

Forecasting the future through 'weak signals'

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Our in-house futurologist explains the importance of so-called 'weak signals' for predicting new trends in technological and social development.

Below is a seemingly random selection of recent news stories:

- The US Army has shown an interest in regenerative medicine. Established in 2008, the Armed Forces Institute of Regenerative Medicine is a virtual research organisation which brings together more than 20 academic and commercial research institutions devoted to research on the field. The US government has reserved \$250m for establishing the institute. The research project focuses on five different areas: burn repair; wound healing without scarring; craniofacial reconstruction; limb reconstruction, regeneration or transplantation; and compartment syndrome, a condition related to inflammation after surgery or injury that can lead to increased pressure, impaired blood flow, nerve damage and muscle death. In other words, in the future it may be possible to replace lost limbs by growing new ones.
- The Australian Tissue Culture and Art Project approaches tissue engineering technology from a slightly different angle, testing attitudes towards the possibilities from such technologies. The project has used tissue-growing methods in order to grow, for instance, a tiny leather jacket, which is called 'victimless leather jacket', since animals were not harmed in the process. The tiny jacket is, in fact, a semi-living work of art grown from human bone cells and 3T3 mouse cells. The project has also managed to grow other interesting artefacts: for example, an artificial beef steak, wings from pig cells and an ear in - scale. Perhaps in a couple of decades people will be able to grow their own leather garments in bioreactors at home, while another bioreactor is cooking a juicy steak for dinner.
- The mission of the American company Solaren is to import electricity from space. The company intends to launch solar cells into space to produce electricity from sunlight. This electricity will be converted to microwaves and send to Earth, where it is then converted back to electric current. The company aims to produce 800 gigawatt hours in space by 2016. In the following years, their intention is to more than double the amount. One benefit in space power is that it's green. It is possible that in the future most of the energy consumed on earth comes directly from space.
- Emotiv has developed a neuro-signal interface headset, equipped with sensors that read electric signals of the brain, which enables users to control a computer with their minds. The users may, for example, move computer game characters by thinking about the motion. The device can also recognise and respond to people's emotional state, altering the game's soundtrack accordingly. The first neuroheadsets by Emotiv are by now available for purchase, starting from \$299. Provided that this technology spreads and advances, we just might be able to say goodbye to computer keyboards as well.

Some readers might overlook these stories - and especially speculations - as mere science fiction. However, these examples are existing research and development projects, and even commercial products, which are capable of shedding light on future prospects and which may develop into global trends.

Change often begins from individual cases and social media may accelerate it.

Disruptive technology

A good example of the progression of change is the development of new, disruptive technology: a researcher comes up with a new material in a lab in some corner of the world and publishes a report of it in a scientific conference or journal. As word spreads, more people become interested and more researchers begin to explore the potential of and applications for the new material.

In the next phase, business associates may become interested and begin by producing the technology on a small scale. If the results are promising, the project will move to a larger scale, leading to different applications. New factories will be established across the world to satisfy the growing demand. The researcher's innovation may become common enough to influence the lives of people globally. Such incidents have occurred, for example, when Art Fry invented the Post-it note and Finland's Matti Makkonen invented text messaging. Neither of the inventions attracted many people at first, but today everyone knows them.

The spread of innovations from the marginal to the masses is often described with the S-curve or the diffusion of innovation curve,

introduced by Everett Rogers in his book 'Diffusion of Innovations' (1962). The invention is first adopted by Innovators, who are in general interested in new things and are ready to purchase them first. The second group to adopt the innovation are the Early Adopters who are normally young and educated. The third group are the Early Majority, the fourth - the Late Majority, and last are the Laggards, who will resist all change to the last.

Today, change is faster than ever. Contemporary data transfer methods and social networking have resulted in the fact that news spreads increasingly fast and changes can be brought about in an ever-accelerating pace. Service providers, like Facebook and Twitter, make it possible to distribute information globally almost instantly. The force of social media has been witnessed in reports on the unrest in Iran, in the coverage of the Tsunami of 2004 in Asia and in how information on the injured was reported worldwide.

Futurists, including myself, are interested in new issues which, at first, appear as individual cases and mainly at the beginning of the S-curve. These issues are not merely related to technology. They may emerge in other areas, too, such as politics, economy, society, state of the environment and design. Futurists have named the signs of such new issues weak signals. By observing weak signals at the beginning of the S-curve, it is possible to forecast future events. In recent years, the acceleration of change has added to the importance of observing weak signals.

A weak signal is, by definition, an indication of a possible emerging issue. It may also inform about a new phenomenon which will wither away. In reality, weak signals may appear in various forms - for example as news articles, rumours in the social media, observations of novelty products in exhibitions, or simply a modest sticker of an alternative movement.

Weak signals are easily overlooked in the business world, because they represent uncertain knowledge. It is often the case that, in the fear of losing face, people are afraid to even mention weak signals. In some companies, it is too much to talk about leather jackets grown in tiny bioreactors. It is often considered more convenient to talk about climate change and globalization. The truth is, however, that the big changes are already common knowledge. It is the innovations and events that bring fresh insights and, at best, create a competitive edge.

It is impossible to estimate how relevant a particular weak signal will be, but later on the situation will change. Historical cases often provide a wealth of evidence for unearthing the first weak signals that pointed towards the significant future changes. Using weak signals for scanning futures, however, always involves a great amount of uncertainty.

When futures forecasting is done using weak signals, people do not normally rely on unconnected individual ones. Instead, they collect a lot of signals in order to find out the similarities and patterns that would reveal the trends that are possibly on the rise. In this context, the term pattern recognition is used. It could be said that forecasting futures is like piecing together a jigsaw puzzle. As many pieces (i.e. weak signals) as possible are gathered and, by combining these pieces, it is possible to outline a general view, even if all pieces were not there.

Dogs for rent

Recently, new kinds of rental services have turned up throughout the world. The German company Lütte Leihen rents children's clothing by the month, whereas the American FlexPetz rents dogs as jogging companions. New business models, such as rental services in new and unexpected areas, raise the question whether it is the emphasis on environmental values that has led to increased popularity of the rental trend.

In the business world, the players who discover future changes before their competitors will have an advantage as they will be able to prepare. In this sense, weak signals are good futures tools for companies.

Not only are the managers capable of observing the future, but also employees. It is advisable to mobilise the entire organisation to collect weak signals. Top executives will possibly suffer from a chronic lack of time, which is disabling in terms of observing weak signals. If the whole organisation is called up to discover signals of future changes, a tool of some kind will certainly be necessary. One possibility is to employ the social media, which might open up new avenues for collecting weak signals on a larger scale; in this task, the organisations' intranets might prove handy. Today's text mining solutions allow for analysing large quantities of signals and building a general view of the change. In addition, commercial software applications for collecting weak signals have already been developed. One such application is the TrendWiki, which I have personally been involved in developing.

When the responsibility for the future-related issues extends to the whole staff, it is likely to motivate the employees better to prepare for future challenges.

In the business world, weak signals can be linked to strategic working, as they do sometimes produce new views. However, futurists have one principle concerning foresight: future cannot be predicted. In other words, weak signals should not be used for predicting one particular future. Futurists consider alternative futures, also called scenarios, but these are not intended to tell exactly what is to come. They are used for constructing different paths to futures on the conceptual level. The typical scenario focuses on contemplating the futures from all sides. The fears and chains of events are thought over to find paths leading to desirable results for the organisation. The intention is to mirror futures that differ to current operations and strategies. A colleague of mine compared them to testing cars. The scenarios produce different working conditions that enable testing the functionality of strategies - exactly like cars are tested in wind tunnels.

Weak signals's importance is not limited to forecasting futures and strategy working: they can also be used in futures innovation. For example, in product development projects, weak signals can inspire new products and services. In my work as a consultant, I have already used the Futures Window method I have developed. It introduces pictures of weak signals without explaining them any further. These pictures of innovations and methods are inspirational for coming up with new products and solutions.

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