MASTERING 'BIG DATA'
IN ENVIRONMENTAL SUSTAINABILITY

Data and analytics are appropriately at the heart of decision-making. Meanwhile, environmental sustainability professionals have their own 'big data' problems and challenges.

Everyone's talking about 'Big Data' – Oracle is; IBM is; there's even a Wikipedia definition:

> "...data sets so large and complex that they become awkward to work with using on-hand database management tools. Difficulties include capture, storage, search, sharing, analysis and visualization."

Big Data is growing at a rate of more than 50% a year[1], and the market to help harness and manage the data is expected to grow from nearly $122 billion in 2015 to more than $187 billion in 2019.[2] The driving factors behind this hyper growth are many: cheaper storage, greater emphasis on governance and risk reporting, and the need for larger market data sets over longer time periods, among others.

This white paper provides topline insights and guidance to wade through this big data challenge. The paper explores the key components for successfully managing environmental sustainability data, from defining and narrowing the universe of data for your company to the tools to help manage and apply those data.

[1] http://www.forbes.com/sites/louiscolumbus/2016/08/20/roundup-of-analytics-big-data-bi-forecasts-and-market-estimates-2016/#50996c6c49c5

[2] http://www.forbes.com/sites/louiscolumbus/2016/08/20/roundup-of-analytics-big-data-bi-forecasts-and-market-estimates-2016/#31fb39ab49c5

HARNESSING BIG DATA IN THE ENVIRONMENTAL WORLD

Data and analytics are appropriately at the heart of decision-making. Meanwhile, environmental sustainability professionals have their own 'big data' problems and challenges:

- **DIFFERENT STAKEHOLDERS REQUIRING DIFFERENT DATA AND REPORTS**

  The impetus towards sustainability is coming from many stakeholders, from governments and NGOs to investors, customers, supply chain partners and employees. Governments around the world are continuously amending regulations, for example, to address new or evolving problems, while investors are demanding greater accountability from public companies regarding sustainability-related risks.

- **DIFFERENT SOURCES AND FORMATS OF DATA**

  Sustainability efforts require the manipulation of large amounts of data from sources that are currently highly diverse (e.g., energy systems, water meters, maintenance reports, field surveys, phase 1 report sources, ERP systems); and disparate (e.g. hard copies such as binders, invoices, paper files and electronic formats, such as spreadsheets, EDI, XML).

- **DIFFERENT DEPARTMENTS ACROSS THE ENTERPRISE OWN THE DATA**

  Various organizations across the enterprise are often the gatekeepers of needed data (e.g. operations, environmental, maintenance, facility-level, accounting), making it that much harder to gather in a timely and consistent manner.

Yet, organizations are looking to sustainability and environmental professionals to satisfy stakeholders by identifying data sources across facilities, departments, and geographies; getting hold of that data from sometimes reluctant colleagues with other pressing priorities; standardizing all the dynamic formats; and then making sense of it all.

DEFINING AND PRIORITIZING YOUR UNIVERSE OF DATA

Determining what information is most important and where to find it is the first step. Whether for reporting or other purposes, success requires identifying your own needs, as well as your critical stakeholders and their priority needs – then addressing areas of overlap.

The following are some ideas that can help you identify your critical data sets:

- **Benchmarking** the data for your industry
- Using **reporting standards** to help select the right metrics
- **Mapping** the major issues and opportunities for your company
- **Prioritizing actions** for implementation

INDUSTRY/COMPETITOR BENCHMARKING

Get a sense of what leaders and competitors in your industry are doing by reviewing their most recent sustainability reports. See what issues they are addressing - what components or processes they tout as being important and why.

An obvious example in the beverage industry is the issue of water availability – it's critical for beverage companies as a core natural resource not only for their operations, but for their products as well. So much so, that companies like Coca Cola and PepsiCo issue reports on their efforts around conserving water resources separately from their main sustainability reports.

Think critically about what practices make the most sense for your business and your mission. Competitive advantage can sometimes come from pushing beyond what others are doing, allowing you to capitalize on your efforts and generate significant benefits for your company and brand(s).

PepsiCo, for example, partnered with The Nature Conservancy to identify ways not only to protect and conserve water resources, but to create a "positive water impact" by ensuring that the company uses less water resources that are left for communities where the company operates.

Some resources you can use to benchmark yourself include *Newsweek Green Rankings* and *CR Magazine's 100 Best Corporate Citizens*.

REPORTING STANDARDS

Look at what major reporting standards require and/or suggest. The Global Reporting Initiative (GRI), for example, has developed a GRI Content Index template and provides a checklist for reporting purposes. It also has a growing number of criteria sets for specific industries.

Other reporting standards that may be helpful include UN Global Compact (UNGC) and CDP's carbon and water standards.

Many companies are reporting to these standards as a strategic tool and/or communications piece for stakeholders. Even for those companies not reporting, the data specified by these standards can help prioritize sustainability efforts.

ENVIRONMENTAL ISSUES MAPPING

An "environmental issues map" can take many forms, but it may be best to start with a grid that identifies key environmental challenges on one axis and categories that identify the specific issues, labels their sources and identifies initial opportunities in addressing those issues. Key environmental challenges may include greenhouse gases (GHG), water (pollution and use), air pollution, waste management and toxics, for example.

This map can serve as a stand-alone effort or as the first step towards a full materiality analysis, discussed below, to help identify the most relevant environmental sustainability issues for a specific company.

In identifying the issues, consider the key environmental problems affecting both your industry and your organization (materiality). Ask questions such as what are the organization's biggest environmental impacts – from acquisition of raw materials through use and disposal of its products? When and where do those impacts arise? Upstream in the supply chain? During shipping and distribution? During production? Or downstream in the hands of customers? How do others view the company's environmental performance?

For initial opportunities, ask questions such as would reducing water use help the communities in which you operate? Would it reduce costs? Would establishing a recycling program to take back your used products for reuse of their materials inspire customers? Would it save on procurement of raw materials?

CHALLENGE	ISSUES	SOURCES			OPPORTUNITIES	GRI	EPA	CDP
		Company Operations	Upstream Suppliers	Downstream Customers				
Greenhouse Gases (GHGs)	GHG emissions from energy use adding to climate crisis; possible constraints or taxes on such emissions.				Launch eco-efficiency effort targeted at energy use and related GHG emissions.	Yes	Yes	Yes
	Rising pressure for improved water quality; competing access for diminishing resources.	Toxic pesticides ending up in waterways; water use for growing, brewing product.			Grow and/or buy more organic coffee to reduce use of pesticides; launch efforts to conserve and reuse water and educate suppliers and customers on how they can do the same.			

Note: From *Top Seven Sustainability Practices: the Sum → the Parts*, P. Goldschein.

MATERIALITY ANALYSIS

Similar to the concept of environmental issues mapping is materiality analysis which helps prioritize sustainability risks and opportunities. Such an analysis is used to determine the most important sustainability issues by understanding, evaluating and weighing the needs of various stakeholders and reviewing the various impacts of environmental and sustainability issues.

A number of companies use materiality analysis to focus their efforts, and their reporting, on the most critical issues.

Dell, for instance, uses a three step process in their materiality analysis:

Stakeholders and sources	Prioritize stakeholder concerns by conducting primary research	Set priorities using pre-set filters

On the other hand, Heinz maps its issues on a two-dimensional matrix to identify those issues that are of the highest stakeholder concern and have the most potential impact on them. Using this method and through this analysis, while over 20 issues were identified, they focus on the top 5 issues.

1	2	3	4	5
FOOD SAFETY	**SUSTAINABLE AGRICULTURE**	**GHG EMISSIONS**	**HEALTHFUL PRODUCTS**	**INNOVATION**
Maintaining stringent policies and practices for the safe manufacture of all our products.	Understanding and addressing (to the extent of our influence) the environmental impacts of agricultural practices such as sustainable land-use management, pesticides application and biodiversity preservation.	Reducing our GHG emissions through mitigation efforts, including reducing our operational footprint, increasing efficiency and adopting green practices.	Providing customers with healthful products, including ones that are low-fat, low-sugar, low-salt, no trans-fat, etc.	Continuing to create new and innovative products to better serve our customers across all our global regions.

Note: From *Corporate Social Responsibility Report 2011*, Heinz.

Knowing what data you need (and for what purposes) will help you determine where to collect the data.

Begin with the end in mind and consider organizations such as:

- CDP
- Global Reporting Initiative
- ISO 14000 / ISO 14001
- FTSE4Good

The following are environmental regulations in the United States alone:

- Atomic Energy Act
- Clean Air Act
- Clean Water Act
- Coastal Zone Management Act
- Comprehensive Environmental Response Compensation and Liability Act (CERCLA)
- Emergency Planning and Community Right to Know Act (EPCRA)
- Endangered Species Act
- Federal Food, Drug and Cosmetic Act
- Federal Land Policy and Management Act
- Federal Insecticide, Fungicide and Rodenticide Act
- Food Quality Protection Act
- Fisheries Conservation and Management Act
- Marine Mammal Protection Act
- National Environmental Policy Act (NEPA)
- Oil Pollution Act
- Resource Conservation and Recovery Act (RCRA)
- Safe Drinking Water Act
- Surface Mining Control and Reclamation Act
- Toxic Substances Control Act
- California Environmental Quality Act (CEQA)
- California Global Warming Solutions Act (Assembly Bill (AB) 32)

Add to that:

- Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
- Occupational Health and Safety Advisory Services (OHSAS) 18001
- Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH)
- UK Mandatory Carbon Reporting
- UK Carbon Reduction Commitment (CRC)
- Australia National Greenhouse Gas Emissions Reporting (NGER)

Note: From A Second Take on Mapping Corporate Sustainability's Complexities, P. Goldschein.

GATHERING, STANDARDIZING AND MANAGING YOUR DATA

At this point, you hopefully have a high-level understanding of the process for determining what environmental sustainability data to gather and where to find it.

The next step is to figure out where it is and how best to gather it. Global organizations struggle to identify, collect and reconcile environmental and sustainability data that come from sources around the world, often in a variety of different local formats.

The sheer volume can make this seem daunting – across industries, data volumes are set to grow by as much as 800% in the next five years. In 2015 alone, the amount of information was about 4.4 zettabytes (44 trillion gigabytes).[3]

However you and your colleagues collect your data – whether more automatically through robust technology platforms, or more manually – the data need to be standardized and managed so that they're accessible and useful. This is necessary, among other reasons, to properly set or revise the specifications for technology solutions you use or need, and to include with any specifications or tool kits you share with the gatekeepers of that data to make both your lives easier in providing these to you.

Accurate and timely data collection is the key to making correct decisions and drive efficiencies in your business. While we advocate technology platforms to help you manage, analyze and report, in many cases, your staff will have to spend time identifying and gathering information from different sources around the organization – not only for benchmarking, but also for monitoring the ongoing operations.

Rather than tackling this on your own or assigning it to your critical personnel, to ensure the accuracy, quality and timeliness of your environmental information, you may want to consider outsourcing the initial and ongoing data gathering and standardization processes.

Standardization can refer to many things, but should include consistency in what's measured (or normalization of data), consistency year-over-year, and consistency and context with specific metrics used. For example, many companies measure such things as reduction in energy or water use per unit of production, while others measure absolute energy or water reductions companywide, and still others supply chain-wide.

[3] http://www.forbes.com/sites/bernardmarr/2015/09/30/big-data-20-mind-boggling-facts-everyone-must-read/#18792bde6c1d

EVOLVING TECHNOLOGY SOLUTIONS

If your centralized system for capturing, compiling, and reporting the various sustainability data is still based on spreadsheets or file folders on your shelf, you'll want to seriously consider some type of more robust technology solutions to help you drive efficiency in your operational processes. Data requirements will only continue to increase, and solutions are becoming more cost-effective all the time due to increased competition and other factors.

The difference between using archaic paper and spreadsheet systems versus the newer software and database solutions for these purposes can be huge when it comes to time and resources. And, when you are referring to Big Data, it's not simply one piece of software, but data warehouses, business intelligence tools, analytics, etc. Technology options available include buying and integrating software into your enterprise system, and utilizing the increasing variety of Software-as-a-Service (SaaS or cloud-based) solutions that are available.

The volume and complexity of the data demands a robust platform that can be easily accessed and updated. For example, cloud-based platforms can be accessed in real time by staff throughout your company's business units, facilities, vehicles, and supply chains. What's more, these platforms allow emissions factors and reporting requirements, for example, to be easily updated, allowing you to identify trends and best practices across your organization.

While an entire white paper can be written on just the data technology tools that are on the market, note that there will be many things to consider in using such tools, including which modules to include or exclude; hardware requirements for the collecting or inputting of data into the system (e.g. manually, meters, monitors, sensors, etc.); and the costs and benefits of a spectrum of sophisticated features, from advances in interval/real-time data collection to sophisticated algorithms. The bottom line, though, is that a well chosen solution will save time and money.

CONCLUSION

The 'Big Data' challenges that environmental sustainability professionals face should be seen as opportunities. The keys are determining the critical issues and relevant data for you and your stakeholders; prioritizing that data to narrow your universe; collecting that data into standard formats; and finding and using the best tools to help manage and apply that data.

If your centralized system for capturing, compiling, and reporting the various sustainability data is still based on spreadsheets or file folders on your shelf, more robust technology solutions may help you drive efficiency in your operational processes. Data requirements will only continue to increase, and solutions are becoming more cost-effective all the time due to increased competition and other factors.

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