

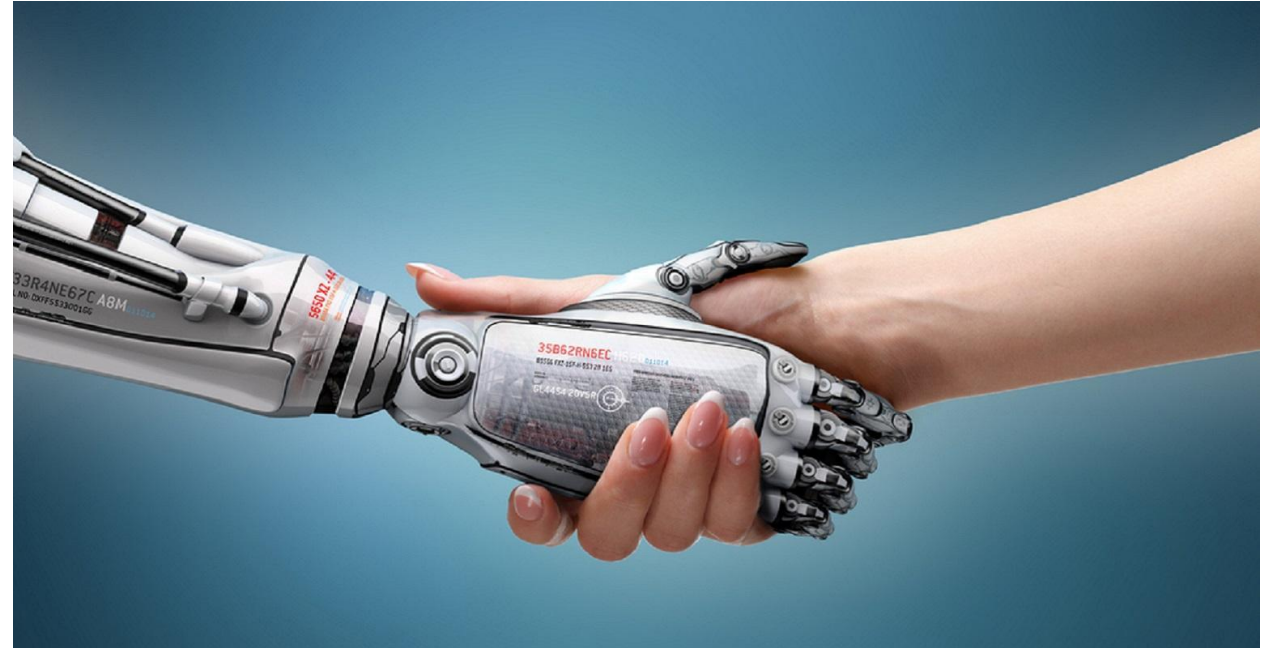
CIWEM

**Water Resources: Are we fit for 2050?
The Appliance of Science**

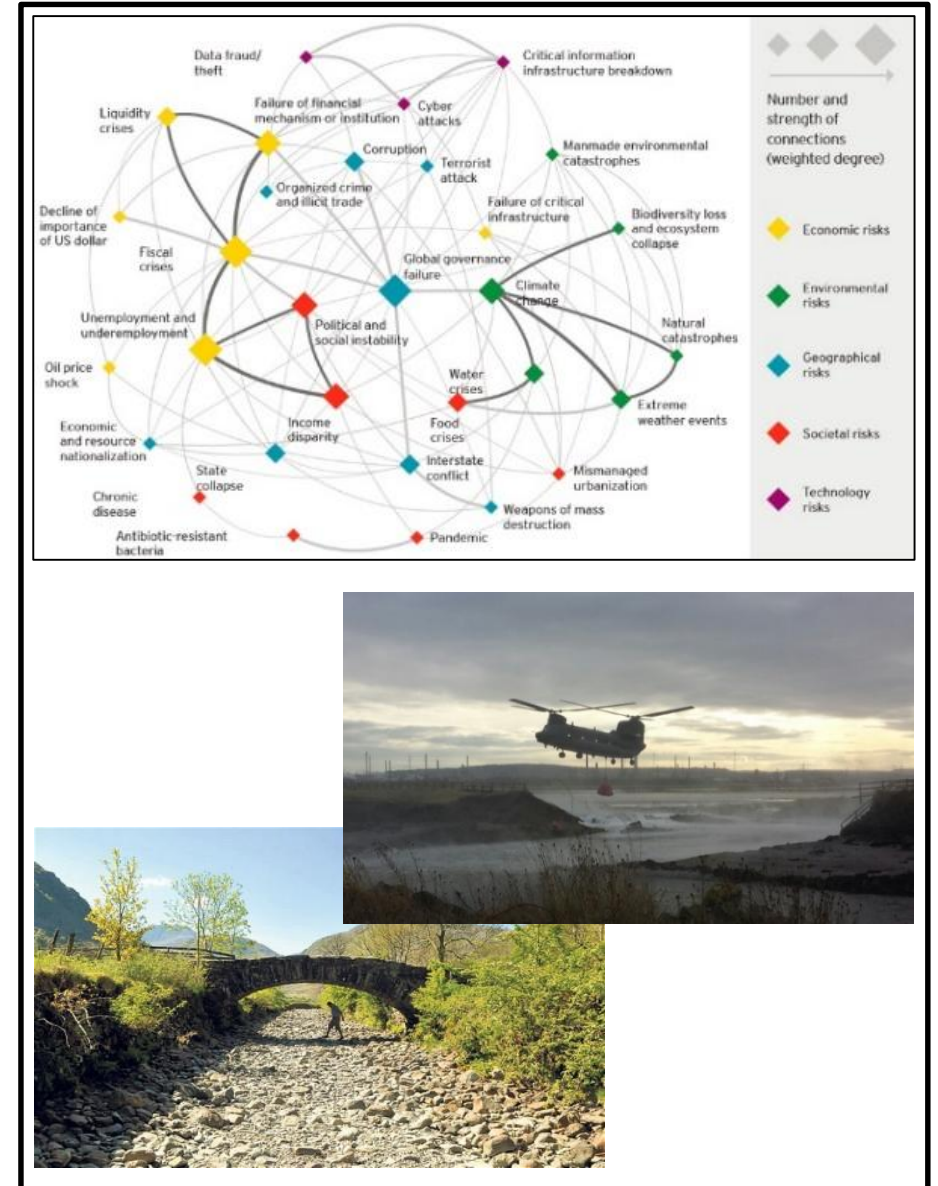
Trevor Bishop, Director Strategy and Policy
5th December 2018



The sector is adapting and is open for change



- **Growing imbalance with environmental capacity**
- **Deep uncertainty mixed with complexity**
- **Embedded stationarity in the system**
- **Societal - Political perceptions and expectations**
- **Economic and social value + natural capital**

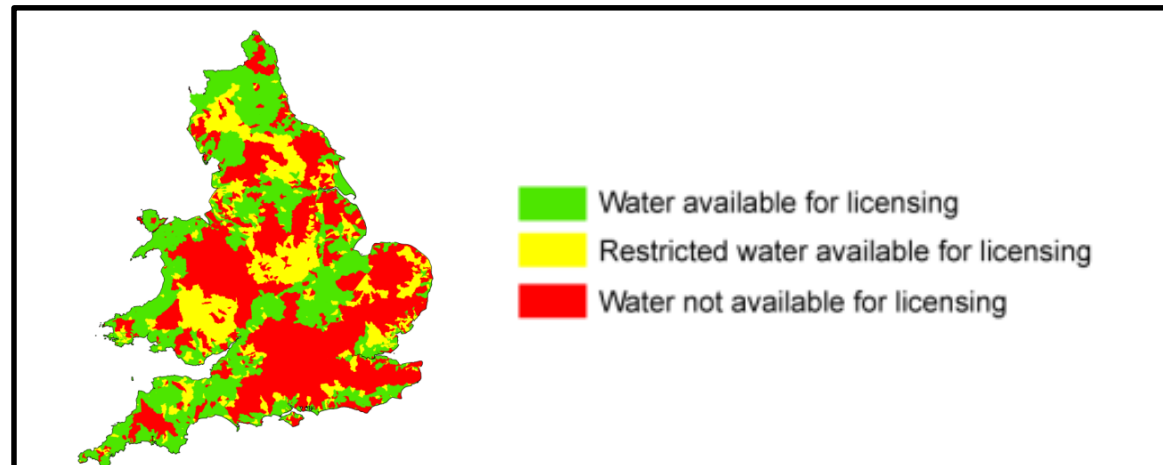
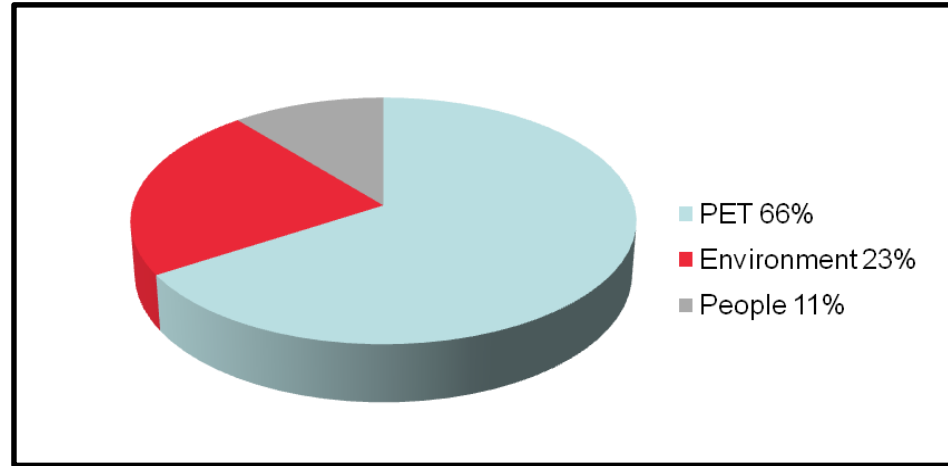


1986 – 2018 - 2050

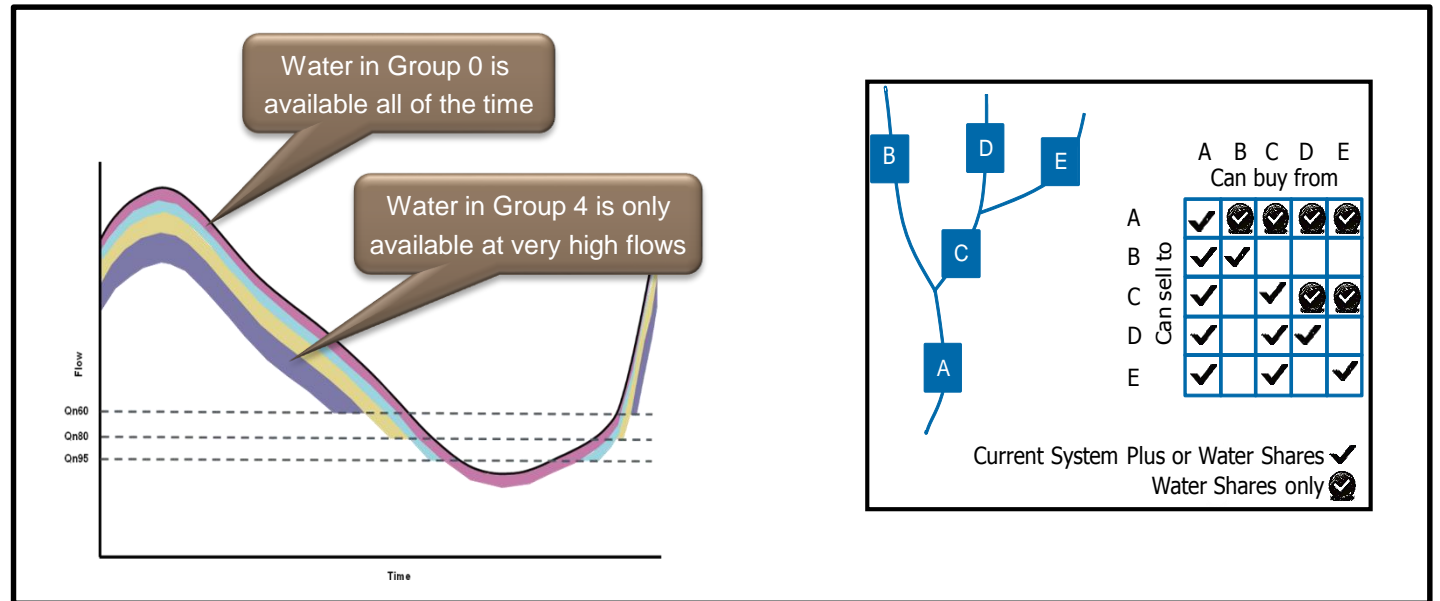
**What might our
disruptor be?**



Its the environment stupid!



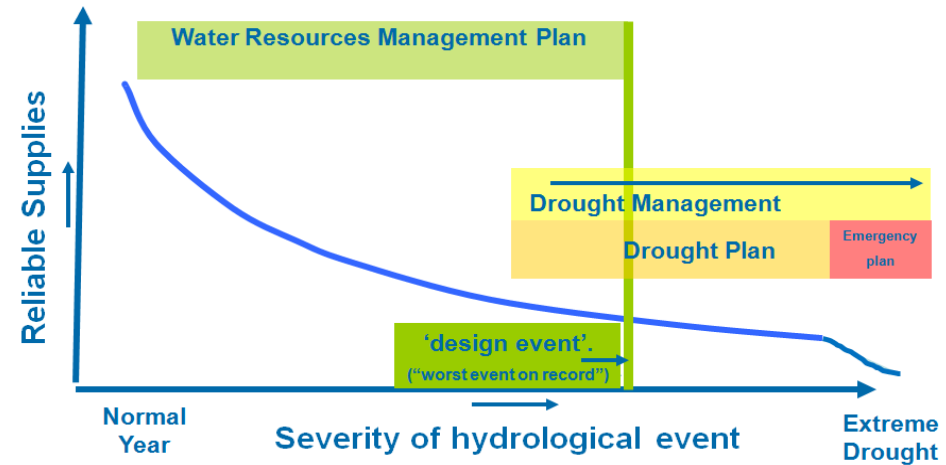
Natural Resource Management in an Uncertain World?



Resilience: Do we know what good looks like?

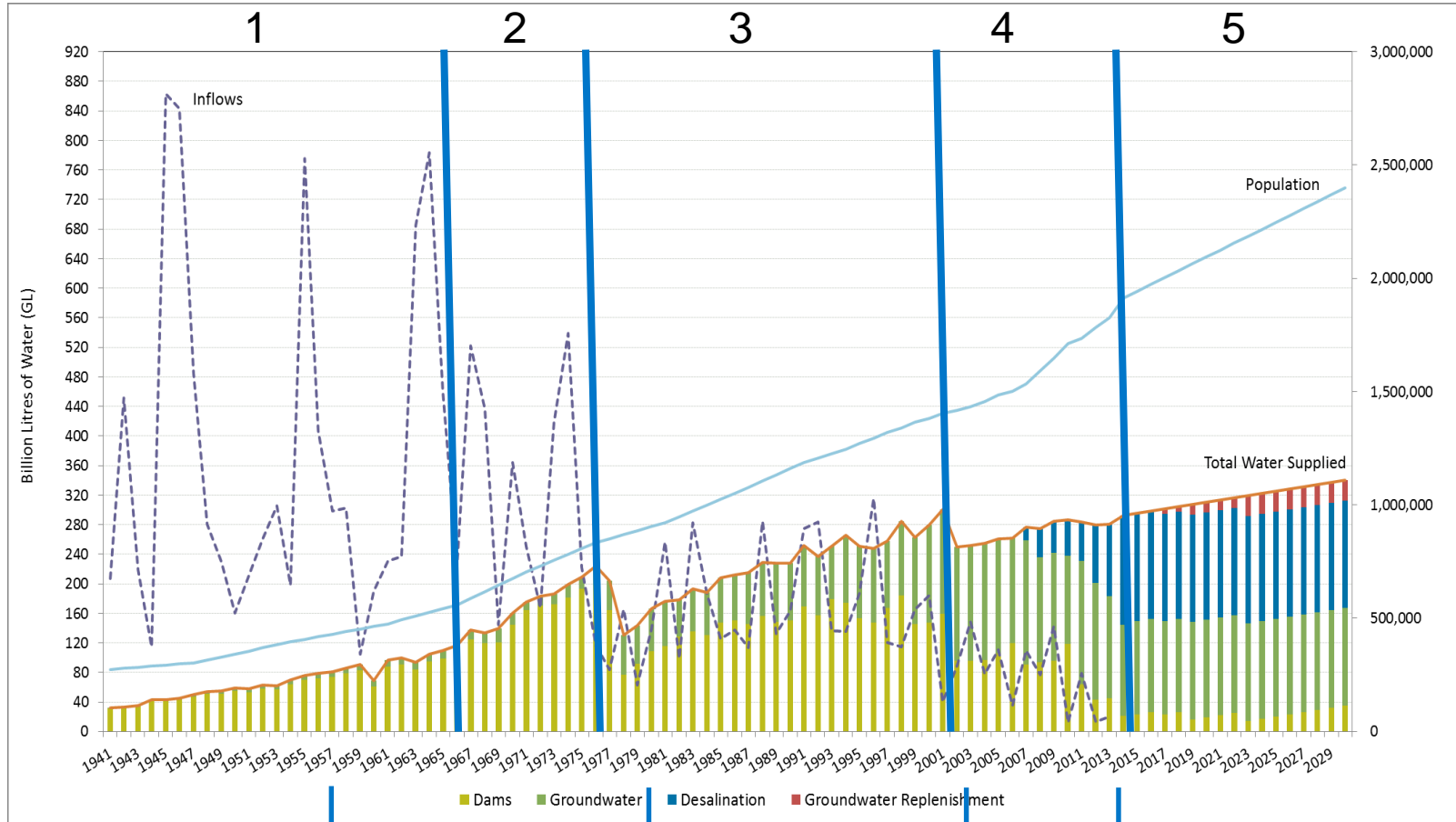


1. Systems thinking
2. The environmental foundation of a resilient sector
3. Customers at the heart of resilience
4. Resilience Planning
5. Smart Resilience
6. Monitoring and Measuring Resilience
7. Company Boards and resilience



- Scalable, adaptable and incremental
- Multiple threats through single interventions
- Embedded vulnerabilities
- Interventions sets (mix of options in a system)

Perth Metropolitan Water Supply



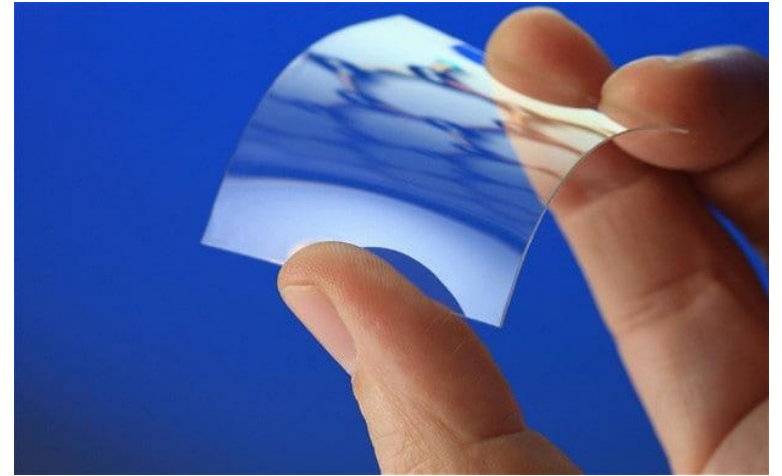
1958
92% Dams
8% G/water

1980
65% Dams
35% G/water

2004
38% Dams
62% G/water

2014
7% Dams 50% Desal
42% G/water
1% GWR

Technology, Digital and Cyber Physical Systems



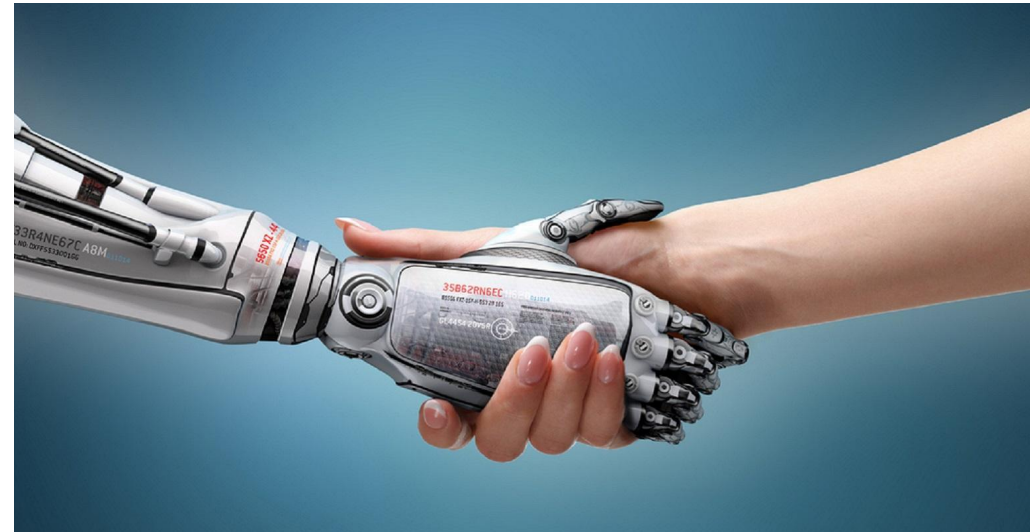
Water 1.0
Local ad-hoc systems

Water 2.0
Large centralized
infrastructure

Water 3.0
Computers and control

Water 4.0
Cyber physical systems

- **What environment we protect**
- **Complex systems**
- **Governance and institutional models**
- **Allocation and Permitting**
- **Smart resilience – best value**
- **People**





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