upon our financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, revenues and expenses, and related disclosure of contingent assets and liabilities. Actual results may vary from these estimates under different assumptions or conditions. On an on-going basis, we evaluate our estimates, including those related to the allowance for doubtful accounts, estimated useful lives of intangible assets and the determination of restructuring obligations. We base our estimates on historical experience, business practices and corporate policies, contractual provisions and various other assumptions that are believed to be reasonable under the circumstances.

We derive revenues from four primary sources: seat-based subscriptions to our Web services, contracts with corporate customers for customized data, sale of our technical services to construct and/or operate the technical systems our customers use to integrate our data and data from other sources into their products and services, and advertising and other e-commerce based revenues. Revenue from seat-based subscriptions is recognized ratably over the subscription period, which is typically three or twelve months. Revenue from data sales is recognized over the term of the contract or, in the case of certain up-front fees, over the estimated customer relationship period. Revenue from technical services, consisting primarily of time and materials based contracts, is recognized in the period services are rendered. Advertising and e-commerce revenue is recognized as the services are provided. Revenue is recognized provided acceptance, and delivery if applicable, has occurred, collection of the resulting receivable is probable and no significant obligations remain. If amounts are received in advance of the services being performed, the amounts are recorded and presented as deferred revenues.

Several of our accounting policies involve significant judgments and uncertainties. The policies with the greatest potential effect on our results of operations and financial position include the estimated collectibility of accounts receivable, the estimated useful lives and fair values of intangible assets and the estimated fair value of goodwill. We maintain an allowance for doubtful accounts for estimated losses resulting from the inability of customers to make payments and for sales allowances. If the financial

conditions of our customers deteriorate or there are specific factors resulting from the specific type of product, or customer class inability to make payments, additional allowances will be required. We establish the estimated useful lives of our intangible assets based on a number of factors, which is in part based on our assessments of the technology and customer relationships acquired. If these estimates change, the estimated useful lives of our intangibles may require adjustment. We test goodwill annually and between annual tests if events occur or circumstances change that would more likely than not reduce the fair value of a reporting unit below its carrying amount. These evaluations are done with the assistance of an independent valuation firm and include assumptions regarding future cash flows, growth rates, and discount rates. Subsequent reviews may result in future periodic impairments that could have a material adverse effect on the results of operations in the period recognized.

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## RECENT ACCOUNTING PRONOUNCEMENTS

In May 2003, the FASB issued SFAS No. 150, "Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity." SFAS 150 provides guidance on how an entity classifies and measures certain financial instruments with characteristics of both liabilities and equity. This statement is effective for financial instruments entered into or modified after May 31, 2003, and otherwise was effective at the beginning of the first interim period beginning after June 15, 2003. The adoption of this statement will not have a material impact on our financial position or results of operations.

In April 2003, the FASB issued SFAS No. 149, "Amendment of Statement 133 on Derivative Instruments and Hedging Activities." The statement amends and clarifies accounting and reporting for derivative instruments, including certain derivative instruments embedded in other contracts, and hedging activities. This statement is designed to improve financial reporting such that contracts with comparable characteristics are accounted for similarly. The statement, which is generally effective for contracts entered into or modified after June 30, 2003, will not have a material impact on our financial position or results of operations.

In November 2002, the FASB issued FIN No. 45, "Guarantor's Accounting and Disclosure Requirements for Guarantees, Including Indirect Guarantees of Indebtedness of Others." FIN 45 addresses the disclosures to be made by a guarantor in its interim and annual financial statements about its obligations under certain guarantees. FIN 45 also clarifies that a guarantor is required to recognize, at the inception of a guarantee, a liability for the fair value of the obligation undertaken in issuing the guarantee. The disclosure requirements in this Interpretation are effective for financial statements of interim or annual periods ending after December 15, 2002. The adoption of FIN 45 did not have a material impact on our financial position or results of operations.

In January 2003, the FASB issued Interpretation No. 46, "Consolidation of Variable Interest Entities" and in December 2003, a revised interpretation was issued. In general, a variable interest entity is a corporation, partnership, trust, or any other legal structure used for business purposes that either does not have equity investors with voting rights or has equity investors that do not provide sufficient financial resources for the entity to support its activities. FIN 46 requires a variable interest entity to be consolidated by a company if that company is designated as the primary beneficiary. Application of FIN 46 is required in financial statements of public entities that have interest in structures that are commonly referred to as special-purpose entities, for periods ending after December 15, 2003. Application by public entities, other than small business issuers, for all other types of variable interest entity, non- special-purpose entities, is required in financial statements for periods ending after March 15, 2004. The adoption of FIN 46 did not have a material impact on our financial position or results of operations.

In November 2002, the FASB reached a consensus regarding EITF Issue No. 00-21, "Revenue Arrangements with Multiple Deliverables." EITF 00-21 addresses accounting for arrangements that may involve the delivery or performance of multiple products, services, and/or rights to use assets. The guidance provided by EITF 00-21 is effective for contracts entered into on or after July 1, 2003. The adoption of EITF 00-21 did not have a material impact on our financial position or results of operations.

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## **ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK.**

### **INTEREST RATE FLUCTUATIONS**

We generally investment in short-term, low risk instruments. We believe that any change in interest rates would not have a material effect on our financial statements.

### **CURRENCY RATE FLUCTUATIONS**

Our results of operations, financial position and cash flows are not materially affected by changes in the relative values of non-U.S. currencies to the U.S. dollar. We do not use any derivative financial instruments.