Commercialisation of an Autonomous Phosphate Analyser

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2. EpiSensor Ltd, Moylish Park, Limerick

Environ 2010, Limerick Institute of Technology,

17th - 19th February 2010

Overview

- Motivation
- Prototype System
- Commercial System
- Communications Platform
- Field Trials
- Conclusions

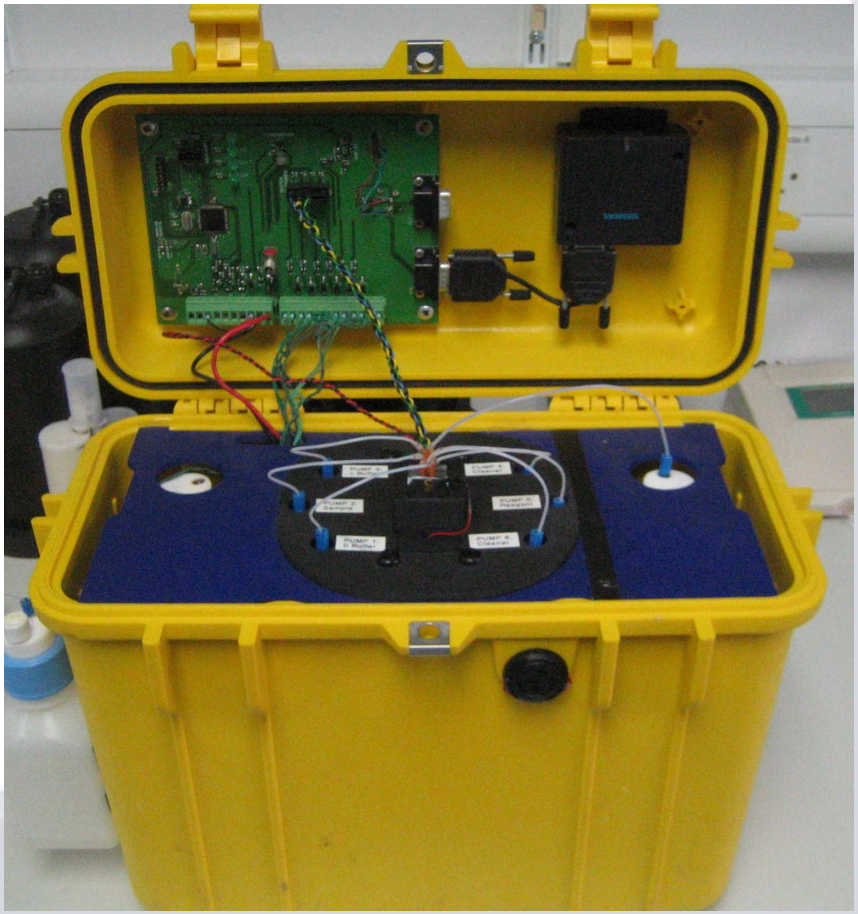
Motivation

- **Phosphates**
- **Manual collection and sampling**
- **Limited spatial & temporal resolution**
- **EU Water Framework Directive[1]**
- **Widespread autonomous sensors**
- **Real-time monitoring**
- **Low cost per measurement**

1. 'Directive 200/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy' , Official Journal L 327/1, Dec. 2000.

Prototype System

- **Portable system[2]**
  - Fluid handling
  - Microfluidic technology
  - Colorimetric detection
  - GSM communications
- **Yellow method for phosphate detection**
- **UV LED and photodiode detector**
- **Two-point calibration**



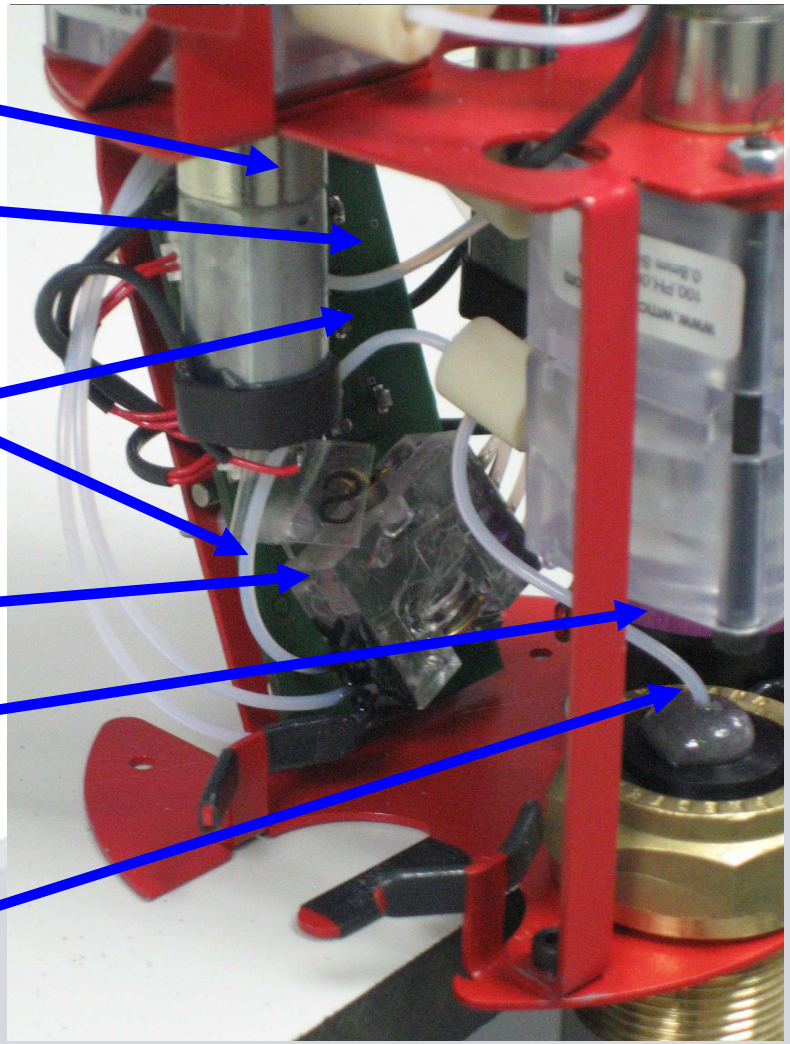
2. C. Slater et al., 'Autonomous field-deployable device for the measurement of phosphate in natural water', in Proc. SPIE, Vol. 6755, 2007.

Commercial System

Prototype System	Commercial System
Component Cost: € Thousands	Component Cost: € Hundreds
Internal Volume: 15L	Internal Volume: 2.3L
System Mass: 12 kg	System Mass: 1.7kg
Battery: 12V Lead Acid	Battery: 3.6V Lithium
Battery Life: 2 months	Battery Life: 12 months
Comms: GSM Modem	Comms: ZigBee Radio
Delayed Reporting	Real time ‘sensor to database’
No Sensor Control	Remote Sensor Control

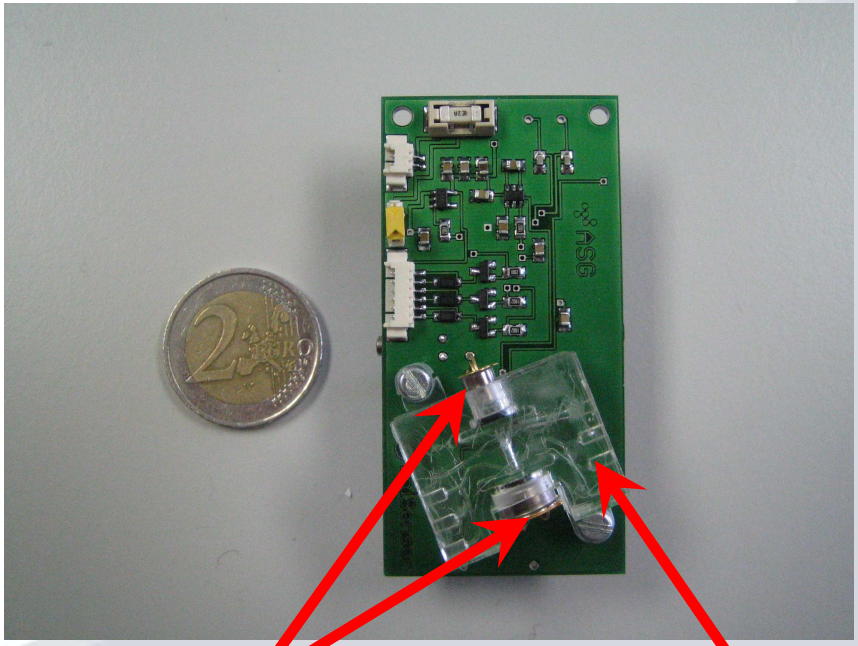
System Design

- Sheet Metal Frame
- Reagent & Standard Bags
- Dual Channel Pumps
- Control Board
- Detection System
- 3.6V Battery
- Sample Inlet(0.45um Filter)



Detection System

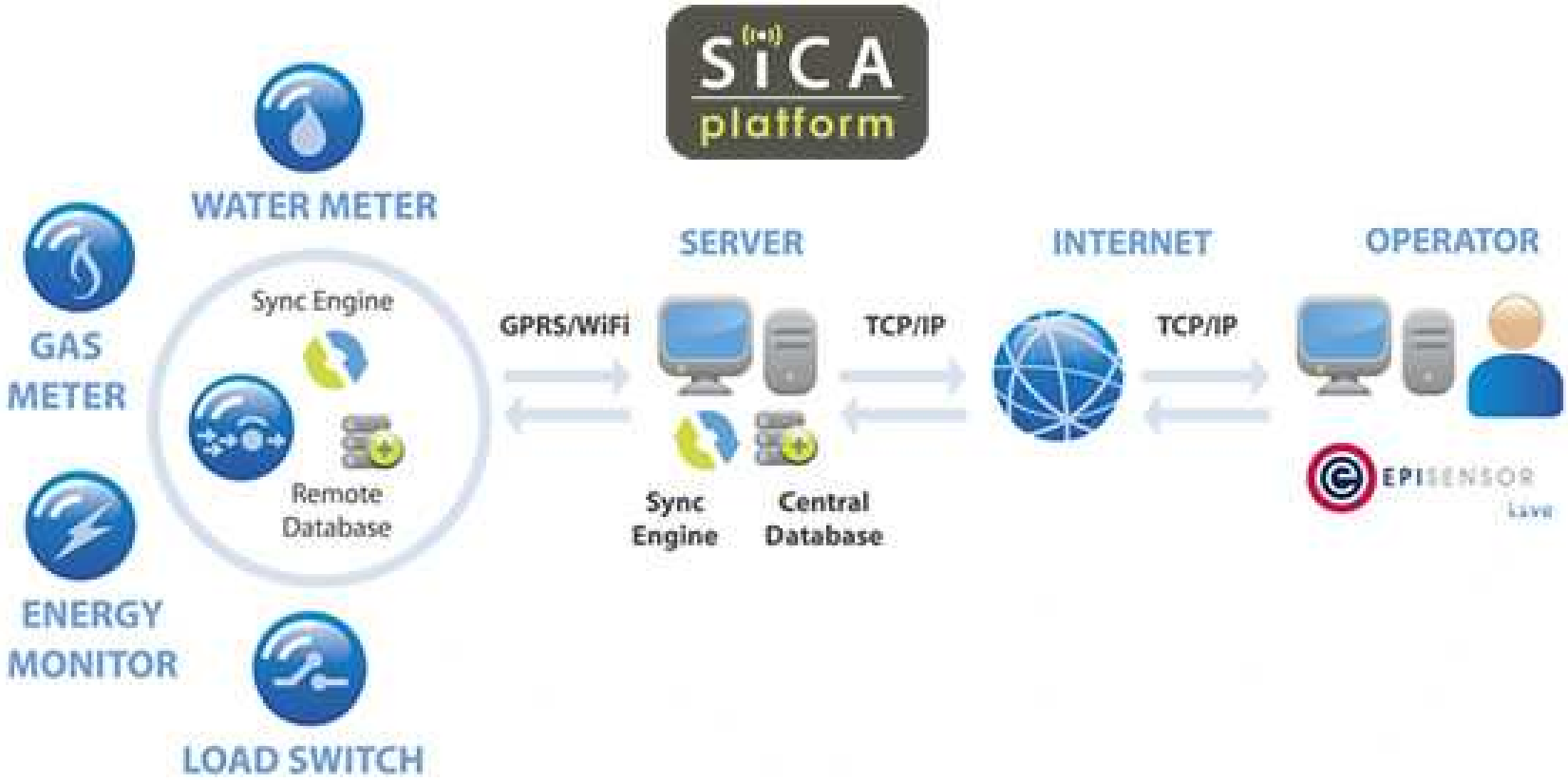
- **Injection Moulded Microfluidic Chip**
- **UV LED and Photodiode**
- **Absorbance Measurement**
- **Waste Storage**
- **100ml Reagent, 15ml Standard per 1460 measurements**



LED and Photodiode Detector

Microfluidic Chip

Wireless Platform



System Performance

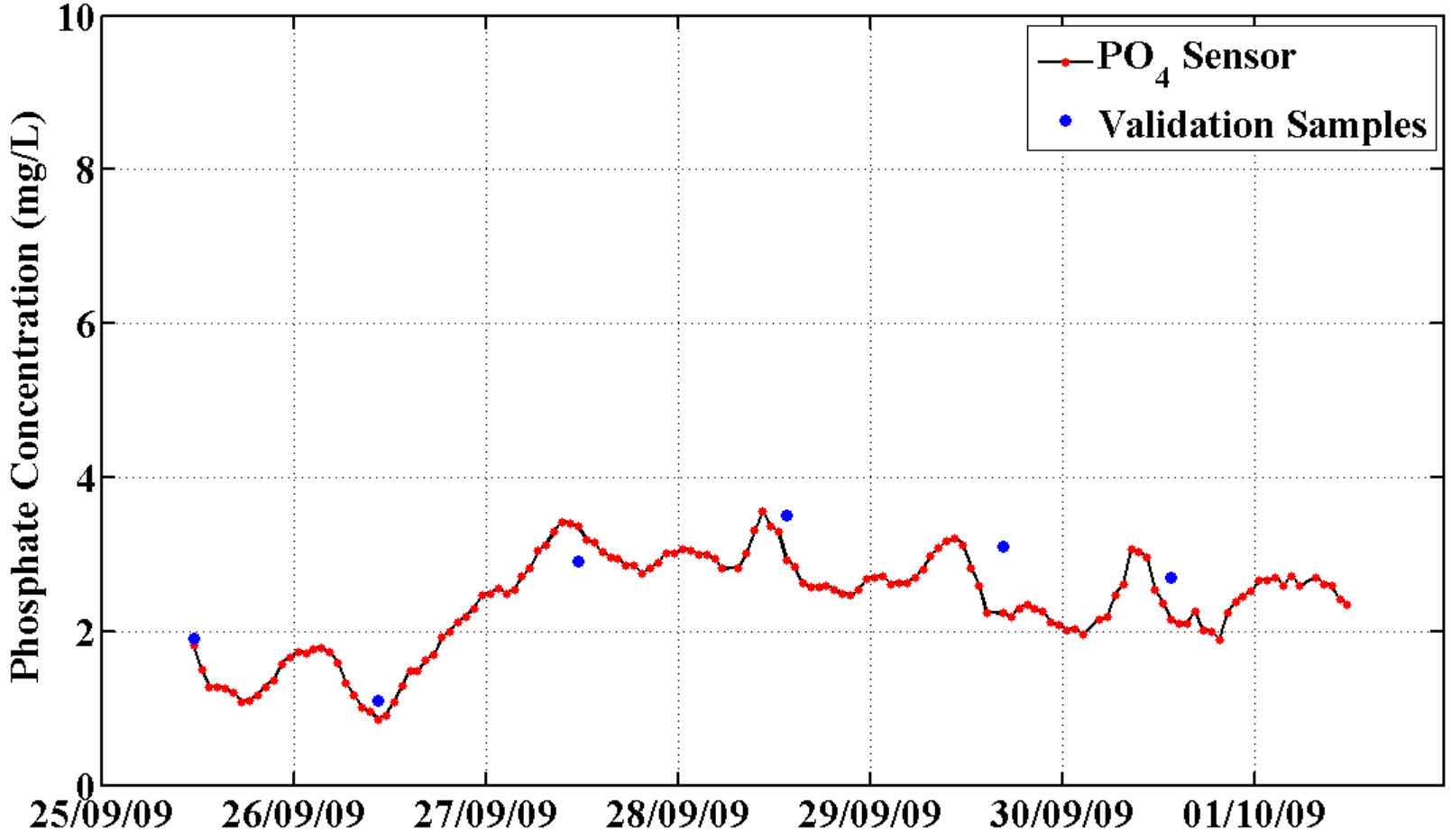
- **Limit of Detection: 0.1mg/L**
- **Minimum sample interval: 20 minutes**
- **Linear response range: 0-50 mg/L orthophosphate**
- **Point source identification**
- **Wireless chemical sensor platform**
- **Ongoing Research into other detection methods**

Field Deployment

Broadmeadow Water Estuary,

Swords, Co. Dublin

Field Trial Data



Conclusions

- **Phosphate Analyser for Water**
  - Compact
  - Long battery life
  - Real time monitoring
  - Remote sensor control
  - Low cost per measurement
- **Wireless chemical sensor platform**
- **Legislation driven market**

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