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

Volume 23, No. 3, June 2023

FUTURE NEWS

TO CONNECT, TO INFORM AND TO INSPIRE

IN THIS EDITION

futures foundation Australia • Ross House, 247 Flinders Lane, Melbourne 3000 • Phone: 03 9029 5787

WHAT DO YOU USE TO LOOK IN THE FUTURE?
TRENDS, DRIVING FORCES OR MAYBE ATTRACTORS?

by Daniel Egger

Dr. Daniel J. Egger is a researcher in the Quantum Applications Research & Software group in IBM Research – Zurich. His current research focuses on quantum information processing with super-conducting circuits, pulse-level control of quantum systems, and quantum algorithms.

You know the feeling. The media hypes a certain technology, telling us it will change everything. Then suddenly it is forgotten. But then a surprising event takes place, and the trend is back stronger than ever — plausible, and a social necessity.

Our society is defined by many elements of change. Sometimes we hear about events that drive change or a revolution for a new technology. Others search for "Black Swans" and/or explore the Technology Progressive reality with its Singularities. You might work with trends, and perhaps have already heard the term "Driving Forces." Let us now explore the key Types of Change.

VARIABLES

Our reality is made up of an incalculable number of varieties of individual, societal and technological changes. These small entities are completely fluid. Each day, new variables die and are born. Some stay isolated or inactive; others connect and become part of a larger shift. Reality is a soup of possibilities defined by its infinite elements and opportunities. It is also the base of what we define as truth. Over time, we create how we perceive reality. This interpretation of "what we believe we know" defines our decisions in the present, but also how we can imagine the future. So the objective is to constantly expand our perception of society, explore the unknown and broaden our view, driven by curiosity.

VECTORS

When variables from similar contexts start to move in a certain direction together, we call them vectors (or emerging trends, weak signals). They represent forming patterns that are hard to validate for their longer-term implications. Yet scanning for weak signals acts as an early-warning system and identifies issues that should be validated. Vectors are used in foresight using Horizon Scanning, but they are also commercially exploited in the creative practice of Cool Hunting — spotting of cultural trends — and explores fast-changing elements such as color, style and forms. Vectors may transform into critical trends, but we can only be certain if we follow up regularly.

TRENDS

If variables from increasingly heterogeneous contexts move in the same direction and get momentum, then we talk about Trends. Those can start in the past or present and represent a great pool of insights. Trends allow us to immerse ourselves in different contexts that we might

not have been aware of, and investigate relationships between the other variables and vectors. In general, they illustrate value shifts already begun with existing underlying past logics. Trends are not the final delivery of a foresight process, but more represent the starting point to navigate and question further.

Only if we understand what drives the trend, contextualize it and explore implications, will its potential for the organization unfold. But time pressures and resource restrictions often don't limit the process beyond high-level summaries. With thousands of organizations using the same "summarized" information, the strategic potential of trends is limited.

COUNTER-MOVEMENTS

A counter-movement is a measure opposed to any technological leap or social change. Whenever one social movement embraces the change, another group works against it. In general, there is a counter-movement to everything. The women's pro-choice movement is countered by the anti-abortion movement; the fast-paced society by Slow Education; the European culture of welcoming migrants is countered by PEGIDA. Any change creates a counter-reaction, and we have to explore how quickly it expands, and its relevance to our research.

STRUCTURAL CERTAINTIES

Also, though we cannot be certain about the future, we know about certain events. Structural Certainties represent mostly large scheduled international projects or happenings such as huge scientific projects, conventions or sporting events like the Olympic Games, which have a set date with an outcome that changes the status quo.

For example, CERN — referring to the particle accelerator — was certain to be built, even when it suffered delays. China has announced that it will build a super-supercollider, initiating construction around 2020. Both change the research agenda. By knowing about the new structures, the scientific community starts to undertake new experiments that drive the research agenda even before the implementation of the event occurs. Other Structural Certainties are related to large events of any subject matter. For example, hacking/security conventions like DEF CON or Black Hat keep pushing the limits of security and provoking what is possible, and where vulnerabilities exist. They force the development of new technological solutions.

DRIVING FORCES

Drivers, or Driving Forces, represent one of the key changes in the Portfolio of Changes. They are a combination of several trends, early signs, and events (shocks), and share a common characteristic — a momentum, moving together in a similar direction. They also represent structures with the highest probability of change.

We analyze Driving Forces by connecting different trend reports, understanding the implications of multiple events, causal layer analysis, or, for example, cross-impact analysis. In simpler terms, a process that connects several types of information/changes from different contexts.

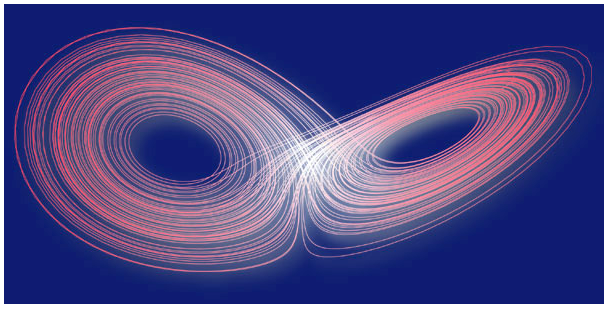
A snapshot example of such a Driving Force is #humanization. We can see people connect in new collaborative networks, freelancers and startups

striking out on their own, and a polarization of huge corporations with many smaller ones. Where the smaller organizations focus on contextualized value generation, larger ones create technological structures. At the same time, with the progress of AI and robotic research, we see that the automation of processes will liberate many individuals, enabling them to change and create different value.

Abilities that were common in the past will arise again, only differently, such as creativity, intuition, critical thinking, synthesizing and defining the right questions. We see increasing mental illness and pharmaceutical corporations are doing less research on new drugs for psychiatric medicine.[i] Mental illness, and especially depression, will challenge us, but a critical step for balancing this is the revitalization of communities, personal contact and support networks. Technology as Virtual Reality will give us access to new realities, to walk in the shoes of others, increasing our understanding and level of empathy.

Driving Forces are a bundle; a mix of changes that define a critical transformation, but they can also die, reduce speed, change their composition, or speed up suddenly. This is why the Portfolio of Changes cannot be static, but has to be part of a process of validation, integrated in the organizational strategic formulation and implementation process.

ATTRACTORS



John Quincy Stewart, an American astrophysicist, first introduced Attractors to social physics around 1947. He suggests the concept of "gravitational forces" that affect and attract a larger number of people. Today the logic has fundamental importance to finding large yet nested changes in our society. As we don't know when and if they will start moving and change our reality, they are part of the Possible Future.

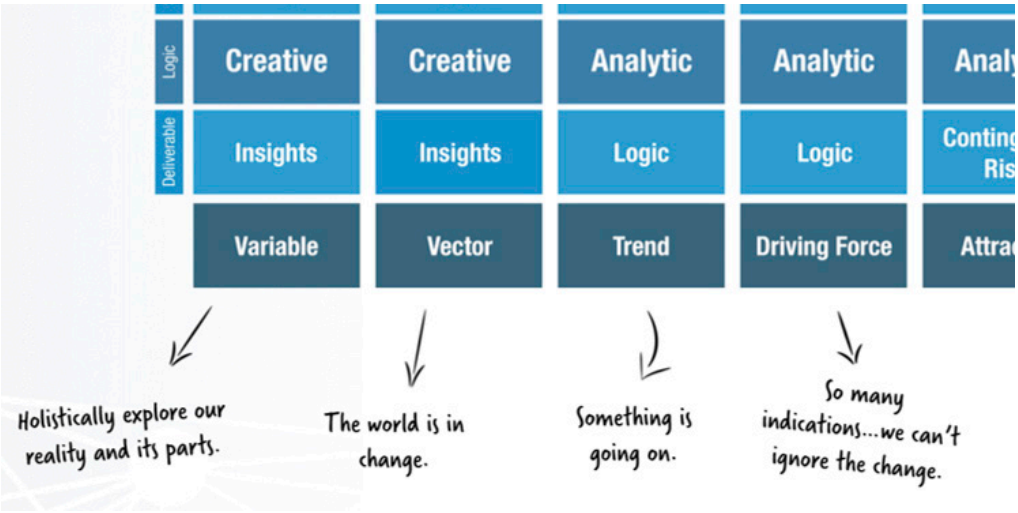
Attractors are a "gravitational force" that describes the accumulation of changes around a Key Topic. This can be a technology, a change in values, or events that took place. Attractors don't draw attention, but instead slowly accumulate or move…but this can change abruptly.

Such Attractors are, for example, food scarcity, depression, or Carbon Nanotubes, calling for entrepreneurs, scientists or networks to experiment and research until their action triggers movement. This can come from many different developments, such as a technological breakthrough, new commercial applications, an increasing community, or media attention.

A stimulus that crosses a threshold is enough to transform an Attractor into a "wildfire" or even a "Gray Swan," one of those "small changes that can make a difference, or so-called "tipping points." As Attractors build up slowly, the organization might argue that the transformation is already integrated into their strategy, or deny that the change exists. Interestingly, positive Black Swans are those that build up slowly, and if we are not exposed to them, opportunity passes.

Suddenly all the connected variables shift together, creating a strong momentum, and changing the rules of the game. In the case of the aforementioned Carbon Nanotubes, the tip would represent a technological breakthrough that allows mass production and economic feasibility not in around 20 years, but in 5. By doing so, superior technologies, from body modification to new materials, will become mainstream and create a new reality.

We might not foresee the "when," but we can increase our present awareness and preparedness for the changes. We don't know when they'll start to move, but when they do, dramatic changes will result.



Summary of the changes

FOR WHAT REASON ARE YOU EXPLORING THE FUTURE?

Before we explore the future and the present changes, we have to critically question the reasons why. Are you worried about possible shocks and risks that might challenge their business logic? Do you want to proactively shape the future reality? Is it a combination of the two?

All valid options. The decision of how much risk or opportunity to consider defines what types of information we utilize in our research, and what is part of the Portfolio of Changes.

Risk awareness follows an underlying resilience strategy, which focuses on mitigation of shock and stress, and an increased preparedness to act using emergency protocols or similar. The primary goal isn't new value generation, but increasing the level of readiness for Gray Swans or other disrupting events. The final delivery of a risk strategy is developing risk policies/protocols. If such strategy is set, the foresight process should explore Attractors more intensively than Drivers.

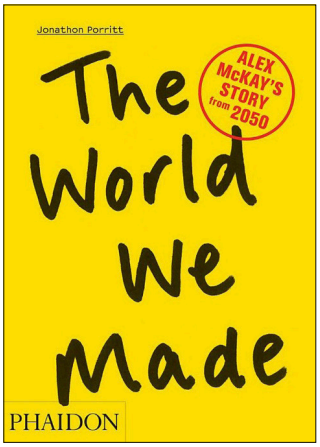
If the strategic choice is a focus on identifying new value opportunities and creating new offerings, then the process should prioritize Driving Forces. This supports a proactive identification of how the organization can adapt and explore new value for stakeholders. Yet you must not let Attractors out of your sight, as they might disrupt the path to the future, and with it, the opportunity of Value Generation.

It is critical that the organization defines where priorities lie. This decision contextualizes and prioritizes certain paths to the future.

Book Review

by Charles Brass – Chair, Futures Foundation

The World We Made
Jonathon Porritt



Jonathon Porritt

Our planet's environmental future is usually described in terms of doom and despair. But now, for the first time, The World We Made presents a credible, positive vision of our planet that is green, fair, connected and collaborative.

Part history, part personal memoir, The World We Made reveals how it is possible to reach a genuinely sustainable world by 2050; describing the key events, technological breakthroughs and lifestyle revolutions that will transform our planet.

Packed with images that bring to life this exciting, high-tech and human world, featuring futuristic photographs, graphics and hand-drawn sketches, The World We Made covers topics as wide-ranging as the 'energy internet' to slow travel airships; 3D printing to robotics; and personal genomics to urban agriculture – all grounded in cutting edge technological insights.

Providing all the tools and advice to prepare yourself for what is ahead, the book is essential reading for everyone interested in a positive future for our planet. All royalties will go to support the work of Forum for the Future, one of the world's leading sustainable development non-profits.

At the end of the 1990s some environmental commentators noted with disappointment how sustainability discourses tended to begin with an analysis of the current state of affairs only to jump immediately into a description of how the world ought to be. Missing in this value-driven view of sustainability was a sense of movement that could take us from our bleak present to a desired future. The situation today is somewhat different. Initiatives such as Transition Towns and academic debates around sustainability transitions are addressing precisely that sense of movement practically and theoretically, often aided by the field of future studies.

The World We Made is part of a burgeoning literature about environmental futures seeking to facilitate the identification of transition pathways. As compared to other studies and besides its undeniable value as a detailed description of a specific scenario, the book is of special interest for two reasons. The first is the way it conceives of a transition path as a sequence of interlinked, cascading events or 'shocks' rather than merely the result of purposeful action. The second is the way it avoids painting possible distant horizons with the broad brushstrokes of macroeconomic variables, technological trends, or tectonic geopolitical shifts that leave only the narrowest leeway to imagine the fine-grained texture of banal routines, fears, hopes and pleasures that are the essence of ordinary lives.

The narrative style of the book helps in conveying this sense of the quotidian. The book is a diary with the fictional memoirs of a future past, that is, the personal account of the everyday life of an individual born in 2000 – a school teacher named Alex living in Ashton Vale (a real place near Bristol in the UK) – recollecting how the world came to be the

way it is (in 2050) through a series of 50 short, thematic chapters or snapshots.

Tempered hope

The World We Made is explicitly written to bring hope to a field – future studies– often associated with bleak perspectives, by showing that sustainability is not necessarily about the renunciation of earthly pleasures, lower quality of life or limiting one's cultural and geographical horizons, and that the experience, the knowledge and the technologies (at least the basic versions) needed to begin making the world a more sustainable reality are already there. In the case of technologies, many are already being commercialised or existing as prototypes or in embryonic form. Drawing on a wide survey of current technological and social innovations, Porritt's argument is that the ferment for a different world is active and rising.

This sense of possibility is reinforced by contextualizing these technologies within daily life. And the result is a future that appears less of a foreign country –there is an air of familiarity in the material, sensuous and emotional textures of quotidian spaces, routines and relationships recreated in the book through photomontages. This optimistic tone is however tempered by constant allusions to a three-decade period of declining standards of living, mounting social, political, security and environmental crises and successive catastrophes that triggered cultural and political tipping points, creating the right market, cultural and political contexts for low-carbon innovations to dominate the technological landscape.

A political tipping point In Porritt's fictional account of a future many of the crises and events happening since the early 2000s are described as small but significant turning points in the way things are seen and done in one's personal life, in one's relations with others and with the environment, in politics and in the economy. What finally puts environmental degradation at the top of the political agenda, what becomes the political tipping point in this troubled unfolding of events, is what becomes known as the Great Famine, caused by the collapse of the food system and involving the death of more than 10 million people, as well as riots in the streets of more than 70 countries.

Occurring in 2025, this catastrophe is the outcome of the chance combination of six simultaneous crises (what is often referred to as a 'perfect storm'): climate change (a severe drought), energy prices (making fertilizers unaffordable for small farmers), speculation (large parts of grain production being under the direct control of speculators), meat consumption (up to 50% of world grain being consumed as animal fodder), biofuels (diverting agricultural uses of land), population (food demand and population growing faster than grain yields). In this dramatic context a fungus known as 'black stem rust' destroyed wheat harvests in Asia, Africa and the Middle East. Porritt's choice of a food-crisis to exemplify the major event that will trigger a political turning point is not random. The 'black stem rust', discovered in 1999 and named Ug99 by scientists, already exists and it is predicted to cause serious trouble in the near future –its

virulent return is believed to be simply a matter of time ('when' rather than 'if').

The choice of a famine is pertinent too for illustrating interdependencies between different systems, in this case the so-called 'water energy-food nexus'. Everyday life and its mobilities An interesting aspect of The World We Made is the way it showcases a stunningly wide range of little known technologies as well as social and cultural innovations that could change often the way we go about in our everyday lives in small but significant ways.

Topics covered range from water, food, energy, biotechnologies, health, the rich, and artificial intelligence, to nuclear power, biodiversity, the cooperative movement, manufacturing, cyber-terrorism, and religion. Although explicit discussion of transport technologies and practices is only a small part of the analysis, it is precisely this panoramic portrayal of work, leisure, shopping, meeting friends and relatives, all requiring some form of mobility, that enables the book to portray a vivid and nuanced picture of how different but not entirely alien mobile lives could look in the future.

In Porritt's analysis of a world in transition, the world has not come to a halt and mobility is still an integral part of Alex's life in 2050. The needs and pleasures of dealing with distance, however, are satisfied by different forms and combinations of physical and virtual mobility. People do move to other cities and countries in search of work, but less frequently. Some forms of 'local' mobility such as commuting or travel for shopping have been drastically reduced. Work is closer to home – Alex's school is a short walk from his house – food is often cultivated in urban orchards (in 2050 40% of food is produced in or around cities) and, in general, everything needed for daily life can be found within one kilometre.

The experience of distant places and communication with people is routinely mediated by screens animating many private and public spaces and there is less need to travel –in fact some people have given up holidays away from home and their experience of the world is completely screen-mediated. Companies offering virtual travel have become a successful business story and routinely enable enhanced experiences of place (known as virtual travel experiences or VITES) that sometimes can be more satisfactory than the 'real' experience (although what is real and digitally mediated has become indelibly blurred). Thus, although most life takes place in the neighbourhood, the outlook of the place and people's experiences of friendship, learning, work, and cooperating with other neighbourhoods in finding solutions to common challenges, are extensively cosmopolitan.

People move more slowly in daily life, but lead more fulfilling lives through face-to-face communication in the neighbourhood and with distant others digitally. Hence the world unfolding in the early decades of the 21st century is not one gradually retreating into tribal identities and conflicts as many feared in the 2000s. On the contrary, the growing number of threats and challenges experienced directly in one's

place of residence or witnessed through the media, from the mighty hurricane ravaging tropical cities to the decline of the humble bumble bee, nurture a cosmopolitan outlook that sparks and facilitates transnational collective action.

Obviously this is a book of fiction and the future scenario it presents is not by any means a prediction. Nonetheless it is designed to inspire. The extent to which it does so may be open to discussion. But in making its case, a virtue of the book is the way it showcases in a clear way and in a single text the everyday uses of a panoply of technologies and social innovations that, in combination, could facilitate different but still familiar and more sustainable worlds. This strong emphasis on technology is rare among environmentalists and certainly new in this specific author.

Although many of the technologies cited are currently known only to engineers and specialists and therefore the reader may find it difficult to assess whether the optimism in the argument is well-founded, Porritt does note that most of his assumptions about likely technological developments stay within what is currently feasible or expected to be reasonably possible in the near future. The book's argument is also premised on a number of assumptions about the nature, implications and chronological order of likely or possible events and processes. Seen from today's perspective, some of these seem far-fetched, such as the end of competitive shopping and status seeking, the conversion of the super-rich into philanthro-capitalists, or the main religions declaring it a sin to destroy the environment.

Porritt is aware that his book will come under criticism for some of these assumptions. At the same, however, he rightly notes that many existing initiatives aiming at sustainability go under the radar of mainstream media and most researchers and this is obscuring the real scope for change.

As noted earlier a virtue of this book is the way it conceives of transitions paths as significantly influenced by cascading set of crises and catastrophes. Being this a book aimed at inspiring hope, Porritt presumes that these events end up having benign consequences, especially the growth of a cosmopolitan conscience. But the set of interlinked catastrophes that many other thinkers and institutions have also predicted for the coming decades could also have less benign outcomes. To name but one example, there is also the possibility that the huge global catastrophes that he describes provide the perfect ground for the emergence of millennial sects seeking apocalypse. In that case and with biotechnologies becoming more available, one could suggest that the sarin gas attack on the Tokyo subway in 1995 by the Aum Shinrikyo sect could also provide a taste of the things to come.

Jonathon Porritt is an influential British environmentalist and writer. He has been advisor to many institutions on environmental matters, was co-founder of the Forum for the Future and has been president of the UK branch of the Friends of the Earth.

The book has been made into a play, which has been performed in England: https://www.rebootthefuture.org/the-world-we-made

FUTURISTS IN ACTION

SEEDS OF A BETTER FUTURE

by Andrew Curry

One of the tough parts of futures work is helping people step out of the present. The sheer weight of how we do things and think about things right here, right now, gets in the way of people imagining how things can change for the better.

Photo by Marco Verch/flickr. CC BY 2.0.

One method that I've used—and I'm very much standing on the shoulders of the futurists Wendy Schultz and Tanja Hichert here—is the idea of 'Seeds of Change'. The phrase was developed by the Good Anthropocene Project, which developed a Seed Bank as part of its work. Tanja and I presented on this at an Association of Professional Futurists' conference a while ago.

MAXIMISING DIFFERENCE

The Good Anthropocene project in turn built on Wendy Schultz' Manoa Scenarios method, which used weak signals or 'pockets of the future in the present' as its initial building block. The Manoa scenarios model, which is designed—Wendy's words—to "maximise difference", starts by placing a set of weak signals at the heart of a set of futures wheels, and the scenarios emerge from this process.

And a seed is defined like this (by the Good Anthropocene Project) as a small sign of a positive future:

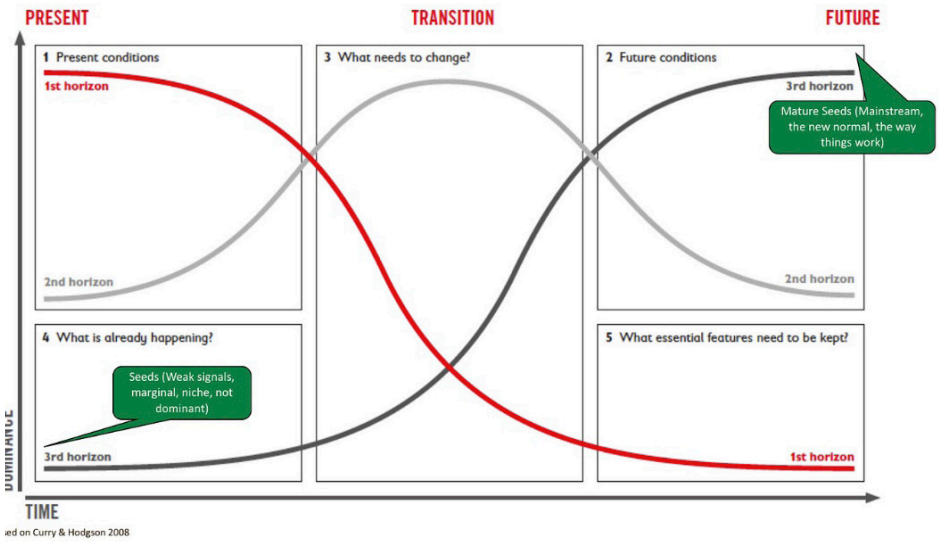
> *'Seeds are likely not widespread nor well-known. They can be social initiatives, new technologies, economic tools, or social-ecological projects, or organisations, movements or new ways of acting that appear to be contributing to the creation of a future that is just, prosperous, and sustainable.'*

INCREASING RESILIENCE

The Seeds of the Good Anthropocene project was designed to help communities in Southern Africa identify ways of increasing their resilience in the face of climate change. It combines a number of methods, including Wendy's Manoa method and three horizons, but its other innovation was to start the process not with a weak signal, emerging at the margins, but with the 'mature' version of that seed. What happens, in other words,

if that seed has grown in such a way that if has become mainstream. It needs to be grown into a tree, in other words.

In other words, at least for readers who're familiar with Three Horizons, it has moved from the bottom left of the Horizon 3 'visionary' S-curve to the top.



Or to put it another way: planners have started to add trees to urban landscapes, but not with any intent (these images are from a project about re-imagining Piccadilly Circus for Chatham House, animated by the Platform Group). What if we decide we're serious about trees?

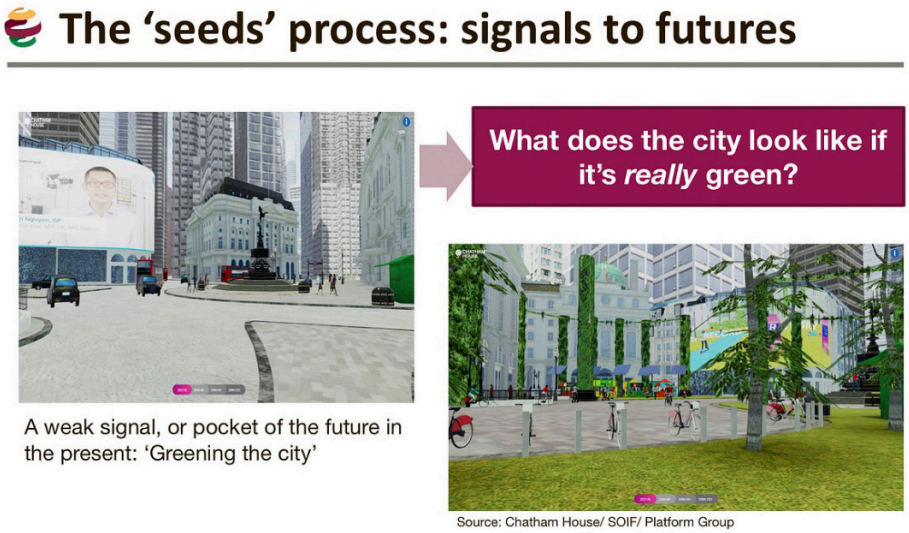


Image: Chatham House/Platform Group

CHANGE FOR THE BETTER

I used this approach in the Community Futures/Better Futures Wales method that SOIF piloted last year with Wales Community and Voluntary Action. We started with developing mature seeds, and it opened space in the (virtual) room for people to imagine worlds in which change for the better was possible.

Typically, you need to combine this with other techniques—both the Good Anthropocene (borrowing from Manoa) and the Better Futures Wales

project use Futures Wheels, if in slightly different ways. And although visioning is, I think, an essential component in helping to build agency, you also need to help people start somewhere rather than be left hanging in an imagined future. It's not coincidence that both projects used Three Horizons as a way to build a narrative about what to do in the 'entrepreneurial' Horizon 2.

THE QUESTION MATTERS

But it's also a reminder that the way you ask people about the future matters. Robert Jungk tells a story in his book Future Workshops (sadly out of print – but a copy is available to be borrowed from the futures foundation library) about a group of teenagers whose views on the future had seemed unremittingly gloomy when they were asked about them in school.

When he started his work with them, he found to his surprise that they were quite animated about possible futures. He asked them what had changed. Their answer: the school asked us about the future we expected, but you asked us about the future we wanted.

GROWING THE SEEDS

Anyway, the handbook for the Better Futures Wales project sets out these steps for building 'mature seeds', as well as connecting them to a whole community futures process:

Check your potential Seeds of Change against these simple statements:

- *A seed is anything that is innovative, already happens and points to a positive future, but is not well-known or widespread.*
- *A good seed would have people excited and inspire them to think of how their own community could change.*
- *It should be novel and not exist at scale in your community but should actually be possible.*
- *It should stretch the imagination and help the community dream beyond your existing conversations.*
- *It should energise or even excite the group when they discuss it, and they should feel comfortable using it at the start of the process.*

If your potential Seed of Change meets most of these criteria, re-write its description in the present tense, as if it already exists and has grown beyond a mere idea to being mainstream or commonplace. For instance, the seed of a single repair cafe has grown into a place where everything can be repaired, or the seed of a single community bus has become a free transport network! Writing the description about your Seed of Change in such a way makes it easier for participants to understand its impact.

Andrew Curry a director at the School of International Futures (soif.org.au).

Signals in the Noise

WHAT FUTURE SCIENCE WILL WE INVENT BY 2030?

by Jenna Daroczy

What technology trends might we see in Australia in 2030? Our leaders in future science platforms share their predictions for the next decade.

Imagine what our lives will be like by the end of the decade. Well, our leaders are doing exactly that. We're researching future science and technologies now for Australia in 2030.

Our science delivers a lot of exciting breakthroughs to make life better today. But we're also busy working behind-the-scenes on science that takes a bit longer to develop. Science that will significantly change what the future looks like.

We call these areas of cutting-edge research our Future Science Platforms (FSPs). This is because they will be the foundations of tomorrow's breakthroughs. We kicked off five new FSPs during 2021.

Our new Chief Scientist, Professor Bronwyn Fox, said the FSPs hold exciting insights into what life could look like.

"Harnessing science to solve our greatest challenges means that we can create a future that makes life better for everyone," Bronwyn said.

"We benefit from our deep, trusted partnerships with industry to inform our horizon scanning. This ensures we are at the forefront of future scientific developments, and solving seemingly impossible problems, to design new technologies for the benefit of Australia."

So, what do we think the future will hold? These are our five FSPs.

QUANTUM TECHNOLOGIES

Quantum physics explains the behaviour of the world at the smallest scale. It shows how it is possible to sense, isolate, and control individual quantum particles. This develops previously unattainable properties that we can build into new technologies.

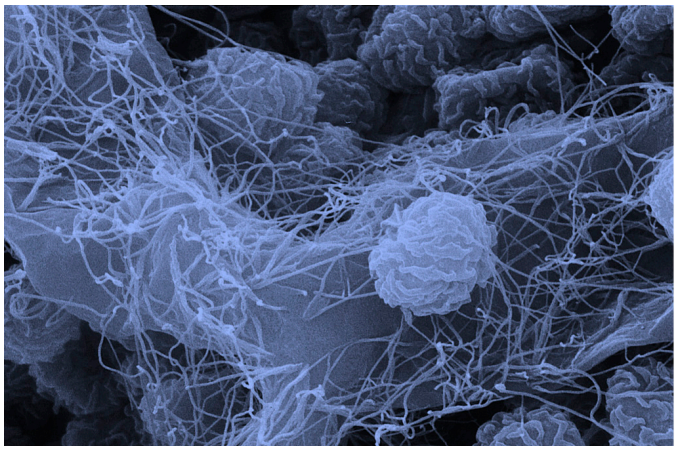
Quantum technologies are a major growth opportunity for Australia, forecast to bring in $4 billion in revenue and create 16,000 new jobs by 2040.

Dr Jim Rabeau leads our new Quantum Technologies program.

"Our focus is to grow our quantum capabilities and translate its research into solutions for real-world problems. These include materials discovery, precision healthcare, defence, and digital security and communications," Jim said.

"By combining our extensive manufacturing, digital, and quantum devices expertise, we have an opportunity to strengthen Australia's global position in the field."

MICROBIOMES



Microbiome FSP. Fungal hyphae (thread like structures), fungal spores, bacteria and actinobacteria growing on crop stubble. Image: CSIRO.

We will invest $15 million to harness the functionality of microorganisms to solve challenges. These include diet and gut health, plant and animal diseases, food safety and degradation of pollutants.

Dr Alan Richardson is the Chief Research Scientist in our Microbiomes for One System Health program. This team will develop our capabilities across agriculture, land-use and human health.

Signals in the Noise

WHAT FUTURE SCIENCE WILL WE INVENT BY 2030?

"Microorganisms hold huge potential because they are integral in the makeup of all plants and animals. And they are the key drivers of biological and environmental processes," Alan said.

"Our approach will reflect the interconnectivity of microbiomes across systems. It will identify new opportunities to manage the environment, transform food production, waste management, and plant, animal and human health."

AUTONOMOUS SENSORS

Dr Yulia Uvarova leads our Future Science Platform (FSP) Autonomous Sensors.

Sensors connect the physical world to digital systems, enabling collection, integration, and interpretation of information. They allow us to rapidly understand and predict the world around us.

But innovation progress is limited by how advanced our sensors are. For example, there are no sensors that can measure minerals trapped inside raw rock materials. Or detect pests in fruit accurately as they move along a conveyor belt.

Dr Yulia Uvarova leads our Autonomous Sensors Platform. This research will develop sensors that could be used in environmental monitoring, health monitoring, mining, agriculture and manufacturing. It will also advance engineering for autonomy.

"Advances in these areas require innovations in sensor technology. We need to sense with increasing accuracy, sensitivity, traceability, and resolution," Yulia said.

"In addition, with technology adapted for the uniquely Australian challenges of harsh environmental conditions and remote locations."

COLLABORATIVE INTELLIGENCE

What if humans and artificial intelligence came together to form a super team? What could they be capable of? This is an exciting new field of research called Collaborative Intelligence (CINTEL for short).

Dr Cecile Paris leads our $12 million CINTEL program, which aims to move beyond machines replacing people or automating parts of their jobs. Instead, it creates teams that maximise the benefits of both human and machine intelligence.

"Human intelligence is creative and adaptable, while machine intelligence is more specific and able to handle vast amount of data," Cecile said.

"We want to create technologies and pathways to bring these two different, but complementary, types of intelligence together. We can create genuine teams where humans and machines pass tasks back and forth, and work together to achieve a common goal."

Cecile said collaborative intelligence moves beyond the idea of machines replacing people or even just 'keeping people in the loop'.

"Instead it aims to unlock completely new capability by creating teams that maximise the benefits of both types of intelligence. This is the next scientific frontier of digital transformation," she said.

VALUING SUSTAINABILITY

Growing consumer and investor interest in sustainability is starting to drive demand for measures and indicators of diverse social and environmental outcomes.

A lot of attention is (rightly) on reducing greenhouse gas emissions and transitioning industries and regions to a low carbon future. However, ensuring sustainable outcomes for biodiversity, regional communities,

Indigenous livelihoods and cultures – and many other aspects that society values – remains a big challenge.

Dr Peat Leith is leading our Valuing Sustainability Future Science Platform.

“A new generation of analysis and insight is needed. Markets are emerging for sustainability outcomes and these can be a powerful force in countering some troubling trends,” Peat said.

“For example, there’s growing interest in indicators that demonstrate social and environmental outcomes. One example is ‘premium’ carbon credits, which are increasingly defined by co-benefits, from biodiversity to economic and cultural benefits for Indigenous communities.”

There are lots of different ways that innovation – such as the development of indicators of sustainability – can drive change. How these get embedded in market and land management decisions will be critical to whether and how fast we are able to drive sustainability transitions.

“The Valuing Sustainability Future Science Platform is about driving sustainability decision-making through building our ability better to attribute change to practice, to track progress, and to embed these within markets and decision-making,” Peat said.

This is part of a regular blog series produced by scientists at the CSIRO: https://blog.csiro.au/future-science-australia/

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