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104 PAGES OF IDEAS TO FUTURE-PROOF YOURSELF & YOUR BUSINESS

JAMES DYSON ON THE YEAR OF THE ROBOT

SAUL KLEIN ON THE CREATIVE ECONOMY

CARLO RATTI ON DRIVERLESS FUTURE CITIES

PLUS 101 MORE IDEAS THAT WILL CHANGE THE WORLD

BUSINESS BRAINS GET THINKING

With detailed metrics pouring in from every direction, businesses have never had so much insight. 2015 will be the year they learn to ask their data the right questions

By **Hal Gregersen**

THE GREATER THE DATA WE HAVE, the harder it is going to be to discover its implications. In 2015, a new approach to analysis – catalytic questioning – will give business leaders fresh insights that will transform markets.

Catalytic questioning is an alternative to brainstorming whereby your team can do question-centric work. Pick a problem that your team cares deeply about and ask nothing but questions (no answers allowed) until you reach at least 50. Once you've done this, step back and determine three or four questions that are the most "catalytic" – the startling ones that force you to change your perspective. Seek solutions to these questions until you uncover extraordinary insights and answers.

One way catalytic questioning can help a company transform its business with big data is by asking: "What story is the data telling us?" Consider SAP.

SAP data scientists worked with a major transportation company that was struggling to understand what was impacting its financial performance, and to predict where the market was heading. Using catalytic questioning, SAP brainstormed with executives. From those questions the data scientists developed forecasting models to analyse more than 48,000 combinations of "products shipped x location x customer" that were validated against thousands of macro-economic factors, competitive data and customer

LEVITATING TRAINS

A Cambridge team will commercialise a cheap, efficient high-temperature semiconductor for maglev trains. The material can trap a record-breaking electric field of 17.6 Tesla.

sentiment. Fuelled by uncommon questions and big data, this company is now predicting future outcomes and competing more successfully.

In the not-too-distant future, we may see artificial intelligence actively engaged in catalytic questioning. By tracking subtle human cues (heart rate, etc) it may provide instant feedback for a group to generate new questions. But machines will not be able to truly read emotion, at least in the next decade or two, so they can't completely duplicate catalytic questioning. This process is inherently a creative one that's meant to convert raw numbers into ripe understanding and solutions. Beyond providing a unique perspective on how to achieve a goal, this process can also uncover whether the original goal is even worth pursuing.

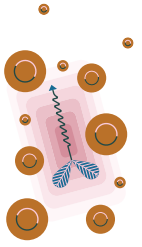
If world leaders learn to ask novel new questions, big data can enable them to solve some of the planet's most vexing challenges. Researchers, for example, have often depended on physical observation to understand Earth's biodiversity and the interrelationship of species. However, by using data from DNA testing, combined with environmental findings, researchers with the Barcode of Life project can now ask questions such as, "What species of plant did a specific caterpillar feed on, and what parasites fed on the caterpillar?"

Understanding the various food webs will be critical to protecting biodiversity and our future food supply.

2015 will be the year when big questions will force big leaders to challenge big assumptions that perpetuate big, enduring problems. If leaders fail to ask new, uncomfortable, emotionally charged questions, we will live out the same old answers – no matter how big the data sets become.

Hal Gregersen is executive director of the MIT Sloan Leadership Centre

SPOT ILLUSTRATION: JAMIE JONES



NANO PROPELLER

Nano materials will be able to travel through fluids thanks to a propeller-like structure developed by researchers in Israel and Germany. The team has built a tiny corkscrew, 70 nm-wide and 400 nm-long, and made of silica and nickel, which is powered by an external magnetic field. This will allow it to propel its payload through bodily fluids such as blood and deliver it to a precise location in the body. In vivo tests will begin in 2015.

DIPLOMACY IN SPACE

Off-planet relations become the new final frontier as the US, Russia, China and Europe work to find ways of co-existing in orbit

By **AN Hash**

BY MARCH 2015, US ASTRONAUT Scott Kelly and Russian cosmonaut Mikhail Kornienko will have begun a US-Russian one-year mission aboard the International Space Station (ISS).

Instead of the standard six months, the two men plan to spend an entire year circling Earth. By monitoring the two men over a longer period of time than usual, medical researchers hope to get a better understanding of the physiological damage suffered by humans in space. The aim is to devise ways of protecting humans living in space for long periods, with an obvious glance to future missions to Mars.

Whether the mission succeeds, or even runs its full term, depends less on the science of health risks, however, and more on the political situation down on Earth. The key question in 2015 will be how viable a multinational space station led by the US really is?

The US is lead nation: it pays the most annually to keep the station running. But the ISS is a joint venture. Russia, Canada, Japan and the European Space Agency contribute substantially to its running costs. As partners in space, they also depend on each other more than many of their politicians on Earth would like.

At the most fundamental level, ISS crew members depend on the station's Environmental Control and Life Support System (ECLSS). This provides critical life support: the air, water and food needed to keep the humans on board alive. Both US and Russians systems are used and, in many cases, this means that redundancy is built in: one side's sub-system can cover for the other's in the event of any major system failure. The Russian segment depends on electricity generated by US solar arrays; it stays orientated using data drawn from US satellites and gyroscopes.

Since axing its ageing Space Shuttle fleet in 2011, the US depends on Russian help to reach the station. For Roscosmos, the cash-strapped Russian Federal Space Agency, an astronaut on one of its Soyuz spacecraft taking the six-hour trip to the ISS brings in over $70 million (£41m).

In 2015 this balance of dependency will end. The renewed rattling of sabres