The CFO and the Sustainability Reporting Chain: Why CFOs should care about sustainability reporting

Introduction *by Francis Quinn*

It goes without saying that Chief Financial Officers (CFOs) pay a lot of attention to the financial performance of their companies—in particular, anything that could impact the bottom line in a positive or negative sense. Sustainability is increasingly on the minds of CFOs because it highlights various reputational and operational risks that should not be overlooked, including compliance issues.

These issues range from the necessity of banks in the United States having enough capital to pass federal stress tests, to the imperative of dealing with oil spills like in Galveston Bay—which takes a terrible ecological and commercial toll, to the critical steps taken by General Motors addressing issues relating to vehicle safety.

Sustainability is becoming a business imperative regardless of whether the company operates in developed or emerging markets. The expectations of both customers and investors are evolving as more attention is paid to issues such as environment, social impacts, and governance.

Sustainability has presented some companies with substantial business opportunities. For example, GE's Ecomagination line of products brought the company US$21 billion in sales in 2011.[1] Furthermore, P&G reports that from 2007 to 2011, its Sustainable Innovation Products earned US$40 billion in revenue.[2]

The CFO plays an important role in key investment decisions because of the responsibility for evaluating new opportunities—such as sustainability-focused product offerings—and for identifying and analyzing any potential risks. That said, not all CFOs are embracing the transition now underway.

Deutsche Bank research found a marked correlation between strong environmental and social performance and a lower cost of capital. This correlation is clearly of interest to the CFO of any company trying to grow the business.[4]

More and more investors are using sustainability as an investment criterion. ExxonMobil recently became the first energy company to respond to this investor interest by publishing a report on how it assesses carbon asset risk.[3] Energy markets are shifting in fundamental ways, and shareholder value is at stake if companies are not prepared to survive in a low-carbon economy.

As oil gets harder to find and extract, more and more unconventional assets, such as deep-water and tar sands, are being booked on balance sheets. These reserves are not only the most carbon intensive, risky, and expensive to extract, but are also vulnerable to devaluation. Investors will move their money to companies that are clearly managing these risks well and likely avoid companies that have not demonstrated management of said risks.

Forward-thinking CFOs need to reassess how they allocate shareholder capital and act strategically to keep their business models focused on managing these new issues. Deutsche

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Furthermore, CFOs must manage investments in new assets as well as any potential new liabilities, including carbon taxes and carbon credits. Good compliance increasingly requires companies to provide more accurate sustainability information. A 2011 study looked at 24 countries that have introduced mandatory reporting requirements since 2005, and all increasingly require third-party verification of the data disclosed.[5]

Another study concluded that sustainable supply chain practices that combine both social and environmental initiatives are positively associated with corporate financial performance as measured by return on assets and return on equity.[6] According to the study, these positive effects are not always immediately apparent, and a time lag of two years or more is not uncommon.

Since 2010, CFOs in the United States must personally sign off on the controls and procedures that are in place to report material climate change-related risks. Under these regulatory requirements, all CFOs need to ensure their companies' processes are high quality: climate change-related data must be quality assured and provenance verified as both reliable and pertinent.

As the importance of such reporting grows, the know-how, resources, and rigor that finance teams have in place for gathering and analyzing data will naturally lead them to take an increasing interest in how sustainability-related issues are managed.

That said, it is not about CFOs taking on the responsibilities of other colleagues. Rather, CFOs are likely to take on a central role in managing the evolving way business performance is measured, evaluated, communicated, and perceived by stakeholders.

This paper seeks to lay out the complex landscape of sustainability reporting and provide some guidance for CFOs in selecting a system that can address their needs for developing sustainability reports.

Overview of the sustainability reporting chain

by Francis Quinn

Sustainability is a new approach to assess the vitality of companies and is becoming increasingly relevant on a global scale for its in-depth evaluation of investment and development opportunities. Sustainability is of paramount importance because investors, faced with the uncertain evolution of the global financial crisis, are looking at evaluation differently. They are evaluating not only the short-term financial performance of companies, but also their real viability: in other words their ability to grow in the context of new challenges and managing new risks generated by a rapidly changing world.

The sustainability approach permits analysis of a company's capacity to develop innovative technologies, secure its access to raw materials essential to business, and manage economic recession trends in addition to its impact on sustainable consumption.

Furthermore, it is critical that this approach be considered by companies operating in emerging economies, including China, India, and Brazil, where national values are strongly supported by local authorities. These values can create political pressure to create new social and environmental regulations.

Leading companies recognize that it is in their own vested interest to acknowledge stakeholder queries and see sustainability and its underlying rationale very differently from their predecessors. In fact, they recognize two complementary aspects to sustainability that are not mutually exclusive: risk management and business growth opportunities.

What is the sustainability reporting chain?

The sustainability reporting chain is the group of departments, affiliates, subsidiaries, partners, distributors, suppliers, and customers that comprise a company's global reporting network as it relates to environmental impact and social responsibility. With increasing industry regulation and the growing importance of managing risk in a proactive manner, organizations now realize the necessity of collecting, analyzing and continuously monitoring, as well as reporting sustainability data to its many stakeholders.

Who is and who should be involved?

Local operational teams that manage the collection, analysis, and validation of the sustainability data of their particular areas—for example, environment or health and safety—need to be directly involved. The process for collecting this data is generally either manual or semi-automated and may use spreadsheet templates or data from an enterprise system. The information is then rolled up into internal reports for local weekly and monthly reporting.

Data from local operational teams are subsequently consolidated by **corporate operational teams** across the entire organization for inclusion in quarterly environmental compliance reports, monthly or quarterly operation reviews, or annual reports at a corporate level. Naturally, these documents include the corporate sustainability report.

In some companies, a cross-functional **sustainability team** manages the authoring of the monthly operation reports, quarterly board reports, and the annual sustainability report. Additionally, they will manage submissions to various ratings agencies, non-governmental organizations (NGOs), and analysts. This team collects information, both numbers and narrative, from departments across the entire organization for its reports.

The different departments typically include:

- Operations
- Human resources
- Environment
- Health and safety
- Supply chain
- Research and development
- Philanthropy

The sustainability team authors the draft report to be reviewed before final publication, whether web-based, paper, and/or mobile devices, ideally by:

- Operational SMEs
- Vice presidents
- Communications
- Public affairs
- Internal audit
- Legal
- Executive teams

As the report is being finalized, the CEO will review and approve the document.

Sustainability **consultants** are external firms that are hired to assist the sustainability team in a range of activities: identifying material sustainability issues, benchmarking performance and reporting practices, interpreting sustainability information, crafting the messaging, identifying information management needs, and recommending strategic next steps.

After the content is approved, the **design team** incorporates it into the designed layout. This team is typically external and works closely with the sustainability team to ensure the design is in line with the company branding and messaging.

In some cases, the internal audit team reviews the company's sustainability data from three perspectives: quality,

pertinence, and provenance. The team can provide an internal, independent review of the data before the report is published.

A few companies engage the services of **external assurance** firms that specialize in verifying the accuracy of the whole sustainability report, specified performance claims, and/or report data. They provide an external, independent opinion on the reliability of the information. They may also weigh in on underlying reporting processes such as stakeholder engagement, materiality assessment, or data systems.

External assurance teams require access to the company's data collection and internal review processes as well as the people responsible for the content of the report. After the audit is completed, a signed assurance statement is typically presented in the sustainability report or on the company website.

Sustainability reporting chain life cycle

There are four main components of the sustainability reporting chain:

- Identifying the right set of material issues
- Data collection, analysis, and validation
- Reporting
- Publication

Once the right issues are identified, supporting information comes from operational facilities, subsidiaries and/or affiliates, and suppliers who provide information regarding their sustainability performance. Data is collected from across the company in many areas, including environment, emissions, water, waste, recycling, health and safety, compliance, supply chain, human resources, philanthropic activities, and relationships with local communities. Most sustainability reporting frameworks require companies to describe the way they manage these important issues, and how they measure performance, in the sustainability report.

Various data types in the sustainability chain:

- Environmental
- Emissions
- Waste
- Compliance
- Conflict minerals
- Community relationships
- Social media
- Health and safety
- Water
- Recycling
- Supply chain
- Philanthropy
- Human resources

After the data is collected, the company must analyze, verify, and report findings both internally and externally. There are various departments, operational facilities, and teams that work within this process. Certain key indicators that are materially important are disclosed to stakeholders in various formats, including annual sustainability reports, integrated reports, investor relations presentations, websites, as well as submissions to ratings agencies, NGOs, and analysts. Often times, important data and narrative commentary are leveraged across these reports and submissions.

However, the data set presented in the externally facing reports tends to be a portion of the full data set gathered by the company to manage its activities. The full data set is used to compile a broad range of internally facing reports, including monthly operations reports, risk reporting, quarterly scorecards, and progress reports to the board of directors or the executive.

The fundamental difference between GRI and SASB lies in their audiences: GRI is stakeholder based, while SASB is specifically designed for investors.

Reporting frameworks, ratings agencies, and formats

A number of sustainability reporting frameworks provide guidance as to what a company should talk about in its annual sustainability report. Companies are free to choose whether they follow any of these frameworks. The most commonly used are the Global Reporting Initiative (GRI) guidelines. Another framework in the United States that is gaining some attention is the Sustainability Accounting Standards Board (SASB).

The fundamental difference between GRI and SASB lies in their audiences: GRI is stakeholder based, while SASB is specifically designed for investors. Therefore, reports following the GRI guidelines are an expression of how companies identify, manage, and react to the impacts on stakeholders. In contrast, reports following SASB standards communicate the organization's performance across a broad spectrum of topics and focus on issues that may affect the organization's near term financial situation.

Each year companies receive requests from multiple sustainability rating agencies to provide information that the agencies analyze. This analysis is used to determine a perceived performance ranking of these companies, which

is then published. The CDP (formerly know as the Carbon Disclosure Project) and Dow Jones Sustainability Index (DJSI) are probably the two best-known examples. In both cases, they send large questionnaires to companies in order to gather as much information as they can about the company and its activities. Most of the questions are common to all companies, but a portion are more specific to certain large sectors of activity.

The CDP has questionnaires for four major topics: carbon, water, supply chain, and forests. Companies provide information on a voluntary basis, and their submission and CDP ranking are posted online in the public domain.

Participation in the DJSI is by invitation only. Neither the information provided nor the final ranking are made public. Companies that do not provide information can still be ranked using information on the company gathered from the internet.

Sustainability reports are typically published in multiple formats including printed reports, interactive websites, PDFs posted to the internet, and reports designed for mobile devices. Some companies produce a complete report and also publish an executive or data summary. Companies may produce reports by geographical region to specifically address topics of local concern.

Once the company has finalized the sustainability report, it is published in the public domain for the benefit of the company's stakeholders. Stakeholder groups typically include shareholders, investors, employees, customers, suppliers, regulators, NGOs, and local communities.

In an attempt to be more responsive to stakeholder requests for more frequent updates on sustainability performance, some forward-looking companies are moving to more frequent external reporting that is published directly to the internet.

An integrated report combines both full financial disclosure and sustainability performance in a single document. Integrated reporting is mandated in several countries around the world. In fact, the International Integrated Reporting Council (IIRC) recently issued a framework for integrated reporting. According to some sources, 700 integrated reports were published last year with more companies publishing their integrated reports directly to the internet.[7] Some of these companies recognize that integrated reports may not reach the same range of stakeholders as sustainability reports and continue to publish a sustainability report for their broader audience.

Financial regulatory bodies are beginning to increase the scope of reporting mandates to include significant sustainability-

related issues. In addition to disclosures on climate change risk, potentially significant regulatory changes, and material environmental liabilities, publicly listed companies in the United States are now required under the Dodd-Frank Act to disclose on the presence of conflict minerals in manufactured goods. Additionally, the Securities and Exchange Commission (SEC) currently mandates disclosure of a basic set of sustainability indicators in the 10-K.

As mentioned previously, SASB is leading an initiative to see more comprehensive sustainability disclosure in filings to the SEC, in particular to address material sustainability issues in their 10-K documents.

Global firms with large supply chains typically require their suppliers to provide a substantial amount of information pertaining to the suppliers' sustainability performance on a range of issues, including environment, human rights, social, and labor. This information is generally conveyed in the form of boiler templates that suppliers are required to fill out and subsequently rolled up to the global firm.

Data, materiality, and verification

by Elizabeth Ewing

Assurance and verification

Partly as a result of the 2008 financial crisis in the United States—and the recognition that the global economy and society are crippled without trust—stakeholders are focused on how they can determine whether companies are trustworthy.

This mistrust of corporations' financial disclosures has been recently exacerbated by incidents such as the BP oil spill in the Gulf of Mexico, Tepco's mishandling of the Fukushima Daiichi nuclear disaster, and the uncovering of horse meat in Tesco's British beef industry products. Market values of these companies fell significantly in the wake of these incidents, reflecting loss of investor trust in company management and disclosures. Incidents such as these underscore the difficulty of judging the adequacy of company processes, environmental and social risks, and the potential financial consequences.

The role sustainability information plays in global business relationships reflects the increasing attention being paid to the non-financial impacts of economic activity. Sustainability-related impacts include a broad range of environmental, social, and governance issues. Awareness of large-scale global trends

(e.g., climate change, warming oceans) and global issues (e.g., poverty, inequality) that affect the the above issues is increasing. The information that companies provide on these non-financial topics helps stakeholders understand how they are navigating this changing global landscape and how their business strategy and risks are being managed.

External assurance can provide some level of confidence over the processes used to report data allowing informed management decisions based on accurate and reliable information, and further improving the credibility of external disclosures to stakeholders on performance. In the United States, about 10 percent of companies that publish sustainability reports have a third-party assurance provider verify all or part of the data presented in their communication.[7]

Data and materiality

Given the existing set of sustainability reporting standards, it is easy for some to consider sustainability reporting as an exercise in checking boxes and providing data sets. However, sustainability reports are not simply about providing data. The real questions companies need to ask are: What do people want to know about our company, and why? Ideally, the information that companies communicate should be the data that matters to stakeholders— their interests, questions, and concerns.

In the world of sustainability, this is referred to as material information, though the meaning differs from the financial definition. The idea is for each company to understand the:

- *Interactions it has with stakeholders on environmental, social, and economic topics*

- *Significance of these and other issues to the company's own strategy, risk management, and success*

- *Issues that are important to both the company and to the stakeholders are deemed material, and are issues important for the company to engage in a continuing conversation*

- *Context of materiality for sustainability reporting purposes, the notion of the corporate boundary extends beyond the financial entity to impacts that can occur both upstream and downstream in the value chain*

There are several ways companies can verify that the information shared with stakeholders is reliable. Companies can have their management systems and internal processes certified to conform to recognized standards, such as ISO 14001, OSHAS 18001, ISO 14064, AA1000APS or the GRI principles. In addition, the reported information can be assured, which means the assurer collects evidence to support the company's claims or the accuracy of the data in the sustainability report.

CFOs should recognize the wide variety of types of assurance and a range of processes and information on which assurance or verification can be performed. Unlike financial reports, which are developed according to standards designed to produce a uniform level of reliable information, the content and reliability of sustainability reports is much harder to discern and is often not verified by third parties. Even when third parties have reviewed company information, the methodologies, the competency of the auditors, and the rigor of these reviews vary widely.

Data systems and quality

The new, broadening expectations around sustainability information are driving change in the systems available to manage corporate data and ensure quality. Though change is underway, investment in sustainability data management systems has not yet caught up with the resources devoted to financial data management. Inadequate appreciation of the effect of sustainability performance management on financial results hinders investment and transparency. Even though the demands for transparency and accuracy in the areas of environment, health, and safety are similar to what has taken place in the financial markets over the last 10 years.

For the purposes of sustainability reporting, metrics and data are truly most valuable in the context of performance discussions around topics important to the organization and its stakeholders. Strategic risks and opportunities ought to be managed by internal programs and processes. The performance of such programs can then be measured with the right kinds of metrics and supported by solid data.

Once the material issues for various stakeholder groups have been appropriately defined and metrics have been identified, there still remains the challenge of how to measure the underlying data.

For example, though the methodologies for calculating greenhouse gas (GHG) emissions have settled out to some clear standards, companies still have several choices on how to report this information to their stakeholders. Some companies report absolute GHG emissions (total metric tons emitted), others report an intensity measure (metric tons/MWh or metric tons/sales), and some report both. The way this data is reported can make a difference in how stakeholders perceive and understand a company's performance.

Additional issues that complicate disclosure of high-quality data include the scope of the data collected, the original source of the data, the collection process, calculation methodologies, and the chain of custody of data from source to the corporate level.

Best practices to address these issues include the implementation of robust internal systems, such as processes that link material issues to the data collection process, internal checks and balances on data quality, management review of data, and balancing the effects of performance incentives tied to certain metrics. Such initiatives can speed data availability and reduce human error that can result from less sophisticated approaches. The potential risk of disclosing incorrect data and damaging trust is also reduced.

Sustainability reporting chain software application requirements

by Mike Sellberg

The CFO and sustainability reporting chain software

As a CFO gains understanding of the organizations, people, data, processes, and reports associated with their sustainability reporting chain, it is critical the company understands the key software requirements for reporting applications that extend across their chain. Companies are moving from just managing environmental issues to broader sustainability platforms that can drive improved operations and business performance. 60% of companies in a recent analyst survey said they were looking to increase the scope of issues managed under their environmental departments or programs over the next two years.[8]

As CFOs evaluate how sustainability reporting throughout this chain can drive improved business results, they should discuss key system and functionality requirements for sustainability reporting applications with their Chief Information Officers (CIO), Chief Sustainability Officers (CSO), and Vice Presidents of Environment. The following will assist in initiating and conducting these joint discussions.

The ideal software requirements are segmented into five key areas:

- Cloud-based sustainability platforms
- Data management—the sustainability reporting chain system of record
- Controlled co-authoring of complex reports
- Change management with seamless real-time updates
- Review, publishing, and mobile access

Cloud-based sustainability platforms

Most companies' sustainability reporting chains are global. It is key that sustainability reporting applications be cloud based to provide instant and easy access to individuals in any division or company, residing anywhere around the globe. The same type of access is extremely cumbersome and expensive to achieve with on-premise systems that require a complex network and VPN infrastructure and firewall configurations maintained by large IT staffs.

Cloud-based systems enable rapid deployment of solutions, which can put business applications in the hands of users sooner than traditional enterprise software/on-premise deployments. This provides companies with a lower cost for implementation and quicker time to value. Cloud-based platforms allow for easy upgrades without IT involvement or messy installations on users' local computers. Many on-premise systems experience lengthy IT delays when upgrades are attempted. In contrast, many cloud-based solutions are updated several times a year, with no impact to the end user.

Companies should look for systems that are designed for business users and don't require IT involvement, including system administration. These systems tend to focus on simpler user experiences by avoiding complex interfaces. Why should something as simple as creating a new template, adding a user, or changing user permissions require IT involvement?

Of course, companies can choose to involve IT when necessary, but requiring that involvement substantially slows the pace of productivity. Sustainability managers should be able to control the platform for their teams by using "zero IT" software that is easy to access, use, and administer.

These types of user-friendly solutions are more readily adopted, have higher customer satisfaction ratings, and reduce IT overhead for maintenance, changes, and upgrades. Analysts predict that complex on-premise solutions such ERP systems will migrate to the cloud aggressively due to some of these constraints.[9]

Sustainability reporting system of record (SRSoR)

Companies that have implemented on-premise, environmental, health, and safety (EHS) databases have received value per the annual Verdantix Green Quadrant Report:

...many customer panel members said establishing a single repository for managing their firm's global EH&S data was the main benefit they derive from deploying software. Particularly for recent implementers of software, this represents a significant step up from managing their data via multiple spreadsheets, custom-built databases and paper log books.[10]

These systems ultimately provide value to sustainability efforts, but at what cost? Companies have traditionally taken the on-premise, enterprise deployment methodology much like

Figure 1

What the cloud brings to the table for CIOs		
	On-Premise	**Cloud-Based**
Future of software delivery		**X**
Rapid innovation		**X**
Customer/Vendor—shared risk model		**X**
Application and infrastructure economies of scale		**X**
Lower total cost of ownership (TCO)		**X**
IT deployment	**X**	*Optional*
IT administration	**X**	*Optional*
Seamless/Non-Disruptive maintenance and upgrades		**X**
Proactive infrastructure scaling		**X**
Uptime and availability	**X**	**X**
Natively designed for global web access		**X**
Data redundancy (3 or more instances)		**X**
Data security	**X**	**X**
Security innovation		**X**

the ERP implementations of the 1990s and early 2000s. This ERP-like implementation approach for EHS can take years, involve large numbers of business and IT staff, and cost millions of dollars.[11]

Furthermore, consider that these systems are primarily designed for EHS data. Where does the complete set of sustainability data needed for reporting across a company's sustainability reporting chain fit into that paradigm? A new system of record for all sustainability reporting chain data is needed (Figure 1)—a SRSoR.

The need for this new system has recently been recognized by experts:

Being able to close the books on the sustainability data set, as well as the financial data, in real time will be essential to timely communications, and an enormous improvement over the many-month-delay in data availability that currently exists. Real-time, high-quality data management systems will enable companies to track lagging indicators of performance and leading indicators of risk—and therefore manage the business more precisely. [12]

Key requirements for a new SRSoR are:

- Provide comprehensive support for all sustainability data

- Provide a common datastore for collecting and organizing both structured and unstructured sustainability data

- Bring meaning and trust to data

- Provide real-time datastore technology that meets the data in motion requirements of the sustainability reporting chain

There is a distinct need for a SRSoR that is comprehensive in its support for the gamut of sustainability data throughout the reporting chain, not just EHS data. It must be able to easily support the addition of new data types as business imperatives require. It must be able to quickly extend the datamodel to support a decision to collect social media for social risk and compliance management—a trend that is becoming more prevalent.[13]

A SRSoR must synchronize with structured systems to access EHS or financial data and also support the collection and management of unstructured sustainability data. This provides a common sustainability datastore, which can be used for linking into a variety of sustainability reports (Figure 3). If an EHS system is in place, the SRSoR provides a necessary complement to all other sustainability data along with synchronizing the EHS data in a common datastore with other unstructured data.

The amount of data and information that is moving through the sustainability reporting chain is increasing. This information is often ad hoc or unstructured data and exists in the form of spreadsheets, documents, images, and files. It is scattered across emails, file systems, and websites. Analysts estimate this unstructured information is more than 90% of the information in an enterprise.[14]

The SRSoR must provide capabilities to automate manual data collection processes with the goal of giving teams more time for analysis. Typically, the manual operations of searching, collecting, aggregating and managing the data providers—sometimes hundreds of providers—take up most of the sustainability teams' time, leaving little for analysis and strategic interpretation.

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To achieve this goal, a data collection system should bring a nimble structure to the unstructured data world by providing:

- Collection templates that can be developed by business users, not the IT department

- Automatic consolidation of information from various sources and global teams

- Automatic roll-up and aggregation across data providers' submissions

- Seamless integration into the SRSoR datastore

- Visibility and oversight of the entire collection process

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The key functionality of a data collection application for unstructured sustainability data is listed in the table below (Figure 2).

Once a common datastore for sustainability data has been established, it is important to embed both meaning and trust into this data. The most advanced way to bring meaning and trust into data is by using semantic tagging.[15] This involves tagging data with terms that themselves are tagged, so that each term is well defined. Definitions can be concise, without ambiguity, and can even show how terms relate to each other.

This process of tagging creates what is called semantic data. This type of data captures the meaning of other data. This data about data (metadata) may be used to capture contextual information that increases data quality and trustworthiness, and is thus essential to every organization's sustainability activities.[16]

Data that is meaningful and trustworthy has been analyzed, interpreted, and curated with strategic insight embedded. It is important that a SRSoR adapts to include this embedded insight as new data about the data. Semantic data model architectures can provide the SRSoR with these capabilities. For a primer on semantic data including technologies being utilized today, see linkeddatatools.com and *CSR Index 2014*.

The technology behind the SRSoR must provide a real-time datastore for the highly unstructured data requirements of the sustainability reporting chain. Traditionally rigid, relational database management systems (RDBMS) no longer meet the requirements

Figure 2

Data request	Data compilation	Process management
Restricting structural and formula changes—define reference and input cells	Aggregating data from multiple sources	Process dashboards—visibility into template and provider status
Indicating requirements for data providers	Copying/pasting or rekeying adds risk	Copying/pasting or rekeying adds risk
Distributing templates	Navigating multiple templates	View contributors to aggregations
Changing templates mid-cycle	Ensuring version control	Safeguarding data
Require approvals for data providers	Real-time integration with SRSoR datastore	Accessing templates remotely
Variance calculation and commentary	Real-time updates of sustainability reports	Linking data into multiple destinations

of today's data management challenges. Instead, nimble, flexible, and extensible datastore technologies are needed to support data in motion ecosystems such as the sustainability reporting chain. These technologies must also be designed for use by business teams, not just IT professionals.

Fortunately, there is a next generation of datastore technologies based on the key-value datastore and graph datastore architectures. This is the NoSQL approach (see nosql-database.org and www.mongodb.com/nosql-explained for details). A graph datastore such as HyperGraphDB (www.hypergraphdb.org) can be utilized to implement a semantic data model, as outlined above. These next-generation datastores are designed to power cloud-based platforms that provide scalability, availability, reliability, and enhanced security.

Since traditional EHS systems are built on legacy RDBMS, companies looking to manage EHS data for the first time can consider a cloud-based SRSoR to collect and manage all sustainability and EHS data. The advantages of a SRSoR over traditional EHS databases is shown in Figure 3.

Controlled co-authoring of complex reports

Most sustainability reports cannot be generated from an ERP or EHS system as canned reports. These are complex reports that contain narrative, data, and graphics. They are developed through a collaborative process of data analysis, filtering and curation, strategic interpretation, and authoring by a team of individuals that may span the globe. Furthermore, these reports have embedded strategic insight that is connected to sustainability data.

Data may be presented in tables or charts and may also be scattered throughout paragraphs. To further complicate things, the same data values are typically repeated throughout the report making it very difficult to update if the single source value changes. Authors should be able to incorporate sustainability data from an SRSoR as well as financial data through simple data linking to support integrated reporting (see www.theiirc.org).

The solution to these types of reporting problems must at minimum provide the following:

- *Multiple users can edit the document at the same time without version control issues*

- *Both document and presentation formats, including charts, that can be linked to a single source of data*

- *A full audit trail to track all submitted updates from any user*

- *Permissions that can be used to control access to the document at both overall document level and the individual section level*

- *Blackline reports that enable reviewers to see changes between revisions of the report*

Figure 3

Key requirements of the SRSoR datastore technology		
	SRSoR datastore	Traditional RDBMS EHS systems
Supports cloud-based platforms with scalable and reliable architectures	X	X
Scalable key-value datastore	X	
Semantic graph-enabled datastore	X	
Enhanced security through distributed architecture	X	X
Data model extensible by business users, not IT	X	
Complements and extends traditional EHS RDBMA investment	X	
Data collection applications for managing unstructured data	X	
Web-based data APIs for external application access to sustainability data	X	X

To create complex reports for sustainability, an authoring environment must allow multiple authors and analysts to work in the documents or presentations at the same time. However, control is paramount as users should not have to concern themselves with manual version control. Track changes can also be used with authoring teams, so it is easy to see changes made by certain contributors. Permissions should be available to determine which users can accept certain changes in the documents.

A full audit trail of any author's changes must be stored and comparisons between different versions, or blacklines, should be supported. An easy-to-use permission model that doesn't require IT administrators should be available to control access to documents, sections of documents, and slide groups for only the necessary authors or reviewers. A full commenting system should allow commentary by other authors and reviewers. Other users should be able to reply to these comments on discussion threads, and comment filtering should be enabled to filter comments by data, reviewer, etc.

Finally, applications for sustainability reporting must be as easy to use and familiar as a user's current office products. They must also support integration with layout and design products such as Adobe® InDesign® to facilitate designed reports that are highly stylized and visually appealing. Ideally, the integration should allow content revisions to continue in parallel with layout and design to provide the most time-efficient process.

Change management with seamless real-time updates

As mentioned above, data is scattered throughout sustainability reports in tables, charts, and paragraphs with data values being repeated across multiple reports. The source values for all these usages can change frequently during the document drafting process.

Imagine if you could change a piece of data one time and have it updated instantly in all reports—monthly EHS operational reports, quarterly board committee reports, quarterly sustainability scorecards, CSR reports, and DJSI and CDP submissions.

An ideal solution for complex sustainability reporting must provide resilient data linking technology that allows any changes to source values to automatically sync impacted data in tables or text references throughout all affected documents, presentations, and workbooks in real time. An audit trail of any changes to data values should also be trackable in a data lineage view. Supporting documentation uploaded to a digital support binder could be attached to data links that support internal audit and external assurance.

The appearance and formatting of the impacted data usages must be allowed to change without changing the underlying data value. For example, two numbers can be linked to the same data, but one number can appear in text as $1.2 billion while another can appear in a table as $1,200,000 (reported in thousands).

This type of data linking could also be used to syndicate data from other systems. Imagine a monthly operation report created as a slide presentation where data is seamlessly linked to a workbook that aggregates data from the SCSoR for sustainability data, risk data from an enterprise risk management system, and to financial data from an ERP/general ledger. This type of loosely coupled data integration could be accomplished for sustainability reporting without IT involvement.

Review, publishing, and mobile access

The distribution of reports for review is oftentimes overlooked. An environment for authoring sustainability reports should provide digital review facilities where drafts can be distributed to different review groups with the workflow being managed by the authoring team.

Comments from reviewers should automatically be aggregated and displayed in the authoring environment, so authors can efficiently manage and address comments. By automatically aggregating comments into one editing view, the author can immediately address redundant or conflicting feedback.

A sustainability reporting system should also support the review of multiple document types including PDFs of fully designed report layouts. An electronic books manager should be included, so multiple file types can be easily aggregated into one environment. This book can be distributed to review groups who can comment on designed files and other graphics. Sending digital reports and books to a mobile tablet viewer or desktop viewer is more secure than email or hard copy reports. The books can also be electronically distributed for board committee and other oversight meetings where committee members can add bookmarks and comments.

Once reports are finalized, sustainability reporting applications should support publishing to a variety of formats including PDF, ebooks, presentations, and direct data feeds for websites. In addition, submissions to ratings agencies such as CDP and DJSI should be automated between sustainability reporting applications and the agency submittal software. This will, however, require a commitment by both the ratings agencies and reporting application vendors.

Final note

The authors hope that this whitepaper helps CFOs better understand the business imperatives surrounding their companies' sustainability reporting chains and the importance of data verification and materiality to these chains. Furthermore, CFOs can investigate with their CSOs and CIOs how the next generation of software technology can help them capture the highest business value from this chain.

About the authors

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Quinn's inventions have earned him more than 30 patents. He has written or contributed to five books and authored several white papers on sustainable development, CSR strategies, and policies on competing in international markets. He has also published original research on sustainable innovation, including nanotechnologies, biomimetic polymers, and technological risk.

Quinn has been recognized internationally by his peers, professional associations, academic institutions, news outlets, international groups, and non-governmental organizations. Quinn received his Ph.D. in physics from Trinity College Dublin.

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