Taking a Big Picture
View to Modelling
Bringing greater plausibility to business strategy

Watermatex 2015
15 June 2015
What is our vision?

We will be world class, delivering essential water that our customers love, in our great city.

The source: + 1 + $ +

Aspirations:

World class performer
Customer at the centre
High performing culture

≈ lifestream
A little about us …

**Thames Water**
- 13 million consumers
- 8,000 km² operations
- 2.7 billion L/day

**New York City**
- 9 million consumers
- 830 km² operations
- 4.9 billion L/day

**Sydney Water**
- 4.5 million consumers
- 12,700 km² operations
- 1.4 billion L/day
Hawkesbury River
by William Piguenit (1881)
Waves of change ...

The world is changing, and utilities must evolve and adapt to remain relevant.

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<th>Emerging voice of the customer</th>
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Waves of change …

These are frequently merging into wicked problems …

- No single department or agency can solve complex challenges
- Expectations that prices and taxes will be contained while more is delivered across all service areas
- Issues of visibility, transparency and inclusiveness of decision-making
- What does this all mean for liveability?
- What does this mean for the relevance of utilities?
Uncertainty and decision-making

Obvious or Simple
- Cause and effect relationships are obvious to all.

Chaotic
- There is no cause-effect relationship at a systems level. (Get out quick!)

Complicated
- The relation between cause-effect requires analysis through application of expert knowledge.

Complex
- The relation between case-effect is only perceived in hindsight, not in advance. Be prepared to learn and respond quickly.

It's becoming more complex and Systems Thinking is needed more than ever
Strategic resilience

- **Leadership's approach and willingness to embrace and drive change**
- **Strong Networks & Connectivity**
  - Strength and durability of connections to the external world – customers, community and stakeholders
- **Change Readiness**
  - An organisation’s agility, including capability and capacity to respond to a changing world
Towards building resilience
We will be world class, delivering essential water that our customers love, in our great city.

**High performance culture**
Our customers will see us
- living our values
- taking ownership and following up
- as role models for Sydney Water

**Customer at the heart**
Our customers will
- find us easy to deal with
- experience us as transparent
- continue to trust us, now and into the future

**World class performance**
Our customers will see us
- providing great value for the quality they expect
- as thought leaders
- co-creating a sustainable future
Clarifying and aligning our focus

Our ultimate transformational goals are in these two elements...

The key factors that allow us to deliver on the goals and keep us ‘in the business of doing business’ for the long term benefit of customers...

The business infrastructure, technology, systems and processes which support the efficient and effective operations: this enables agile, inclusive and robust decision-making.

Where customers and the community see results and perceive value

Where our staff and shareholder value is created and measured

Where great stuff happens to support customers, the community, and staff and helps build business agility and resilience

Where we manage our business resources in the most efficient and effective way (eg, cost-to-serve, capital allocation)
Strategic research investment

INVESTMENT HORIZON

Core Science and Research

Discovering and creating today's valuable knowledge

Applied Research

Converting science know-how into best business practice

Strategic Foresight

Building plausible futures that uncover risk and opportunity

Transforming Customer and Community Value

We have a deep understanding of what shapes customers’ perceptions of value

Our engagement with customers and community has built trust and confidence

Delivering World Class Performance

We identify and inform the business of emerging public health and environmental risk

We build innovative analytical capability to solve complex challenges and forecast long-term performance

We understand new technologies and their ability to transform our business

We build capacity to improve health and environmental outcomes

Preparing Our Business for the Future

We understand the critical long-term trends that drive future water security

Application of findings will be addressed under the 'Market Vision' Strategic Initiative

We build foresight that informs the organisation’s strategy and resilience

Key Results Areas
Strategic research investment

1. Customer Journey Mapping and Values
   - Core Science and Research: Discovering and creating today's valuable knowledge
   - Applied Research: Converting science know-how into best business practice
   - Strategic Foresight: Building plausible futures to understand risk and opportunity

2. Transforming Customer and Community Value
   - Receiving Water Quality Modelling
   - Sewer Odour and Corrosion
   - AdaptWater™

3. Delivering World Class Performance
   - Short, Medium and Long-Term Water Demand Forecasting
   - New community engagement Methods

4. Preparing Our Business for the Future
   - We understand the critical long-term trends that drive future water security
   - Application of findings will be addressed under the "Market Vision" Strategic Initiative
   - We build foresight that informs the organisation's strategy and resilience

IWA Watermatex 2015 | 15 June 2015
Strategic research partnering

- Large number of critical partners
- Inside and outside the sector
- Academic, government and private
- National and international
- Critical ‘outside-in’ thinking
- High leverage on investment
- Invest where there is alignment with strategic objectives
- Value co-creation
- Builds business resilience
Corrosion and odour research

Context

- Nationally, 127,000 km of sewers (23,800 km in Sydney)
- $109 billion asset value ($20 billion in Sydney)
- 809 km (3.4%) Concrete Sewers in Sydney
- 20,000 tons of ferrous chloride dosed per year in Sydney
- $45 million per annum of renewal costs in Sydney
Corrosion and odour research

Benefits

- Adaptation of the hydrogen sulphide and ventilation models: $90 million differed rehabilitation and reduction in preventive chemical dosing
- New specifications for protective coatings: resulting in avoided costs on rehabilitation
- Improved ventilation design and location
- Integrated use of tools to target sewer renewals

PROJECT BUDGET

- Cash: $8.1m
  - ARC: $4.7m
  - Industry: $3.5m
- In-kind: $11.7m
- Total: ~ $20m
Water demand forecasting

Context

- About $1 billion in revenue per year – hence getting demand wrong has major implications for the business
- Forecasts key inputs to
  - financial planning
  - long term demand and supply planning
- Revenue water (billed consumption) about 456 GL in 2012-13
- Change in the in demand trend over the last 25 years
- Challenge to understand demand drivers and uncertainty
- Strong link to customer behaviours

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Water demand forecasting

Benefits

- Data driven decision making for financial and demand/supply planning
- Identification of major drivers shaping future water consumption
- Reducing uncertainty
- Story telling of possible/plausible futures to enable adaptive planning
- Research challenging existing assumptions and preconceptions
Critical pipe failure prediction

Context

- **Australia**
  - 140,000 km of buried water mains ($80b)
  - 28,000 breaks – 25% are critical mains

- **Sydney Water**
  - 4,700 km of critical mains (>300mm)
  - $24b replacement cost
  - Average 165 failures per year
  - $160 million investment in renewals over four years
Critical pipe failure prediction

What are we trying to achieve?

- How, when and where pipes fail?
- How do we assess cost effectively the condition of the pipe?
- How do we calculate pipe corrosion rates?
- Improving pipe failure prediction confidence along the pipe
- Knowledge management and decision support

World first research pipe test bed

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Hawkesbury-Nepean River modelling

Context

- Inform planning decisions for servicing growth in the Hawkesbury Nepean catchment (~$2 billion)
- Provide a sound evidence-basis to support future Environment Protection Licence conditions
- Ensure future infrastructure investments provide value-for-money for customers, the community and the environment
- Deliver world-class performance led through investments in leading edge innovation, science and analytics
Hawkesbury-Nepean River modelling

Scenario-based approach

- Staged infrastructure roll-out
- Land use change
- Treated wastewater discharge
- Environmental flows
- Large scale recycling
- Water Sensitive Urban Design
- South Creek Rehabilitation
- Climate variability and change can be accommodated
Quantifying climate impacts

Context

- Water industry is heavily exposed to climatic and weather-related risks
- Risks include financial, customer, compliance and reputational
- Incorporate climate change adaptation into utility asset management and long-term planning / decision-making
- Provide a flexible risk management investment / adaptation approach acceptable to stakeholders
- Sydney Water developed an online climate change adaptation quantification tool AdaptWater™
Quantifying climate impacts

Benefits

- Quantify risk cost of climate hazards on $39b worth of assets
- Prioritise adaptation options to inform asset management planning and ‘Resilience’ reporting
- Input into capital investment program
- Communicate outcomes with external stakeholders (financial, environmental and operational)
- Contribute to develop national standard for climate change adaptation reporting in the water industry
Future applications

Future price determinations

Wider rollout to councils other sectors

State of Asset Resilience

The State of Asset Resilience (SoAR) report for Sydney Water provides analysis of extreme weather failure and risk costs affecting the asset base today and over the lifetime of the assets.

Assets Under Resilience Management
There are approximately 200,000 assets under ‘resilience management’ in the AdaptWater cloud servers. Almost all of Sydney Water’s major assets have been assessed.

Internal Resilience Benchmarking
Looking across 8 major asset types the Resilience Indices vary from 0.996 and 0.993. These asset types have been benchmarked in Figure 1.

Future Outcomes
The Resilience Index is a measure of the annual asset value considered resilient to extreme weather and climate.

Resilient Index
The Resilience Index is the annual asset value considered resilient to extreme weather and climate.

Resilience Index is 0.977.

This indicates that the annual cost of risk is approximately 2.5% of total asset value.

Regional servicing strategies

Wider rollout to councils other sectors

State of Services reporting

Treatment facility planning
In the end, what’s it all about?

How do we improve the overall customer experience, build trust and create sustainable value?

- Make it better
  - Receiving water quality improvements
  - Reduced wastage and odours
  - Reduced service disruptions
  - Reduced costs
  - Climate proof our future

- Make it easier
  - Improved robustness of planning decisions

- Meet my needs
  - Improved supply sustainability
In the end, what’s it all about?

- Inclusiveness & understanding
- Affordability and contribution to a prosperous economy
- Sustainability of the environment and business
- Reliability, fairness & ease-of-dealings

Relevance and Resilience
Higher Purpose
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lifestream