UKWIR
UK Water Industry Research

COLLABORATIVE, IMPARTIAL RESEARCH

Using Tomorrow's Technology to help Manage Yesterday's Infrastructure.

Data & Research

Steve Kaye – CEO - UKWIR

4th December 2018

Contents

- About UKWIR
- Big Questions and Route Maps
- Digital Transformation – Challenges and Opportunities
- Some real examples
- Conclusions and next steps

UKWIR Members

- Affinity Water
- Anglian Water
- Bristol Water
- Dwr Cymru Welsh Water
- Irish Water
- Northern Ireland Water
- Northumbrian Water
- Portsmouth Water
- Scottish Water
- Severn Trent Water
- SES Water
- South East Water
- South Staffs Water
- South West Water
- Southern Water
- Thames Water
- United Utilities
- Wessex Water
- Yorkshire Water

UKWIR
UK Water Industry Research

About UKWIR

- *Not For Profit* organisation set up in 1993 by UK water companies
- Funded and wholly owned by its 19 current members
- Common interest (One Voice)research themes
- Annual subscription revenue £3M

Why create a platform for Research and Innovation in the UK Water Sector?

- To drive real outcomes in areas of common interest
- Leverage funding for projects
- Bring stakeholders together
- Engage other industrial sectors
- Support from and involvement of regulators, lateral endorsement and partnerships
- Reduces the problem of fragmentation in the water industry
- Do research collaboratively & deliver outcomes locally
- A platform for Open Innovation
- Develop short, medium and long term projects
- Need to develop a digital transformation strategy - UKWIR

UKWIR
UK Water Industry Research

Overview of Big Questions – *12 BQ's across 4 Themes*

Drinking Water

1. How do we halve our abstractions by 2050?
2. How will we achieve zero leakage in a sustainable way by 2050?
3. How do we achieve zero interruptions to water supplies by 2050?
4. How do we achieve 100% compliance with drinking water standards (at point of use) by 2050?

Wastewater

5. How will we deliver an environmentally sustainable wastewater service that meets customer and regulator expectations by 2050?
6. How do we achieve zero uncontrolled discharges from sewers by 2050?

Cross cutting

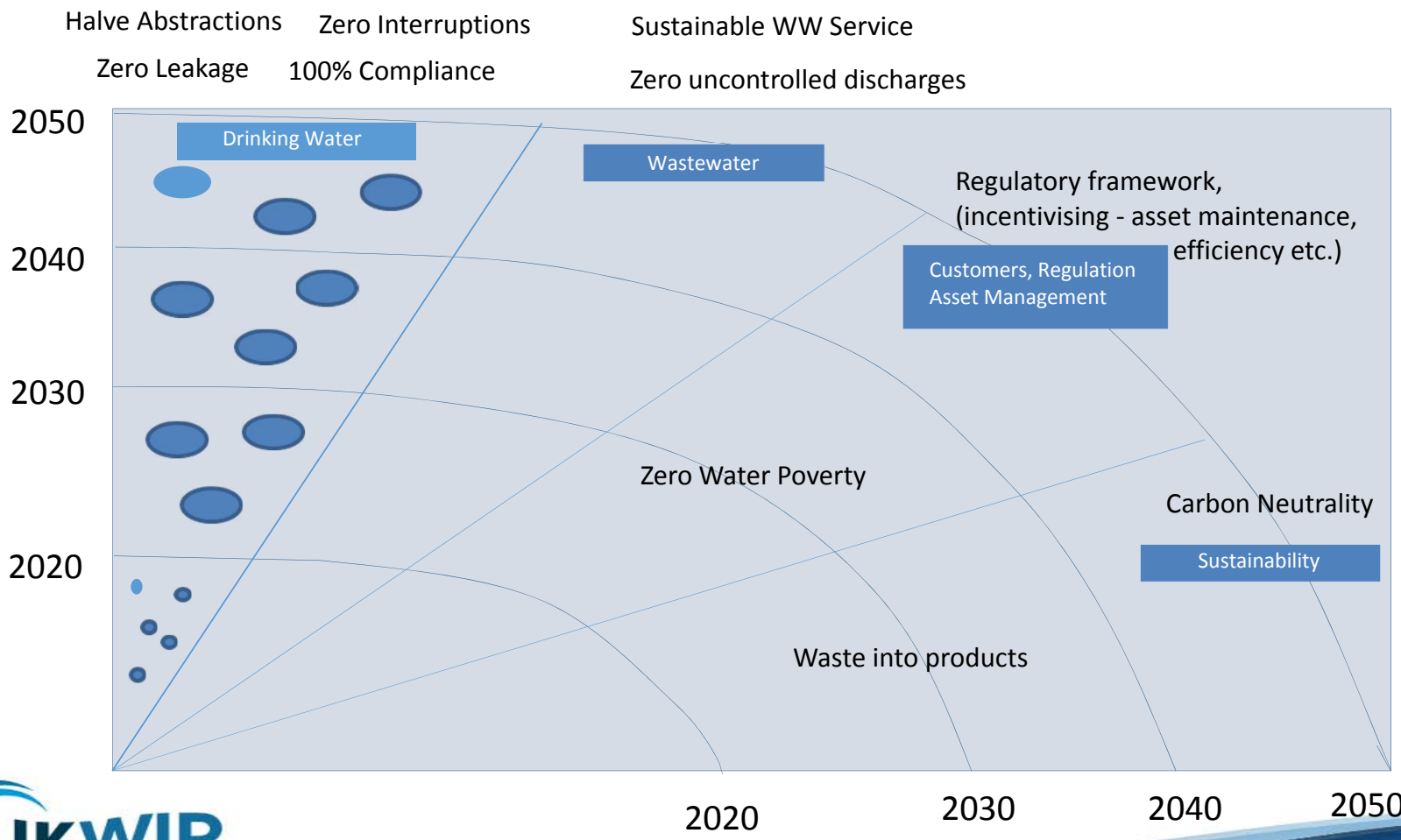
7. How do we achieve zero customers in water poverty by 2030?
8. What is the true cost of maintaining assets and how do we get this better reflected in the regulatory decision making process
9. How do we ensure that the regulatory framework incentivises efficient delivery of the right outcomes for customers and the environment?

Sustainability

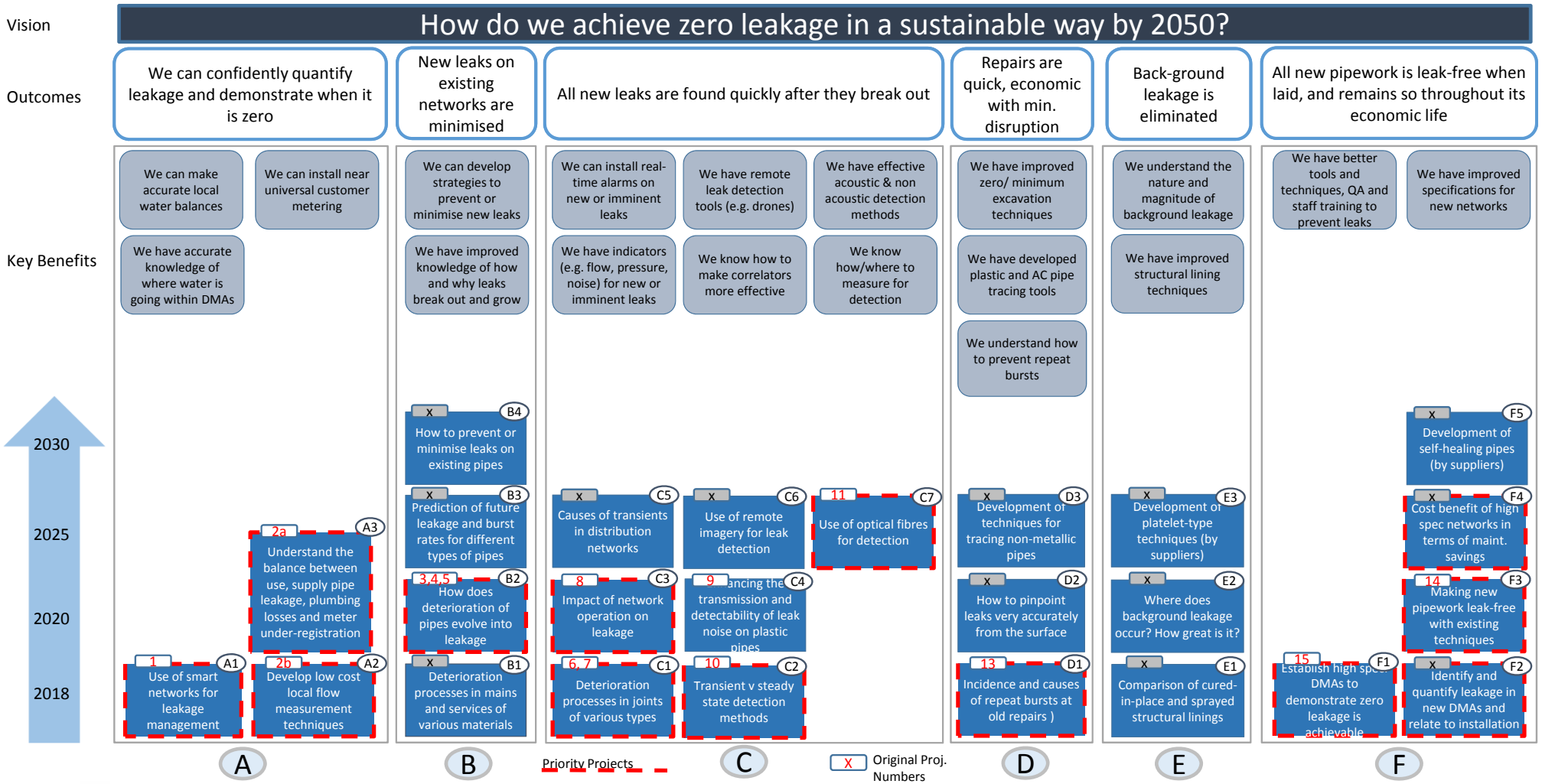
10. How do we become carbon neutral by 2050?
11. How do we turn all wastes we receive and generate into products by 2030?
12. Zero problem plastics in the water cycle

UKWIR
UK Water Industry Research

Big Picture – A Strategic Approach



UKWIR
UK Water Industry Research



UKWIR
UK Water Industry Research

How it fits together – engaging the supply chain…

Transient Risk Mapping

Zero Leakage

Satellite Based Leakage Detection

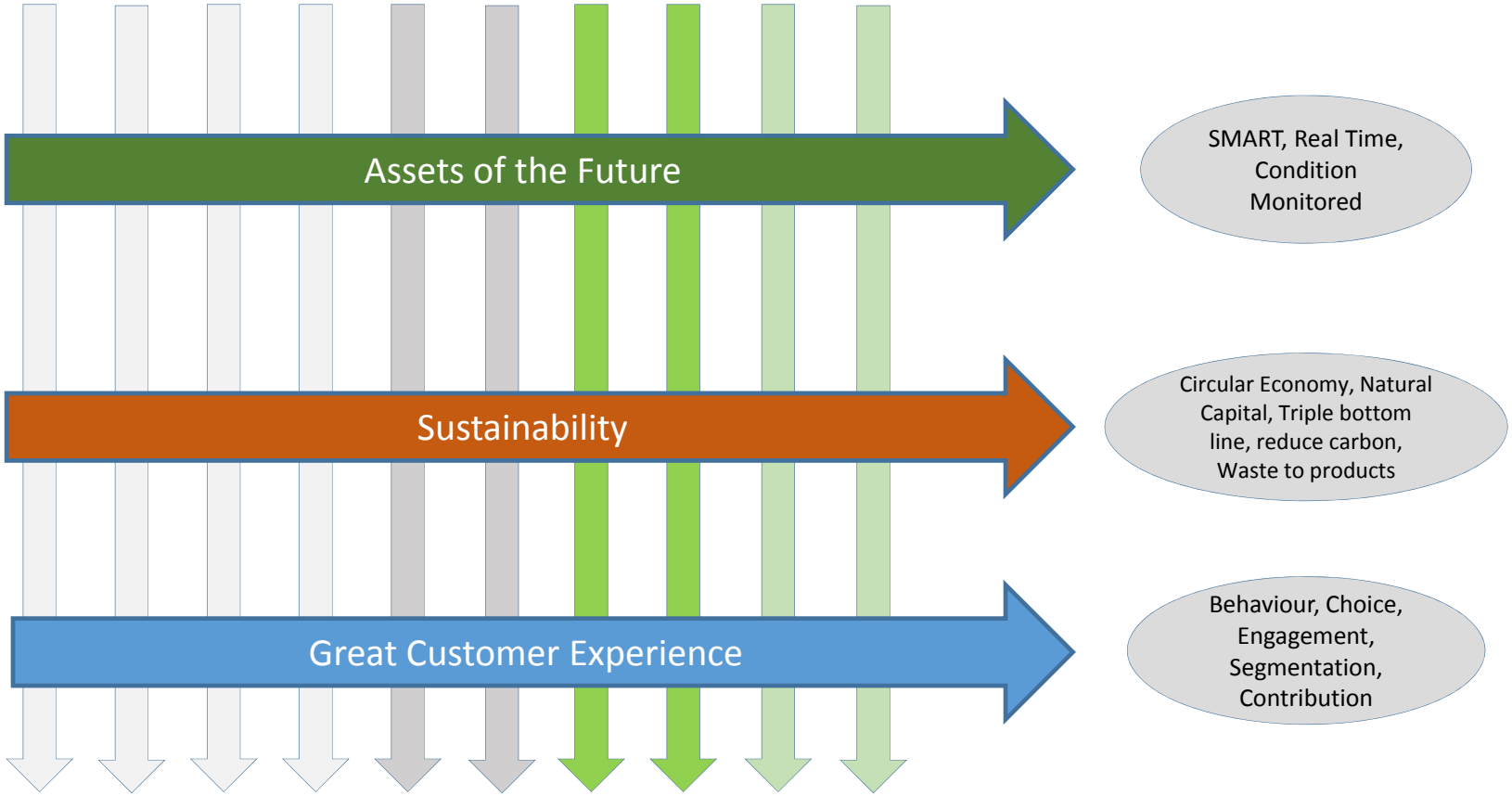
Permanent Noise Logging Leak Detection

Leakfinder ST – Plastic Pipe Correlator

Micro Hydrophones

UKWIR
UK Water Industry Research

Emerging Cross Cutting Themes

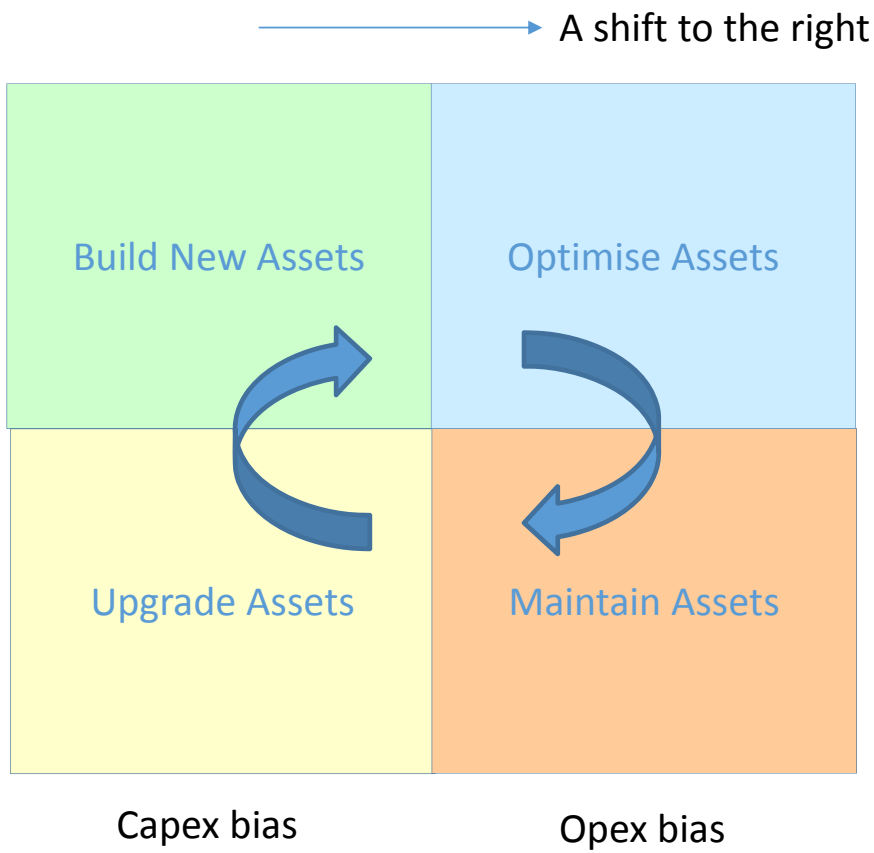


UKWIR
UK Water Industry Research

Ageing assets

UKWIR
UK Water Industry Research

Totex – What does it mean ?

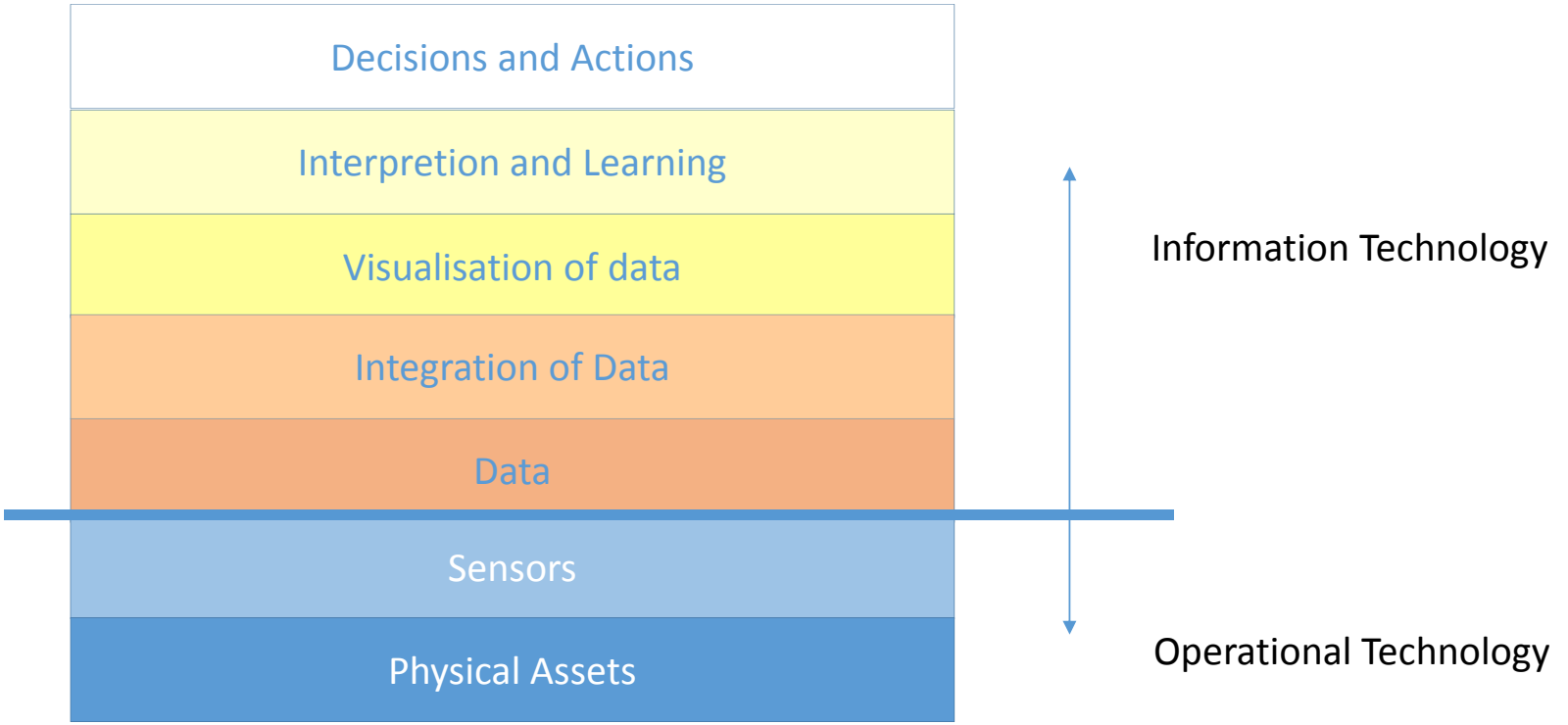


A Shift to the right – From a data & information perspective?

- Optimising assets
  - Sensors
  - RTC (real Time Control)
  - Knowledge and Skills
  - Avoiding New Build

- Maintaining
  - Failure data
  - Predicting asset condition
  - Systems & processes to deliver pro-active maintenance

Digital Transformation – Connecting the OT to the IT



New Skills and People of the Future

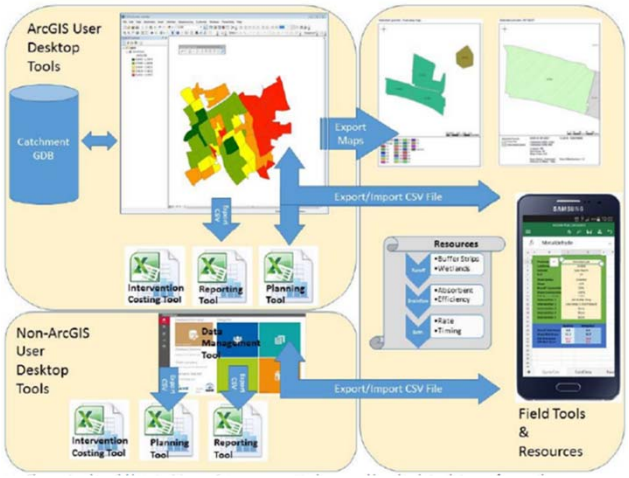
- Customer engagement IT
- Data and Information Management
- Managing Complex Systems
- Sensors
- Modelling
- Analytical Skills
- Artificial Intelligence

Project: Pesticide Risk Mapping and Catchment Interventions

Project objective: Multi-stakeholder collaborative project to enhance and improve the utility of the ADAS Pesticide Risk Mapping Modelling approach and produce a field usable tool

Deliverables:

- Pesticide risk maps created for mobile herbicides (applied to arable and grassland) and metaldehyde (applied to arable land only), covering most of the UK at a field level
- Maps have been incorporated into software tools for ease of use and editing



Key Benefits:

- Allows a consistent approach to pesticide risk mapping for the Industry and stakeholders.
- Reduces duplication of effort and provides the basis of integration of this model into farm software packages

Further Work:

- Develop all-party engagement and inter-company coordination during field trials of the tools.
- Review the benefits of this approach alongside more simplistic approaches developed elsewhere.
- Assess the speed at which the software could be integrated into key agronomist packages

Programme Lead: John Haley, Yorkshire Water
Project Manager: Sian Hills
Partners: Environment Agency (EA), Natural England (NE), DWI
Timeframe: April 2015 to March 2016

Overall project cost: £134,000
External funders: DWI
Total external funding: £9,500

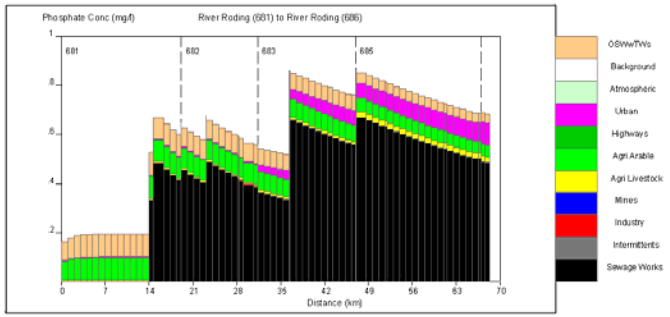
UKWIR
UK Water Industry Research

Project: Extending and Updating SAGIS
UKWIR's pollution Source Apportionment Tool

Project objective: Multi-stakeholder collaborative project to enhance and update the Source Apportionment GIS (SAGIS) water quality model, the UK Water Industry's primary water quality planning and discharge permitting tool.

Deliverables:

- Updated and enhanced water quality planning tool to test and justify PR19 Investment and WFD measures.
- A strategic tool that operates at river catchment and national spatial scales. Identifies sources of pollution and the contributing sectors so that mitigation measures can apply the Polluter Pays Principle.



Key Benefits:

Outputs can be used to underpin management decisions on investments, permitting and actions to improve the quality of rivers, lakes and the marine environment.

Further work:

- Migrate computer code to a new programming language
- Eliminate Intellectual Property constraints hindering broad uptake
- Integrate with other Water Industry Decision Support Technologies

Programme Lead: Howard Brett, Thames Water
Project Manager: Brian Ellor
Partners: Environment Agency (EA), SEPA, Natural Resources Wales (NRW), Natural England (NE)
Timeframe: April 2013 to March 2016

Overall project cost: £217,000
External funders: EA, SEPA, NE
Total external funding: £132,000

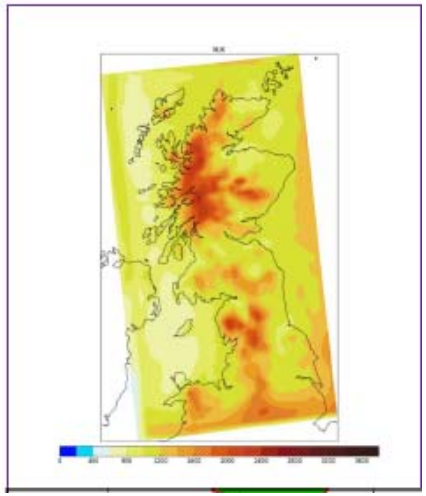
UKWIR
UK Water Industry Research

Project: Rainfall Intensity for Sewer Design: Stage 2

Project objective: Understand the current company approach to climate allowances; improve estimates of storm uplift; develop methodologies to perturb historic time series data to be representative of future rainfall intensities – 'future time series data'

Deliverables:

- Extended coverage of UKWIR stage 1 method using whole of UK (used new CONVEX tools and worked with Met office and Newcastle University)
- Used modelling to improve the estimates of storm intensity uplift and the impacts on different sewerage systems.
- Developed methods to enable a representation of future rainfall time series for use in service and asset planning.



Key Benefits:

This work will enable sewerage and drainage modellers to account for the implications of climate change in sewerage design, particularly the scale of rainfall intensity this may bring.

Further Work:

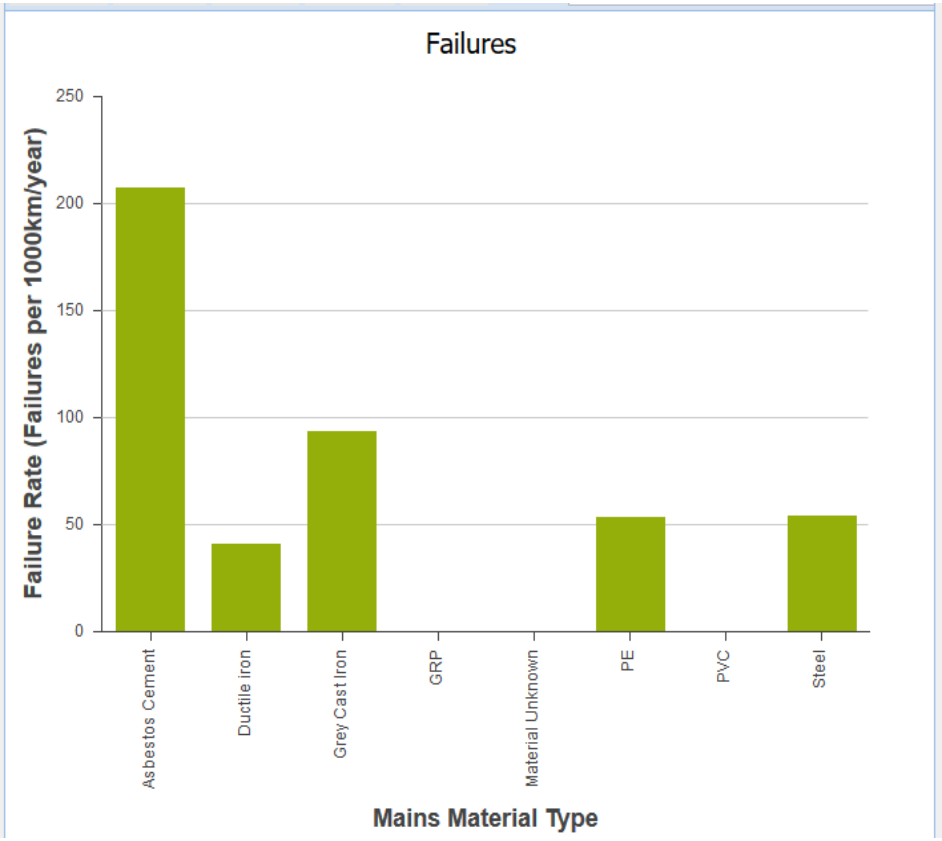
- Develop agreed perturbations, deliver methods and validate with real examples through working with companies.
- Provide online UKWIR tool for companies to utilise for the extraction of 'future' time series data for their location

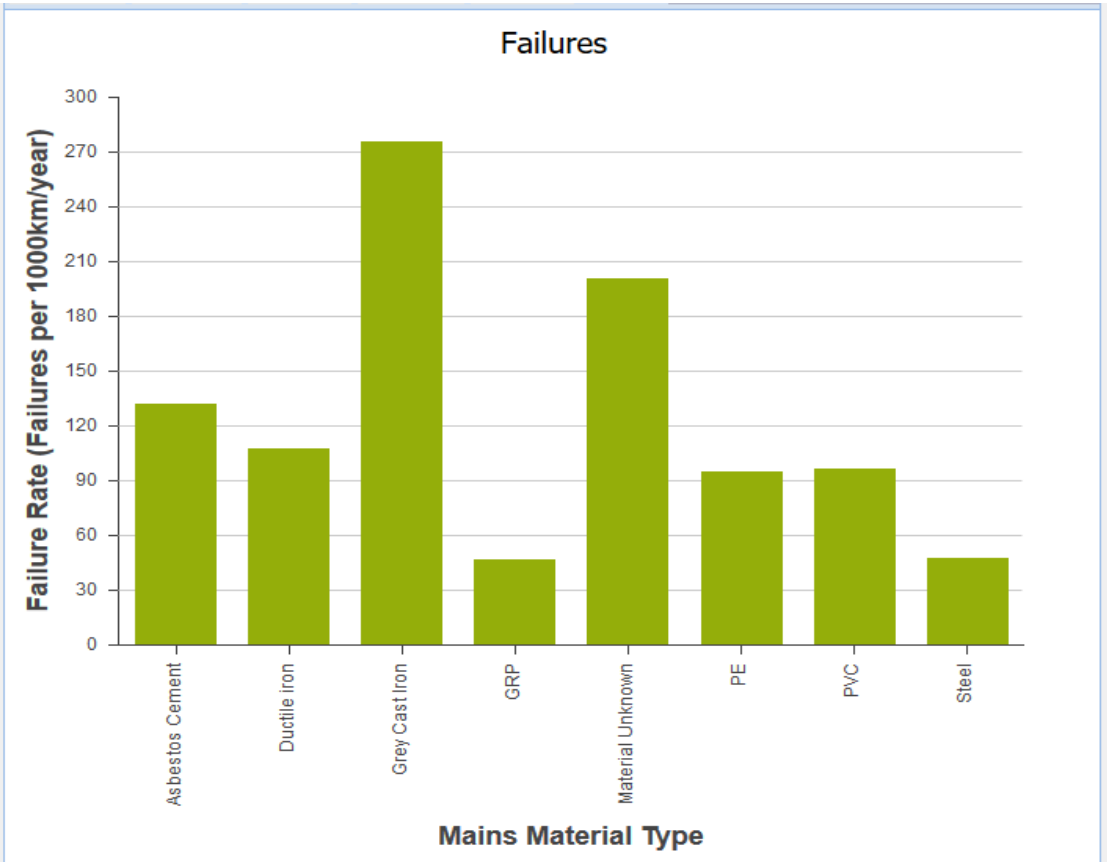
Programme Lead: Mark Williams, Scottish Water
Project Manager: Barry Luck
Partners: (Delivery) Newcastle University, Met Office, CH2M Hill
Timeframe: April 2016 to April 2017

Overall project cost: £120,000
External funders: None
Total external funding: £0

UKWIR
UK Water Industry Research

UKWIR – Mains Failure Database





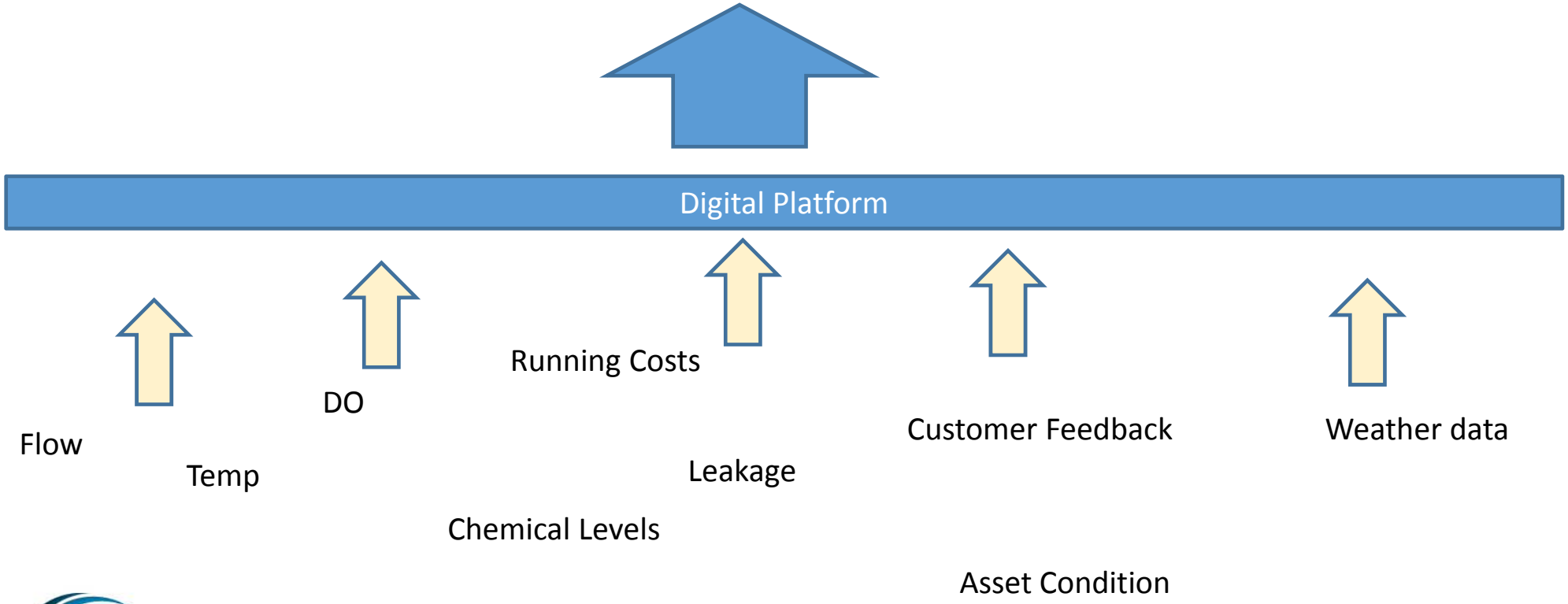
Sewers – Managing flows and avoiding pollution incidents

- **INFRASTRUCTURE PERFORMANCE**

- Linking weather radar sewerage asset operation
- Fuzzy logic and active control
- Condition monitoring
- Real time control, avoid building new assets

Creating a Common Digital Platform

Data Integration and visualisation – Real time Control, Artificial Intelligence, - Capex reduction, improved optimisation and maintenance of assets



Conclusions and Next Steps

- Develop research programme – Digital Transformation
- Involve wider stakeholders
- Accelerate Totex thinking
- Natural capital where appropriate
- Look after our ageing assets
- Develop low cost sensors
- Move to real time control systems
- Invest in our people

Come and work with us

skaye@ukwir.org.uk

UKWIR
UK Water Industry Research