



# The Future of GIS and Geo-information at drinking water companies

**Bernard Rateman (KWR) & Ferdinand Zoutendijk (PWN)**

**Esri User Conference 2011 San Diego, July 12<sup>th</sup> 2011**

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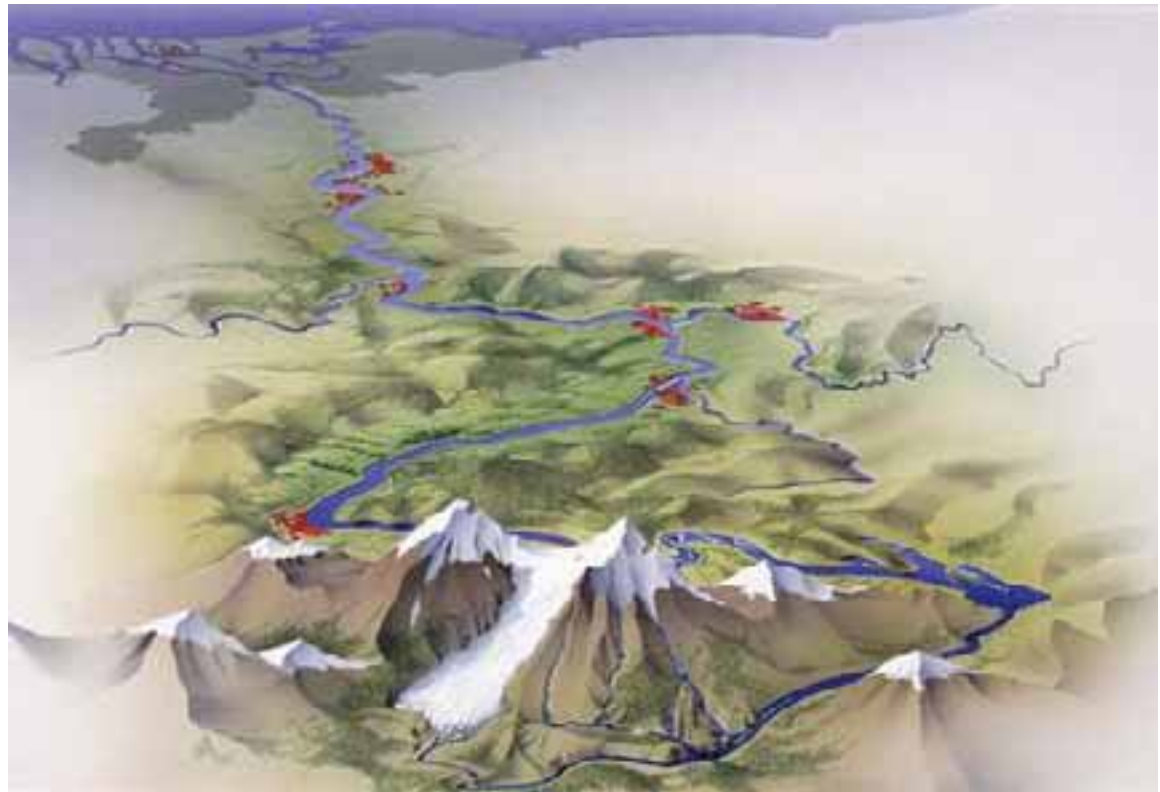


Introduction

Geo-information research

Future of GIS

Applications



# Organisation of the Dutch Water Utilities Sector



Activity	Responsible Institutions	Coverage	Connections	Annual Turnover
Drinking water supply	10 Publicly owned Limited Liability Companies	99.99 %	7.0 million	1,150 million €
Sewerage	418 Municipalities	97.20 %	6.3 million	560 million €
Sewage treatment	25 Water Boards	97.20 %	6.3 million	870 million €

# Dutch water companies

## Example: PWN





# Key figures



## Netherlands

Area: 38,000 km<sup>2</sup>

People: 16.7 million

## Drinking Water

Production: 1,250 million m<sup>3</sup>

Plants: 238

Sources: 60 % groundwater  
40% surface water

Network: 110,000 km

Price: 1.3 Euro/m<sup>3</sup>

## Values:

Safe drinking water at the tap

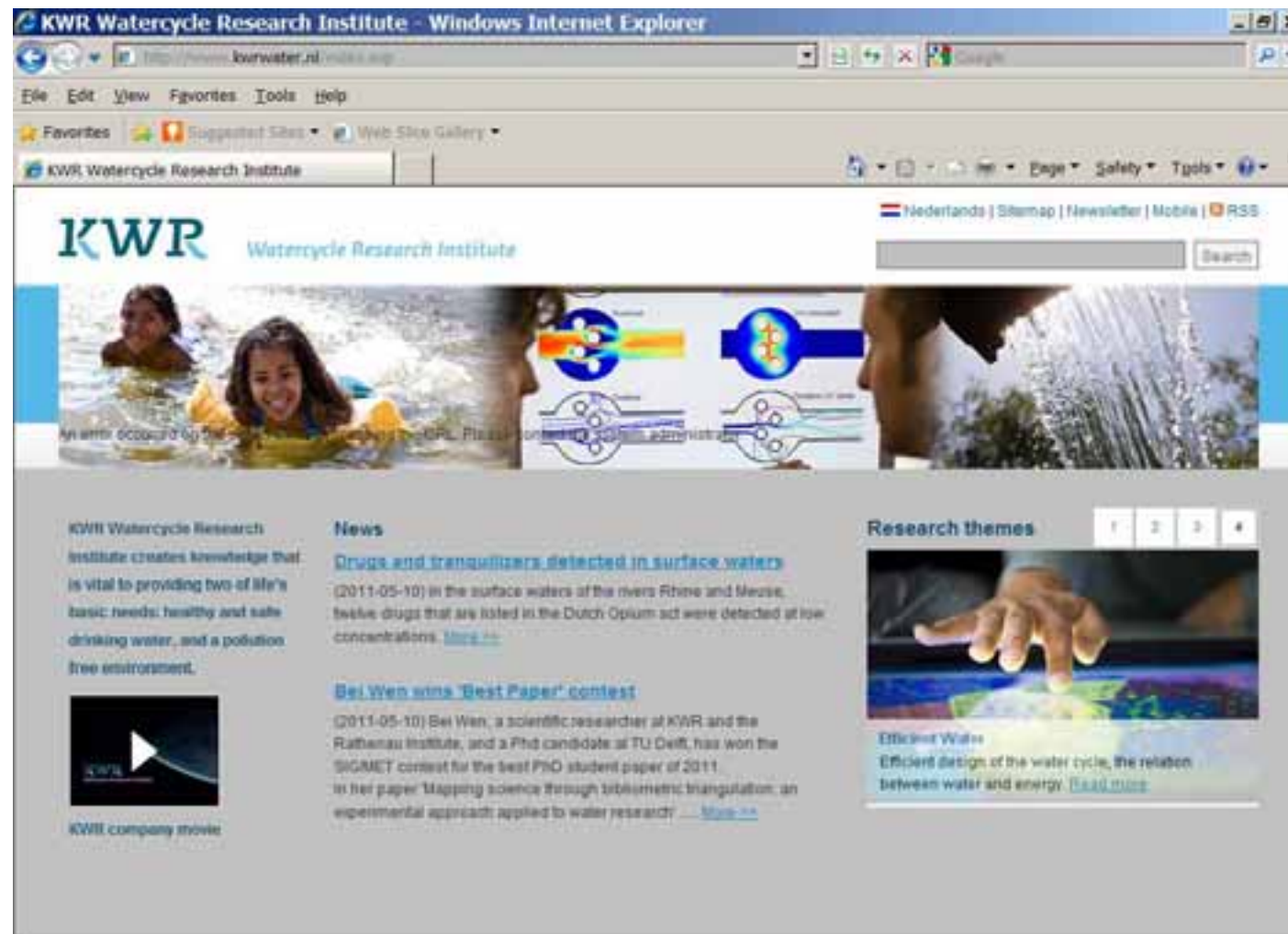
No chlorination

# Vewin

## Association of Dutch water companies



# KWR Watercycle Research Institute





# Integrated water cycle approach is needed



**Water system**



**KWR**



**Sewage**



**Waste water**



**Drinking water**



# KWR conducts research for organisations involved in the watercycle



- (Drinking) water companies
- Waterboards
- Municipalities
- Business
- Provincial and central government

Focus on Applied Research



## Water Quality & Health



**Water Systems**



**Water Technology**

# Laboratories



## Materials Research

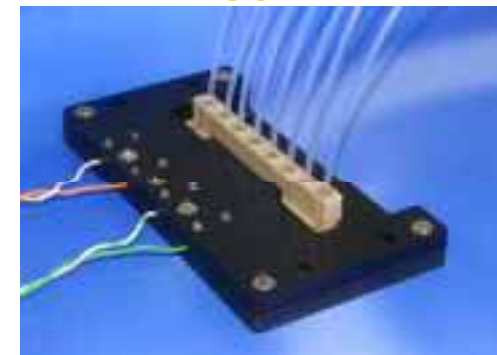


**Test Facility**



**Microbiology**

## Chemical Analysis



**Sensors**

# KWR

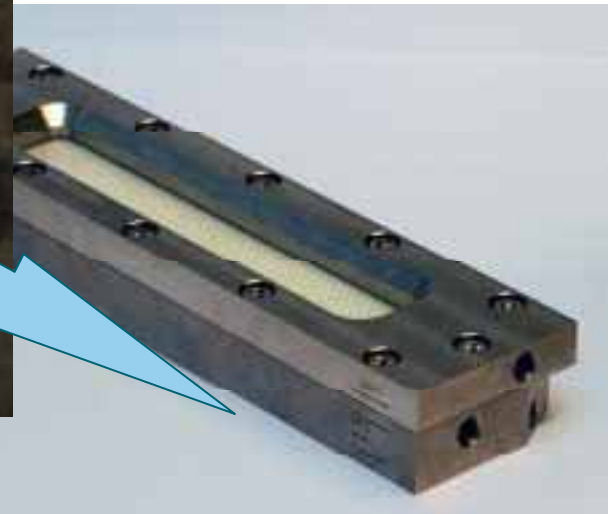
## Bridging Science to Practice



**Full scale**



**Laboratory**





# Challenges for the water sector

## Need for global cooperation



Climate Change

Urbanisation

Emerging Technologies

Ageing Infrastructure

Globalisation

Consumer Involvement

Emerging Pollutants

Energy

The Efficiency Driven Water Sector



Source:



# KWR in a Global perspective

## Innovation and technology development



World	Global Water Research Coalition (GWRC)	<ul style="list-style-type: none"> <li>+ Attuning research</li> <li>+ Joint research</li> <li>+ Emerging issues</li> </ul>
Europe	TECHNEAU, WSSTP	<ul style="list-style-type: none"> <li>+ Joint research from source to tap (19 M€)</li> </ul>
Israel	Joint research project	<ul style="list-style-type: none"> <li>+ SafeWat<sup>®</sup>-system (sensor technology, Decision Support System)</li> </ul>
Singapore	Joint research program	<ul style="list-style-type: none"> <li>+ Source to tap</li> <li>+ Reservoir management</li> <li>+ OMBr<sup>®</sup> reactor</li> <li>+ Distribution network</li> </ul>
China	Joint research program	<ul style="list-style-type: none"> <li>+ Early Warning System</li> <li>+ Lp-UV-OC<sup>®</sup> reactor</li> </ul>
USA	AwwaRF / Joint research program	<ul style="list-style-type: none"> <li>+ Joint research Program</li> <li>+ Lp-UV-OC<sup>®</sup> reactor</li> </ul>

## Value of Geo-information and GIS for water companies

2009: Inventory and Vision

2010: Focus on promising developments

- Mobile GIS
- Geoservices
- Augmented Reality

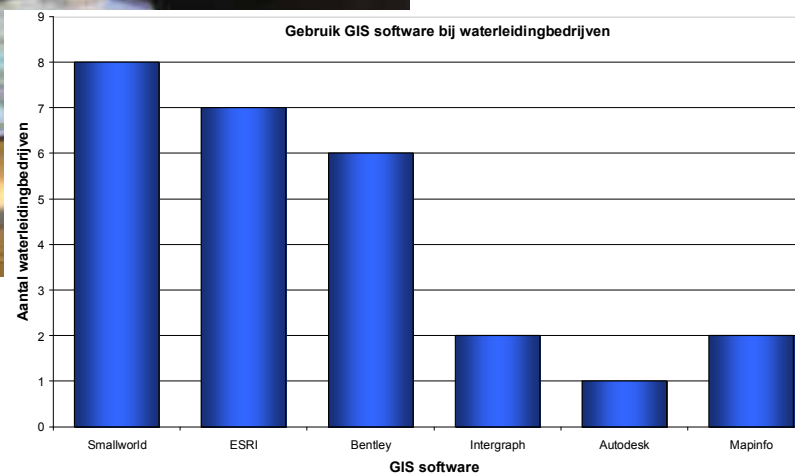
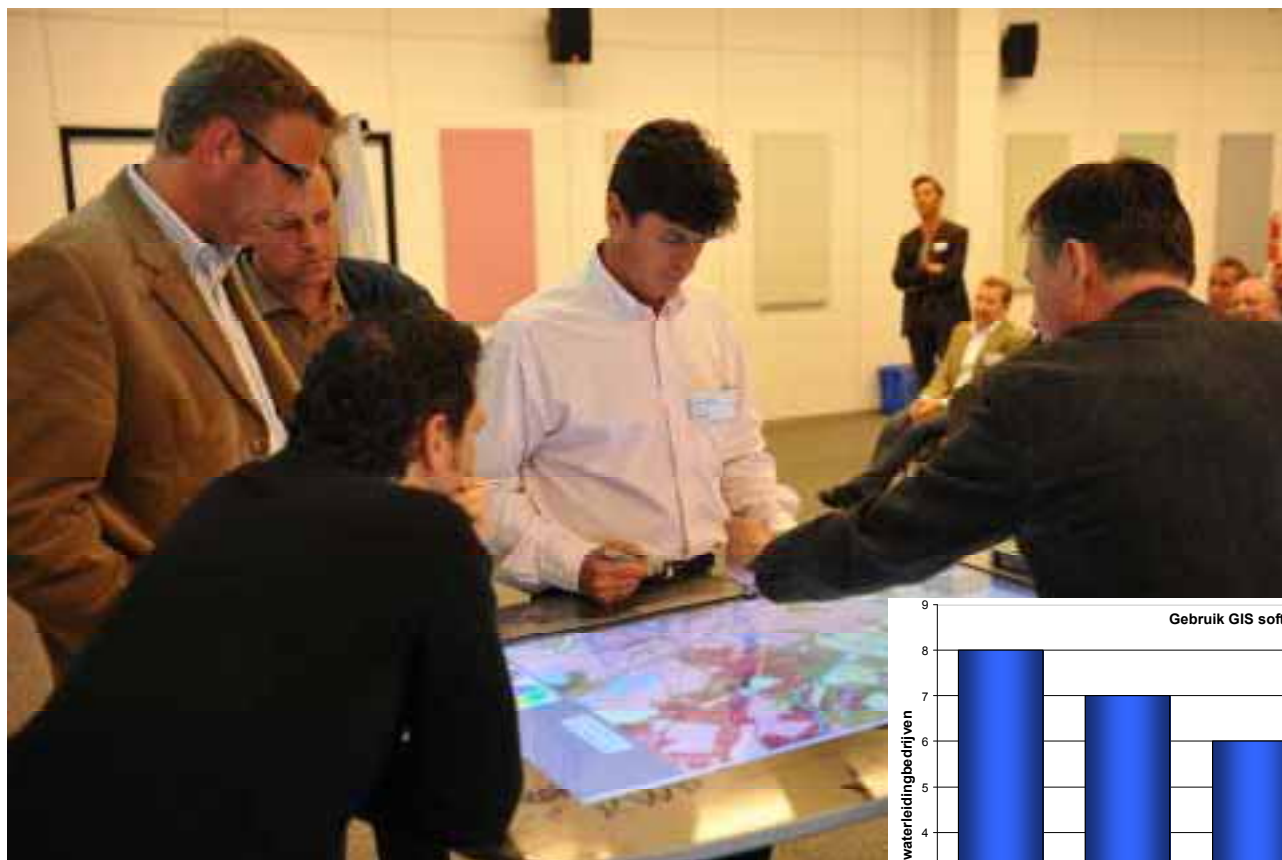
### *GIS Study Trip (July 2011)*

2011/2012: *Pilot projects*

- 3D GIS subsurface
- Analysis of failures
- AR for networks



## 2009: Identify the need for Geo-information



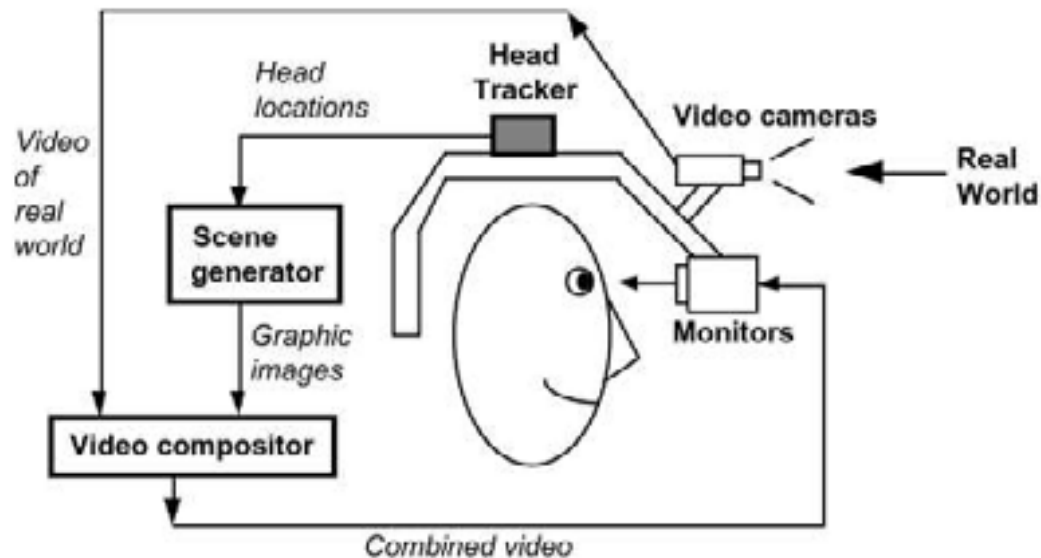


## 2010: Investigate promising developments



### Mobile GIS – extended by

- Geoservices (medium term)
- Augmented Reality (long term)



# Future of GIS:

## Geoservices Towards a NSDI



# Future of GIS: Geoservices



## Water companies:

- May use available geoservices (WMS/WFS) in work processes
- Can create and distribute own geoservices
  - Fire hydrants
  - Maintenance work
  - Real estate
  - Ground water protection areas
  - Water use / water quality
  - Customer information



## Future of GIS:

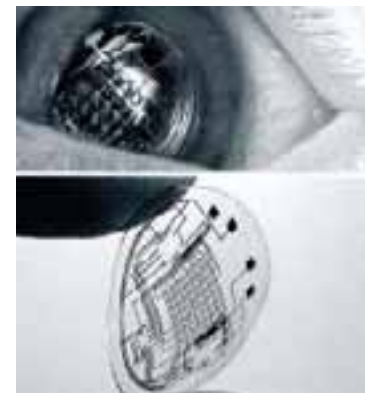
## Augmented Reality levels



- Physical World Hyper Linking

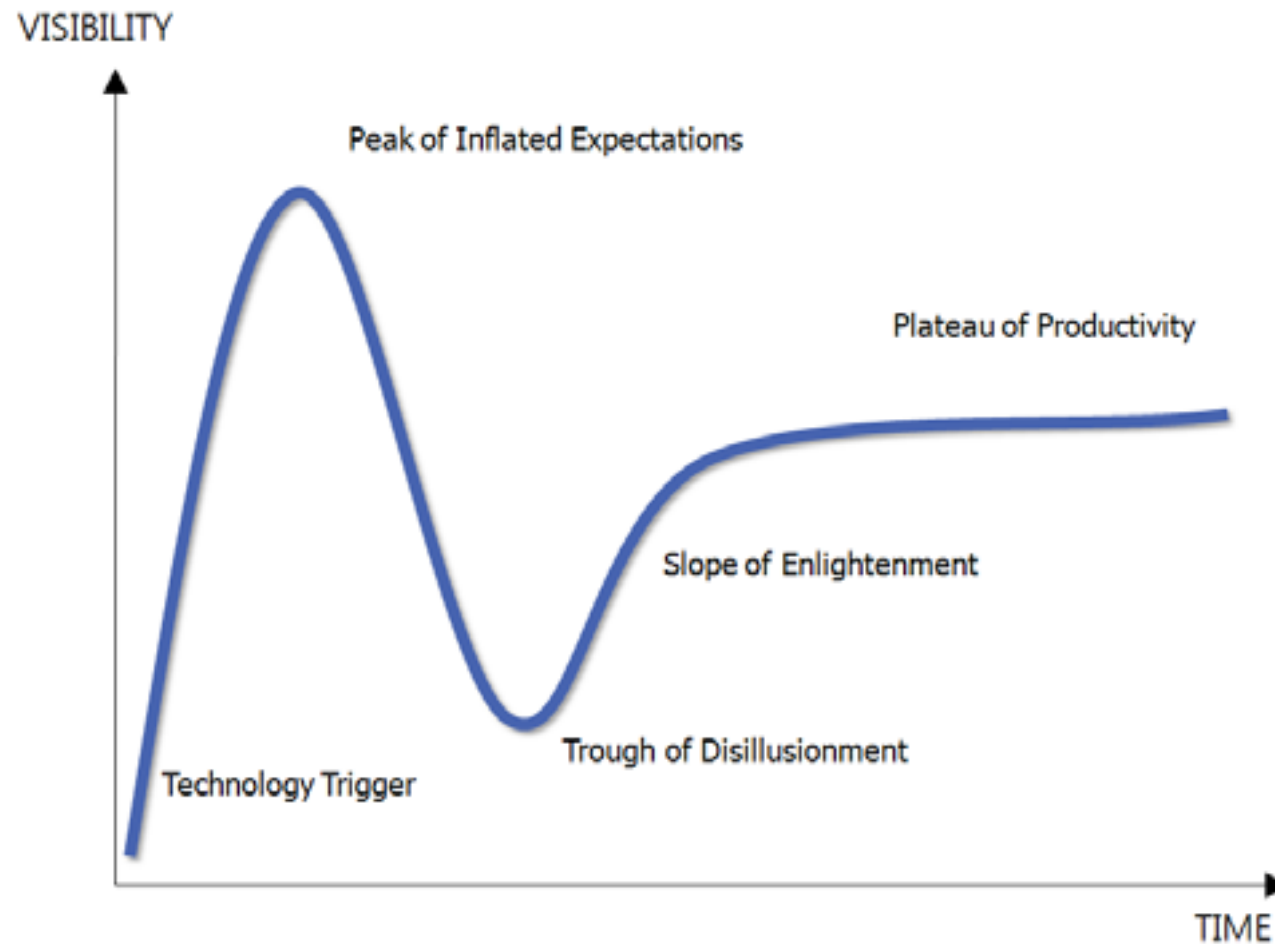


- Marker Based augmented reality
- Markerless augmented reality
- Augmented Vision





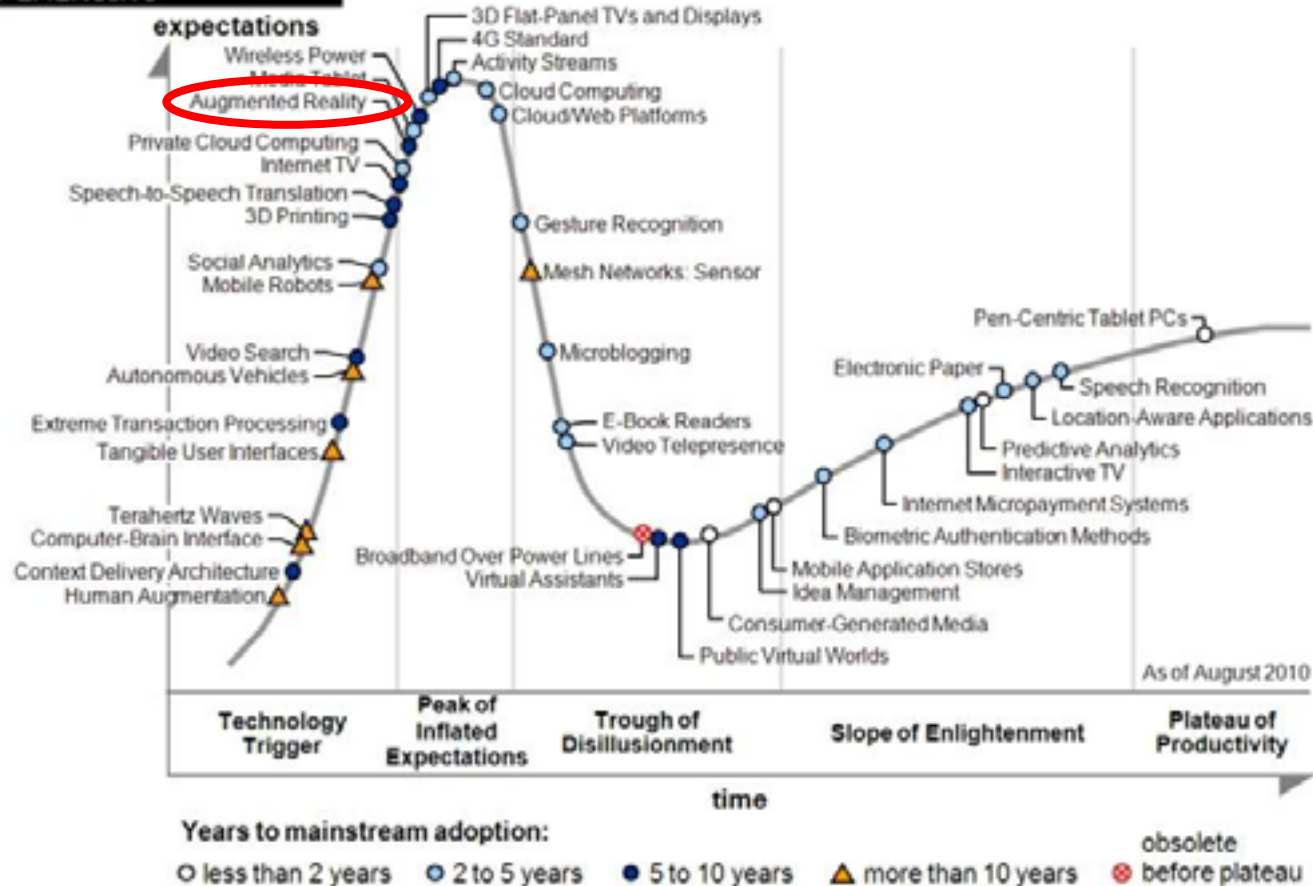
# Phases in technology (Gartner)



# Hype Cycle 2010 (Gartner)



## 2010 EMERGING

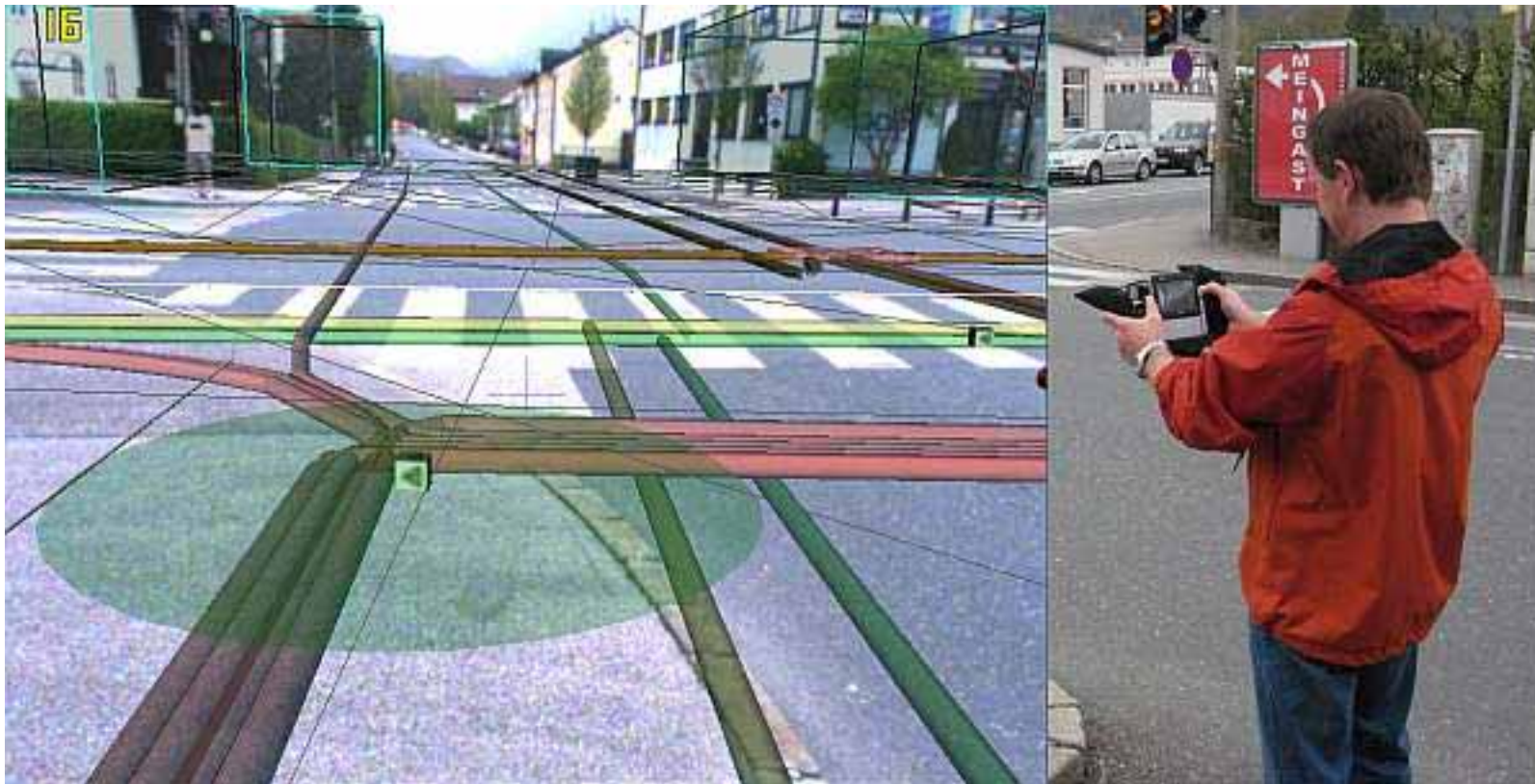


Gartner

# Future of GIS: Markerless augmented reality



Vidente



## Applications: Complexity in the subsurface



Design and  
Maintenance costs





## Applications: Soil Pollution around pipelines



### Risks:

- maintenance
- water safety
- water distribution



## Applications: Leakage of pipes



### Risks:

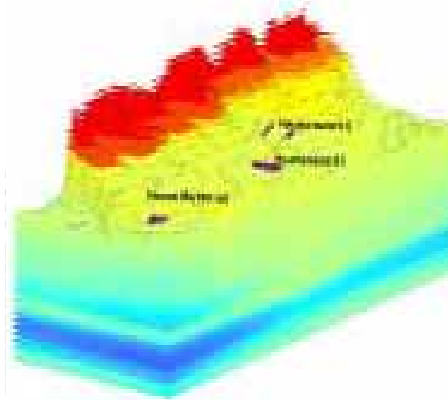
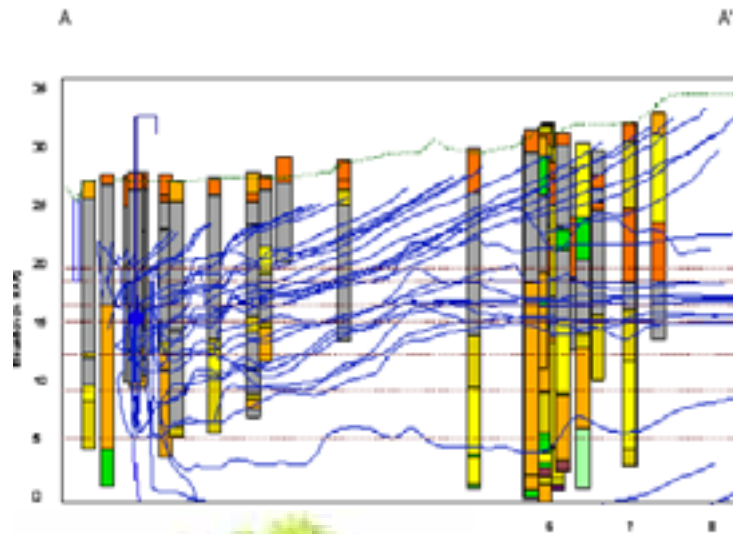
- people safety
- water distribution
- liability



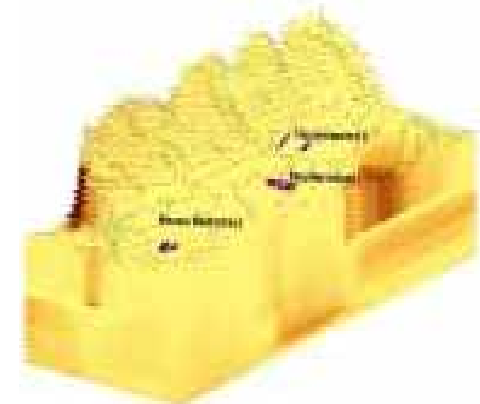
# Applications: Soil Pollution - ground water sources



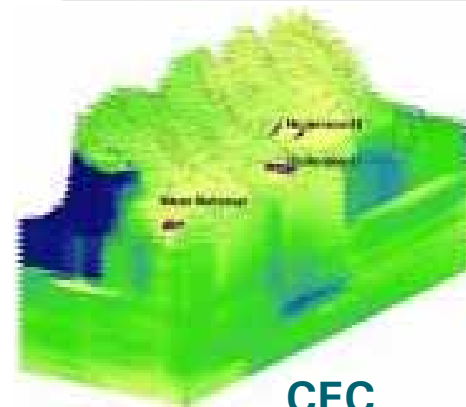
# 3D Modelling Marker based AR



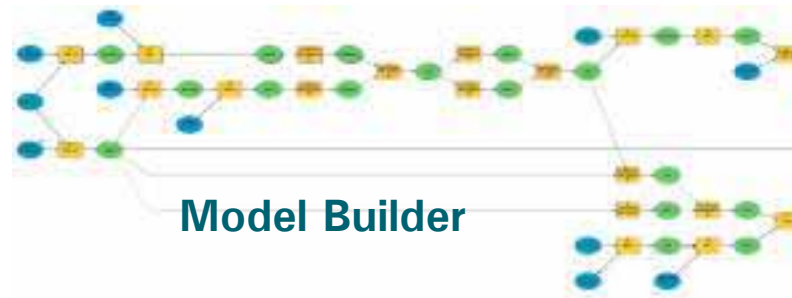
pH



Organic matter



CEC

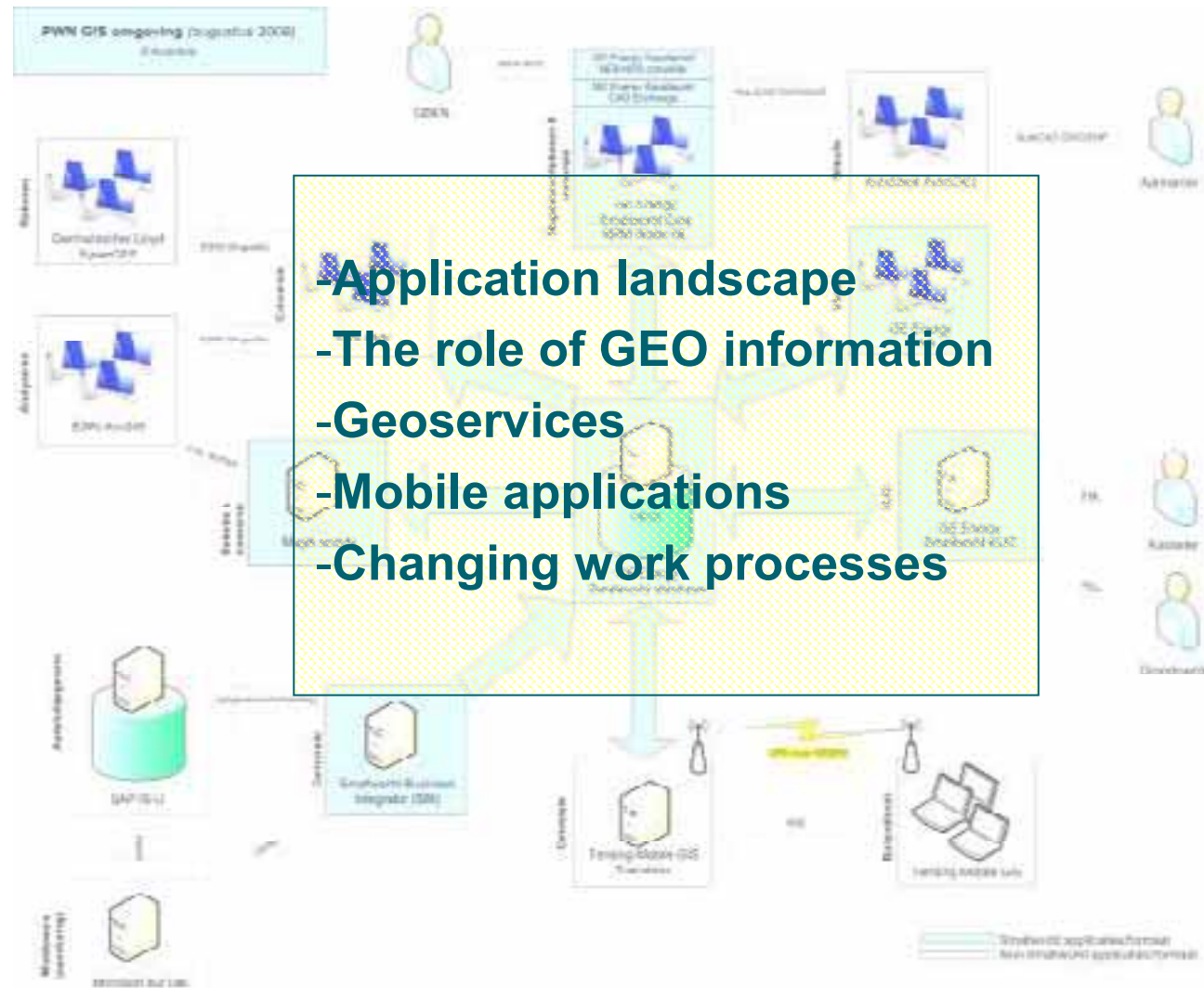


Model Builder



# PWN

## Preparing for the future





# Geo-information Research The Road Ahead



## Value of Geo-information and GIS for water companies

2009: *Inventory and Vision*

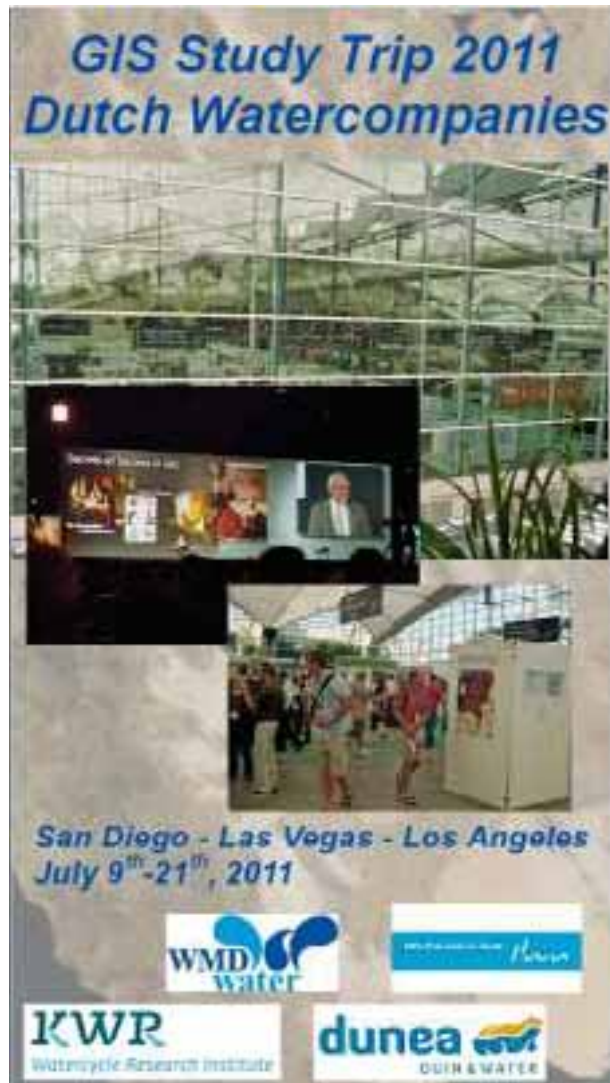
2010: *Focus on promising developments*

### ***GIS Study Trip (July 2011)***

2011/2012: Pilot projects

- 3D GIS subsurface
- GIS Analysis of failures in pipelines
- AR for network design and maintenance

# GIS Study Trip



## **Petra Holzhaus**

“Building an Enterprise GIS System for Waterleidingmaatschappij Drenthe, Netherlands (WMD)”  
GIS for Water - Wednesday, July 13, 2011  
Time: 3:15 PM - 4:30 PM Room 24 B

## **Marjolijn Brasz**

“Geo enterprise architecture in a best of breed application landscape”  
Enterprise GIS - Wednesday, July 13, 2011  
Time: 3:15 PM - 4:30 PM - Room 27 A

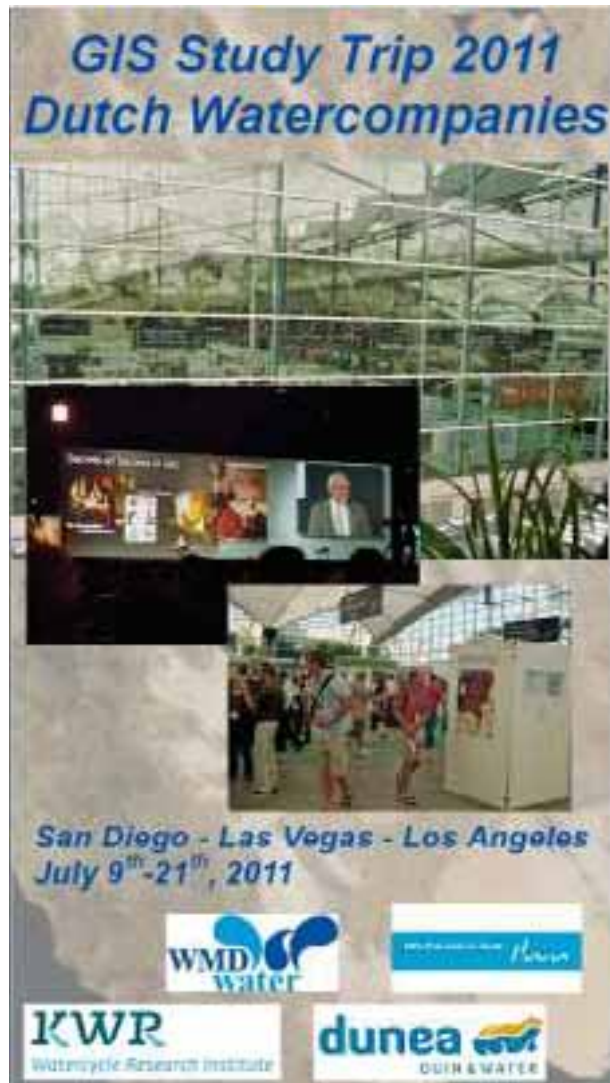
## **Rob de Bont**

“The development of a vision on Geo-information 2015 at Dunea”  
Enterprise GIS - Wednesday, July 13, 2011  
Time: 3:15 PM - 4:30 PM - Room 27 A

## **Ferdinand Zoutendijk**

Pipelines in Polluted Soil  
Map Gallery

# GIS Study Trip



## 4 Company Visits

- Olivenhain Municipal Water District
- Las Vegas Valley Water District
- Cucamonga Valley Water District
- Southern California Edison

## Workshops

- Evaluation of the User Conference
- Closing meeting



# Thank you for your attention

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