

TELEMAC



TELEMonitoring and **A**dvanced tele**C**ontrol
of high yield wastewater treatment plants

Proposal number: *IST-2000-28156*

General presentation

- TELEMAC is an IST (Information Society Technologies) project
- 15 partners and 7 countries are involved (B, Br, F, I, SP, UK, MX)
- Duration: 3 years (starting date: 2001, September)
- Total budget: 4.6 Millions €
- Funded by the EC: 2.1 M€

Motivation

- The TELEMAC project aims at designing a **modular** and **reliable** system supporting a **remote monitoring and control** of **small depollution units** with **no local expertise**.

Motivation

- This system is designed to provide a framework for **ISO14001** certification and to allow small and medium units to **meet** the **European pollution constraints**.

General objectives

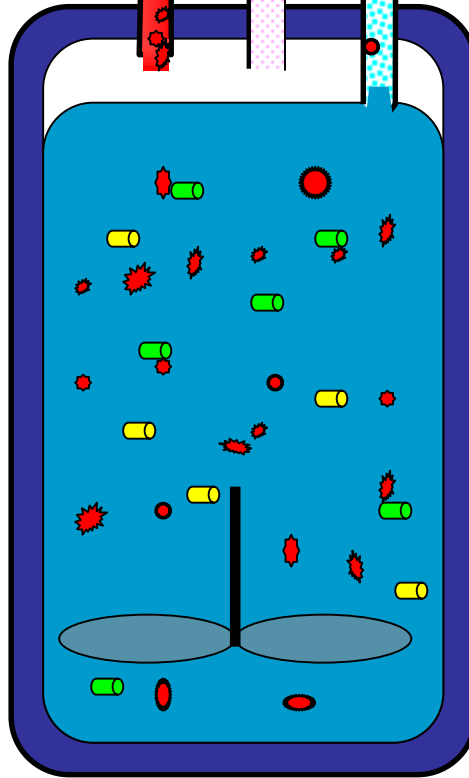
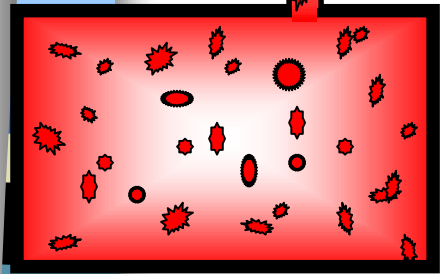
- Propose a set of adaptive and customisable tools for the small units in order to
 - improve the **quality** of their depollution process
 - improve the **reliability** of the process
 - reduce the **treatment cost**
 - increase the **derivative products** output.

General method

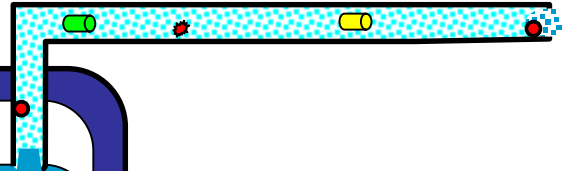
- It is stressing on the synergy expected from the merger of **robust advanced control** algorithms and **supervision systems** based on artificial intelligence techniques.
- Based on the development of **new sensors**



What is anaerobic digestion ?

- A high yield biological process used to process organic pollutants



CH_4



-  Organic pollutant
-  Anaerobic bacteria



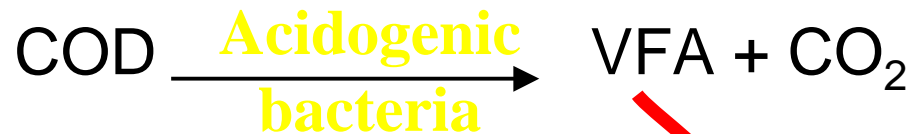
What are the advantages of AD ?

- **Rapid**
- Can degrade **concentrated** substrates
- Can degrade **difficult** substrates
- **Energy** can be recovered
- Produces very **few sludges**

How does it work ?

2 main steps

- Acidogenesis:



Fast

- Methanogenesis:

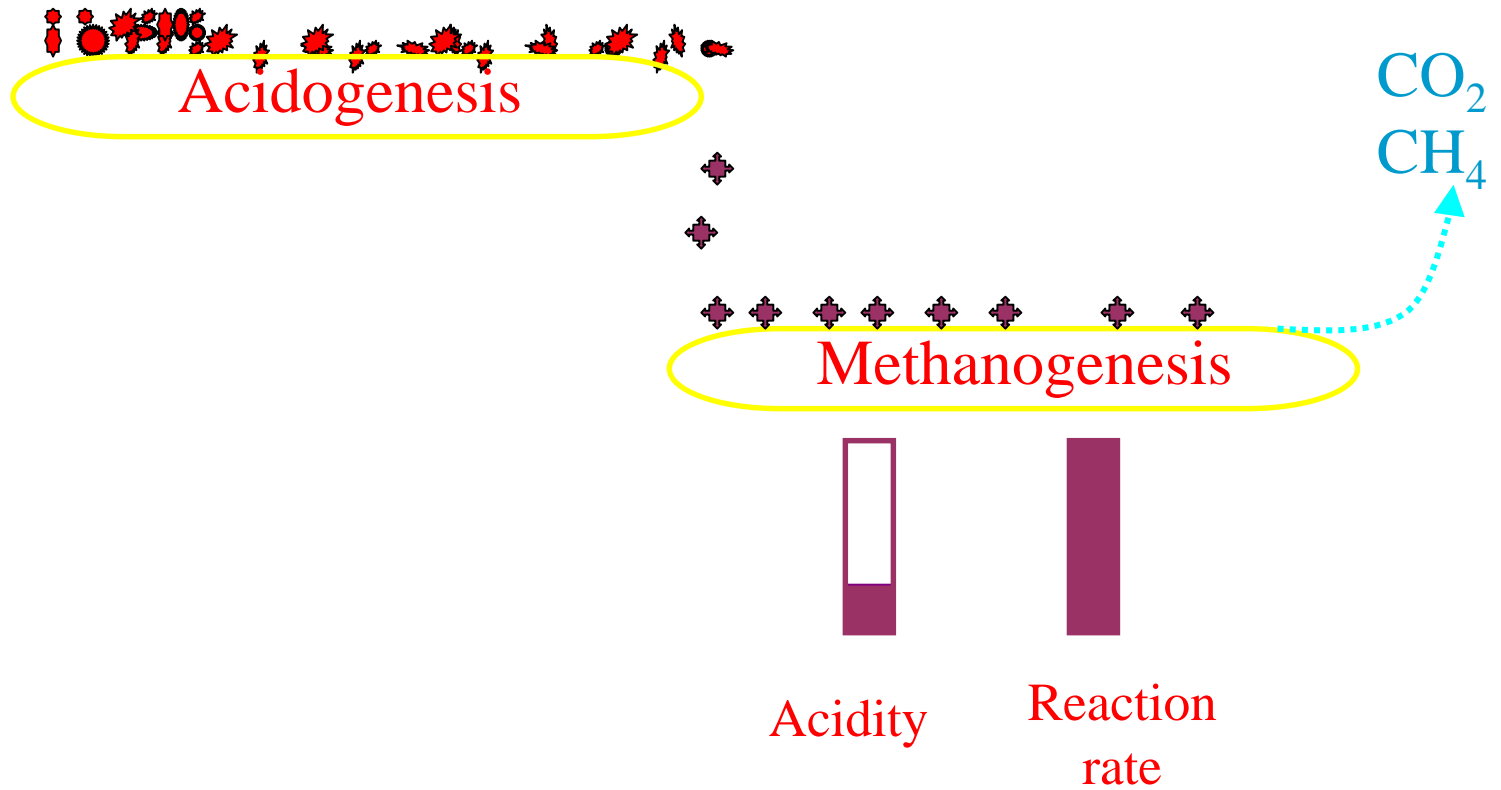


Slow

Inhibition



Process instability

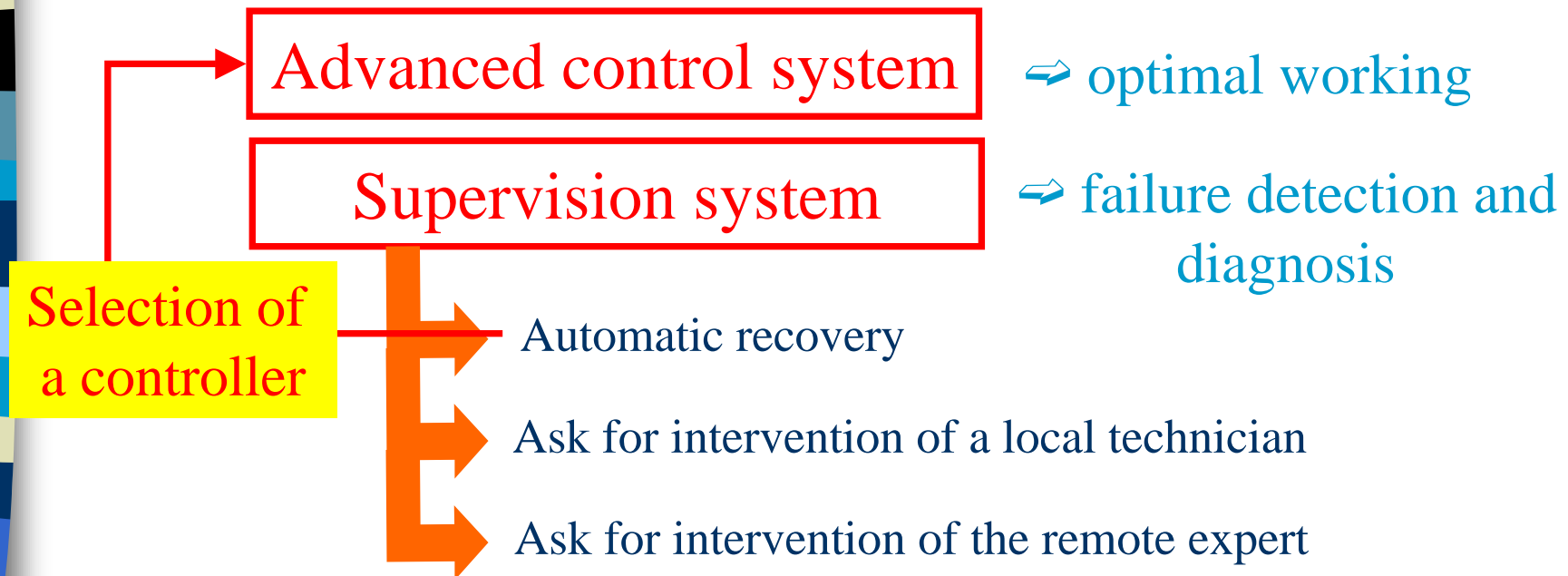


What are the drawbacks ?

- It is unstable !
- The biological/chemical variables are difficult to measure (lack of sensors)
 - ⇒ an expert is required

Objective 1

- Provide a set of tools to assist a remote expert centre in managing a wastewater treatment plant through internet.



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⇒ **improve the process reliability
and quality**

Objective 2

- Guarantee a customised depollution system to SMEs i.e. characterised by :
 - low cost
 - easily portable architecture
 - plug and play installation

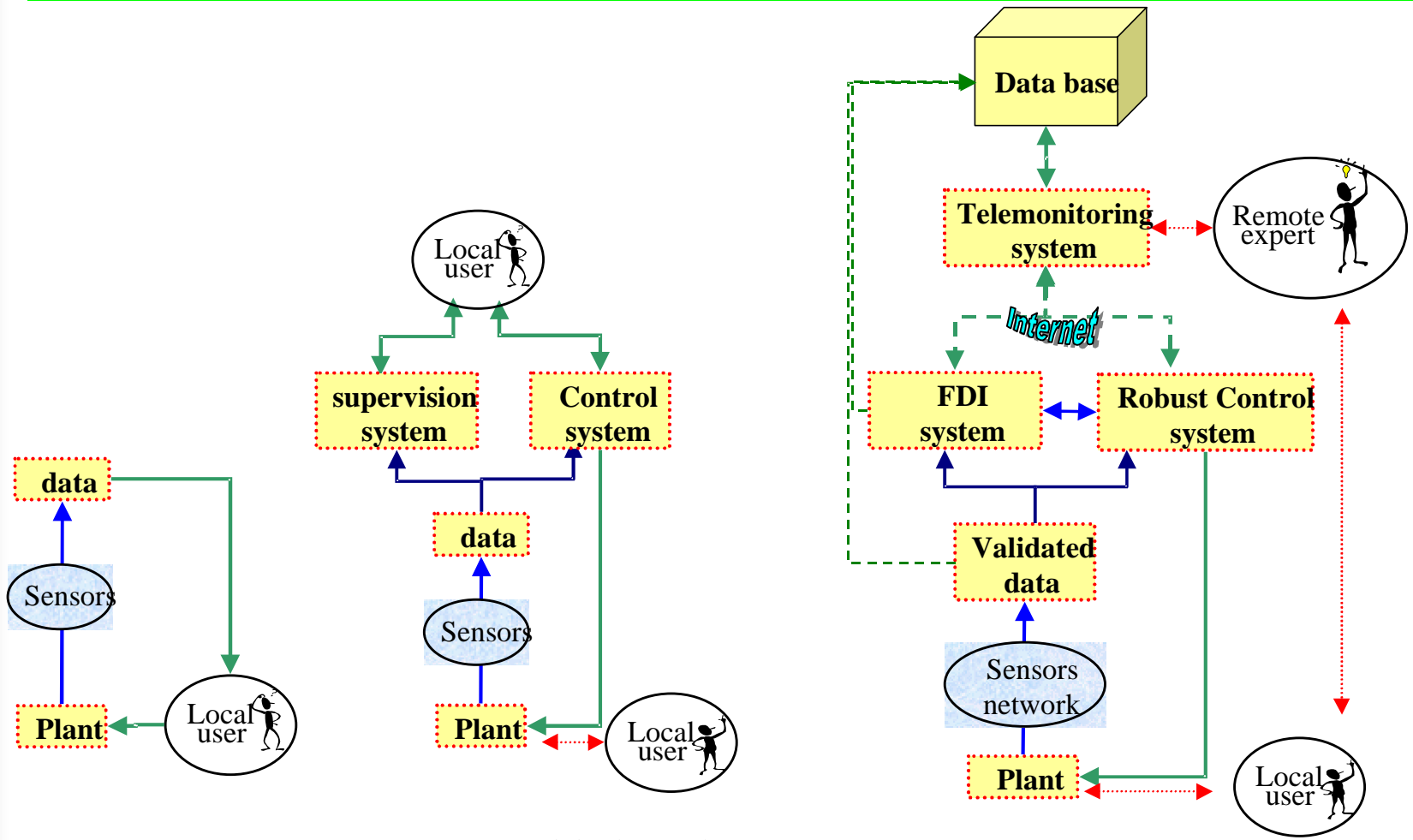
Objective 3

- Decrease the depollution costs :
 - maintenance cost **Preventive maintenance !**
 - operational costs **Optimisation provided by the controller**
 - post treatment costs **Better depollution yield**
 - initial investment **Smaller WWT units**

Objective 4

- Improve derived products output, and in particular provide a biogas quality suitable for cogeneration

Overview of TELEMAT solution

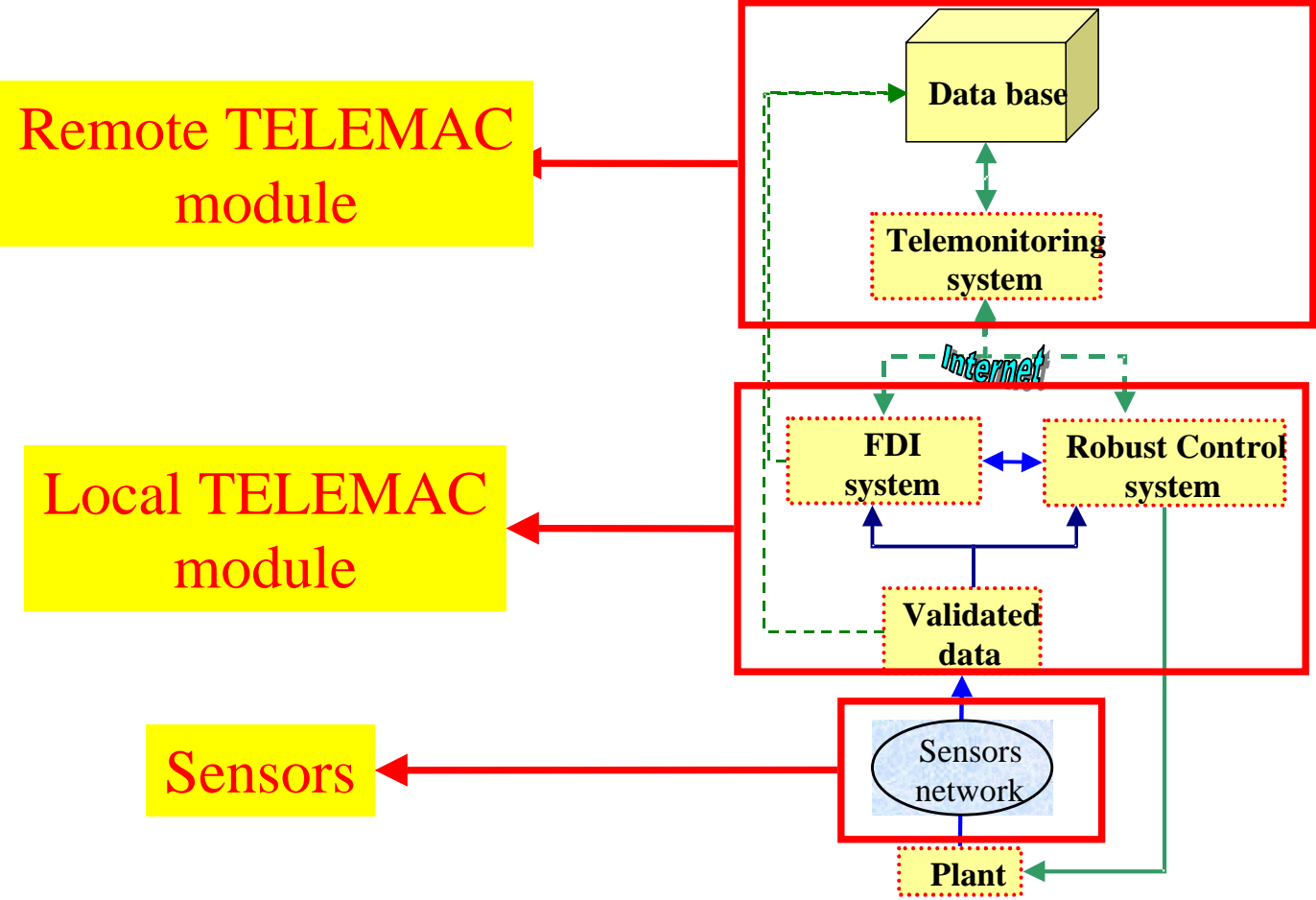


Profile 1: Traditional WWTP management

Profile 2: in lab advanced management

Profile 3: TELEMAT solution Remote advanced management

Overview of TELEMATIC solution



Organisation

■ 7 WorkPackages:

- WP 1 will run the experimentation and validation aspect of the project at lab, pilot and industrial scale.
- WP2 will focus on the Smart Sensors development (hardware and software) including fault residues and autocalibration.
- WP3 will provide the Advanced Control system relying upon validated models in normal and abnormal working conditions.

Organisation (2)

- WP4 will design the supervision system and develop knowledge base and data base management. It will provide assistance to human to help them address the problems.
- WP5 will be dedicated to software integration, analysing information security requirements and setting up web based interfaces and communication tools.

Organisation (3)

- WP6 will ensure an efficient exploitation and dissemination of the results, both in the scientific and industrial domains.
- WP7 will co-ordinate the project scientifically and administratively.

Responsibilities (1)

Task	Title	Manager
WP 1	Experiment design and running	Juan Lema, USC
WP 2	Smart sensor development	Kristof De Neve, APPLITEK
WP 3	Advanced control	Olivier Bernard, INRIA
WP 4	Supervision system	Jean-Philippe Steyer, INRA
WP 5	Software Integration	Simon Lambert, CCLRC
WP 6	Dissemination and implementation	Bruno Le Dantec, ERCIM
WP7	Project management	Bruno Le Dantec, ERCIM