

Melbourne Sustainable Society Institute



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Resilience in the face of sustainability crises: In innovation the problem or the answer?

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My guess would be that some of you here tonight are sick and tired of hearing how innovation will save the planet. Others may have been drawn here by a glimpse of hope and optimism that the word innovation tends to evoke.

I hope that you won't be disappointed, but I am not going to give a definitive answer to the question raised in the title of the talk—to my PhD students in the audience, please don't repeat this. The point I do want to raise in tonight's oration is that we need to reconsider how we think about and practice innovation in light of the major sustainability challenges that we are facing.

Having arrived at MSSI a little bit less than two years ago I must admit I have witnessed and become affected by a fair share of eco-anxiety. And surely, federal government policy in Australia has not offered great relief. Amidst all of MSSI's science-based idealism, healthy scepticism and critical hopefulness, it brought back some of the values I held dearly at the start of my academic career—in chemical engineering.

In my transition to the social sciences I have forgotten most of the engineering knowledge and know-how but kept a deep respect for how the engineering sciences maintain an intellectual pragmatism—thought as an instrument or tool for problem solving and action.

MSSI's mission is not just about understanding sustainability challenges, it is equally—and perhaps even more so—about addressing these challenges. This dual role requires indeed a fair share of pragmatism. It is however a pragmatism that goes beyond simply instrumentalism. It is a pragmatism that requires careful reflexivity on the solutions to sustainability that are suggested. Sustainable development is after all, a challenge that consists of many interconnected moving parts.

Reflecting on my former life, as an innovation professor at Lund University, Sweden, it strikes me that the 'why' question was hardly raised. 'Why innovation?'

Rather, in tune with David Bowie's early master piece 'Changes' we are supposed to turn and face the change... accept the challenge, look for the new opportunities that always come with change and then create some awesome solutions and plans to move ahead. But is innovation and change really always good? Or have we started to fetishise the novelty in innovation at the expense of its purpose?

Growing up as a child from the 80s I remember well the shiny promises of new technology brought about at the start of the Digital Revolution and the Information Age. At that time, computers achieved semi-ubiquity as they made their way into schools, homes, business. Video games, electronic music and robots all fuelled what became the zeitgeist of the 1980s. The term 'futuristic' had a positive ring to it and few people talked about future-proofing our societies or how to build resilient cities. Even though there was a growing concern with runaway technology development, especially in the aftermath of the Chernobyl disaster, the 1980s and also the 1990s can be characterised as a period of great technological optimism.

In sync with the techno-optimism of the 80s and 90s, we also saw the rise of the 'New' Knowledge Economy. In recognising the fundamental importance of knowledge and learning in economic performance and development, education was propelled as a basic universal right and the higher education system experienced a transition from elite to mass form. This had a profound impact on my personal life course.

Whereas my father followed in the tracks of his dad and started work life in the coal mines in Dutch Limburg, I was so fortunate to be able to go to university—with financial support from government— and became the first academic in my family and experienced a fair degree of social and spatial mobility.

I am keen to retain this sense of optimism and the 'economics of hope' that follows from this modern history of innovation, scientific and technological advancement during the past two to three decades. And it is delightful to see that also the economics discipline has acknowledged the fundamental importance of knowledge and technology for growth and development with the 2018 Nobel Prize in Economics going to Paul Romer.

However, hindsight should not be mistaken for foresight. It is like the old joke, beautifully captured in the 1990s French movie La Haine (The hate) about a guy who, falling from a tall building, repeats to himself, "So far so good... so far so good". Until you hit the ground, the fall can be okay.

But while modernity has pushed humankind not just to live in the future but to actively shape its course through innovation, science and technology, it has, at the same time, created a risk society, as asserted by sociologists like Ulrich Beck and Anthony Giddens and acknowledged as a key point of departure in resilience thinking and practice. We are currently facing environmental and social risks that are a predominant product, not just an unpleasant, manageable side-effect of industrial society.

It's in this context I would like to use tonight's oration to question the purpose and direction of innovation. We're all supposed to be innovative now, with 'innovation' the buzz-word that future-proofs our society. But what if we're getting innovation all wrong?

In December 2015, the former Prime Minister of Australia, Malcolm Turnbull unveiled the much anticipated 'innovation statement' which sought to move the Australian economy beyond dependence on natural resource extraction. The statement was a response to a growing awareness that the country cannot continue to rely on digging up and exporting its natural resources for its future prosperity, especially if these resources contain significant amounts of carbon. Instead, the Prime Minister suggested Australia should transition from a mining boom to an ideas boom and engage with the opportunities provided by the knowledge economy.

The general response to the PM's plan was lukewarm at best and antagonistic at worst. Economists experts couldn't see the point of all this faddish talk about the knowledge economy as Australia has been experiencing 25 years of uninterrupted growth so there is surely no need to change a winning strategy of laissez-faire policy. The general public didn't seem too impressed either as many kept a healthy scepticism regarding the avalanche of innovation that the prime minister had in mind.

And it seems that the economists did not draw the short end of the stick. With the replacement of Malcolm Turnbull by Scott Morrisson three months ago, innovation seems to have disappeared completely off the government's radar. To the consternation of the tech and start-up sectors, the Prime Minister has dumped innovation from his cabinet, with the portfolio abolished entirely as part of his new ministerial line up. Does this mean the Australian economy has become so innovative, it does not require any more attention from government?

Unfortunately not.

Despite Malcolm Turnbull's vision in the Innovation Statement for Australia to be counted within the top tier of innovation nations, known and respected for its excellence in science, research and commercialisation, Australia ranked a lowly 76th in terms of innovation efficiency, according to the 2017 Global Innovation Index—an index that provides a ranking of nations in terms of their aggregate innovation performance.

But there are more sobering statistics on the Australian Innovation System. Australia is rock-bottom in the OECD 2017 Science, Technology and Industry scoreboard on 'Businesses collaborating on innovation with higher education or research institutions'. Similarly, the country finds itself in the

lower quarters for 'Businesses collaborating on innovation with suppliers and clients' or for 'Businesses engaged in international collaboration for innovation'.

This poor performance in collaboration is a key explanation for Australia's failing innovation efficiency. On the input side of the equation there is a lot of valuable knowledge and research produced, not the least in places like Melbourne with a suite of universities, hospitals and research organisations. However, it does not generate similar levels of output measured as new or improved products, products and services compared to other countries.

Translating knowledge to innovation requires extensive levels and degrees of collaboration, particularly across sectors. What the stats are telling us is that the Australian innovation system has a problem because it collaborates poorly across the board—at least compared to countries that are considered to be innovation leaders like the Nordics, the Netherlands but also many Asian countries.

The single most popular innovation policy instrument used in Australia, R&D rebates, is not designed to change much in this. It fails to situate and recognise innovation for what it really is—collective and not individual action. This is the 'change of culture' that Australia's innovation system needs to paraphrase the Chair of the Board for Innovation and Science Australia, Bill Ferris, during the launch of the latest national innovation strategy last year.

But while it may be easy to point to the need for more collaboration, the real challenge lies in how to achieve this.

Based on my research on what makes cities and regions innovative, back in Northern Europe, I suggest we start looking for a fundamentally different notion of innovation. Not one that is framed exclusively in economic or technological terms. Not one that is only cognisant of the financial return on investment or one where novelty or excellence overrides a proper assessment of what is useful.

As very powerfully conveyed by a near-future visitor to Melbourne, Mariana Mazzucato, professor and thought leader in the economics of innovation from UCL, we need to better acknowledge the value of innovation. Not for its exchange value, but for its use value.

To take innovation beyond a buzz-word or a techno-fix, we should acknowledge that it fundamentally concerns collectively solving problems as a society, with solutions that are relevant to all of society—not just to its economies.

In Australia and many places around the world, still, the key arguments for innovation are largely framed in economic terms. 'Innovation keeps us competitive. It keeps us at the cutting edge. It creates jobs.' Similarly, my former home region Skane, in Southern Sweden, has a formal development strategy to become the most innovative region in Europe, my former home town in the Netherlands, Eindhoven praises itself for being the most innovative city in the world while Plan Melbourne is positioning the metropolitan as Australia's pre-eminent knowledge economy driving innovation. But to what purpose?

Yet, despite becoming increasingly knowledge-intensive, our innovation-fuelled economies are facing some intractable sustainability challenges. Social polarisation is deepening even in cities and regions that rank high on liveability and innovation indices. We struggle to stay within a safe climate envelope despite (or even because of) technological advances.

On that note, let us have a look at the 'dark side' of innovation. Is there something to learn about 'how to innovate well' by scrutinising some of its less glossy, more controversial examples?

Take for example biotechnology, and particularly genetic engineering. Arguments that humankind is foolishly 'playing God' have been common ever since research breakthroughs in the late 1970s. Still, the

potential environmental benefits of greater use of genetic engineering have excited researchers and entrepreneurs from the technology's earliest days. Its advocates argue that accelerated use of genetic engineering offers the only hope of feeding, clothing and housing the growing global population.

Sceptics say the financial incentives driving agribusiness leaders like Monsanto continually push all types of biotechnology toward an industrial model of agriculture that is too energy intensive, wasteful of water and dependent on chemicals. But if confidence has grown as the years pass without any biological Chernobyls, doubts have persisted about the long-term health effects from engineered plants and animals. More recently, security experts have begun to fret that terrorists could engineer and release novel viruses, bacteria or fungi.

What sceptics, at a more general level point at, is that innovation may come with associated risks and unintended consequences. This is inherent to innovation being a fundamentally uncertain and creative process of novelty creation. Picking back up on the risk society these mentioned earlier, some innovations may impose unpredictable costs on society, and their transformative nature may render it difficult to anticipate their overall effect once diffused.

To take a final example from close to home. The Smart City. Despite its promethean promises to make our cities more sustainable, resilient and liveable, the idea that increased use of sensors and big data improve our urban systems of provision is facing increasing opposition by urban dwellers. Instead of viewing smart city technology as a means to improving urban life, fear over loss of privacy and the prospect of a surveillance society have become increasingly prevalent. As a result of such popular resistance, various cities have been forced to scrap or radically rethink their Smart City Strategies.

Barcelona, for instance, has gained a reputation as one of the world's top smart cities. However, many of the gadgets no longer work properly. The smart streetlights on the Passatge de Mas de Roda, which were put in place in 2011 to improve energy efficiency by detecting human movement, noise and climatic conditions, later fell into disrepair. Equally, while the Barcelona Innovation District @22 is seen as a global role-model, the Barcelona metropolitan region is falling rapidly into mediocracy on the European Innovation Scoreboard.

It seems that also in other domains, such as the increased automation and roboticisation of health-care services, driverless vehicles and artificial intelligence, innovative runs the risk of turning into a misnomer. What these examples have in common is that what is branded as 'innovative' has turned innovation into solutions looking for a problem, rather than the other way around.

A key response to the looming threat of delegitimising innovation due to its unforeseen and unethical dark sides has been the rise of Responsible Research and Innovation (RRI), notably in Europe.

Responsible Research and Innovation seeks to give greater control over the direction of research, technology development and innovation to a broader group of stakeholders, most notably 'the public' not just as citizen-scientists but as knowledgeable citizens or users. It is integral to Horizon 2020—the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over seven years—through a set of responsibility criteria that research proposals are expected to follow. One of the shortcomings of RRI is that it is largely procedural and it remains to be seen how its design principles are being implemented.

A similar sympathetic critique can be made about EUs turn towards mission-oriented science, technology and innovation policy, another key characteristic of Horizon 2020. Rather than assuming that all innovation is desirable it seeks to warrant greater explicit attention for the direction by stating ex-ante the societal problems that require to be solved. As laudable as this may appear in principle, its delivery ultimately depends on which voices are asked to state the problems.

The EU approach to innovation policy and funding put an emphasis on societal purpose to a degree that is not mirrored in Australian research and innovation policy. Still, also the EU remains wedded to a narrowly conceived notion of technology-centered, market-based innovation. Instead, I think we need to have an even broader understanding of what innovation really is.

Problem-solving not at the mercy of talented scientists and heroic entrepreneurs but a collective problem-solving that happens in and across all sectors of society. Even though there is no universal, one-size-fits-all strategy, innovation will always be a messy process of trial and error. Invariably we need to combine scientific and technological solutions with expertise from the social sciences and humanities, and to that mix we need to add real-world lessons from practice-based knowledge and experimentation. Beware of anyone promising swift results!

Consider the extraordinary success of wind power in Denmark, a small country which is a world leader on renewable energy. Denmark was an early mover in acting on the 1970s oil crisis and acknowledging—not ignoring—warnings of climate change. The early development of wind turbines blended scientific expertise with carpenter knowledge, and with farmers and grassroot environmental organisations involved too. New forms of partnerships were trialled between the private sector, government, universities and civil society organisations that led to so-called Wind Meetings, fora for knowledge exchange and the establishment of collective Test and Certification Centres. The Danish government acted as an entrepreneurial state which actively contributed to creating a market for wind energy through investment subsidies. Overall, the Danes took an approach of being resilient in a crisis, and pursuing diversity of knowledge and cross-sector collaboration. It has paid off big-time for the Danes.

Somewhat similarly there is the German case of solar photovoltaics. In part this is a tale of 'Vorsprung Durch Teknik' (technology-based leadership) based on continuous and significant public and private investment in Research and Development as well as close collaborations between research organisations, manufacturers and equipment suppliers. But this technological leadership cannot explain Germany's success alone. The German solar feed-in tariff triggered an unprecedented phase of market expansion and enabled the large-scale mobilisation of private investment for the production and installation of solar photovoltaic systems.

What few people seem to know however is that the German national feed-in tariff originated out of local experiments to create a market for solar energy. Prior to the year 2000, development and deployment of PV technologies in Germany were not driven by national feed-in tariffs but a mix of direct R&D funding, some smaller local initiatives and two large demonstration programs, the 1000 and the 100 000 Roofs Program. Subsequent policy experimentation within local arrangements between grassroot solar initiatives, local politicians and local utilities resulted in the introduction of cost-covering payment schemes in numerous municipalities, mainly in Southern Germany. These local arrangements were effectively municipal predecessors of what later become a nation-wide feed-in tariff.

What both examples show is that successful development in renewable energy technology both requires innovation and experimentation in hardware—the technology—and software—regulation, collaboration and institutional and behavioural change. But what I really want to draw attention to is that in both examples, innovation originated in profoundly bottom-up ways through local collaborations and networks across sectors.

While it may be tempting to look at both countries for policy lessons for Australia's energy transition, there is a risk of rationalising after the fact. It recognises insufficiently the deeply uncertain process of innovation that were present at the start of Denmark and Germany's renewable energy success stories.

Strictly speaking, most innovation fails, and it fails big-time. According to research at the University of Toronto, 30 000 new consumer products are launched annually, 95 per cent of them fail. As a rule of thumb, the success rate of an innovation project is about 10 per cent. And the more radical an innovation is, the lower its success rate.

This shouldn't surprise us—innovation is a risky business that involves a great deal of uncertainty made up of technical, market, social, political and other factors. That is why we have patents that seek to incentivise and protect innovators. Still, its fundamental uncertainty and serendipity is not really acknowledged in how we organise for innovation.

Often, the usual investment logics prevail—what is the expected return on investment, how can we reduce risk and costs, what are the expected outcomes? At this university we often mention innovation as part of commercial engagement rather than community engagement.

In contrast I find it very telling how in Sweden, the national innovation agency—VINNOVA—was a champion for the world's first Museum of Failed Innovation. Having worked with this agency for over ten years, I am truly impressed by their willingness to accept failure and to share the lessons learned from it. And at the same time, Sweden is one of the leading nations in the world when it comes to innovation.

Being such a risky and uncertain endeavour requires trust between partners, a high level of transparency and a willingness to share and collaborate for good and for bad. It requires often tough and honest conversations. This is why the local scale is so important for innovation. But there is also something else going on. Innovation generates significant positive externalities. Even if an innovation strictly speaking fails, on aggregate it generates knowledge spill overs that strengthen the innovation milieu and characterises those cities and regions that are highly innovative. This is for example beautifully documented in the ethnographic work on Silicon Valley by Anne-Lee Saxenian and very aptly described by leading economic geographer Michael Storper as untraded interdependencies.

This emphasis on innovation as local, bottom up collaborative problem solving brings cities and regions obviously into the limelight. And, not the least in Australia, many cities are running ahead of their states and federal government in addressing sustainability challenges, particularly climate change.

Here in Melbourne, one of the most significant innovations to grow resilience in the face of climate change is the development of an urban forest. This is one of the flagship actions in the Resilient Melbourne Strategy. The urban forest comprises all trees, shrubs and other vegetation (eg grasses, herbs, and fungi) growing on public and private land in metropolitan Melbourne. This includes vegetation within parks, reserves and private gardens, along railways, waterways, main roads and local streets, and on other green infrastructures such as green walls and roofs. An urban forest provides health, infrastructure and amenity benefits to Melbourne's rapidly expanding population and contribute to the city's resilience through improvement of sustainability, liveability and community wellbeing and, not the least, its biodiversity.

Using state-of-the-art geo-spatial technology, Resilient Melbourne is developing the evidence base for metropolitan Melbourne's urban forest in terms of mapping, data analysis and biodiversity indicator modelling. In the past, the various councils place different emphasis on the urban forest components under their remit leading to considerable fragmentation and lack of coordination. With an explicit focus on metropolitan Melbourne, the strategy is bringing together many stakeholder organisations from across Melbourne. These include the 32 local governments, as well as Victorian Government departments and statutory agencies, landowners, land managers, companies, financial organisations

and community representatives. This wide group of stakeholders is convened to co-design solutions to maintain and develop metropolitan Melbourne's urban forest by increasing canopy cover and improving other aspects in the ecological sphere. Equally, the strategy seeks to explore innovative finance solutions.

Our research into the strategy demonstrates the challenge of combining citizen engagement with large corporates, elite universities, and governments which have a tendency to operate in silos. It shows also how significant innovation may potentially fly under the radar. Albeit not branded as innovation, Melbourne's urban forest is a very striking example of a nature-based solution to climate change. It addresses 'real' problems and draws on locally available capabilities distributed across a set of diverse organisations. That is why it needs cross-sector partnerships to make the innovation work.

Experimentation within these cross-sector partnerships is not just a success-story. While new and successful collaborations are forged, there are at the same time numerous constraints, risks and conflicts that are identified and negotiated in the course of the development and implementation of the strategy. At the heart of innovation projects like these, are processes of democratic deliberation that involve contestation and conflict resolution, consensus-building and coordination.

Whether innovation will be part of the problem or part of the solution in building resilience to sustainability challenges will ultimately depend on its ability to acknowledge and deepen the generative power in democratic societies for deliberative problem-solving. This is not about bringing innovation to a city or to a region but it is about discovering and developing place-based innovation involving all relevant stakeholders to a problem—not just those most knowledgeable or resourceful.

This is why I am excited working with Resilient Melbourne. It is perhaps not recognised as innovation understood the conventional way but it clearly showcases how innovation really is about being experimental, entrepreneurial and collaborative in process. It is by leveraging its networks and partnerships with university, private sector and civil society around issues that concern people, that cities and local governments demonstrate leadership and innovation. This requires humility to trial solutions with no guarantee of success.

Bumping innovation off its pedestal opens up for a greater appreciation of diversity in skills, knowledge, ideas and experiences that matter for collective problem solving and also empowers more people to see themselves as innovators in an age where many people feel powerless against the 'systems' that be. It means broadening up towards also considering indigenous knowledge and perspective not because that is considered fairer but because it enables best social thought. Innovation can be at once creative, mundane and conflictual. It happens by and between all people including you.

This brings me to a final example and one that speaks to one of the most significant sustainability challenges that Melbourne is facing. It's extreme car-centredness. It is encouraging and courageous of Resilient Melbourne to have selected the expansion and improvement of a metropolitan cycling network as one of Resilient Melbourne's flagships. Getting Melburnians out of their cars and onto their bikes is taking a lot of people of out of comfort zones.

By way of experiment I exposed myself and my family with three young children to the constraint of living in Melbourne without owning a car. It did not take long before we experienced the first challenges and tribulations in terms of how to do groceries, how to get to school when it is over 40 degrees or how to stay in touch with friends that don't live on a North-South axis of where you live. Also we experienced as avid cyclists how extremely hostile the roads in Melbourne can be for anything other than cars. It surely isn't easy but ultimately we managed to find our ways around most of these challenges.

Sustainability problems are typically wicked problems. They involve many stakeholders with different values and priorities and are difficult to come to grips with as the problem changes with every attempt to address it. In short, they cannot be solved—they can only be tamed. Deliberation across many stakeholders is therefore key. Such deliberation is however under threat as socio-economic and political polarisation is on the rise.

Recent work by economic geographer Andres Rodriguez Pose at the London School of Economics has called attention for the 'geographies of discontent' and the ways in which 'the places that don't matter' have started to take revenge in an unmistakably democratic way—not by deliberation but via the ballot-box. His work has shown a remarkable overlap between voting patterns for populist parties both on the right and left of the political spectrum and relative underperformance in terms of socio-economic development. He provides convincing empirical evidence that uneven territorial development as a result of concentrating public and private investment in economic centres, in part justified to maximise output by benefitting from the dynamism, innovation and agglomeration advantages of the big cities, has started to create a backlash. It is resulting not only in growing socio-economic inequality but, increasingly so, in political polarisation and antagonism between the places that matter and those that don't.

Getting innovation right to improve resilience is therefore important for all places—be it in a context of staggering growth and dynamism in places like Melbourne but equally it is critical for places in Regional Australia like the Latrobe Valley that are facing the potential loss of major industry as we sooner rather than later transition to a low-carbon economy.

Let me now conclude by summarising the key points of this oration.

We run the risk of treating innovation as a one-off event, a eureka moment of genius by a heroic innovator or entrepreneur. That is still the stereotype that prevails in most narratives about innovation. Especially in the face of the wicked problems that constitute our sustainability challenges, it is rather a process of continuous and collective learning. The challenge that we are facing is how to monitor and capture the value of these learning processes. There is an urgent need to develop and implement better metrics to measure innovation in Australia within all kinds of organisations, be it public or private.

Similarly we need to lift our game when it comes to organising for innovation. Innovation for sustainability requires knowledge partnerships that are transformative not transactional. Innovation for sustainability in Australia will be a challenge because it is a long-term endeavour that cuts across many sectors.

Thirdly we need to better acknowledge the existing capabilities that this country has for innovation. There is a lot of local innovation happening which we fail to recognise both in what we call regional and urban Australia. There are more than enough sustainability crises coming at us that will require collective problem solving. Being resilient means being adaptive—learning-by-doing and doing-by-learning. Even though we can't afford to get this wrong, we will undoubtedly make many mistakes along the way. But to conclude with the words of Yoda, "The greatest teacher, failure is".

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About MSSI

MSSI facilitates interdisciplinary sustainability research across faculties and centres at the University of Melbourne, and promotes research in a way that maximises engagement and impact. MSSI emphasises the contribution of the social sciences and humanities to understanding and addressing sustainability and resilience challenges.