Changing the way we think

A preview of the Keynote Speech to be given in Brisbane.

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Water is an incredibly precious commodity, and current events paint a rather grim picture of the global water supply. Just take a look at recent headlines from around the world: one-third of all Yemenis lack access to safe water[1]. The Chinese government plans to collect and melt the snow in Beijing this winter to avoid a shortage. Egyptian farmers have resorted to using untreated sewage to irrigate their crops[2] due to a lack of water.

Forecasts for the future are even more alarming. One-third of all U.S. counties [3] are poised to suffer water shortages by 2050, according to one report. Lebanon could see a 25% decrease in precipitation [4] and a 25% increase in evaporation by the end of the century, while water demand is expected to triple by the year 2050. In Asia, researchers project that water supplies could fall short [5] of demand by 40% in 20 years' time. It's not hard to find distressing water news from almost any corner of the planet.

Water shortages won't necessarily just result in rations, either. Aside from the fact that a severe shortage could wipe out entire species of animals and spread disease, shortages could also lead to an energy crisis. Water is used to pump oil out of the ground; it's used to generate the steam that turns turbines in power plants, and it's used to keep power plants cool. It takes, for example, up to 60 liters of water to use a 60-watt light bulb for 12 hours. Without water, the power would go out, and when the power goes out, so does the economy.

In India, violence has already erupted [6] due to water shortages. According to one report, a family was killed by a mob in the state of Madhya Pradesh, after they were found to have illegally drawn water from a municipal supply.

And then, of course, there's the matter of food. Without an adequate water supply, it's impossible to grow crops, so water shortages would pose a major threat to food security [7]. It may not significantly harm developed countries, such as the U.S., but it would likely have a devastating effect in emerging regions such as Africa and Asia.

But water security isn't just a humanitarian issue. Some of the largest corporations have rightly identified water as a major threat to the way business is conducted. More than half the corporate respondents of a recent survey said they expect to experience some sort of problem related to water in the next one to five years. Coca-Cola warned in its annual report that water is a limited resource facing unprecedented challenges [8], and will increasingly require the company's attention.

Conservation is part of the solution, but there's something even more basic that water utilities should do: Plug leaks. It sounds obvious but it's not a trivial matter. In the U.S., some municipalities lose up to 50% of treated water to leaks. In the Philippines, 29 billion cubic meters of water [9], worth roughly $9 billion, are lost every year due to leaky infrastructures and inefficient agricultural irrigation. Leaky infrastructures are a particularly embarrassing problem when you consider that in many cases, there would be enough water to meet demand if it weren't for an outdated or poorly maintained infrastructure.

Although leaks are a sweeping problem, throwing a bunch of engineers at it may not be the only answer. One possible solution lies in information technology. In the not-so distant past, fixing a leak wasn't as difficult as trying to find it. Today, a network of thousands, if not millions of wireless sensors can be used to collect data, and by analyzing that data, we can detect significant water loss in nearly real-time. We can almost immediately identify where we're losing and using water, how much water is being used and who is using it. If water consumption patterns change dramatically, we

will know within minutes. More importantly, the technology can be used to predict potential problems, too -- we can identify vulnerabilities in the infrastructure and repair equipment before it breaks. London's water supply system used to lose 900 million liters of water [10] a day, and some 240 leaks had to be repaired daily. After replacing 1,300 miles of cast-iron water mains, and installing a vast network of wireless sensors, the city now only loses 670 million liters per day. (Clearly there is still room for improvement.)

Water mismanagement is a problem ideally suited for information technology. Ford Motor has spent the last decade analyzing its water consumption [11] and using a custom-built software program to reduce usage. So far, it has paid off: The company saves more than $1 million per year in water costs at one facility in Ohio alone. And IBM dramatically lowered fuel, electricity and water usage at its Vermont semiconductor plant. By analyzing data collected from a network of more than 60,000 sensors, we reduced water usage at this facility by 27%, saving $3 million per year.

Five years ago Johnson & Johnson's goal was to reduce water use by 10% by the end of 2010. The company shaved water consumption by 14%, a year early. What's notable about Johnson & Johnson's achievement is that its green work also helped pad its bottom line: The company's environmental projects have delivered a 19% return and saved the company an estimated $50 million [12]. Similarly, Levi's had the novel idea of using water scarcity as a marketing opportunity: the company is releasing a pair of "Water>less" jeans that reportedly require 28% less water [13] to manufacture.

In the current economic environment, local municipalities would be wise to embrace IT as a cost-efficient way of making their utilities smarter. In cases where a major infrastructural upgrade isn't in the budget, data collected and

about water

analyzed by an IT system can provide effective guidance as to which repairs are essential and which are not. And in rural areas where the infrastructure isn't built yet, information technology can help engineers design the most efficient system so that every single drop of water is optimally utilized. Many agricultural-intensive regions, such as Hawaii [14], have used water management software to analyze rain patterns in an effort to optimize agricultural development. Bakersfield, Calif.-based fruit grower Sun World threw out the Farmer's Almanac and now relies on hard data. The company began using IBM analytics to keep an eye on its water consumption and irrigation patterns and has lowered fuel use by 20%, reduced water consumption by 8.5%; and cut labor costs by 10% at a time when California increased its minimum wage.

On a consumer level, this same sort of data has driven change in people's behavior. Smart meters, which have only been rolled out in a small percentage of counties in the U.S., will provide detailed breakdowns of how, where and when water is being used. Armed with this data, consumers are more likely to modify their behavior. The water bills consumers get today reveal nothing about patterns and trends in water usage, and certainly will not spur change.

And at this point, change is not a luxury -- it's necessary. It's coming at us whether or not we're prepared for it. The question we have to ask ourselves now is whether we can attack these problems thoughtfully, before we face a global crisis, or whether we'll wait until there are massive shortages to come up with solutions under duress. Most people would agree that the former is preferable.

References
1 http://www.reliefweb.int/rw/rwb.nsf/db900sid/SNAA-8BA8TX?OpenDocument
2 http://edition.cnn.com/2010/WORLD/africa/11/09/egypt.water. shortage/
3 http://www.nrdc.org/media/2010/100720.asp
4 http://www.dailystar.com.lb/article.asp?edition_id=1&categ_id=1&article_id=121188#axzz15dmlBAc5
5 http://www.circleofblue.org/waternews/2010/world/looming-asian-water-crisis-requires-billions-in-annual-improvements-adb-says/
6 http://www.treehugger.com/files/2009/05/violence-over-water-already-happening-in-india.php
7 http://www.usaid.gov/our_work/environment/water/food_security. html
8 http://www.ajc.com/business/coca-cola-tries-to-745702.html
9 http://www.circleofblue.org/waternews/2010/world/looming-asian-water-crisis-requires-billions-in-annual-improvements-adb-says/
10 http://www.economist.com/node/17388318?story_id=17388318&fsrc=rss
11 http://www.greenopia.com/usa/news/16110/6-28-2010/Ford-Motor-Company-Actually-Cut-Water-Consumption..Really-
12 http://www.smartplanet.com/business/blog/smart-takes/johnson-johnson-sustainability-part-of-the-total-trust-package/9820/
13 http://green.blogs.nytimes.com/2010/11/04/soft-jeans-water-waste/?src=twt&twt=nytimesgreen
14 http://hawaii.gov/dlnr/cwrm/publishedreports/PR200808.pdf