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Regulation Enhancement with the use of ICT for the Environmental Management and Monitoring of Waste Water Treatment Plants

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ACORN Research Centre LIT

ICT for Environmental Regulation
NUI Galway June 20th-21th 2013

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Overview

- Discuss relationships between Monitoring, Management and Regulation
- Present Case Studies in Waste Water Treatment Plant aided by ICT
- Examine how the Case Studies can enhance Regulation ?
- Discuss the challenges of Regulation

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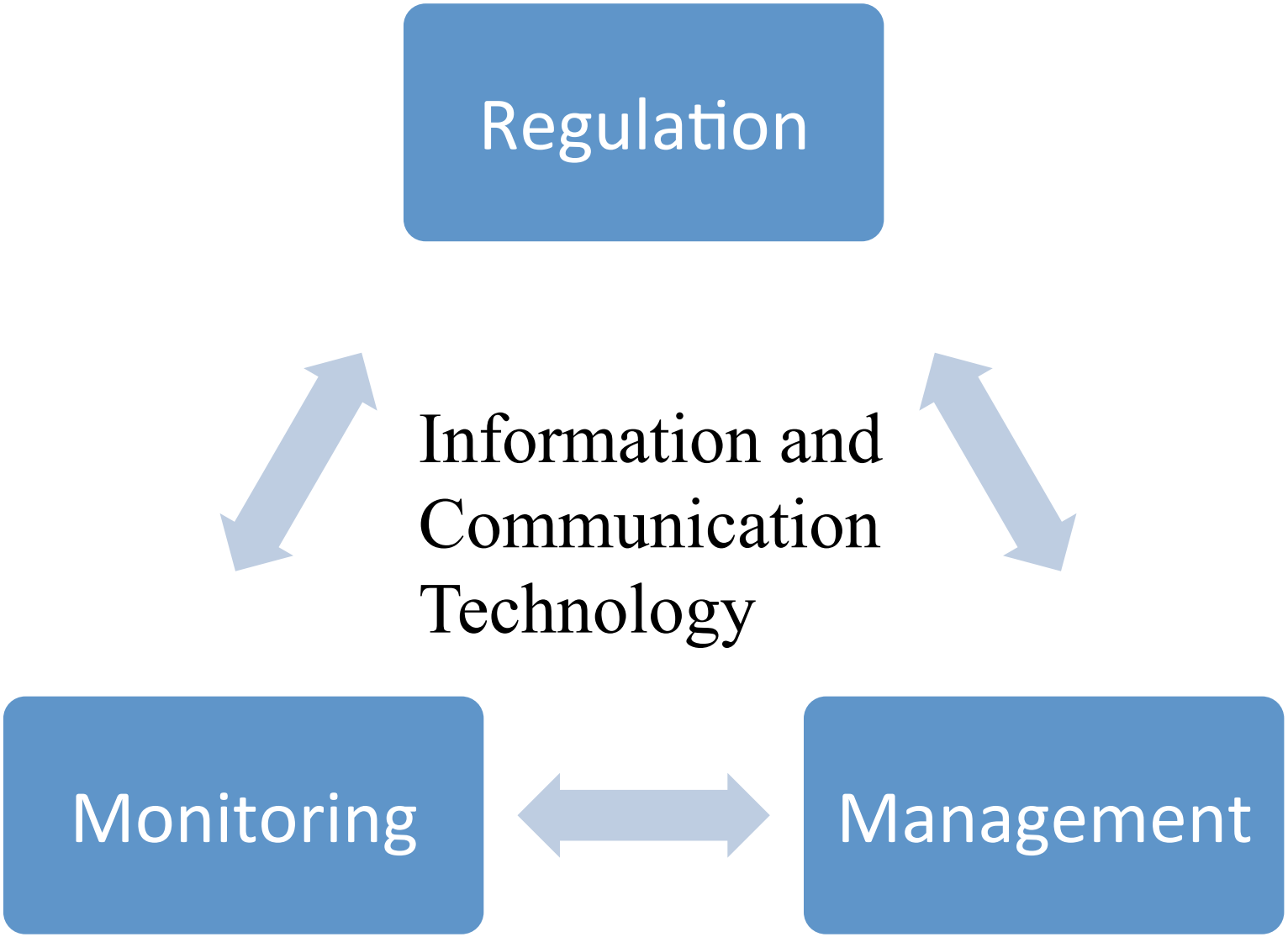

		Regulation including statutory instruments (SI)
12	2001	Water Quality (Dangerous Substances) Regulations, 2001
254	2001	Urban Wastewater Treatment Regulations, 2001
267	2001	Waste Management (Use of Sewage Sludge in Agriculture)(Amendment) Regulations, 2001
213	2003	European Communities (Protection of Waters against Pollution from Agricultural Sources) Regulations, 2003
722	2003	European Communities (Water Policy) Regulations, 2003
440	2004	Urban Waste Water Treatment (Amendment) Regulations, 2004
787	2005	European Communities (Waste Water Treatment) (Prevention of Odours and Noise) Regulations, 2005
684	2007	Waste Water Discharge (Authorisation) Regulations, 2007
272	2009	EC Environmental Objectives (Surface Water) Regulations, 2009
9	2010	EC Environmental Objectives (Groundwater) Regulations, 2010
32	2010	Waste Management (Registration of Sewage Sludge Facility) Regulations, 2010
48	2010	Urban Wastewater Treatment (Amendment) Regulations, 2010
231	2010	Waste Water Discharge (Authorisation) (Amendment) Regulations, 2010

PRTR Pollution release and transfer register

Environmental Management and Monitoring
Limerick City Main Drainage

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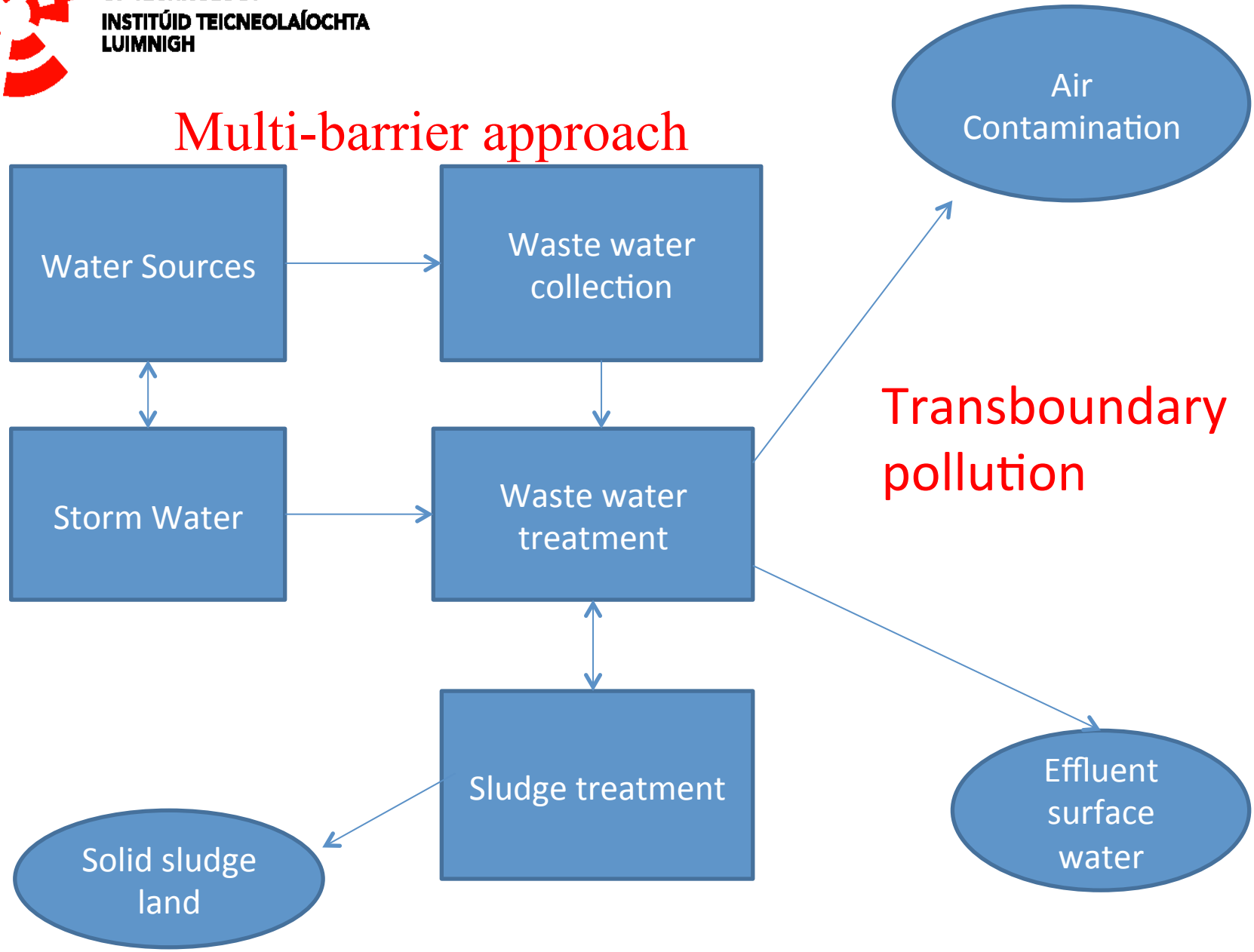
Multi-barrier approach



Transboundary pollution

Our Clean water is only as good as our waste water monitoring and management which is guided by regulation

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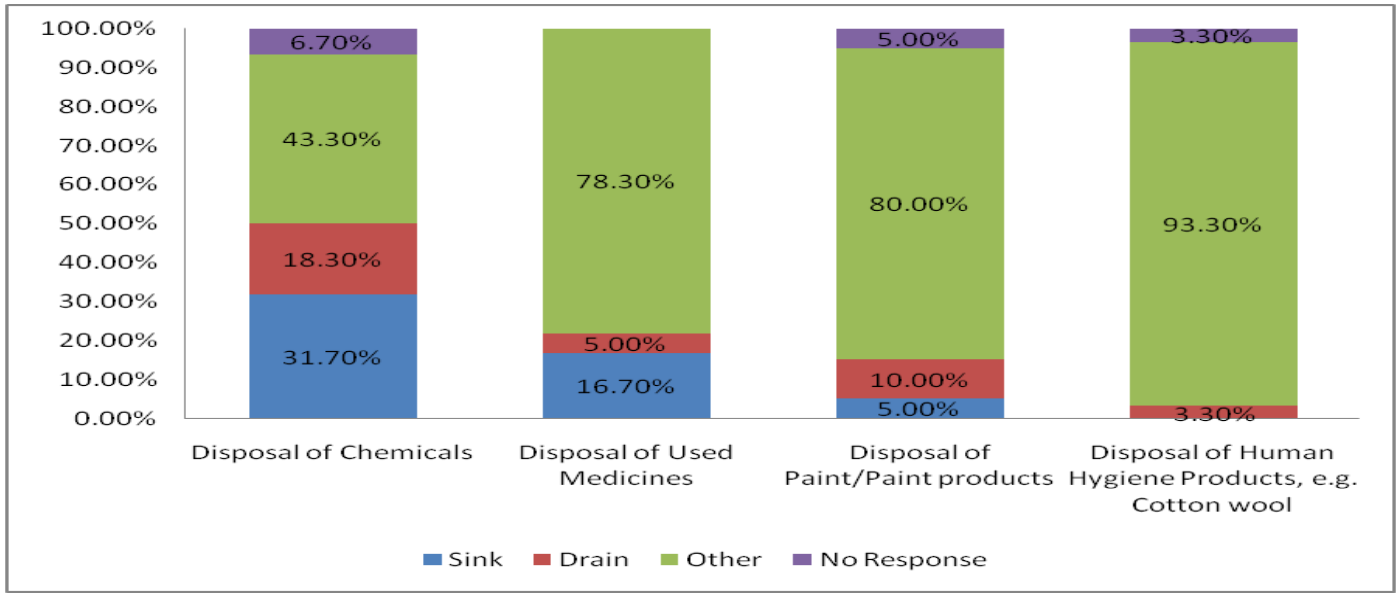
Case Study 1

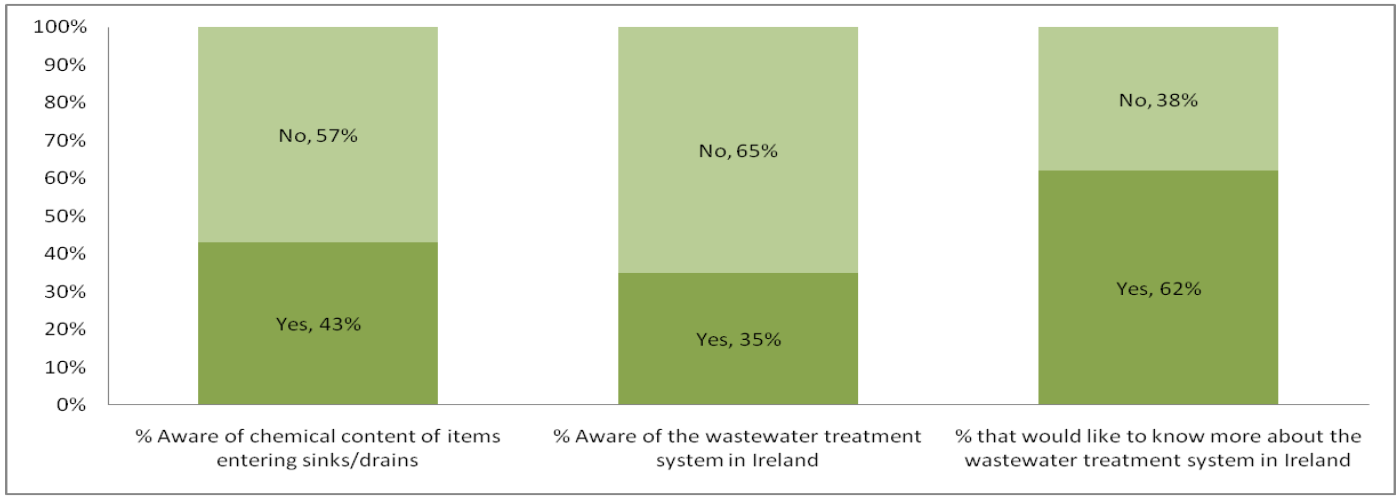
The development of a quality Management System with the aid of Information Technology

- Survey research
- Present Monitoring and compliance
- Management system design

Survey Trends General Public

N= 60





Survey Waste Water Treatment Plants Distributed to water services Departments (n= 16)

Training & Staffing Issues
Plant and/or Mechanical Issues
Infiltration
Financial & Administrative Issues
Stormwater & Seasonal Variations
Fats, Oils & Grease

Software Design What is desired

WWTP Quality Management System

Welcome Niamh Devane

WWTP Quality Management System

This Site: WWTP Quality Mana

WWTP Quality Management System | Inlets | Primary | Secondary | Tertiary | Sludge | Outflow

View All Site Content

Monitoring
- Online Readings
- Offline - Analysis Forms
- Offline - Analysis Reports

Compliance
- Offline - Compliance Forms
- Offline - Compliance Reports
- Limits

Maintenance
- Offline - Maintenance Forms
- Offline - Maintenance Reports

Reports
- Report Builder

Scheduled Activities
- Upcoming Activities

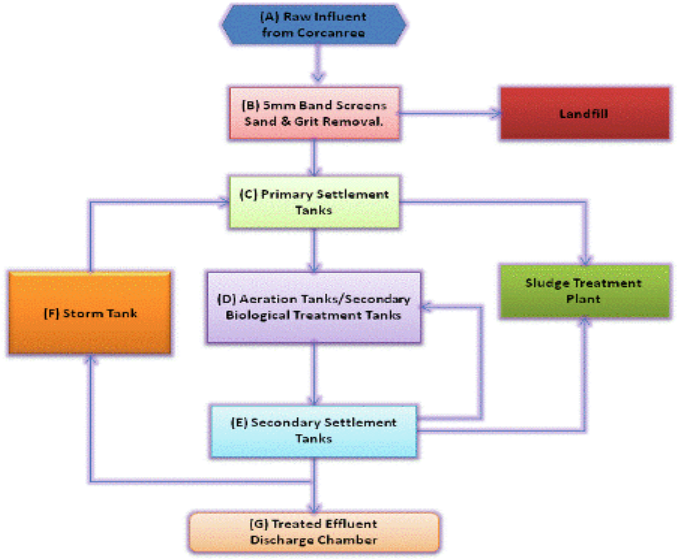
Welcome to the Limerick Wastewater Treatment Plant

The Limerick Main Drainage Scheme is a major environmental and infrastructural project, which enables **Limerick City and its environs** to provide for the domestic, industrial and commercial development of the area well into the new millennium.

The City of Limerick has over **70,000 people** living within a 4km. radius of the city centre. There are over 15,000 households within the city limits and up to a further 6,000 households in counties Clare and Limerick which use the city sewer system. Each household generates on average 150-250 gallons of wastewater per day.

The city drainage infrastructure covers some 30km2. The project has significantly upgraded the existing sewer network and pumping facilities. The new system is linked to a **state-of-the-art waste water treatment plant**, thereby eliminating untreated discharges to the Shannon and Abbey Rivers from Limerick. The **€300 million investment** has improved river water quality in the whole area, from Parteen in Co. Clare to the Shannon Estuary.

Limerick WWTP - Process Flowchart



Plant Statistics

- P.E: 130,000
- Primary & Secondary Treatment

Aerial View of the Plant

Contact Details

Links

- EPA

Done | Internet | 100%

Inlets

Monitoring
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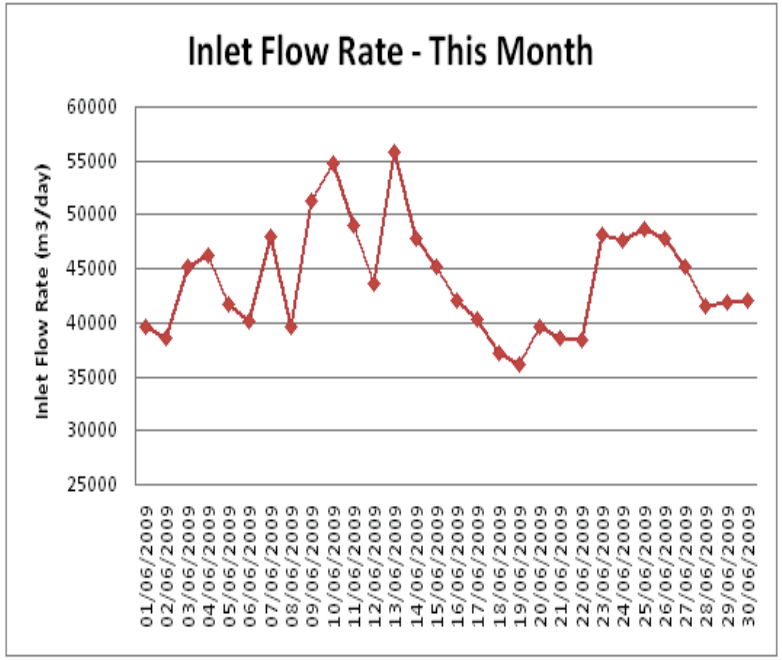
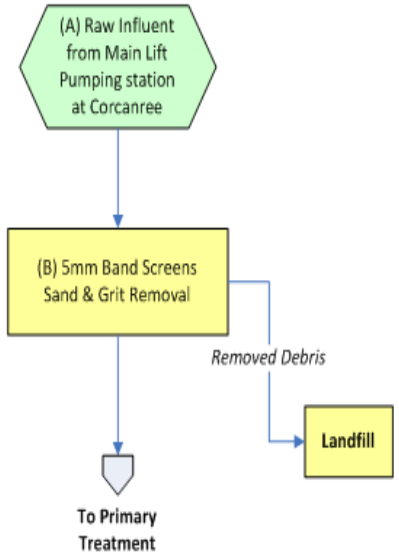
Limerick WWTP Inlets

Hydraulic Load:
Dry Weather Flow - 29,250 m3/day
Stormwater Storage Capacity - 7,500 m3
Peak Storm Flow - 1800 l/Sec

Raw Sewage Load:
BOD - 7800 kg/day
TSS - 9750 kg/day
TKN - 1560 kg/day



Inlets Process Flowchart



Inlet Screens

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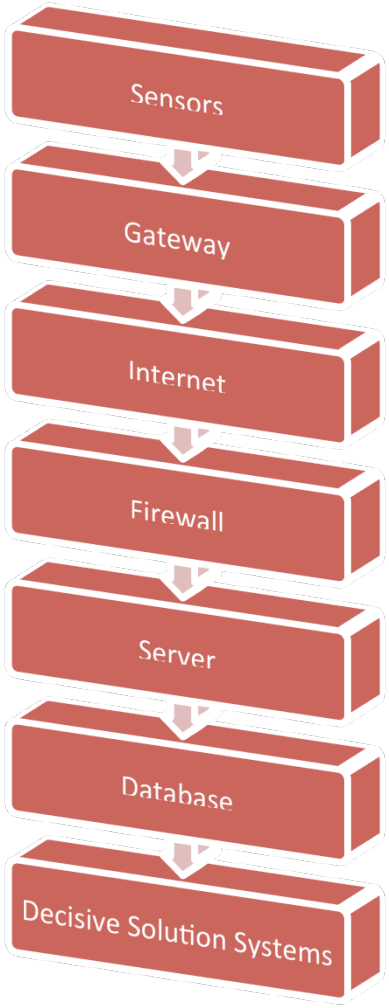
Case Study 2

Wireless monitoring of pH temperature and odours in waste water treatment plant



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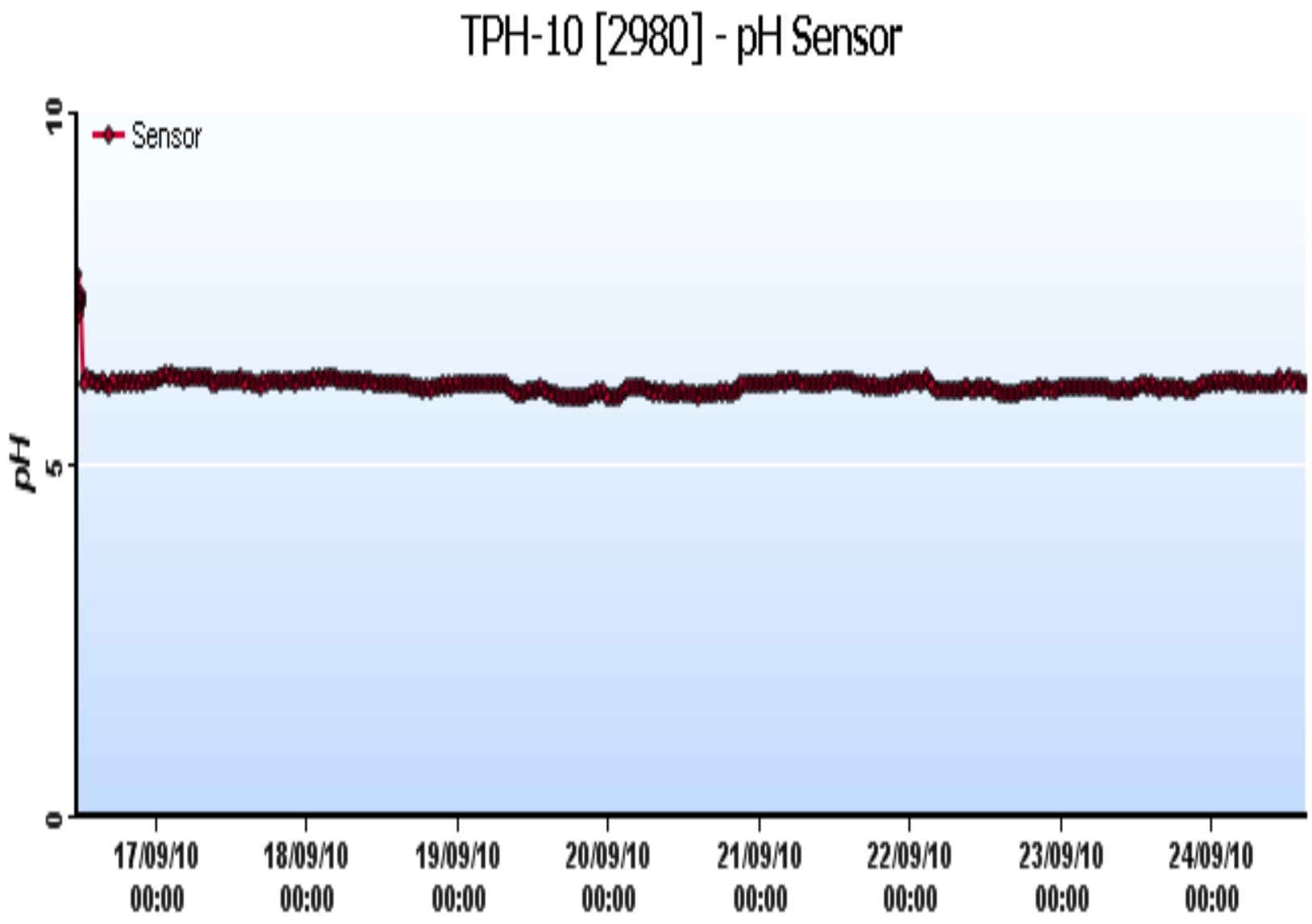
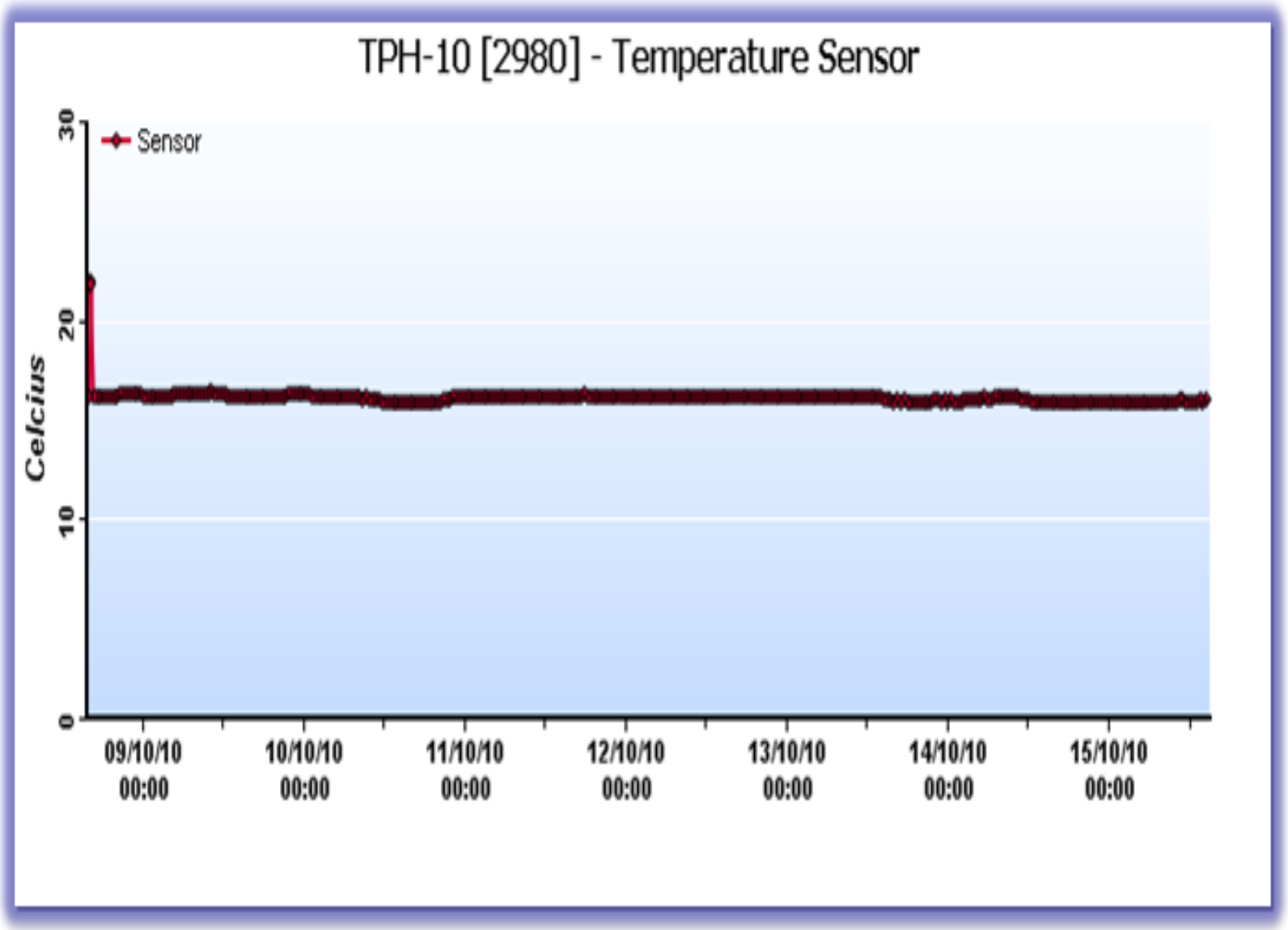
pH and Temperature Sensor

pH and Temperature Wireless Sensor Deployed at Limerick Main Drainage


TPH-10 [2980] - pH Sensor
Sensor
pH
10
5
0
17/09/10 00:00
18/09/10 00:00
19/09/10 00:00
20/09/10 00:00
21/09/10 00:00
22/09/10 00:00
23/09/10 00:00
24/09/10 00:00


TPH-10 [2980] - Temperature Sensor
Sensor
Celcius
30
20
10
0
09/10/10 00:00
10/10/10 00:00
11/10/10 00:00
12/10/10 00:00
13/10/10 00:00
14/10/10 00:00
15/10/10 00:00

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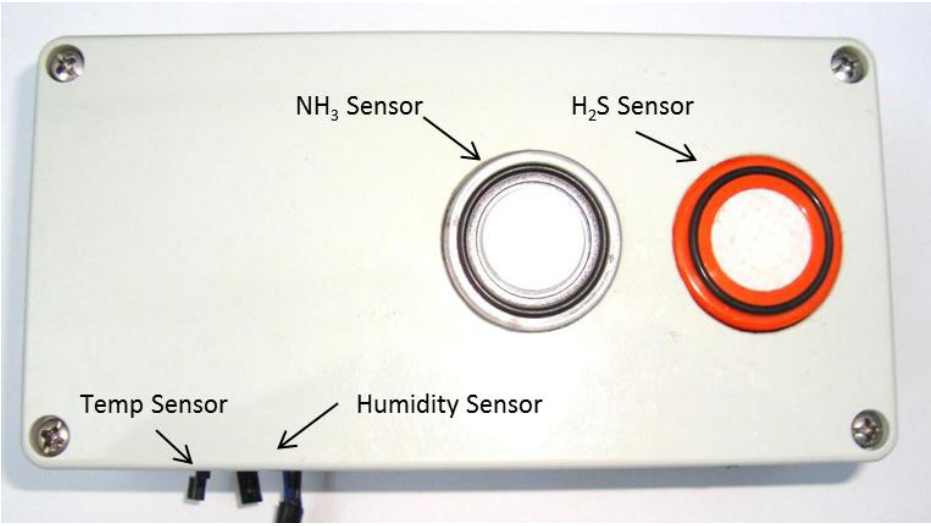
Real-time wireless odour monitors



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Passive sampler for odour

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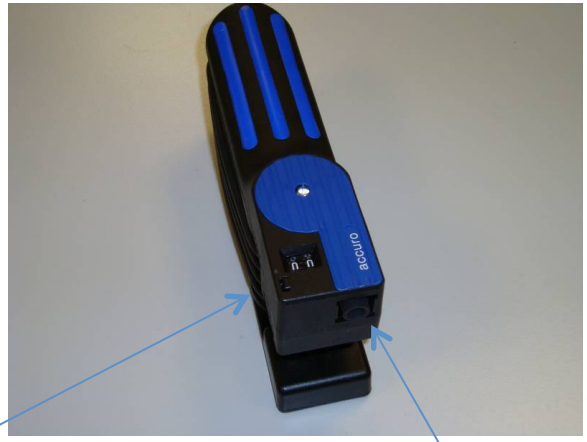
Active sampling



Stroke counter

Inlet

A hydrogen sulphide “Dräger®” colorimetric tube

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Conventional sensors shed and wireless sensors

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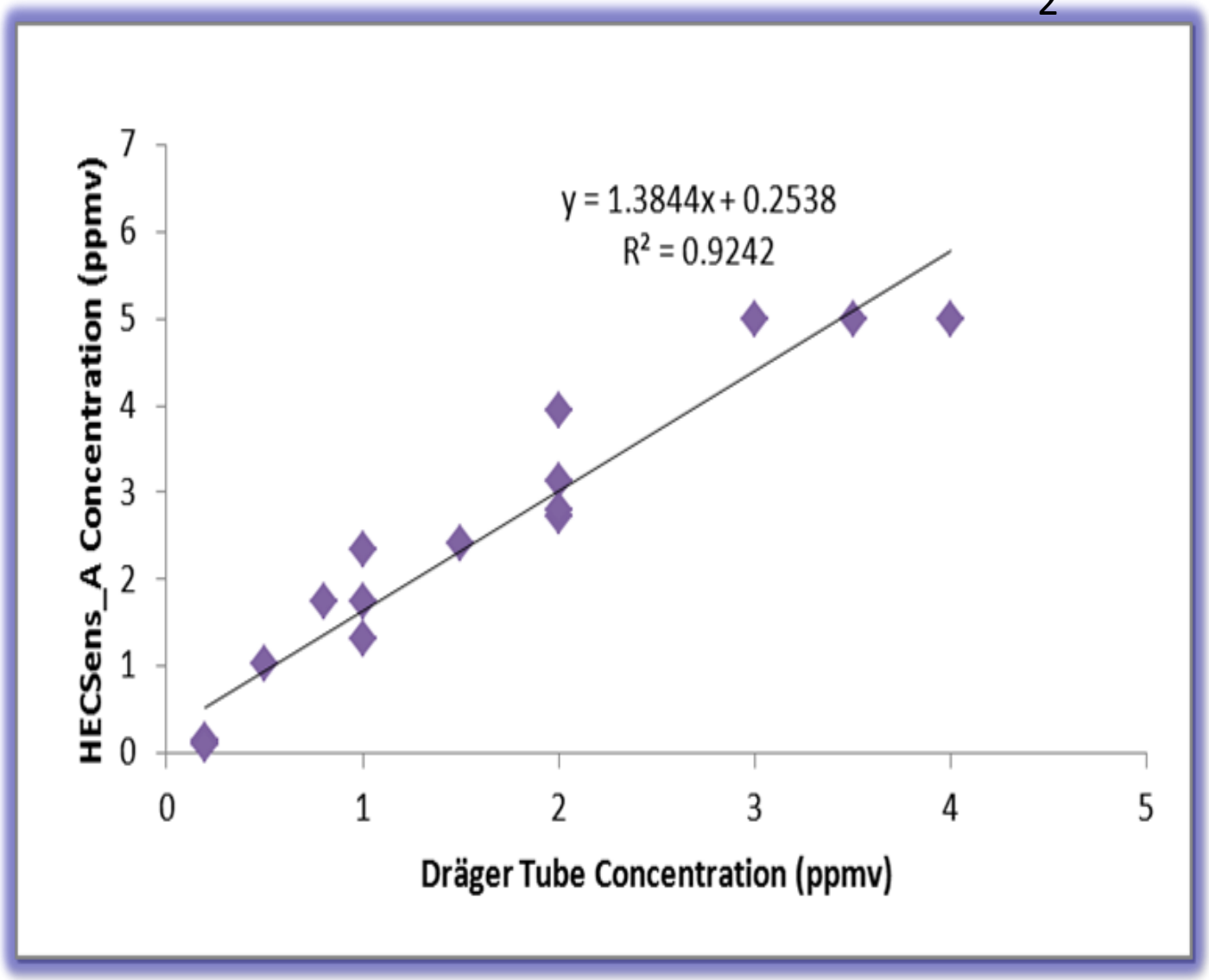
Correlation between Active sampling and analysis and wireless sensor for H_2S



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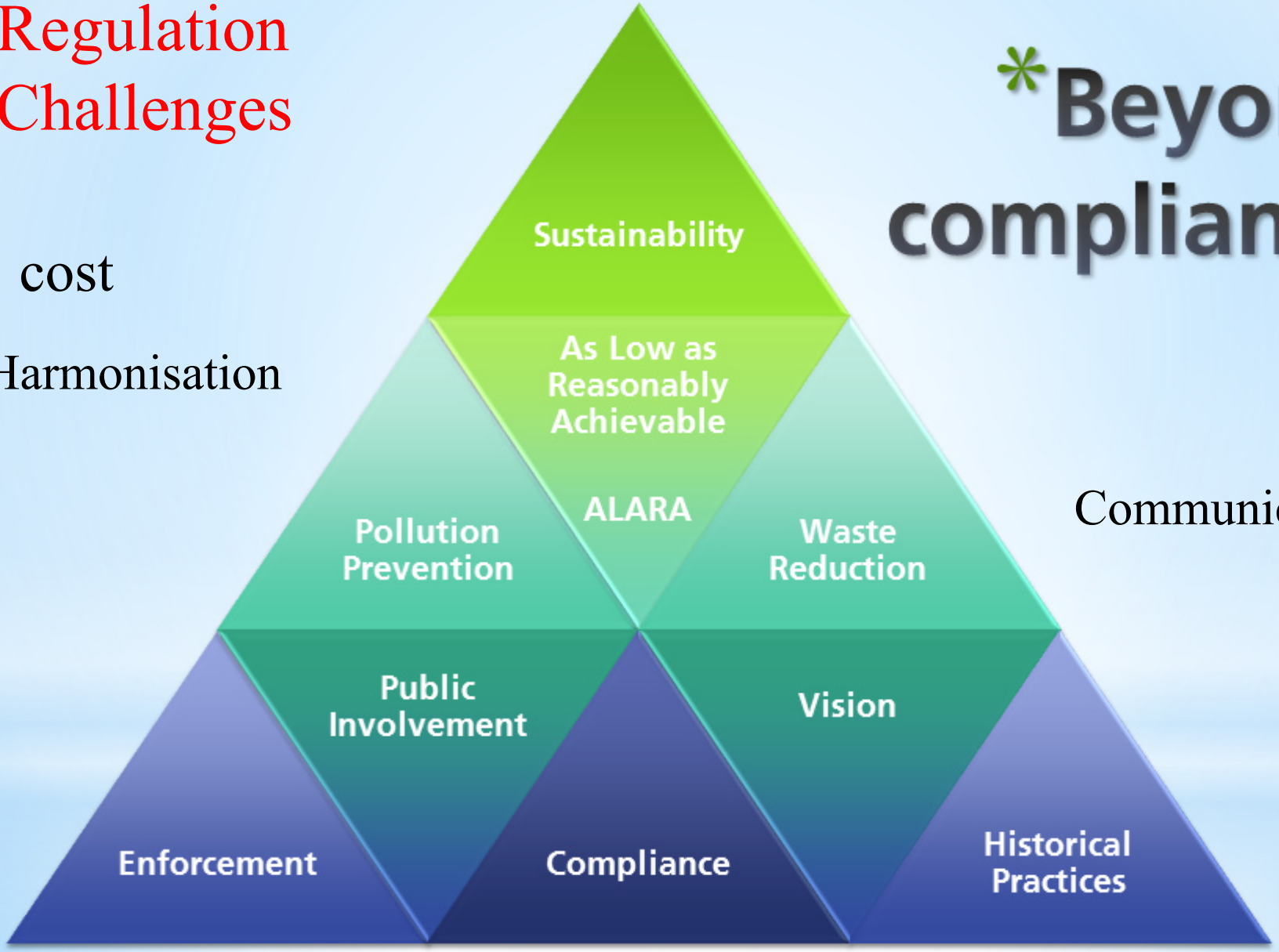
How can Case Studies Enhance Regulation ?

Regulation Challenges

cost

Harmonisation



*Beyond compliance

Communication

http://www.lanl.gov/community-environment/environmental-stewardship/protection/compliance/index.php

Acknowledgments

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