How smart can you get?
Harnessing the power of data to reduce —and prevent—waste in business

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How much wasted opportunity—and revenue—does a taxi company face by not knowing it's likely to start raining in the central business district 10 minutes from now?

Thirty years ago, that would have been a ridiculous question. There was no way a cab company could have accessed such a short-term weather forecast, much less taken advantage of it quickly enough to deploy drivers to the neighborhood where taxis would be needed when the downpour starts.

Today, however, such data-driven strategies are being tested in cities such as Singapore[1], where the Massachusetts Institute of Technology[2] has helped to combine near-term weather forecasts with GPS data on taxi locations.

Strategies like these are making it increasingly possible for businesses to improve efficiency by reducing and preventing waste wherever it exists. In today's fast-changing and increasingly competitive environment companies that embrace these approaches first will be able to adapt more quickly and improve their odds of success.

What is waste?
Waste in any business is more than just "stuff you throw away". Every resource a company pays for—from paper and printer ink to packaging material, electricity and even time—that goes out as waste, rather than as a value-adding product or service, has a direct, negative impact on a firm's bottom line.

"Many companies underestimate how much waste is costing; it could be as high as 4 percent of turnover," notes Zero Waste Scotland.[3] "The true cost of waste isn't limited to the charges for disposal... It also includes wasted raw materials, energy and labour—which can be between 5 and 20 times more than the cost of disposal. It could cost more to throw resource away than to purchase it in the first place."

As California's Department of Resources Recycling and Recovery[4] puts it:
"Waste is a symptom of an inefficient process. Preventing waste increases efficiency. Increasing efficiency increases profits."

A growing number of businesses are recognising that and moving beyond early "green" strategies such as recycling to more ambitious zero-waste goals (which are often regulation-driven[5]).

They're realising that recycling is not enough in the drive to become more efficient and sustainable—it is better to reduce the need to recycle by preventing waste in the first place. While recycled material avoids the landfill, it still represents a business cost of resources going out the door.

In 2005, 3M—which had already reduced its waste-to-net-sales ratio by 68 percent since 1990—revised its definition of waste to include material it was already recycling.[6]

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[1] http://www.theclimategroup.org/_assets/files/information_marketplaces_05_12_11.pdf
[2] http://senseable.mit.edu/livesingapore/
[3] http://www.zerowastescotland.org.uk/sites/files/wrap/Measuring_to_manage_resources_and_waste_An_introduction_revised.pdf
[4] http://www.calrecycle.ca.gov/reducewaste/office/
[5] http://www.zerowastescotland.org.uk/
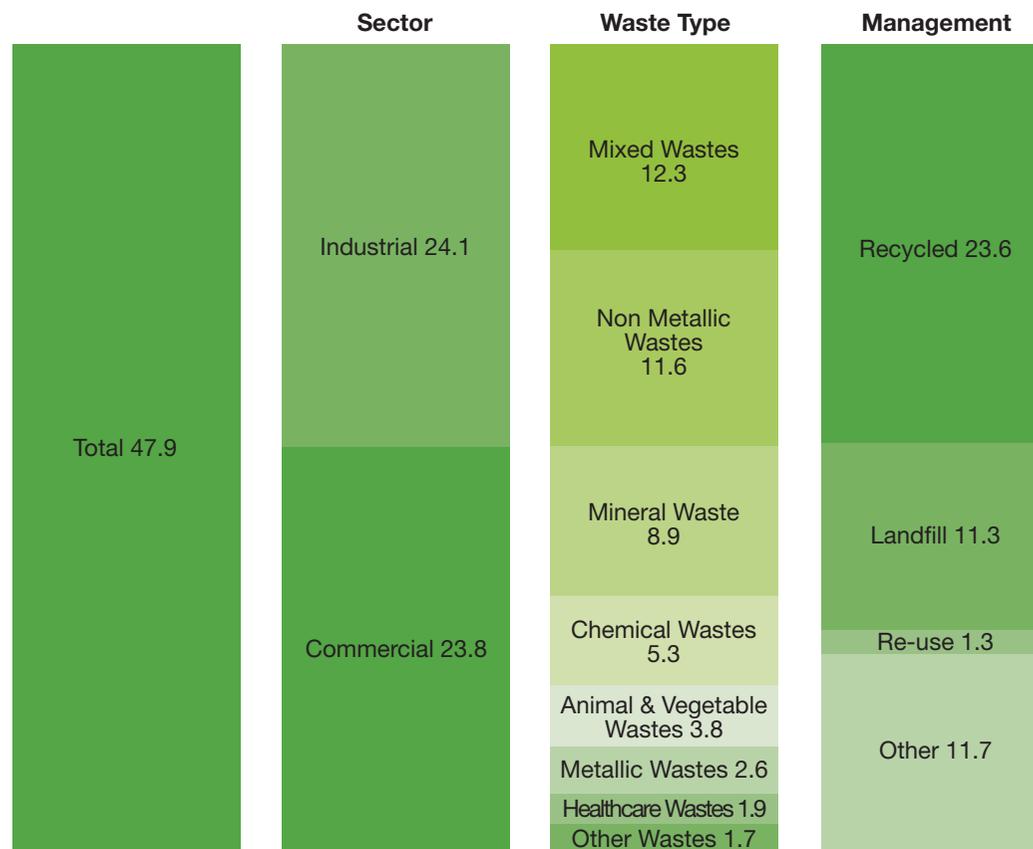[6] http://solutions.3m.com/wps/portal/3M/en_US/3M-Sustainability/Global/Environment/ManagingWaste/

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According to the company's sustainability website: "While we have always promoted recycling, the new definition was established to challenge ourselves to find ways to prevent the generation of waste in the first place. While difficult, the goal helped us to increase our focus on pollution prevention, design changes in products and process, and on internal recycling and reuse programs."

Data on demand

One way in which businesses can reduce waste is simply by making their data easier to access and use, whether by employees or customers. Bank of America once found itself with $5 million worth of out-of-date, useless printed materials when it had to update its forms.[7] By making documents available online and enabling print on demand, the bank was able to save $10 million in inventory costs and reduced storage requirements.

Similarly, by digitising its film processes, the Walt Disney Company is moving to a "tapeless, filmless workflow".[8] That strategy has already

	Sector	Waste Type	Management
Total 47.9	Industrial 24.1	Mixed Wastes 12.3	Recycled 23.6
		Non Metallic Wastes 11.6	
	Commercial 23.8	Mineral Waste 8.9	Landfill 11.3
		Chemical Wastes 5.3	Re-use 1.3
		Animal & Vegetable Wastes 3.8	Other 11.7
		Metallic Wastes 2.6	
		Healthcare Wastes 1.9	
		Other Wastes 1.7	

Million tonnes

Source: Defra, Environment Agency
*Other includes common sludges, discarded equipment and non-wastes

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[7] http://sustainability.tufts.edu/wp-content/uploads/BusinessGuidetoPaperReduction.pdf
[8] http://corporate.disney.go.com/citizenship2010/environment/overview/waste/

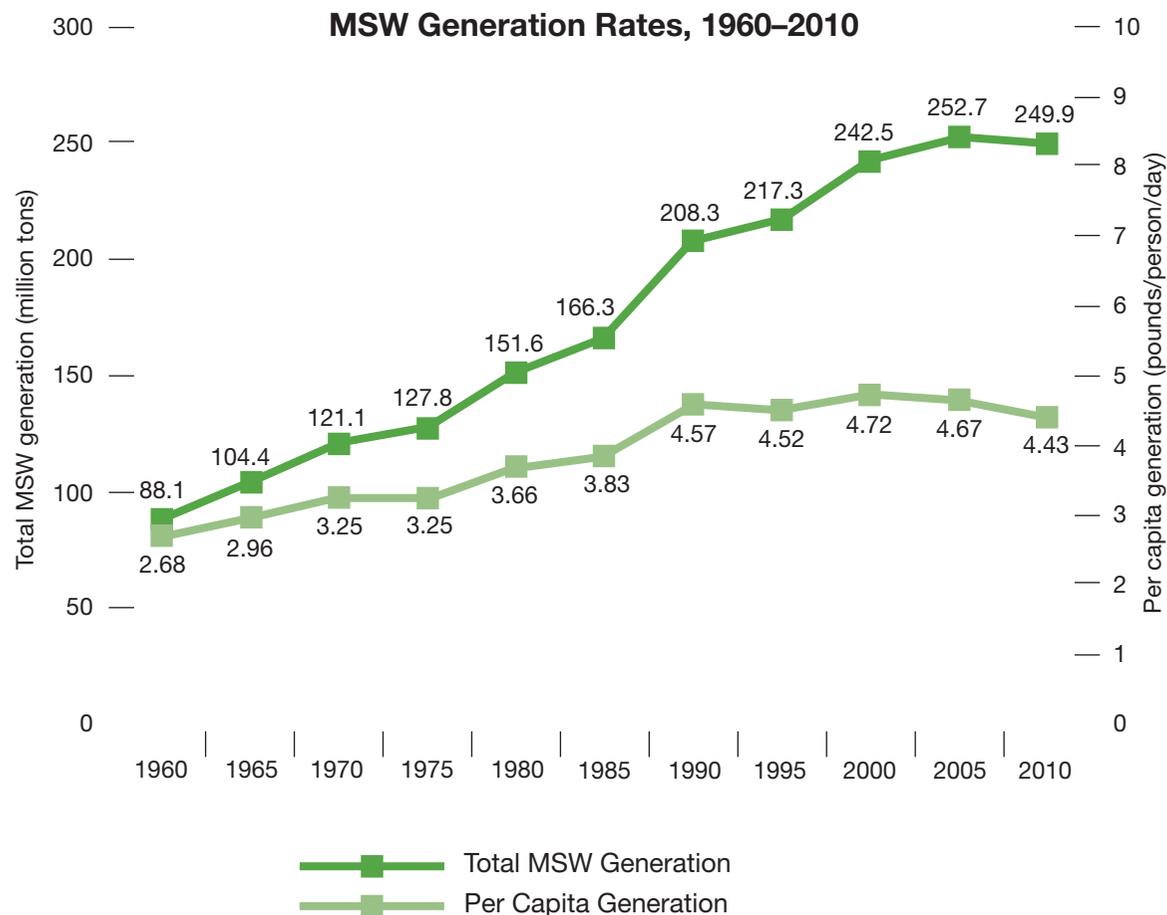# Harnessing the power of data to reduce—and prevent—waste in business

enabled it to considerably reduce the amount of film it uses to create prints for release to movie theaters. In 2003, for example, its film "Pirates of the Caribbean" required 400 million feet of film for release prints. By 2010, it used only 75 million feet of film for "Disney Alice in Wonderland."

Making data about waste itself available online can also help companies improve their resource use. By streamlining its electronic reporting and creating a database to track waste and recycling activities, the Louisiana-Pacific Corporation was able to reduce waste by 6,500-plus tons and save nearly $400,000.[9]

Real-time data

The emerging "internet of everything"—which includes sensors that can measure energy consumption, building ventilation, street traffic, airline arrivals and more in real time—is making it possible for businesses to monitor and manage more and more areas of resource consumption.

Heating, cooling and ventilation systems, for instance, can be surprisingly energy-intensive,

MSW Generation Rates, 1960–2010

Total MSW generation (million tons)

Per capita generation (pounds/person/day)

Year	Total MSW Generation	Per Capita Generation
1960	88.1	2.68
1965	104.4	2.96
1970	121.1	3.25
1975	127.8	3.25
1980	151.6	3.66
1985	166.3	3.83
1990	208.3	4.57
1995	217.3	4.52
2000	242.5	4.72
2005	252.7	4.67
2010	249.9	4.43

Legend:
— Total MSW Generation
— Per Capita Generation

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9 http://www.epa.gov/epawaste/conserve/smm/wastewise/pubs/frdfact.pdf

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consuming some 18 percent of all the energy used in non-residential buildings in the US.[10] By installing an automated system of sensors to manage exhaust and provide "demand-controlled" ventilation in a single laboratory building, Michigan's Grand Valley State University has been able to reduce its energy costs by $58,000 a year.[11]

Businesses with especially time-sensitive operations can reap large efficiencies—and financial benefits—by analysing real-time data for better, quicker decision-making. Continental Airlines, for example, achieved more than $500 million in reduced costs and improved revenues (a 1,000-percent return on investment) by deploying a $30-million business intelligence system designed to better track arrivals and departures.[12]

The system helps the airline identify, among other things, where more gate agents and transportation assistance are needed to help high-value customers make connecting flights.

While the drive to eliminate waste often puts a lot of emphasis on reducing energy use, especially from fossil fuels, real-time data monitoring and analysis is also proving to be invaluable in the fossil-fuel industry itself, as a recent report from McKinsey[13] indicates:

"For decades, the oil industry has used huge amounts of real-time data to develop ever more hard-to-reach deposits. Now, the industry has extended its use of big data to the production side to the automated, remotely monitored oil field. The benefit of this approach is that it cuts operations and maintenance costs that can account for 60 percent of wasted expenses... Experience suggests that the digital oil field can cut operational costs by 10 to 25 percent even while potentially boosting production by 5 percent or more."

Predicting the future
As businesses gain access to more and more customer data via everything from in-home smart energy meters to mobile apps

on smartphones, they will uncover new ways to reduce waste, improve the efficiency of operations and boost revenues.

Just as Singapore is finding it possible to analyse real-time and forecasting data to predict where taxis might be needed most, retail stores and restaurants could soon be able to predict whether people with mobile devices will be in their vicinity a day or so in advance.

By looking at a person's smartphone location data in combination with information about the habits of others in that person's social network, researchers at the University of Birmingham have developed an algorithm that can predict to an accuracy of 20 meters where that person will be in 24 hours.[14]

Such insights could, in future, enable companies to reduce wasted expense by better managing employee work schedules so there's adequate staffing at busy times and fewer idle workers when business is slow.

[10] http://www.greenbang.com/cash-strapped-school-cuts-bills-with-high-tech-ventilation_20490.html
[11] http://newsroom.aircuity.com/pressrelease/Aircuity-Customer-Grand-Valley-State-University-Wins-Association-of-Energy-Engineers-Regional-Energy-Project-of-the-Year-Award-166.aspx
[12] http://zimmer.csufresno.edu/~sasanr/Teaching-Materal/MIS/MRS/BI-at-Continental.pdf
[13] http://www.mckinsey.com/insights/mgi/research/technology_and_innovation/big_data_the_next_frontier_for_innovation
[14] http://www.birmingham.ac.uk/news/latest/2012/07/16-Jul-12-Do-you-know-where-youre-going--Your-smart-phone-soon-will.aspx

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According to Jonathan T. Scott's 2011 e-book, "New Standards for Long-Term Business Survival,"[15] the most sustainable businesses today recognise that eliminating waste—including unnecessary future expenses—is the best way to "increase profits and facilitate longevity and competitiveness".

ABCD: Always be collecting data
The more aspects of operations that a business monitors and measures (ie, the more data it can gather and analyse), the more opportunities it will be able to find to continue reducing waste and improving efficiency. This means being ready to look beyond standard metrics such as electricity use, paper consumption or water use to the full life-cycle impacts of every resource a company uses.

Businesses that proactively look for hidden inefficiencies in this way do more than find new ways to cut expenses or boost revenues.

They also help future-proof their operations from a host of potential challenges: rising costs for energy and raw materials, new government regulations aimed at curbing pollution or fossil-fuel use, supply-chain disruptions and more. ■

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[15] http://www.sustainbusper.com/New-Standards-for-Long-Term-Business-Survival.pdf

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