FUTURE NEWS

TO CONNECT, TO INFORM AND TO INSPIRE

IN THIS EDITION

Australia in 2100 – some scenarios

A recent article by Lisa Cornish on Australia in the year 2101 published in *The Australian* while excellent in bringing in the longer term, for reasons of space, stayed focused on forecasting and not on foresight, that is, bringing in alternative futures, scenarios.

In these scenario notes, Ivana Milojevic and Sohail Inayatullah expand the discussion by bringing in alternative futures of Australia. While we cannot know which future will result, we can surmise that decisions made today will be critical in deciding which path is followed.

Equitable, wealthy and futures-oriented or divided, polluted, internationally marginalised and conflict- ridden Australia – two scenarios for the futures of Australia by Professor Ivana Milojevic

Where Australia will be by 2101 will depend on decisions made today (and decisions made in the near and mid-range future). As I see it, Australia has a great potential to become even wealthier, whilst simultaneously reducing income disparities, with more educational opportunities and better health provision for majority of the population. It has a great potential to maintain its clean environment and improve its record in this area even more. At the same time, Australia also has a potential to make itself an international pariah, for example, as far as the environmental protection measures and the humane treatment of people (such as respecting the human rights of asylum seekers) goes. If it continues to define 'progress' based on some past criteria (i.e. only economy matters) the second option is more likely. I thus see two scenarios:

1. Equitable, Wealthy and Futures-oriented Australia

The more desirable but perhaps less likely scenario is Australia as: equitable, wealthy and futures-oriented. What is required for this future is bi-partisan support to orient Australia towards the future rather than towards the past. Indicators of this shift towards the future would be: (1) recognition of our current and new reality: in particular related to detrimental environmental changes, in Australia and globally (rather than denial or desperately trying to go 'back to the [idealise] past')- and then introduction of measures to minimise or reverse these. This would help the Australian economy in the long term. (2) recognition that Australia is a multicultural nation positioned within the Asia-Pacific region & minimisation of overt and institutionalised racism would

lead to the better use of human resources already here; countries that successfully utilise 'migrant resources' fare much better than those that do not (i.e. economy is enhanced via innovation, social conflict is minimised).

What is needed, however, is a shift away from monoculturalism or token multiculturalism and towards expansive multi/metaculturalism (difference is seen as an asset rather than a liability, cultures learn from each other rather than 'assimilate' into the dominant one).

Similarly, (3) women's (and third gender's) potential could be harnessed to contribute towards creating a more inclusive and happier Australia if numerous/current barriers preventing gender equity in the public/private sphere are removed. This does not simply mean 'more women' in power & on top in economic/political organisation; rather it means serious re-definition of what is considered a desirable value/priority (such as, for example, increasing the importance of traditional 'feminine' values of caring, nurturing, helping vulnerable, peaceful conflict resolution, equity and so on). Furthermore, 'feminising Australia'/acceptance of the existing gender diversity would bring numerous benefits to Australian society in the near and long-term future as well as to future generations, for example, the redistribution of resources towards preventative health and education would make Australia both healthier and more educated/competitive in the global market, more equity would also have very concrete implications such as that the first home buyers are not locked outside of the housing market and in resulting in stronger middle class and consequently maintaining economy strong as well. Obviously, the way 'merit' is currently defined needs to change. The last indicator includes (4) investment into preventative measures which would save time, energy and resources as preventative measures bring more benefits and cost less as compared to reactive ones. For example, preventative measures to protect communities against forthcoming environmental disasters (floods, fires, cyclones etc.) would result

in less destruction (i.e. human lives and infrastructure preserved). This approach would be built into merit/innovation/economic strategy and so on: it is important to stress here that it is the orientation towards preventative and forwards looking worldview rather than highly specific measures that would facilitate this scenario potentially becoming a reality in 2101.

2. Divided, polluted, internationally marginalised and conflict ridden Australia

In this future, political divisions between future oriented and past oriented groups remain, as do those across ethnic/cultural/gender/class/ideological lines. One's own views are aggressively defended and there is a refusal to learn from and engage with others. Australia becomes even more of a dominator society: 'a system of top-down rankings and authoritarian rule ultimately backed up by fear or force' (Riane Eisler's definition). The division between a very wealthy minority and struggling majority becomes the norm. Indicators of Australia remaining past oriented include: the Australian economy reliant on the use of fossil fuels and other non-renewables (such as nuclear); continual exploitation of finite ecological resources; ecology and ecological changes 'not an issue'/deleted as a concern; patriarchy with 'men on top'/sexism and chauvinism remain rampant; racism continues to be institutionalised and practiced; contribution towards resolving violent conflicts remains within the 'security discourse' and predominantly via use of policing/military - consequently creating more enemies than friends overseas/and more 'punitive' based society (rather than society based on conflict prevention) and so on. While elites are initially protected from the worst outcomes of this system, ultimately they too will suffer the detrimental effects of this scenario. These are some of the main indicators that Australia remains locked in the past rather than looking towards the future. Political decisions along these lines will contribute/enhance the likelihood towards this scenario becoming a reality in 2101 rather than towards more desirable first (for majority of the population and for the world).

AUSTRALIA 2100 – Four Futures

by Sohail Inayatullah
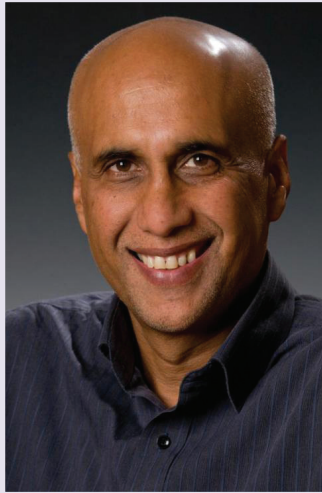
1. The Great Transformation

This scenario occurs for a number of reasons including personalized health care - wherein each child born by then will have a full life probability pathway given, based on genomics, where they live (geomedicine), parents, income and epi-genetics. This will help the child map their life journey ensuring optimal health. Evidence-based practices with high health outcomes and low costs such as meditation and yoga will be dominant by then. Acute care will drop as prevention becomes the norm. Alcohol will become a minor drug by then not the dominant as in 2013. Insurers will provide dramatically reduced premiums for those who follow the health pathways. Over 50% of Australians will follow a low meat diet, generally vegetarian. Life expectancy will be 100 plus, if not more. 3d printers will be the norm, for food and other small scale manufacturing goods. Of course, there will still be organic gardens and many farmers will flourish from niche farms. Homes, city design, office design, will all be smart ie bioinformatics to ensure optimum health and productivity. Most will work from home, and the home will change dramatically by 2100. Ethnicity and being Australian will be delinked. The long term trend from farming to manufacturing to services to meaning systems will continue.

Australia's leadership in governance will help the nation become an integral part of the thriving Asian Union. However, the polities will be far less nation-dependent and more an alliance of thousands of regional local communities with an overall Asian Unions platform as part of a global governance protocol. Solar and other soft energies will be dominant. Australia will be a far less blokie society and far more gender-embracing; an ecology of multiple perspectives.

Fairer, richer, healthier and happier

2. The Great Wars of 2050 - geopolitics wins the day.

The rise of Chindia, while benign in the beginning, led to a range of military conflicts between the declining core-USA and UK - and rising Asia. Australia, unfortunately, chose the wrong side, keeping allegiances with the old world. Economic devastation followed. Naval blockades, and the use of advanced technologies to disrupt food systems, information systems led to a world economy in a downward spiral. Eventually by the end of the century, there is redevelopment, but the last 50 years have been traumatic, large war, followed my smaller wars. . The world economy remains Asia-pacific focused by Australia does not benefit. Self-reliant communities do fine and the "battler" continue. There is major pressure on Australian lands for large Asian corporations. Cities, offices and homes remain stupid, not using the new technologies for optimization but rather focused on safety and security. Being Australian means being white.

Great inequity, poorer, sick and miserable.

3. The Great climate change (flip-flops) - Nature has the last laugh

Sea-level rise, climate refugees and a major landscape shift leads Australians to move away from the beach as climate change devastates the nation. Others adopt good old fashioned bush resilience and survive in this new world. Government is stronger, stricter, almost at a war footing. However, in the near future, as many climate change experts argue, the next flip flop is about to start, the ice age of 2130. Technological advancements will be focused on adaptation - new materials, even floating cities.

Resilient, poorer, in shock, and constantly adapting

4. Difference does not make the difference - the economic train wreck

The promises of the earlier part of the century - new health technologies, flatter politics, change in values - were incremental and did not overhaul the entire system, as the system was based on inequity. For the wealthy, they were healthier - engaged in organic food, personal trainers, meditation classes - while the poor migrated to Mcdonaldsville, using alcohol and sports to forget that the world economy exponentially rewarded those who could adapt to the new technologies. Those who could not, became poorer and poorer, fatter and more miserable. The fair go was changed to the smart go. A middle class in decline. In a way, Australia followed the path of the USA, with innovation not leading to more equity but to more gated (virtual too), communities. The main competition is who is the fattest nation in the world - Australia or the USA?

Dramatic inequity - health, wealth and (happiness) for the few and misery for the poor.

13 mistakes you make when exploring the future

by John Mahaffie

Futurist John Mahaffie has been exploring the future, and helping others explore the future, since the late 1980s. He has long made a direct, though un-scholarly study of the dos and don'ts of foresight, and likes to share insights from that in his blog. Below he offers, an "unlucky 13" mistakes you can make when exploring the future.

1. Presentism – interpreting the future or future possibilities with present-day attitudes and values.

Imagine fifty or a hundred years ago, a view of 2010. Could an African-American be president of the USA? Certainly not. Back then people would be sure that most Americans would not support that. So a view of today, from back then, probably wouldn't include an African American president. In fact, any one change happens along with all sorts of other change. As we think about a particular change, we have to remember that values and attitudes, and lots of other conditions in the future will also be different.

2. Over-optimism – Assuming that change will happen faster than it likely can.

Usually this means a technological change that will, in fact, be held up by social forces, but the reverse is also possible. Personal or organizational interest in the expected change often drives over-optimism. You like it, so you assume everyone will like it, and it will happen. Technology enthusiasts are especially prone to this. They may look forward to a big technology advance and know why it is technically possible. They are less likely to remember that we have to be ready as a society for the change too.

3. Over-pessimism – Assuming change will happen slowly or never.

Our sense of "that will never happen" is rooted in experience—it is often hard to make a desired change. So we may assume that change won't happen, or will take a long time to happen. But there are breakthroughs in technology and society all the time. We get slow change, but it is punctuated by times of sudden, or rapid change. We can't let our pessimism and past experience blind us to the possibilities that things could happen quickly.

4. Extremism – Mistaking a visionary idea for likely.

An example is the [Singularity](), the assumption of a quantum change in society because of a rapid coming together of the effects of technology. Extreme and sudden change is rare though not impossible. But even the big waves of change we've experienced, World War II, the Sixties, the Internet, the Post-9-11 world, have unfolded in a society with mainly continuity. In other words, even significant change is part of the evolution of society. And just as the Spring Paris fashions finally arrive at Macy's in a muted form (e.g. somewhat bigger shoulder pads, rather than enormous shoulder pads), we should recognize the visions of what is possible will usually bring us less-pronounced change.

5. Underinterpretation – It's easy to come up short in assessing what a change might mean. Usually, there is a conventional wisdom, or an obvious implication of a change. With a technological change, it is what the innovators first develop the technology to do. What's so much more interesting, and often has much more impact, is what other things we use the innovation for. For example: the mobile phone was not invented as an alternative for cash, but in more and more places, it has become the means of payment for shoppers. While we watched the spread of cellular telephones, we thought we were seeing a revolution

in personal communication: people talking to people. But it has meant much more than that.

6. Superlativitis + use of always, and worse, never.

It's tempting to decide something is impossible—it will never happen. It's also tempting to decide something is eternal—it will always be true. Those absolute words are often clues to an overreach. I have a favourite quote from one of my favourite writers: "No one is ever going to sit down and read a novel on a twitchy little screen, ever." – E. Annie Proulx (1994).

7. Looking for an answer – Expecting specific predictions about the future.

It would be great if we could simply predict the future, but we can't. At best we can narrow the range of things we have to consider possible, identify a set of alternate possibilities. We can even identify what parts of the unfolding future we might shape for outcomes we want. But people crave answers, and the temptation is powerful to draw overly-specific conclusions about the future or look for an overly-specific answer.

8. The tyranny of sunk investment

We have trouble, especially inside organizations, in seeing past the current systems we worked hard to put in place and pay for. It's tough to let go of the thing you've put so much money or effort into. While often this is literally a sunk investment of money, it can also be a psychic investment—something you've given so much effort and attention or "love" to, it's hard to let go. While we cling to such things, the world tends to change around us.

9. Parochialism – We instinctively use our own point of view to understand others. We live our lives inside our country, our culture, and our community. We bring one person's view to most things we do, and it's hard even to take the point of view of our own friend, child, or spouse, let alone understand someone on the other side of the world. But more and more things make it valuable or essential to try to understand the perspective of people with far different lives.

10. Force fitting to categories.

Exploring change, such as through environmental scanning requires you to establish some "buckets" – some topics or categories which you can use to collect information that suggest important forces and trends. A good practice is to use a set of open, broad categories such as STEEP—society, technology, economy, environment, politics. However, what we tend to do is discover a few things of a more specific nature, and then continue to find things that reinforce those. For example, when you have "discovered" the importance of nanotechnology, you are may decide to collect things on that topic, and you are sure to spot more about it as you read and research, and add to the category. It will gain in apparent importance, sometimes at the expense of another topic. You will see what you are set up to see, and could miss spotting other information and insights

11. Accepting the given framing:

Peanut butter goes with jelly, and the way those two are linked makes it hard for us to think of peanut butter and something else. The way something is framed and understood can block our thinking about it in a new way. Particular stakeholders on an issue are the most vocal and most published and they set the issue and discussion agendas in how they write and talk about a topic. Their framing of the topic can become the way everyone thinks and talks about it. The most politically-clever know how to set and shape the issues agenda on purpose to control the discussion.

It's particularly important when this is happening to step back from the discussion as it is being framed and argued, and look at the bigger picture. That may mean totally reframing how you look at it. That's where

1. breakthrough thoughts are likely to come from, and

2. you can move the discussion off the partisan and politicized basis.

12. Single-trend thinking can include jumping on a fad bandwagon, or being too interested in a specific force or trend in society. Our society

and our world are complexes of forces, trends, shaping factors, players, etc. No change has a single cause. No one trend defines our future. To understand what's happening and get a sense of the directions of change, you have to look at broad range of things, and avoid looking at everything through the single perspective of a big factor or trend. For example, in too many businesses, a commodity or product price is the factor that drowns out other factors that ultimately may be more important.

13. Asking the wrong question.

It is common to look at change from a routine point of view, asking how the usual factors are changing. This is a way of monitoring conditions, and regularly ask "how are we doing". We all do it. A company that asks "how can we grow our market share in the next three quarters?" Is asking the routine question they probably always ask. Their question assumes that conditions remain the same, no great change unfolds in the game space in which they play. But what if there's a big change, or challenge to the core of the business? A disruptive technology? Imagine the owners of Tower Records planning their next few years of strategy, ignoring the new player in the music game—download music sales and iTunes. Tower Records went bankrupt in 2006

John's blog can be accessed here:

http://foresightculture.com/13-mistakes-you-make-when-exploring-the-future

Book Review

Randomness and the engines of change
by Charles Brass

Human beings are clearly complex structures. How we came to be so complex has fascinated great minds for centuries. Even trying to decide the differences between complicated things (such as motor cars) and complex things (like animals and ecosytems) still causes controversy.

In his prize-winning 1986 book *The Blind Watchmaker* Richard Dawkins distinguishes between things which have been designed for a purpose (like a watch) and things, like mountain ranges, which though complicated are the result of long sequences of natural forces acting blindly.

In this book, John Mayfield sets out to explain (in a blessedly non-mathematical way) what it means to "design something with a purpose" and to examine various design mechanisms – including things designed by humans (like watches) and things not designed by humans (like, well, humans).

As the book's subtitle suggests, he focuses particularly on iterative design processes (i.e. evolutionary processes) and concludes that: "evolution is most meaningfully understood as computation" (p5), in other words as the processing of information. Mayfield describes his book as a search for the design principles: "which are shared by photosynthesis and the Sear's Tower, but do not operate on Mars" (p12).

He begins by looking at how the Earth differs from other planets in our solar system. There are lots of very unusual features of our solar system (from the rings of Saturn to sulphur volcanoes on Io, a moon of Jupiter) but what sets the Earth apart are: "I-Pods, blades of grass and Beethoven Symphonies – we know of no natural laws or processes which will create these without the intervention of a design intent" (p11).

Mayfield distinguishes between Type I objects (which don't require specific instructions to make them) and Type II objects (which do). Many Type I objects (such as mountain ranges and hurricanes) can be very complicated, but he argues it is the presence of Type II objects that distinguishes the Earth from everywhere else we currently know about.

As he says: "objects not requiring instructions have no purpose – they may be useful for something, but they are not made for something" (p38).

Most of his book, therefore, focuses on what we can learn about how Type II objects emerge and are maintained.

However, first he looks at the natural processes creating Type I objects. The laws of physics and chemistry mean that, so long as external energy is available, mixing 'stuff' together always creates new 'stuff'. This new 'stuff' then changes in response to the same laws of physics and chemistry. This is how, over aeons, mountain ranges develop.

For Mayfield there is a computational aspect to this process – an initial state is transformed, according to fixed rules, to a new state. However, creating Type II objects requires at least two more steps:

· being able to consistently repeat the transformation (ie self-replication)

· being able to evaluate the new state against some sort of design criteria.
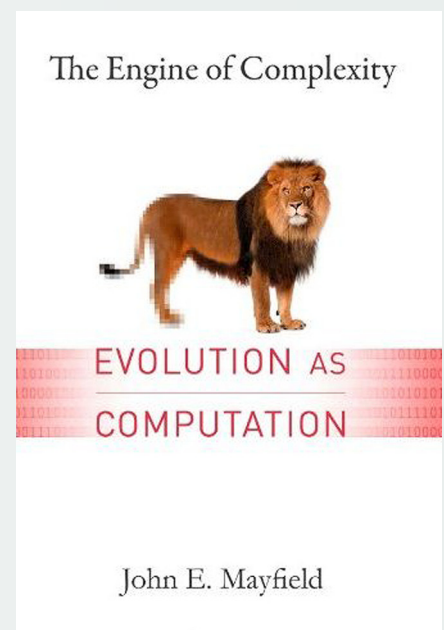
The Engine of Complexity:
Evolution as Computation
by John E. Mayfield

It is self-evident that human beings are capable of creating Type II objects, but it is also obvious that, long before we existed, natural biological processes could also create Type II objects (unless you believe humans were placed on Earth fully formed).

Mayfield notes in some detail that we humans have not yet been able to recreate the conditions that created the first biologically active chemicals, and hence there is still debate about how life itself actually emerged. He does, however, note that scientists have conclusively proved that: "matter can assemble itself from very simple components into useful structures" (p61), and hence even if we are not currently able to replicate the conditions under which Type II biological objects were first created, we are confident that the process could proceed without external intervention.

To demonstrate this, Mayfield has created (on page 65) an intriguingly designed set of nine physical objects which can self-assemble only in one unique way. The problem is that these objects are highly unusual and were able to be created only after great thought and much trial and error (viruses are a biological example of the same process).

Mayfield looks in detail at how the human immune system works. When something unwanted invades the body, the immune system creates huge numbers of different molecules (called antibodies). The organism then notices which antibodies successfully bind with (i.e. neutralise) the invader and then creates enough of these to eliminate the threat.

The human brain develops in just the same way. Newly created neurons connect with each other in myriad ways. Connection networks which are useful are strengthened, less useful ones decay. Mayfield also looks at cultural evolution (the evolution of what Richard Dawkins called 'memes') and sees similar processes in operation.

From this Mayfield concludes there need be no surprise that cells and ultimately multi-cellular organisms developed – atoms and molecules followed the rules of physics and chemistry to create new molecules, and those new molecules which were most useful in the world were maintained and those which were not were discarded.

However, there are still two questions to be answered (and this is the key reason for Mayfield's book). When humans create Type II objects we know where the design criteria come from – we think them up. Does this imply an intelligent mind behind the biological creation of Type II objects? Mayfield says not. Reproducibility and survivability in the world create their own assessment criteria: "[S]tructures that exist because they have survived selection always have a kind of purpose" (p116).

However, he still needs to explain how the biological diversity we see all around us arose. The laws of physics and chemistry are fixed. Start with a set of reagents in a fixed set of conditions and these laws always create the same outputs.

To explain this, Mayfield returns to the human immune system. I blithely noted earlier that, when attacked, the human body produces huge numbers of different antibodies. How are these different types of antibodies produced when the same DNA and RNA molecules are used to create them?

The answer turns out to be, literally, the engine of complexity. The process of replicating DNA and RNA is not perfect. Random errors occur because of natural variation (a fascinating example is given in the box below). Our bodies make billions of cells every day, all based on the 'rules' specified by our DNA and RNA. When an error occurs the result is usually detrimental. However, occasionally the error will produce an output which is beneficial, and hence we (or any other animal in which this process also occurs) will be better suited to our environment.

It is the introduction of randomness which completes the engine of complexity. Or, as Mayfield puts it: "the engine of complexity is a probabilistic computation that is naturally carried out by populations of replicating entities subject to repeated cumulative selection" (p116).

One way in which biological replication can be imperfect

The production of melanin is critical for the creation of skin pigmentation. In the absence of melanin, skin is white (and the animal is called an albino). Phosphorous is a key atom in the creation of melanin. Simplifying somewhat, in nature, most phosphorous atoms are of a very stable kind called P31. Occasionally, radioactive atoms of P32 enter our bodies. If one of these atoms decays at just the wrong time (just as melanin synthesis is about to begin) then the animal will be an albino.

FUTURISTS IN ACTION
Welcome to the Open Futures Library - openfutures.net
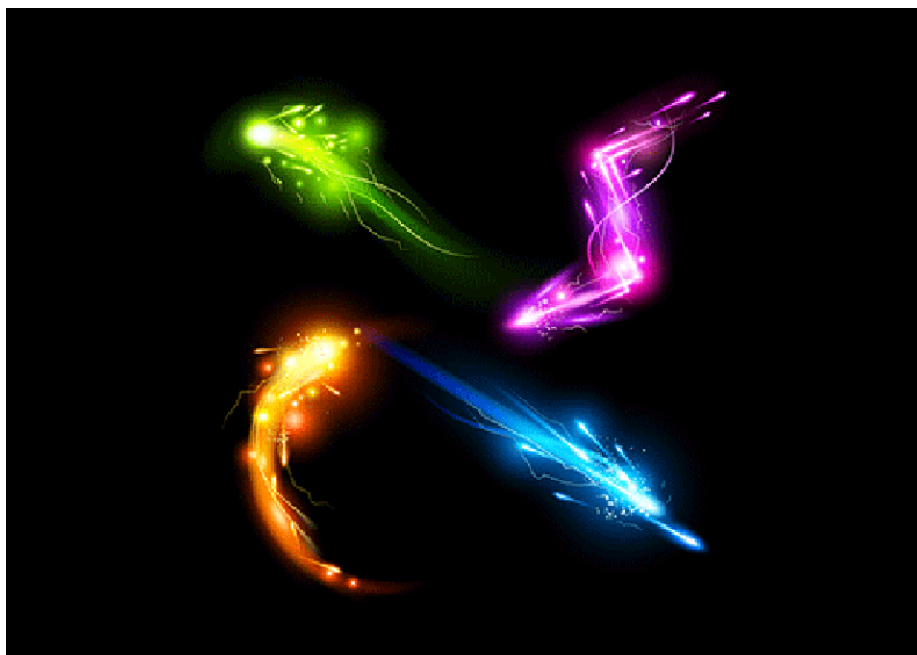
Every year hundreds of projects worldwide generate depictions of alternative futures in the form of scenarios, stories, artist's impressions, videos and so on and publish them online. These projects are generated by futurists, governments, corporations, designers and other research organizations; many are quite detailed and have had considerable investment in their development, others may be short but vivid insights into an alternative future.

In our foresight work with the Smart Services CRC we found these depictions useful as research tools and as a low-cost way of prompting discussions about the future – discussions which supported other methods we use. We found in conversation with other futurists and CRC partners that they too had collections of this kind of material. Finding and using these depictions (outside of a few regular publishers like Shell) can be difficult and time consuming especially if you have several topic areas to investigate. The Open Futures Library is our answer to this problem.

The Open Futures Library is a publicly-contributed, indexed, searchable collection of future scenarios and other images of the future. Our goal with the Open Futures Library is to provide a repository which indexes each depiction of the future by the kinds of criteria that makes it reusable. This will make searching for collections of scenarios

easier and provide a place to comment on the use and quality of the scenarios. To ease rights management issues, in most cases the database only stores the metadata and description of the scenario with a URL linking it to the canonical source of the scenario (usually a web page or PDF document online).

Such a collection of scenarios can help a group; for example, explore future by 'incasting' - a technique that involves imagining what it's like to live in diverse futures and what that means for their organisation. We believe that having a collection of scenarios that is being constantly updated by a community of users many provide additional benefits. Many of the scenarios produced each year are very well researched and developed by authorities in the field – the expertise and authority embedded in a collection of high-quality scenarios can provide legitimacy to discussions which otherwise might be difficult to have.

As an example: an organisation might be interested in transport, reviewing several sets of scenarios with a transport theme (our data has 13 so far) reveals common themes as well as differences in opinion on timeframes for the adoption of technologies or new practices. Some have a global focus others are focused on more specific topics e.g. rail. The collection provides a broad overview of current expert thinking and allows the organisation to consider how local

implementations may differ. This doesn't necessarily negate the organisation's need to undertake original futures work but may reveal where the really juicy topic areas are. The database has short film clips and images which can be used to convey aspects of a larger scenario you are working with, even though the two were developed independently. These are two small examples of how working with collections of scenarios can help. We expect that as more people use collections of scenarios many new methods will emerge.

The Open Futures Library is developed and hosted by the Services 2020 project of the Smart Services CRC in Australia. The Library will always stay open and free for public use. The Open Futures Library can be found at http://openfutures.net

The library has 4 basic functions: search, discover, contribute and improve. The Search page allows you to search for scenarios using important words or phrases. The 'Discover' page allows you to find scenarios by subject, time horizon, and publication date via an interactive timeline or a map. Drilling into the scenario from the search or discover page accesses the metadata stored on the database this includes:

- A brief description,
- Time horizon,
- Subject keywords,
- The URL link to the scenario,
- Location, creator, and publisher.

Registered users can also add comments to the existing scenarios. The Contribute and Improve functions are also for registered users and allow the users to add new scenarios or to improve existing scenarios by adding missing data. We have over 200 "seed" items in the database so far with more being added each week. We hope to add new functionality to support better conversations between users about the scenarios and groups of scenarios. At present we are focused on building the community and listening to what people want before we embark on any enhancements. We welcome suggestions for the library's future development or any other comments through the feedback page.

We invite you to register and join the Open Futures Library's growing community at http://openfutures.net

Signals in the Noise

IBM's predictions for next five years: everything will learn

IBM just unveiled its annual 5 in 5 — five predictions about technology innovations that IBM expects will change the way we work, live and play within the next five years.

This year's IBM 5 in 5 explores the idea that everything will learn — driven by a new era of cognitive systems where machines will learn, reason and engage with us in a more naturalized and personalized way. These innovations are beginning to emerge enabled by cloud computing, big data analytics and learning technologies all coming together, says IBM.

IBM suggests that "over time, these computers will get smarter and more customized through interactions with data, devices and people, helping us take on what may have been seen as unsolvable problems by using all the information that surrounds us and bringing the right insight or suggestion to our fingertips right when it's most needed. A new era in computing will lead to breakthroughs that will amplify human abilities, assist us in making good choices, look out for us and help us navigate our world in powerful new ways."

The predictions

The classroom will learn you: The classroom of the future will go from one-size fits all to learning about each student, providing them with a tailored curriculum from kindergarten to high school and on to employment. A system fueled by sophisticated analytics over the cloud will help teachers predict students who are most at risk, their roadblocks, and then suggest measures to help students overcome their challenges so they can master the skills critical to meeting their personal goals in life.

Buying local will beat online: Savvy retailers will use the immediacy of the physical store to create experiences that cannot be replicated by online-only retail. Watson-like technologies and augmented reality will allow physical stores to turn the tables and magnify the digital experience by bringing the web right to where the shopper can physically touch it.

Doctors will use your DNA to keep you well: Computers will help doctors understand how a tumor affects a patient down to the DNA level and present a collective set of medications shown to best attack the cancer, while reducing the time it takes to find the right treatment for a patient from weeks and months and days and even minutes.

A digital guardian will protect you online: Security systems will acquire a 360-degree view of an individual's data, devices and applications. By learning about you, your context and behavior on various devices, a digital guardian will spot patterns that could be precursors to a cyber attack or a stolen identity and intervene on your behalf while maintaining the privacy of your personal information.

The city will help you live in it: Learning systems, mobile devices and social engagement will create "sentient cities," understanding in real time how billions of events occur as computers learn to understand what people need, what they like, what they do, and how they move from place to place. Mobile devices and social engagement will enable citizens to strike up relationships with city leaders so their voices will be heard not only on election day, but every day.

Each of these predictions is supported by a brief video, which can be viewed at Ray Kurzweil's site:

http://www.kurzweilai.net/ibms-predictions-for-next-five-years-everything-will-learn