Water (Quality) Research, Development and Innovation Roadmap

KSA 3 – Water use and waste management

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Water and sustainable development

- Adopted as part of the United Nations Sustainable Development Goals, Transforming Our World: the 2030 Agenda for Sustainable Development

- To achieve the WQ goal
  - investment in cutting-edge knowledge,
  - development and deployment of innovative approaches and
  - an in-depth understanding of the inherent scientific, economic, social and environmental issues

The Water RDI Roadmap:

Channelling knowledge, capacity and solutions to secure water for the future

Science and Technology
Water and Sanitation

Context

- **98% of all water resources already allocated**
- **Ongoing water quality challenges**
- **Non-revenue water is 36% on average ~R7 billion / year**
- **By 2030 demand will outstrip supply by 17%**

Roadmap Intervention Focus

Human Capital Development (HCD)

(M & PhD Skills)

Research and Development (R&D)

(Research Calls, Chairs, CoEs)

Innovation (technological and non-technological)

(Demonstrations, Professional collaboration, knowledge brokering)

Roadmap Thematic Focus

Objectives

Better coordination and improved decision making

Faster deployment of context appropriate performance improvements

More products and services to reach the market through better coordinated water innovation

National savings through targeted RDI investments

Water Quality: A cross cutter in the Roadmap

Unlock Alternative Sources of Water

- Feasible approaches to utilizing alternative sources of water, including grey and brackish water
- Quality assurance for diverse locations are key issues to respond to

Govern, Plan & Manage Supply

- Landscape impacts on water quality in catchments (land use, quality improvement interventions in degraded catchments, etc.)

Govern, Plan & Manage Demand

- Licensing , standards and regulation and what is required to facilitate more effective implementation from an institutional perspective

Built and ecological infrastructure

- Deepening planning and implementation synergies between ecological and built infrastructure as a way of improving quality and managing costs
- Water treatment tech insertion (beneficiation, energy considerations)

Efficiency/ Reducing Losses

- Alternative Sanitation
- Agricultural and water quality
- Human behaviour cognitive tools

Run the Water Sector as a smart business

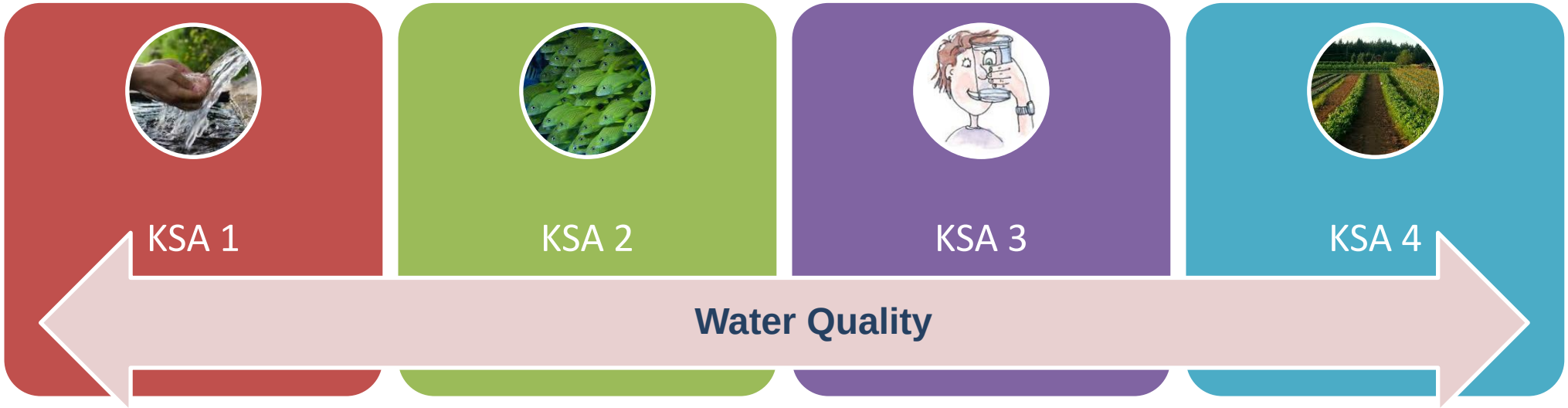
- Pricing, billing, procurement support tools

Monitoring and Metering

- Big data and ICT interventions
- Monitoring and metering solutions
- Hydrological monitoring centre

The WRC Instruments

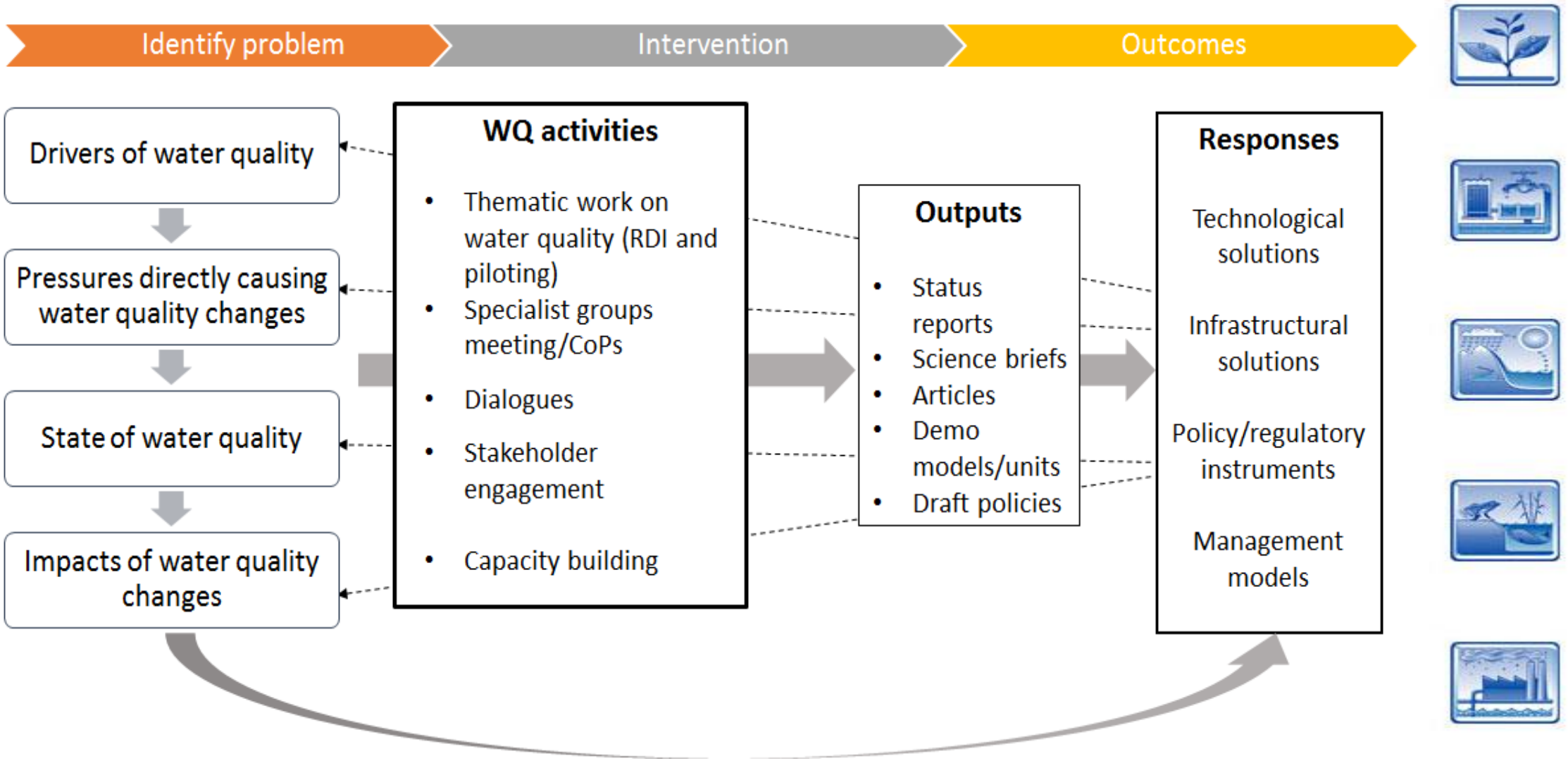
- Research Projects
- Research Portfolios/programs
- Lighthouses
- Advisory
- WADER (Water Technologies Demonstration) Programme



WRC program on Water Quality

- a better understanding of the processes affecting the water cycle, water availability and quality
- Explore new possibilities for increasing availability of usable water by exploiting nonconventional new water resources
- Facilitate the development and deployment of technical and water governance solutions to improve resilience

WQ RDI framework



Focal research areas + HCD

Drivers of water quality

- The effect of global change on water resources eg
- land use/land cover;
- climate change

Pressures for water quality changes

- The contribution of anthropogenic activities (emissions and waste discharges) to water quality eg
- point and nonpoint sources of pollution
- hotspots

State of water quality

- Establish a scientific understanding of the hydrological cycle (and interlinkages) and variability of the quantity and quality of water
- Current and long-term (emerging) water quality challenges for complex chemical and microbial pollutants

Impacts of water quality

- Establish an understating of the likely water quality change risks & implications on socio-economic status, as well as ecosystem and human health

Solutions

- Identifies opportunities to reduce water quality risks and vulnerabilities
- Develop solutions in for addressing water quality challenges in order to enhance water sector resilience and sustain development

Example – focal research areas

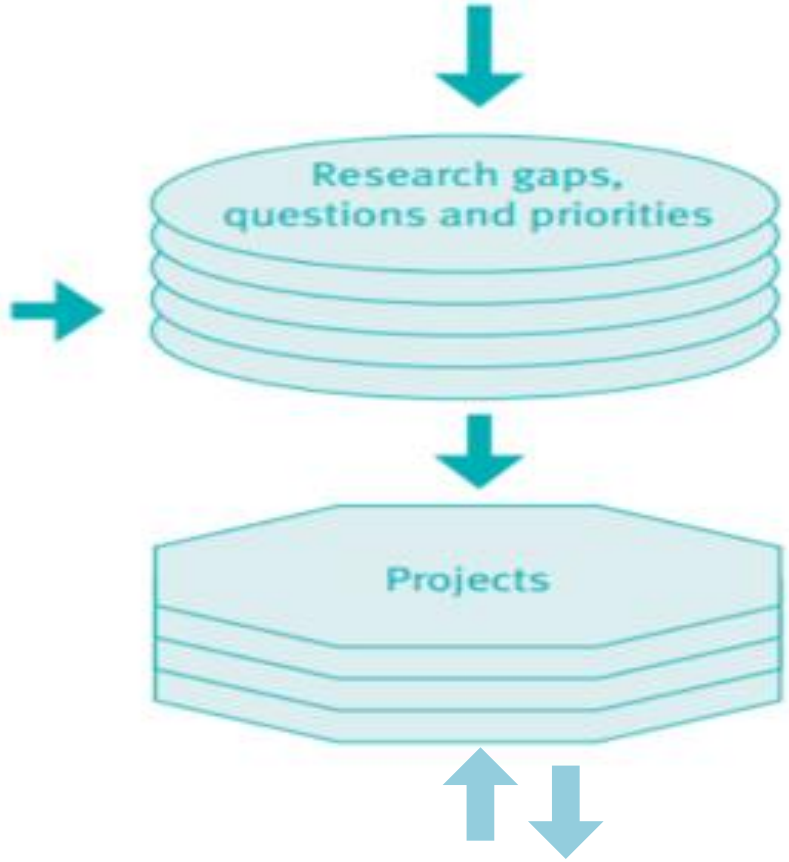
Status of water quality

Theme 1: Water pollution - the hydrological cycle (and interlinkages) and water quality & quantity variability

Theme 2: Water quality status – indicators & emerging chemical and microbial pollutants of concern

Theme 3: Methods for detection, quantification and monitoring of pollutants;

Theme 4: Models WQ assessment, prediction & decision support systems



Water RDI roadmap

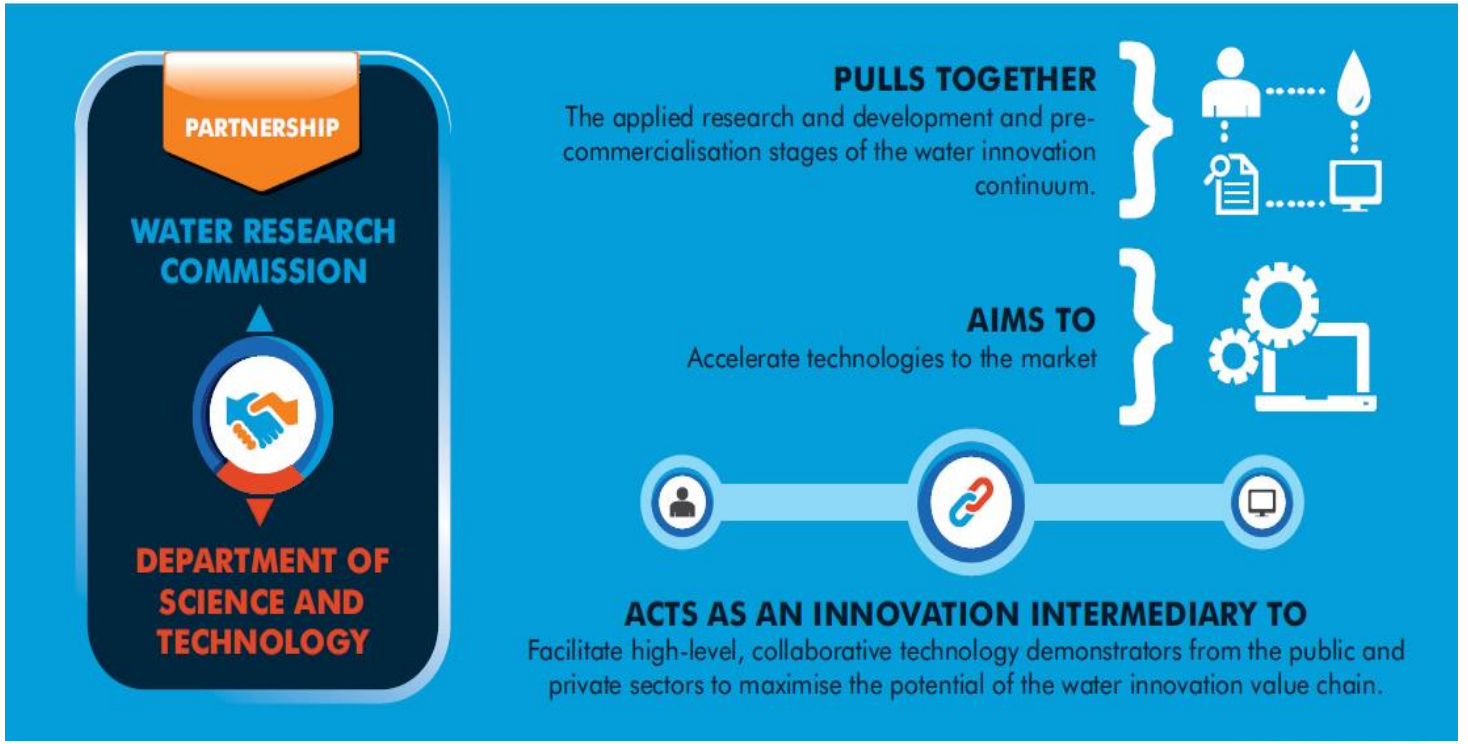
Collaborations, stakeholder consultation, peer review, etc

Solutions

technological, infrastructural, policy/regulatory, management models

Water Technologies Programme - WADER

- Demonstrate water technologies
- Assess the performance, validity, impact and suitability
- Build multi-sectoral and cross-disciplinary partnerships
- Disseminate information widely to promote technology adoption
- Promote and support water entrepreneurship and relevant skills



Example – Deployment of technological innovations

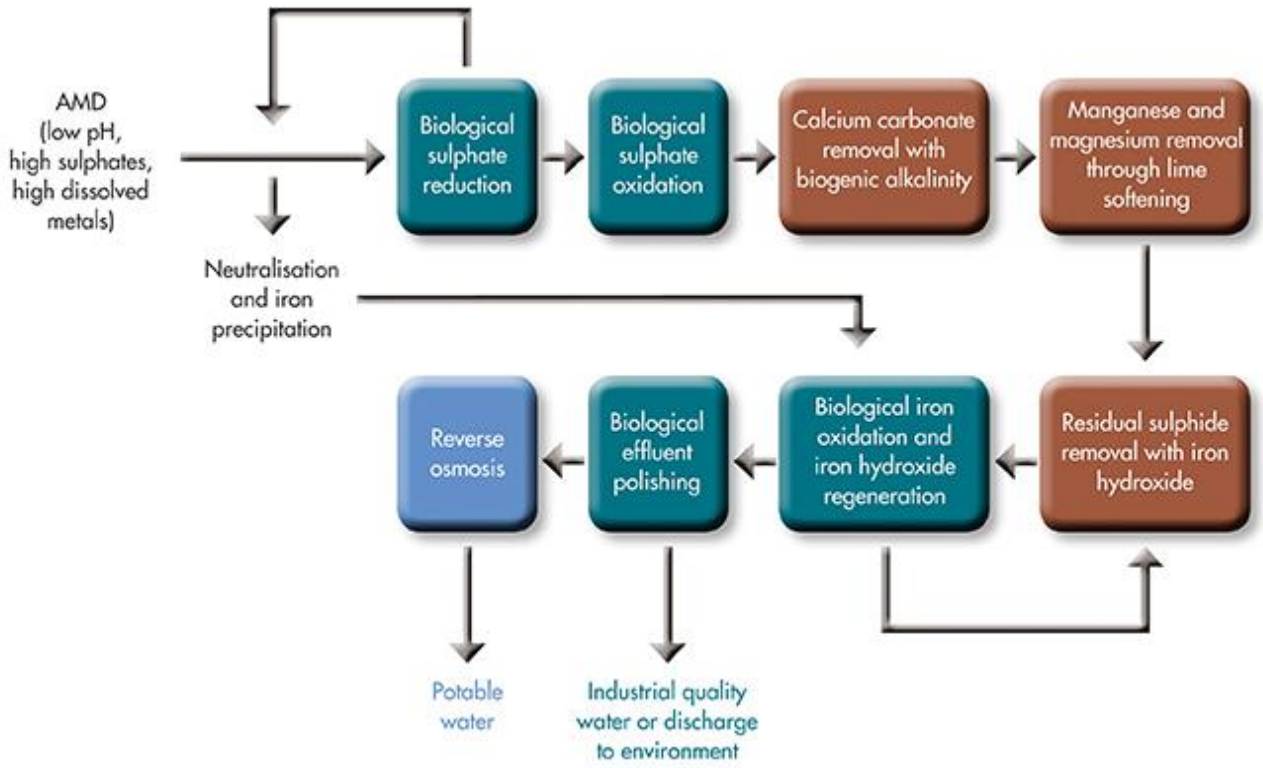
Challenge

- management of the quality of acid mine drainage
- Increase water availability by exploring alternative sources

Responses

- Development of a innovative treatment process

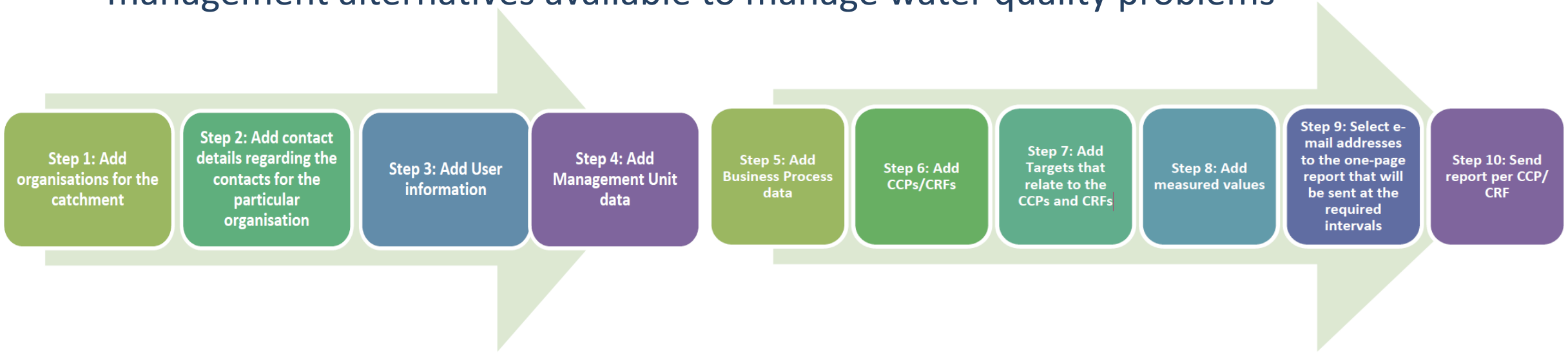
The VitaSOFT Technology Demonstrator



Example – Knowledge to practice

Integrated water quality management model

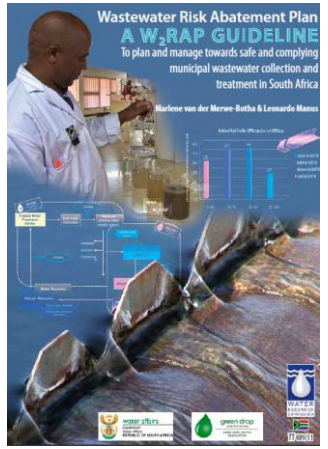
- Research gap – water quality management model for aligning the management of quality of water from catchment to consumer
- Need for a holistic approach involving all interested people
- IWQM promotes innovation and increases the amount of water quality management alternatives available to manage water quality problems



Re-imagine sanitation and wastewater treatment

Knowledge Dissemination and Events

- Dialogues
- Symposiums
- Knowledge Products
  - Technical, science & policy briefs
  - Career Guides
  - Guides /Manuals

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