

Innovation at Watercare Services



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An Age of Complexity

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We are in age of scarcity and complexity. Macro-scale events such as the Covid-19 pandemic have created conditions of funding and resource scarcity. Uncertainty due to climate change will be a complex challenge for the foreseeable future. Conditions of scarcity are the ideal breeding ground for creativity, more so than abundance.

Facing these challenges requires more experimental modes of behaviour and management, via a culture of curiosity. A culture that accepts ambiguity, creates spaces for more interactive communication and allows for emergence of patterns and opportunities. **An innovation-oriented organisation is more able to shape its strategic direction in deep uncertainty and conditions of scarcity than a conventional organisation that fails to adapt.**



“Needs-driven innovation is not unimportant, but there are steps above it. Values-driven innovation. At higher strategic levels given complexity and deep uncertainty - where we don't know what we don't know. Rapid experimentation and feedback unlocks a new dimension of problem solving.”

- Apra



“Rapid experimentation and feedback unlocks a new dimension of problem solving.”

Watercare Services Ltd, Auckland, New Zealand

Watercare provides water and wastewater services to the Auckland region of New Zealand, spanning Pukekohe in the south to Wellsford in the north; and with a combined \$10b worth of assets. These include 12 dams, 15 water treatment plants, 18 wastewater treatment plants, 9000km of water pipes, 8000km of wastewater pipes, numerous pumpstations and smaller wastewater systems.



45%

Over the next 20 years, approximately 45% of Watercare’s capital investment is in the expansion of its existing network to cater for growth. Auckland is a high-growth region, with projected population expected to grow 29 percent over the coming 20 years. Land-use planning and the sequencing of growth, in general, is a key uncertainty in infrastructure planning.



Like most water utilities, Watercare faces challenges in keeping its sizeable network in working order. Challenges come via investment in renewal of ageing assets and capacity increases to address level of service and growth. The scope and scale of these interventions are highly sensitive to external stressors, such as population growth, changing demand patterns, public perception, extreme weather events and the impact of climate change.

Renewals spending for increasingly ageing infrastructure is a challenge. Underinvestment in asset depreciation has been highlighted nationally (Water New Zealand, 2020). A report commissioned by the Department of Internal Affairs from the Water Industry Commission for Scotland states that in New Zealand, “asset condition and performance are likely to be getting worse; or risks to levels of service and quality performance are increasing; or both”. This statement perfectly highlights the challenge of simply understanding and maintaining existing water and wastewater systems, even without addressing the complex challenge of a deeply uncertain future.



The 21st century challenge has ushered a shift into uncertainty in which traditional asset planning to address renewals, level-of-service and growth requires an updated strategic approach to maintain effectiveness.



The arrival of deep uncertainty

Climate change increases the unpredictability of weather patterns and extreme events, therefore introducing deep uncertainty in the long-term planning and design of infrastructure. The ability of Watercare's infrastructure to provide an adequate level of service is intricately linked to the impact of weather and the environment. The Tasman Tempest of 2017 and the drought in the Auckland region are examples of these extremes that have already impacted our existing resilience and levels of service. These impacts will be compounded due to climate change (NIWA, 2018; Watercare, 2020). In Auckland, increase in extreme rainfall events and sea level rise will lead to more flooding and coastal inundation impacts on our low-lying assets. Droughts will also become more common and more severe leading to increased fire risk, reduced water source availability, pipe cracking and sewage septicity.

The shock of Covid-19 has also introduced deep uncertainty in growth projections in the short and medium-term. The sensitivity of infrastructure planning and design decisions to the wider, long-ranging impact of the Covid-19 pandemic on global and local socio-economic trends needs to also be considered (Zechman Berglund et al., 2021).



Photo courtesy of Watercare Services Limited

Why Is Innovation So Hard?

Organisations are often focused on optimising for a core set of skills and competencies. In Watercare's case they focus on creating and maintaining the infrastructure and support systems needed to provide water and waste water to a fast growing city. Naturally, the immediate focus is on quality and efficiency of service delivery, an optimisation strategy.

The perverse side effects of optimisation

Optimisation is a sound approach when faced with economic pressure and the need to provide consistent services to a growing population but it can lead to a reduction in diversity in people and ideas.

As pressure to perform increases, new ideas are often focused on delivering the same service more efficiently. Our competency can lead us toward a narrow view of the world. Optimising for one set of conditions can lead to a rigid organisation that lacks the ability to adapt to change.

“At Watercare, we referred to this as the ‘big pipes’ problem. If we are optimised for building big pipes then we may fail to search for ideas that result in the need for smaller pipes, or no pipes.” - Apra

If new projects are selected on their ability to meet the direct needs of our optimisation strategy then we become fixated on a ‘return on investment’ paradigm. In strategic terms we call this a local optimisation.

Requisite inefficiency – learning from bees.

Once they find a viable food source, a hive of bees can locally optimise for that food by transmission of location information via a ‘waggle dance’. Most bees who observe the waggle dance will obey the instructions and fly to the food source. Some of the bees will studiously ignore the intent of the waggle dance and fly off in a seemingly random direction, still searching for food. Most are unsuccessful but the ones that succeed radically improve the probability of long-term success for the hive.

On the face of it these bees are creating inefficiency. The truth is that these bees, either deliberately or by accident, are the saviours of the hive. By refusing to conform with the local optimum they are providing the hive with the opportunity to discover other food sources. If the original food source is under threat or diminishes, the hive is more likely to have alternatives.

We call this ‘requisite inefficiency’ it is an affordable loss that maintains the ability to survive in uncertain times.

Organisations can get locked into Local Optimums via three factors:

1. **The hierarchy**
Clear lines of control, decision making and authority.
2. **Division of labour and task specialisation**
People are organised into business units according to their specialty.
3. **Management by objectives**
Everyone knows their job (and what is not their job) and what outputs are expected of them.

These three factors are the reason that organisations can create value, deliver services and maintain control. They are also the enablers for the observed behaviours, culture and inertia that can actually inhibit innovation. For many companies however, simply disrupting these factors can lead to chaos and is not recommended.



How Not to Innovate

Attempts to 'create innovation' can focus on the wrong things such as:

Atomistic Innovation:

We try and train individuals to be innovative (like sending everyone on a design thinking course) but we don't change the system in which they operate. Innovative people will usually crash into organisational inertia and stop. This is both a waste of resources and frustrating for the people involved. Some people can't or won't participate. Some people shouldn't (i.e. those who manage critical systems and infrastructure). Those who are innovative usually just want to get on with it but become disillusioned with the rigidity of the organisation. Innovation can happen but it is usually ad hoc and deliberately hidden from senior management.

Innovating in silos:

Pioneered by Lockheed Martin's Advanced Development Programs "skunkworks" is used to describe a group within an organisation given a high degree of autonomy and unhampered by bureaucracy, with the task of working on advanced or secret projects. This may work for organisations that build discreet products and services. It almost never works in organisations with a high degree of interoperability and complexity. The result is that a few edgy things get designed and built but it is really hard to integrate these back into the larger organisation. The 'skunkworks' teams are viewed with resentment and suspicion by the rest of the organisation. You now have a culture problem.

Innovation Theatre:

Innovation usually starts small and messy, it is on the edges not the middle. Many business leaders want innovation to be big, visible and clear, mostly to satisfy frustrated senior managers and board members. Innovation theatre usually involves a lot of PR and management attention and that creates a real fear of failure. Innovative ideas get pushed through with much fanfare but are quietly killed off later, because they don't meet the needs of the organisation or fit their context. Innovation theatre starts to look like a cargo cult. We go through the rituals and make a lot of noise, but innovation never seems to land.

https://en.wikipedia.org/wiki/Skunk_Works

https://en.wikipedia.org/wiki/Cargo_cult

A Little Bit of Theory

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Many innovation programmes, techniques and 'experts' have no basis in any theoretical understanding of socio-technical or complex adaptive systems. Most are founded on the false belief that if you take a set of successful companies and analyse them, you will arrive at a recipe for success. All this does is create a false sense of confidence and an easily repeatable mode for consultants. At best it is pseudo science, at worst it can lead to a huge waste of resources and low morale.

AGLX are part of a distributed global network of researchers and practitioners who are working at the leading edge of management thinking, strategy and organisational development. All of our work is underpinned by a deep understanding of theory combined with experience in its application to real world situations and problems.

We have learned that:

- » Innovation is not a business input. It is the outcome of a way of working that allows for rapid testing, learning and amplification of success
- » Simply generating new ideas is not enough. Methods like hackathons and design thinking may result in a lot of ideas but if they are not supported by a coherent process then they are unlikely to survive
- » Innovation cannot be created but it can be enabled
- » We can create conditions that allow innovation to emerge

Photo courtesy of Watercare Services Limited



“Our personal relationship with uncertainty is fundamental to being human, yet over the last 30 years we’ve begun outsourcing it to certainty merchants.”

– Diego Espinosa (CEO Sistema Research)



Development of ICE Innovation[®]

The ICE innovation[®] Framework was developed from our interactions with Watercare over a number of years. When asked to look at innovation at Watercare we made three observations:

One: The organisation is under pressure

There is an immediate pressure to address the impacts of four big challenges:

- » **Climate change** - increasing extremes and frequency of floods and droughts
- » **Social pressure** - a growing city with relatively low population density
- » **Ageing infrastructure** - a legacy of underinvestment. An asset base that is past its expected service life
- » **Economic pressure** - higher expectations from smaller budgets

Two: The engineering paradigm

There is no shortage of pragmatism and hard work amongst the staff at Watercare. Engineers love solving problems and getting things done. The issue is that the pressure to act now when seen through an engineering dominant view of the world can lead to a narrow solution set.

At Watercare this manifests as 'Bigger Pipes' solutions. Engagements with external stakeholders are typically transactional. Watercare engages them when there is a need - driven either by an infrastructure project or a crisis.

Three: You don't get paid to be curious

Like most infrastructure organisations Watercare is focused on delivering services and building infrastructure. This situation forces the organisation into a pragmatic plan-do-check-act mode of operation. A focus on delivery creates two issues:

- » People seldom interact with others outside of their specialist area and when they do the interaction is constrained by process
- » There is very little time for exploration and experimentation so new ideas struggle to compete with entrained methods and well worn procedures

The system was constrained in a way that meant innovation was stifled.



“We are a high reliability organisation, risk taking isn't part of our DNA.”

- Senior staff member



Photos courtesy of Watercare Services Limited



ICE Innovation® creates the conditions for people to explore opportunities to test, learn and innovate by harnessing our business intelligence, natural curiosity and our ability to execute. When combined these three forces enable innovation.

ICE Innovation® Framework



*Safe-to-Fail experiments are small actions designed to explore and learn from the strategic environment.

Intelligence and Curiosity without execution means we risk getting lost in our imagination. **The Dreamer** can imagine a better future but lacks the ability or desire to participate in its creation.

Intelligence and Execution without Curiosity means we rush into problem solving without thinking about the bigger picture. **The Pragmatist** may stifle our ability to explore novel ideas and find innovative solutions.

Curiosity and Execution without Intelligence leads activity that has little grounding in the needs of today. While we may eventually hit on an innovative idea - **The Mad Scientist** expends lots of energy and recourses creating things of marginal value.

ICE Innovation® is a process of finding a balance of these forces so teams can think and act differently to create the conditions for innovation, act with confidence in a fast-changing world. They rapidly test new ideas, learn and move forward, build resilience by harnessing diversity and become better at making decisions under conditions of uncertainty creating a culture of innovation and psychological safety.

The Watercare Innovation Playbook



We developed a 'Playbook' for Watercare. It is an easy to use document with tools and techniques to guide the ongoing implementation of the ICE Innovation® framework. It is specifically designed for Watercare and their unique context and strategic intent. The Playbook is designed to be easily accessible - it provides structure but allows for diversity and creativity.

A Playbook is a set of tactics and methods that are coherent with the strategic intent. Like a sporting playbook, the situation and context determines the tactics, and the team reserves the right to adapt the tactics in response to feedback and changes in the strategic environment. The principles for the Playbook are:

The situation determines the tactics - context matters

Every situation is unique in its context. There are no universally applicable methods or tactics. The playbook allows us to take a 'best for situation' approach and fit our response to their needs. A Playbook isn't a recipe or a rigid structure, it is meant to create momentum and act a start point for learning and adapting to uncertainty.

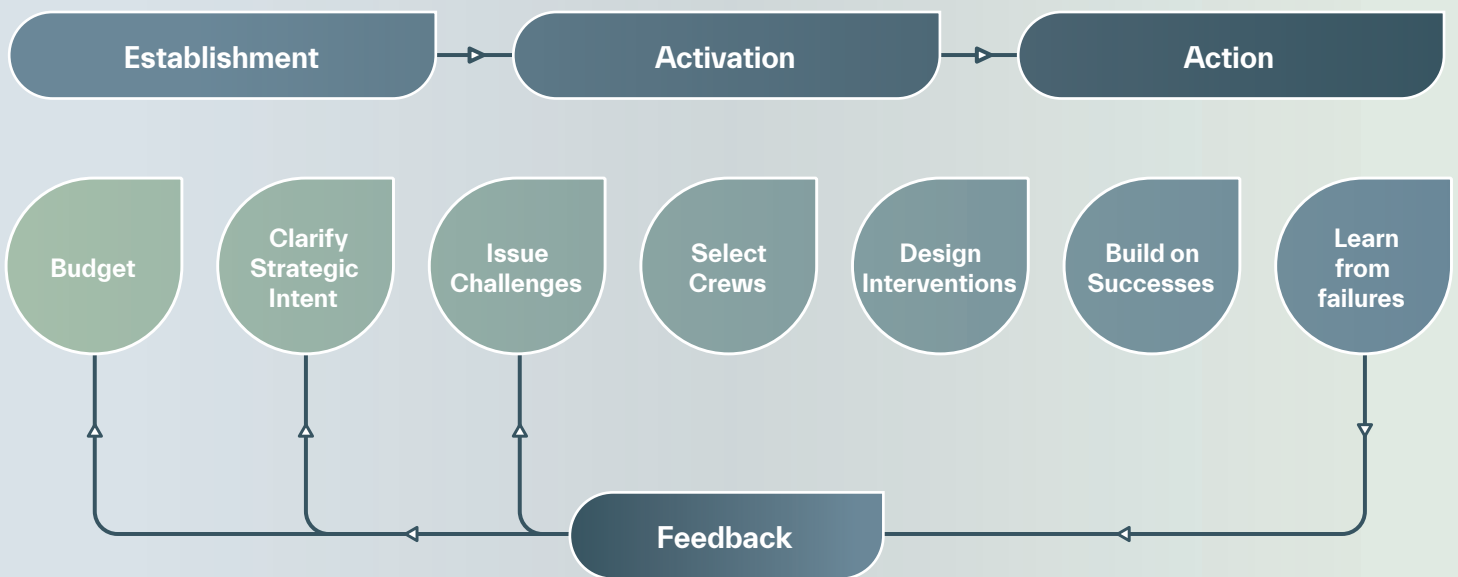
Action provides information

We privilege action over analysis. We establish basic rules for articulating an idea, building a team, getting funding, and sponsorship. Our playbook is about moving rapidly from idea to action.

Fast feedback and rapid response

We learn quickly, amplify success and mitigate failure. We share our experience so that others may learn.

The key elements to the playbook are:



Our role was to guide and mentor the Watercare team through this process.

Impact



Apra Boyle-Gotla
Head of Innovation
Watercare Services Ltd.

Apra's perspective: What happened

I started my role as Head of Innovation in September 2021. Prior to this, I was a planning engineer at Watercare for 5 years.

Of course, I accepted this exciting challenge given that both the CE and CTO were in full alignment with the human-centred approach I wanted to take with innovation. Indeed, the language of safe-to-fail that Steve and the AGLX team had introduced to the business resonated deeply with me. As a planner, I had studied deep uncertainty and complexity, and in AGLX, found people who spoke my language.

I first understood the challenge ahead of me when I witnessed Steve speaking to a room of senior leaders on the ICE framework, and despite the room's good intentions, I could sense a chasm between his world and the world our senior leaders occupy. Watercare, like most utilities, has a strong engineering expertise. We deliver water and wastewater services through infrastructure.

However, given the unfolding complexity of climate change and its non-linear ripple effects through every aspect of our society, water service providers of the future cannot simply rely on the current business model of big infrastructure provision.

It was clear then that my role was to hold the liminal space between complexity, a realm that needs experimentation, and complicated, a realm of expertise. Psychological safety to fail was going to be big factor in successfully unlocking innovation in Year 1. My new role forced me to work in two important ways:

Embrace the awkwardness

I needed to confront my own worldview and inherent engineering bias. This manifested in the following ways:

- » Perfectionist
- » Afraid to fail
- » Afraid to look foolish
- » Expertise

I needed to let these go and actively play the jester or the challenger when required.

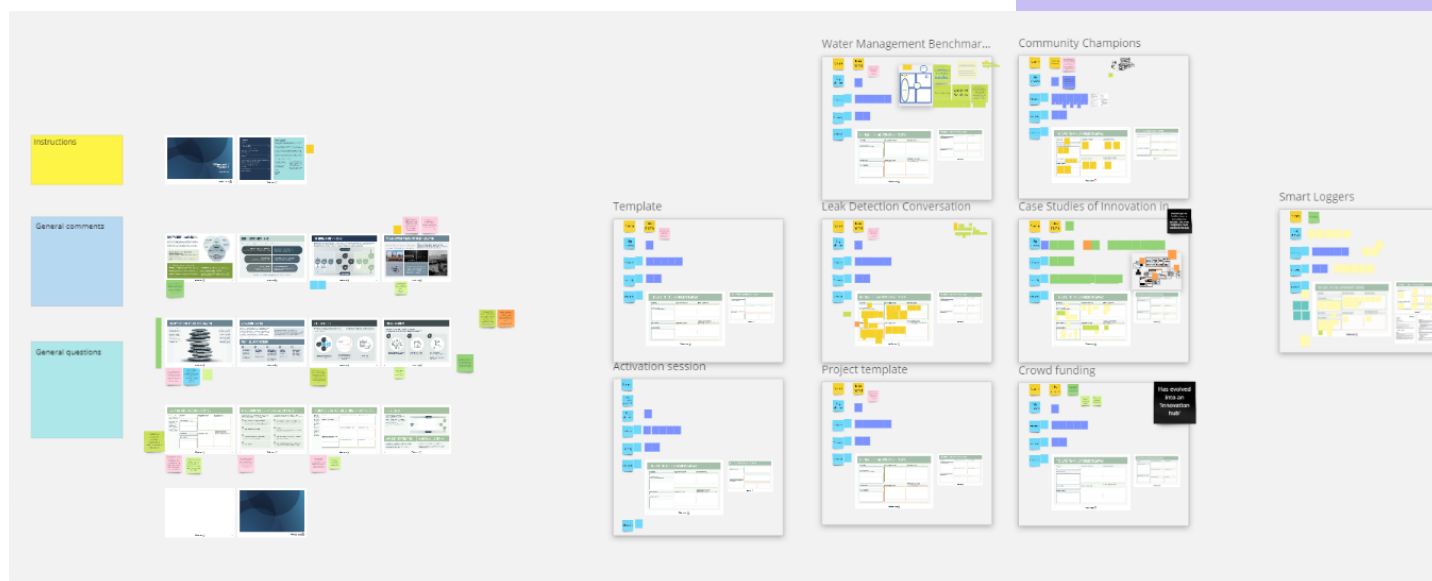
Become the therapist, nurturer, coach to young water professionals.

Start under conditions of disruption and uncertainty

Auckland was locked down from mid-August to December due to the Covid-19 Delta variant outbreak. I started my role as a lockdown hit, which threw a spanner in the works of collaboration and human interactions. Like most organisations we embraced tools like Teams and Miro.

I was heartened that through the internal announcement of my role, a number of people connected with me to learn about how they could participate. These individuals would make the core group of people around whom the grounded, liminal spaces would eventually form that would connect the chasm between the old, dominant system and the new. The ICE Innovation® Framework was socialised via workshops. Invitations were extended to staff who showed curiosity and had ideas they wanted to action.

The original Miro Board – Designing STF experiments



We used a Miro board to facilitate the design of Safe-to-Fail experiments. People could see what other were working on and self-select into teams, which started running Safe-To-Fail workshops to create momentum. These are still running on a fortnightly basis - this forum is now for check-ins and for connecting over problem statements and new ideas. It has become a space for connecting, mostly for young staff, who while asking questions realised there were many avenues for them to contribute.

Our new platform for STF design

I have always taken the mindset that my overall objective is to make myself redundant. A centralised innovation function is about facilitating innovation via distributed 'innovation teams' - that is innovation champions who have 'day jobs' in our business.

Governance and Monitoring

The CEO is the executive sponsor of innovation at Watercare. ICE Innovation® was activated and is managed by the Head of Innovation.

The Senior Leadership Team (SLT) should place their emphasis on enabling innovation through supporting the Head of Innovation and becoming the evangelists of an 'innovation culture'. Three main areas of focus are:

- » Supporting the Head of Innovation to identify and manage constraints and enablers to innovation
- » Committing resources to support innovation teams and Safe -to-fail (STF) experiments
- » Issuing specific challenges (or a call to arms) to provide direction and as a catalyst for innovation

Measuring and Monitoring

“When a measure becomes a target, it ceases to be a good measure”
- *Simplification of Goodhart’s Law.*

The fundamental principle of ICE Innovation® is that innovation is an emergent property of a process not an input or an end state. We should be wary of using measures that suit more linear projects such as:

- » Activity measures like setting KPI’s for the amount of time and money spent on innovation or the number of experiments conducted. This will lead to activity but not necessarily impact
- » Outcome measures such as trying to determine return on investment for STF experiments. This will lead to short term thinking and risk avoidance – the antithesis of innovation

An authentic measurement and reporting system for Innovation should focus on two things.

1. What is our capacity to innovate?

We recommend Vector Measures. Vector Measures allow us to determine if we are travelling in the right direction at the right tempo and that we do not expend too much energy doing so.

Direction of travel. Do we have a clear and concise call to arms based on the strategic challenges? The executive has a role to play here.

Tempo. How quickly are we creating the interactions that will lead us in that direction? For Watercare that is the time taken to form teams, design STF experiments and start taking action.

- » What is the most energy efficient way of doing that?
- » Are we seeing self-selection or do we need to drive this through management intervention?
- » Do we have a system of issuing challenges that elicits a response from the organisation and stakeholders or do we need to push people to act?

Vector Measures ask “what direction are we moving in?”

2. What is the impact of the innovation process on our business?

We recommend a set of Impact Measures. Impact Measures allow us to determine the net result of our innovation activity. It is important to note that this is different from ROI or measuring the outcome of any one STF experiment. ROI implies linear causation (STF experimentation will be non-linear).

Impact Measures ask “what happened as a result of our actions?”



**“Te toia, te haumatia
– Nothing can be
achieved without a
vision and a way of
doing things.”**

- Senior staff member

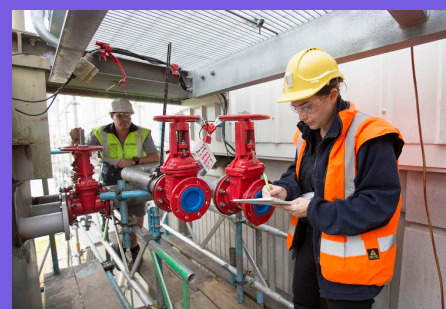


Photo courtesy of Watercare Services Limited

Lessons From ICE Innovation[®] at Watercare

Senior Support

Executive sponsorship has sent a clear signal to the organisation - innovation is a top priority.

We need management support to enable real innovation, even if this means they have to confront their entrenched mindset. There is a gap between the methodology proposed by ICE Innovation[®] and the world in which engineers operate. To slow down and embrace curiosity means backing away from entrained habits and the urge to 'solve problems'. At Watercare we colloquially called this the 'Bigger Pipes' mind trap. Falling into entrained habits will lead to lots of action but no innovation.

Budget

Innovation comes from the edges, not the centre. This means we need to accept that failure is part of learning. To address this situation we cannot look at an innovation programme through the lens of 'return on investment'. ROI implies that we have enough information to create a financial model. Very few potential projects or ideas will meet this threshold from the beginning.

We need to switch our perspective to 'affordable losses' and commit the budget before we establish the program. We will create a project approval system based on coherence and plausibility not ROI.

Democratise the process

The ICE Innovation[®] programme is designed to democratise innovation in the organisation. Previous attempts at innovation at Watercare focused on 'teaching innovation' or identifying 'innovators'. These approaches were inauthentic, damaged the culture and ultimately failed. The role of the senior team, delivered through the strategy is to focus on the strategic intent. Senior managers need to issue challenges to the organisation and its external stakeholders so they can focus their efforts on the things that matter.

ICE Innovation[®] means anyone can participate in the process that leads to innovation and self selection creates a more focused effort and real diversity of ideas. We are not trying to create an elite group of innovators.



"We don't need to innovate, we just need to get better at our core service delivery."

- Senior staff member



Embrace the messiness, stick to the principles.

"We are at a stage where there is a risk that the rise in organic curiosity - experimentation and momentum - can inadvertently be killed by trying to formalise this too much." - Apra

The formation of ideas and innovation teams is nearly always messy. Ideas aren't fully developed and teams are never fully prepared. Let people embrace the messiness as long as they follow the principles. The enemies of innovation are all too willing to step in and 'help'. Don't let them.



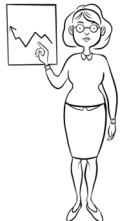
'Good Idea' Fairy:

Usually a senior manager who adds the fairy dust of 'helpful' suggestions to streamline the process or improve a STF experiment. The good idea fairy acts as if they can see the future and have the magical ability to pick a winner before it is tested.



The Innovator:

We don't want to try and create "innovators" or people who, through luck or success start to believe they have a recipe for success. ICE Innovation[®] means anyone can participate in the process that leads to innovation. Celebrate success, but don't canonise those who participated in it. The value is in the process not the outcome of any one experiment.



Over Analyst:

We can't make a decision unless we have empirical evidence, business case, benefits analysis etc. We analyse our recent successes and create a recipe. Innovation is enabled not created. If success was a matter of analysis - we wouldn't have any problems.

The Effect on the Business

Apra's Perspective

On the surface we are seeing innovative technologies and systems. Underlying this is the intent and the energy of the people who feel empowered and motivated because they have been allowed to solve their own problems - and empowered to try solutions without fear of failure. We have reduced the energy required to innovate at Watercare.

What has shown up:

- » Clear themes - increased efficiency, increased health and safety, increased productivity
- » Better use of data and increased understanding of our existing systems

The outcome for the Watercare:

- » We are better informed
- » Increase in evidence based decision making



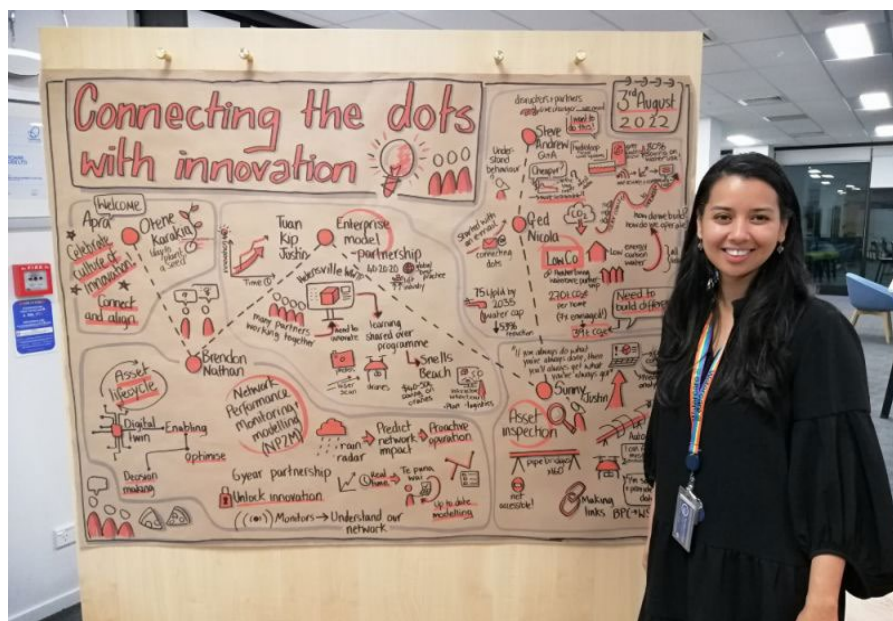
“We are starting to see a huge increase in organic curiosity”

- CTO Watercare



“The way we are approaching innovation at Watercare is changing the way we work and our culture. It has been extremely well designed and facilitated.” - Senior staff member.

“It is empowering and involving people; creating conversations for learning; developing customer service focus in highly expert silos to solve problems in a customer centric manner. Our innovation coherently connects to the Watercare mission. The way we work has rippling impacts across New Zealand, and the world. The value of the outcomes that our approach to innovation is delivering cannot be understated.” - Senior staff member.



Applying the ICE Innovation[®] Framework

1. Learning from the past and present

Team members provide stories and anecdotes about where innovation has occurred organically in the past. We assess the organisational strategy to find the areas of focus - where will innovation provide the greatest value? We focus on two themes:

Build on success - where has innovation occurred in the past?

- What has been successful/unsuccessful?
- What has held us back?

Identify strategic intent - what are the big opportunities for innovative solutions or novel approaches in the future?

- What are our biggest strategic issues / opportunities?
- What things have we repeatedly tried and failed to change?

2. Adapting to the future

Here we apply our Adaptive Strategy methodology. We work with a group of business leaders on how to enable innovation and lead teams through the ICE process. Applying the ICE Innovation[®] framework can be expressed using the Mayo Clinic mantra:

- Think Big** We use 3 to 5 issues identified as part of our strategic intent from the previous phase as a starting point to explore and learn.
- Start Small** We introduce our Safe-to-Fail (STF) methodology to provide the basis for exploring, experimenting and learning.
- Move Fast** We rapidly test multiple STF experiments. We amplify success, learn from failure and exploit opportunities to create value.

3. Activating ICE Innovation[®] - The Playbook

Teams expand on the STF experiments created during the workshop. They run these experiments, gain fast feedback and enable rapid exploitation of success. This is a continuous process: leaders manage the tempo and direction of the experiments and provide the opportunity to amplify success. The Safe-to-Fail experiments provide a pathway for new opportunities to emerge, and also create resilience by learning from small failures.

During this phase AGLX act as guides and 'Thinking Partners' for leaders as they manage portfolios of STF experiments and manage the impact of these experiments.

For more information on ICE Innovation[®] please contact:



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Where others see complexity we see competitive advantage

