the futures foundation
engaging all Australians in creating a better future...

Volume 14, No. 5, October 2014

FUTURE NEWS

TO CONNECT, TO INFORM AND TO INSPIRE

IN THIS EDITION

2050 and the Future of Infrastructure

by Thomas Frey

Much of the world around us has been formed around key pieces of infrastructure. Most see this as a testament to who we are as a society, and part of the cultural moorings we need to guide us into the future. In general, infrastructure represents a long-term societal investment that will move us along the path of building a more efficient, better functioning, society. And usually it does … for a while.

But infrastructure comes in many forms and as we build our elaborate networks of pipes, wires, roads, bridges, tunnels, buildings, and waterways, we become very focused on the here and now, with little thought as to whether there might be a better way. Virtually every piece of infrastructure creates jobs, revenues streams, and investment opportunities, as well as new laws, regulations, and industry standards.

The longer a piece of infrastructure is in place, the greater the resistance there is to replacing it. Much like an aging tree, the root system that feeds it becomes enormous. That said, the life-cycle of infrastructure is getting shorter, and teams driving the disruptive technologies are getting far more sophisticated. Infrastructure projects represent huge paydays

Here are five examples of how our core infrastructure are about to change and what this will mean to the nations and businesses at the heart of this revolution.

1. Driverless Cars and Driverless Highways

Even though the art of road building has been continually improving since the Roman Empire first decided to make roads a permanent part of their infrastructure, highways today remain as little more than dumb surfaces with virtually no data flowing between the vehicles and the road itself. That is about to change, and here's why.

Driverless technology will initially require a driver, and it will creep into everyday use much as airbags did, first as an expensive option for luxury cars, but eventually as a safety feature required by governments.

The greatest benefits of this kind of automation won't be realized until the driver's hands are off the wheel. With millions of people involved in car accidents every year, it won't take long for policy-makers to be convinced that driverless cars are a safer option.

The privilege of driving is about to be redefined.

As cars become equipped with driverless technology, important things begin to happen. To compensate for the loss of a driver, vehicles will need to become more aware of their surroundings.

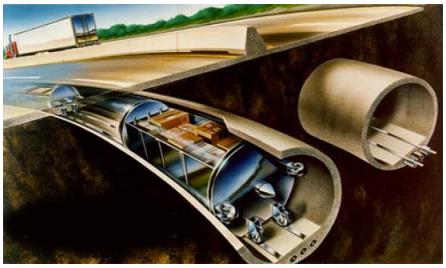
Working with cameras and other sensors, an onboard computer will log information over 1,000 times per second from short-range transmitters on surrounding road conditions, including where other cars are and what they are doing. This constant flow of data will give the vehicle a rudimentary sense of awareness.

With this continuous flow of sensory information, vehicles will begin to form a symbiotic relationship with its environment, a relationship that is far different than the current human to road relationship, which is largely emotion-based.

An intelligent car coupled with an intelligent road is a powerful force. Together they will accelerate our mobility as a society, and do it in a stellar fashion. In the driverless era, intelligent highways will be able to accommodate 50-100 times as many vehicles as they do today. Counter to traditional thinking about vehicle safety, the higher the speeds, the fewer the number of vehicles on the roads at any given moment. As we compress the time and space requirements of every vehicle, we achieve a far higher yield of passenger benefits per square meter of road resources.

In addition to the benefits passengers receive, the road itself will greatly benefit from this technology. With cars constantly monitoring road conditions, the road itself can call for its own repair. Rather than waiting until a road becomes a serious hazard, as is currently the case, and repair crews disrupt traffic for hours, days, or longer, micro repairs can happen on a daily, sometimes hourly, basis. High-speed coatings and surface repairs can even be developed for in-traffic application. Even treacherous snow and ice conditions will have little effect if de-icer is applied immediately and traffic is relentless enough.

2. Tube Transportation Networks



When Tesla Motors CEO, Elon Musk, mysteriously leaked that he was working on his Hyperloop Project, the combination of secrecy, cryptic details, and his own flair for the dramatic all contributed to the media frenzy that followed. Leading up to this announcement was his growing anxiety over California's effort to build a very expensive high-speed rail line between Los Angeles and San Francisco with outdated technology. While the Musk media train was picking up steam, several reporters pointed out a similar effort by Daryl Oster and his Longmont, Colorado-based company, ET3, to build a comparable tube transportation system that was much further along. Indeed both are working on what will likely be the next generation

of transportation where specially designed cars are placed into sealed tubes and shot, much like rockets, to their destination. While high-speed trains are breaking the 300 mph speed barrier, tube transportation has the potential to make speeds of 4,000 mph a common everyday occurrence.

As Daryl Oster likes to call it, "space travel on earth." Even though tube travel like this will beat every other form of transportation in terms of speed, power consumption, pollution, and safety, the big missing element is its infrastructure, a tube network envisioned to combine well over 100,000 miles of connected links. While many look at this and see the lack of infrastructure as a huge obstacle, at this point in time it is just the opposite, the biggest opportunity ever. Constructing the tube network will be the biggest infrastructure project the earth has ever seen, with a projected 50-year build-out employing in excess of 100 million people along the way.

3. Micro Colleges

In March, when Facebook announced the $2 billion acquisition of Oculus Rift, they not only put a giant stamp of approval on the technology, but they also triggered an instant demand for virtual reality designers, developers, and engineers. Virtual reality professionals were nowhere to be found on the list of hot skills needed for 2014, but they certainly will be for 2015.

The same was true when Google and Facebook both announced the acquisition of solar powered drone companies Titan and Ascenta respectively. Suddenly we began seeing a dramatic uptick in the need for solar-drone engineers, drone-pilots, air rights lobbyists, global network planners, analysts, engineers, and logisticians.

Bold companies making moves like this are instantly triggering the need for talented people with skills aligned to grow with these cutting edge industries. Whether its Tesla Motors announcing the creation of a fully automated battery factory; Intel buying the wearable tech company Basic Science; Apple buying Dr. Dre's Beats Electronics; or Google's purchase of Dropcam, Nest, and Skybox, the business world is forecasting the need for radically different skills than colleges and universities are preparing students for.

In these types of industries, it's no longer possible to project the talent needs of business and industry 5-6 years in advance, the time it takes most universities to develop a new degree program and graduate their first class. Instead, these new skill-shifts come wrapped in a very short lead-time, often as little as 3-4 months. With literally millions of people needing to shift careers every year, and the long drawn out cycles of traditional colleges being a poor solution for time-crunched rank-and-file displaced workers, we will be seeing a massive new opportunity arising for short-term, pre-apprenticeship training in the form of Micro Colleges.

4. Our Trillion-Sensor Infrastructure

In the last six years, we've gone from 10 million sensors—in things like the Nintendo Wii and iPhones—to 3.5 billion. This is why Janusz Bryzek, an executive at Fairchild, organized the Trillion Sensor Summit, which took place last year in Palo Alto. Bryzek is projecting 1 trillion sensors by 2024 and 100 trillion sensors in the mid 2036 along with literally millions of new primary and secondary jobs to manage this emerging sector.

5. Atmospheric Water Harvesters

With all of the water we have in the world, only 2% of it is fresh water. To make matters worse, only one-fourth of all fresh water is accessible to humans. Until now, the entire human race has survived on 0.5% of the available water on earth. But that's about to change.

We are seeing a fast growing trend towards harvesting water from the atmosphere, something our ancestors first began working on centuries ago. People in the Middle East and Europe devised the original air-well systems over 2,000 years ago. Later the Incas were able to sustain their culture above rain line by collecting dew and channeling it into cisterns for later use.

Even though these techniques have been around for a long time, technology in this area has recently taken a quantum leap forward, and many are beginning to think in terms of houses that generate their own water supply, self-irrigating crops, and even "waterless" cities.

The earth's atmosphere is a far more elegant water distribution system than rivers, reservoirs, and underground waterways. Our current systems involve pipes and pumping stations that are expensive to operate and maintain, and easily contaminated.

There are roughly 37,500 trillion gallons of "fresh" water in the air at any given moment. The age-old problem has been getting it to people who need it at exactly the right time.

A new breed of inventors has emerged to tackle this exact problem. Using solar, wind, and other forms of passive energy, our future water networks will operate with far more efficiency and convenience than anything imaginable today.

Today's steel pipes will soon be replaced with tomorrow's air pipes, and we will forget what life was like when chlorine-tasting water was an everyday occurrence.

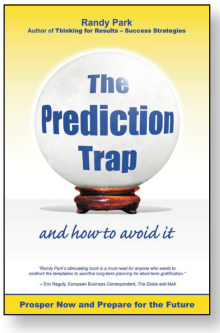
The entire story (which includes 5 more infrastructure predictions) can be found here. Many thanks to Thomas Frey for permission to reproduce his article.

http://www.futuristspeaker.com/2014/08/2050-and-the-future-of-infrastructure/

The Warka Water Tower can produce over 25 gallons per day for remote villages

Book Review

by Charles Brass – Chair, futures foundation



The Prediction Trap
and how to avoid it
by Randy Park
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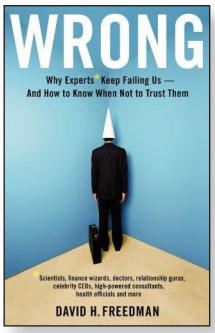

WRONG
Why Experts Keep Failing Us—
and How to Know When Not to Trust Them
by David H. Freedman

One of the most common traps clients prepare for futurists is asking them, or expecting them, to be experts about the future. The wisest futurists are too wily to fall into this trap and talk not about *the* future but about *multiple alternative futures*, and encourage their clients to *prepare for*, not try *and predict* the future.

The temptation to be seen as an expert can, however, be overwhelming (particularly when that is what the client asks for).

As part of my own education against succumbing to this temptation, I have just read two books which I will attempt to summarise here.

The first was written by Canadian Randy Park in 2008 and is entitled: "The Prediction Trap and how to avoid it" and the second is by American journalist David Freedman published in 2010. It is titled: "Wrong - why experts keep failing us and how to know when not to trust them."

Park's book is in many ways a sub-set of Freedman's. It focuses almost entirely on human decision making processes, how these can be fooled and how they can be strengthened. These concerns only occupy a couple of chapters in Freedman's book. Most of it looks more broadly at how predictions and pronouncements arise and are promulgated.

Both authors, however, concur that as human being we tend to repeat similar errors which it comes either to predicting the future or to evaluating the predictions of others.

Freedman gives the example of a patient with chronic back pain who is faced with divergent opinions from orthopaedic specialists. One says he has seen many similar cases, and cause and cures vary. He recommends a particular treatment which "usually doesn't work but which at least works more often with patients like you than do other treatments." He suggests trying this for a month and then returning. The other specialist says he is sure what is wrong and proposes a different treatment for a month before returning for a review. Most people, according to Freedman, say they would choose the second doctor's advice, even though they are sceptical about the doctor's apparent certainty. As Freedman says: "apparently we like the second doctor's advice so much that we are willing to

take a chance on it in spite of whatever qualms we might have about its reliability" (p69).

Secondly, we seem rather too readily prepared to discount information if it doesn't fit our current mental model. As Park says: "Have you ever watched a child when they first learned to play peek-a-boo? At that stage of their mental development, they believe that by covering their eyes they can make objects disappear. They take great delight in having people and objects appear and disappear at will. These days I observe many adults behaving like children playing peek-a-boo. They seem to believe that if they close their eyes and ignore the problem it will go away" (p46).

Park uses the relatively well known Donald Rumsfeld quote (about distinguishing between kown-knowns and unknown-unknowns) to remind us why "anticipation rather than prediction is the most effective strategy for dealing with the future" (p105).

The Prediction Trap explains why humans base so much of their thinking on the past – and a selectively remembered past at that.

Most of Freedman's book concentrates on why and how 'experts' get things wrong. He notes how few 'expert studies' are ever replicated, even in mainstream scientific disciplines. He observes that few studies which disprove anything ever get published ("who wants to read that orange juice doesn't cause cancer?"). He points out that the media, which is after all the main medium through which opinion is disseminated, is much less focused on finding 'the truth' than reporting contention, dissent and scandal.

His final chapter outlines: "Eleven simple never-fail rules for not being misled by experts" (p203). These include identifying the following characteristics as being typical of less trustworthy expert advice:

- it is simplistic, universal and definitive
- it is groundbreaking
- it is pushed by people or organizations that stand to benefit from its acceptance
- it is geared toward preventing a future occurrence of a prominent recent failure or crisis

and the following as being typical of more trustworthy expert advice:

- it's a negative finding
- it's heavy on qualifying statements
- it provides some context for the research on which it is based
- it includes candid, blunt comments.

Park on the other hand concludes with: "Key threats leader's shouldn't miss" (p131) a chapter in which he provides examples of the need to pay attention to the four key themes of his book:

- thinking accurately
- looking to the future
- understanding others
- collaboration (p132).

The chapter critiques our modern fetish for growth and concludes: "eventually our global growth must stop. We live on a finite planet with finite resources" (p136), and he concludes with a detailed examination of energy use and climate change.

He suggests the first thing we all should do is become informed: "While you can't be an expert on everything, I do believe for both your personal and work responsibilities it is important to have an idea of the seminal issues of the day....I think we need more reasoned dialogue...." (p161).

But perhaps the final word should go to Francis Bacon who is quoted on the cover of Freedman's book: "If a man begin with certainties, he shall end in doubts...". Helping clients become comfortable with doubts is, I believe, the major work of all futurists.

FUTURISTS IN ACTION

Strategic Planning within a local Community Association

Recently a membership based community group approached the futures foundation to help them think through their strategy planning process.

For years they had set aside one Saturday afternoon a year and invited their members to come along and help them develop their future strategic plan. Often they invited an external facilitator to help manage the discussion and to write up the outcomes, and they provided wine and gourmet food as an incentive for their members to attend.

The number of attendees, and the quality of the discussion, had been declining for some years and the futures foundation was invited to help the committee think through alternatives.

We quickly identified that the group had a membership base in excess of 500 and in the past had quickly mobilised even larger groups when the community faced specific challenges. The committee told us that the number of people who attended their regular monthly meetings comfortably exceeded the number who had attended recent strategic planning sessions.

If wasn't hard to conclude that the group would benefit from a process which more effectively engaged with more of their members, and which might even be used to attract new members.

It was agreed that the current year's process would begin nearly three months before the actual Saturday afternoon planning session.

A simple survey was developed to which all members (and a range of other community members) were invited to respond. The survey asked four questions:

1. Are you aware of any activities/ groups involved in maintaining or improving the amenity of our community? What can you tell us about them? Are you directly involved with any of them?
2. Are there any aspects of the amenity of our community to which you believe more attention needs to be paid? What can you tell us about these?
3. Are you aware of things which have been done to improve the amenity of other communities from which our community might learn? What can you tell us about these?
4. Would you like to be involved in the community gathering which will be convened on July 12 to talk through the consequences of responses for our community? If so, please provide your contact details below:

The survey invitation indicated that the responses to the survey would initially be fed back to those who responded and that all the responses would shape the agenda for the planning day which would be distributed to all respondents three weeks before the event.

Over 100 responses (including 17 from non-members) were received. A summary of the responses to questions 2 and 3 were collated and sent to all respondents along with an invitation to rate these in order of importance.

Just under 80 people responded to the second survey and the ratings were used to prioritise the discussion at the planning day.

Just under 40 people came to the strategic planning day, the agenda for which was as follows:

1:00 p.m. Welcome, introduction to the gathering

1:15 p.m. introduction of those present

1:45 p.m. Exploring the amenity of our community

participants were divided into small groups to explore one of these aspects of the community's amenity in more detail, producing a summary of their thoughts and reporting back to the whole group.

3:15 p.m. taking the next steps

the final task for the day is to agree on an agenda of next steps to be taken by the members of the Association in future

in thinking about these next steps, we will not ignore the valuable role which the Association has played in the past in supporting individual and collective action in response to various development proposals

4:00 p.m. meeting close

The committee not only gained valuable material for planning the future direction of their Association but also gained three new members on their committee. It is planned to repeat this process every three years from here on.

Signals in the Noise

10 Breakthrough Innovations That Will Shape The World In 2025

What world-changing scientific discoveries might we see by 2025? Will we have more energy technologies that move us away from fossil fuels? Will there be cures for cancer and other diseases? How will we get around and communicate?

To make some predictions, the Thomson Reuters IP & Science unit looked at two sorts of data: current scientific journal literature and patent applications. Counting citations and other measures of buzz, they identified 10 hot fields, then made specific forecasts for each.

“A powerful outcome of studying scientific literature and patent data is that it gives you a window into the future–insight that isn’t always found in the public domain,” says Basil Moftah, president of the IP & Science business, which sells scientific database products. “We estimate that these will be in effect in another 11 years.”

DEMENTIA DECLINES

Prevailing opinion says dementia could be one of our most serious future health challenges. The World Health Organization expects the number of cases to triple by 2050. Thomson Reuters is more optimistic in its report. It says a focus on pathogenic chromosomes that cause neuro-degenerative disease will result in more timely diagnosis, and earlier, more effective treatment. “In 2025, the studies of genetic mutations causing dementia, coupled with improved detection and onset-prevention methods, will result in far fewer people suffering from this disease,” it says.

SOLAR POWER EVERYWHERE

One to warm the hearts of climate activists: By 2025, solar power will be the world's largest single source of energy, the report says. “Solar thermal and solar photovoltaic energy (from new dye-sensitized and thin-film materials) will heat buildings, water, and provide energy for devices in the home and office, as well as in retail buildings and manufacturing facilities,” the authors write.

TYPE 1 DIABETES PREVENTION

Type 1 diabetes typically strikes at an early age and isn't as prevalent as Type 2 diabetes (which comes on in middle age). But cases have been rising fast nonetheless, for reasons that aren't fully explained. The report gives hope that kids of the future won't have to give themselves daily insulin shots. It expects “genomic-editing-and-repairing” to fix the problem before it sets in. “The human genome engineering platform will pave the way for the modification of disease-causing genes in humans, leading to the prevention of type I diabetes, among other ailments,” it says.

NO MORE FOOD SHORTAGES

From the first three ideas, you may have noticed the report has a largely positive bent. This continues with the fourth idea: No more food shortages and no more food-insecure people. The innovation? Lighting. “In 2025, genetically modified crops will be grown rapidly and safely indoors, with round-the-clock light, using low energy LEDs that emit specific wavelengths to enhance growth by matching the crop to growth receptors added to the food’s DNA,” the report says. “Crops will also be bred to be disease resistant. And, they will be bred for high yield at specified wavelengths.”

10 Breakthrough Innovations That Will Shape The World In 2025

SIMPLE ELECTRIC FLIGHT

When you choose how to get around in 2025, there will be a new option: small electric aircraft. The report says advances in lithium-ion batteries and hydrogen storage will make electric transport a reality. “These aircraft will also utilize new materials that bring down the weight of the vehicle and have motors with superconducting technology. Micro-commercial aircraft will fly the skies for short-hop journeys,” the authors write.

DIGITALLY CONNECTED, OF COURSE

By 2025, the Internet of things will be a reality. Everything will be connected–from the fridge in your kitchen, to the remotest farmer in Africa. “Thanks to the prevalence of improved semiconductors, graphene-carbon nanotube capacitators, cell-free networks of service antenna, and 5G technology, wireless communications will dominate everything, everywhere,” the report says.

NO MORE PLASTIC GARBAGE

Floating garbage patches? Not in the future. The report expects packaging made from plant-derived cellulose to dominate by 2025. “Toxic plastic-petroleum packaging that litters cities, fields, beaches, and oceans, and which isn’t biodegradable, will be nearing extinction in another decade. Thanks to advancements in the technology related to and use of these bio-nano materials, petroleum-based packaging products will be history.”

MORE PRECISE DRUGS

By 2025, we'll have sophisticated personalized medicine. “Drugs in development are becoming so targeted that they can bind to specific proteins and use antibodies to give precise mechanisms of action,” the report notes. “Knowledge of specific gene mutations will be so much more advanced that scientists and physicians can treat those specific mutations. Examples of this include HER2 (breast cancer), BRAF V600 (melanoma), and ROS1 (lung cancer), among many others.”

DNA MAPPING NORMALIZED

Kids born in 2025 will be tested at the DNA level, and not just once or twice, but continually using nano-probes inserted in the body. “In 2025, humans will have their DNA mapped at birth and checked annually to identify any changes that could point to the onset of autoimmune diseases.”

TELEPORTATION TESTED

Beam me up, Scotty? Not quite. But the report says research into teleportation will be underway. “We are on the precipice of this field’s explosion; it is truly an emerging research front. Early indicators point to a rapid acceleration of research leading to the testing of quantum teleportation in 2025.”

Will all of these changes come to pass? Probably not. We know from history that exciting research doesn't always make it to the market. A host of things–politics, money, monopoly power–get in the way. However, Moftah believes we should be positive about the future: “[The predictions] are positive in nature because they are solutions researchers and scientists are working on to address challenges we face in the world today. There will always be obstacles and issues to overcome, but science and innovation give us hope for how we will address them.”

The original article can be found here:
http://www.fastcoexist.com/3032260/10-breakthrough-innovations-that-will-shape-the-world-in-2025

Future News is published by the Futures Foundation six times a year for its members.