

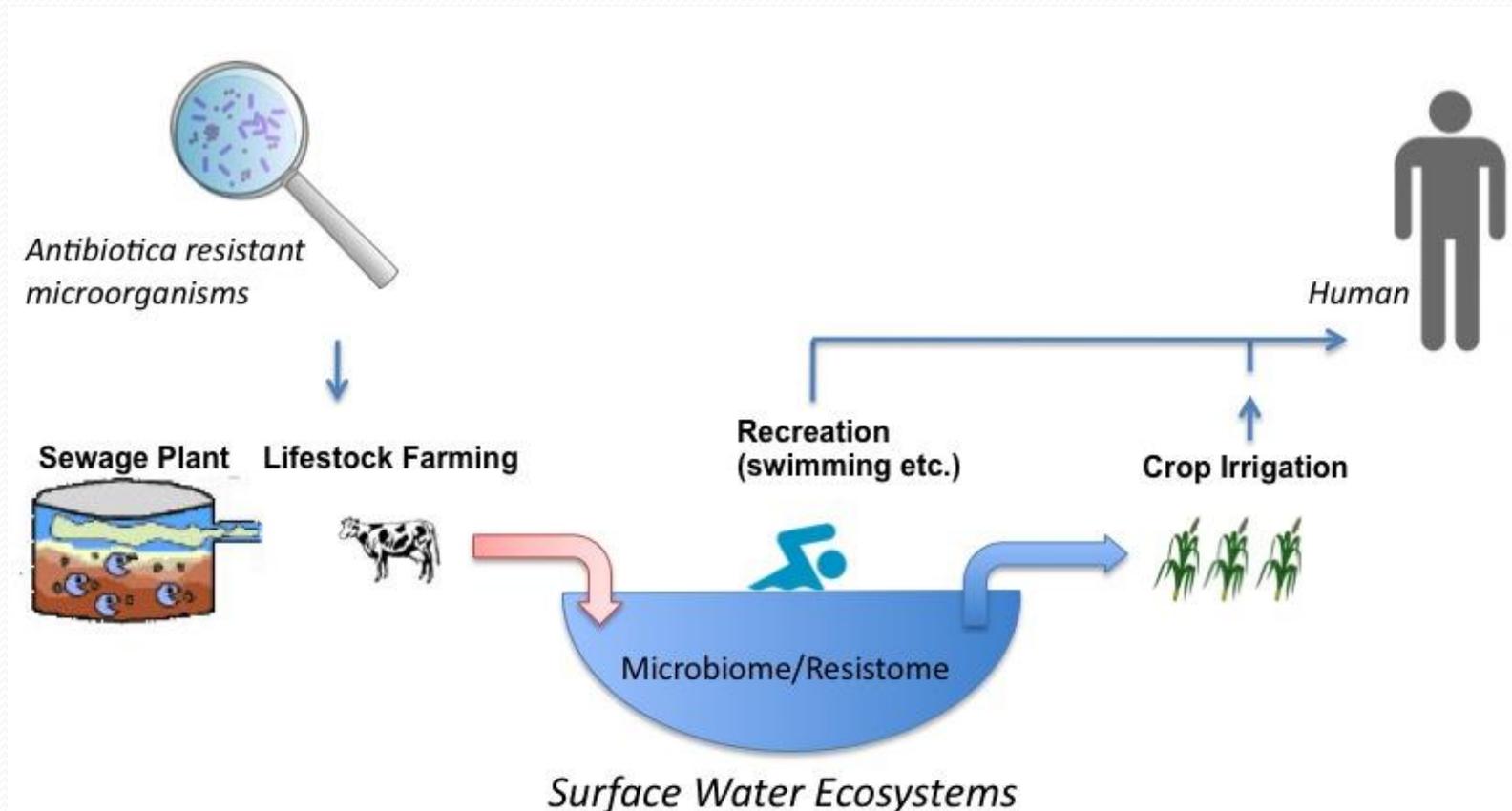
# Tracking and Assessing the Risk from Antibiotic Resistant Genes using Chip Technology in Surface Water Ecosystems (TRACE)



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Angelo Solimini (UR I) I

Water JPI  
Pilot Call Kick-off meeting  
11<sup>th</sup> of March 2015, Brussels

Serious public health threat by antimicrobial resistance:  
TRACE investigates role of surface water and assesses the  
potential associated risk to human health



# GOALS

- develop an **on-site detection technology** in a **chip-based solution** to detect a panel of antibiotic resistance genes for waterborne microorganisms, allowing **time- and cost-efficient evaluation of AR patterns** and the associated risk for human health.
- understand the **sources** and **behaviour of antibiotic resistance** in natural waters and infection routes

# Partners



umcg

Alexander Friedrich

- Whole Genome Seq.



Enda Cummins

- Risk assessment



UNIVERSIDADE  
**NOVA**  
DE LISBOA

Pedro V. Baptista

- Probe design & optimization
- Lab tests



Carles Borrego

- Antibiotic pollution
- ARGs quantification/screening
- Selection of target ARGs



Wolfgang Fritzsche

- DNA chip design & test
- Chip optimization

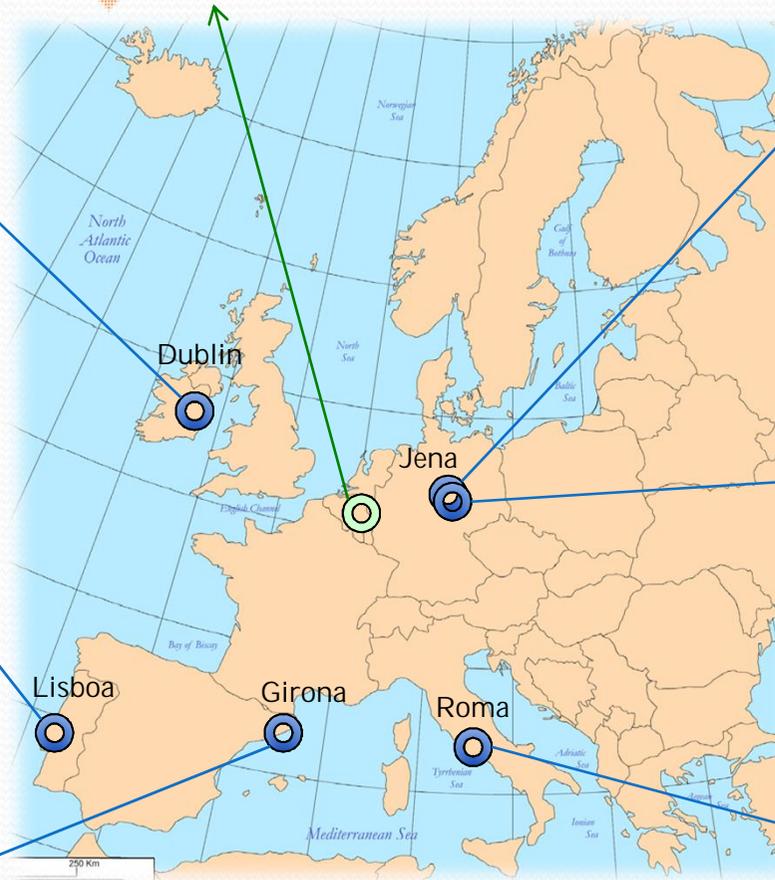


Bernd Giese



Angelo Solimini

- ARB isolation and characterization

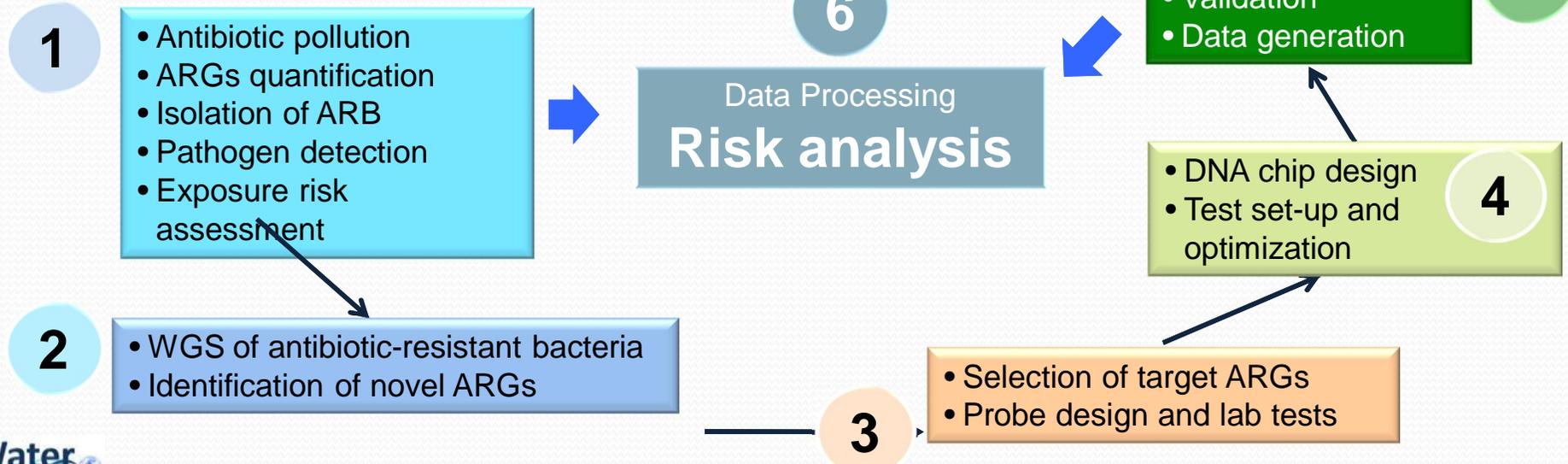
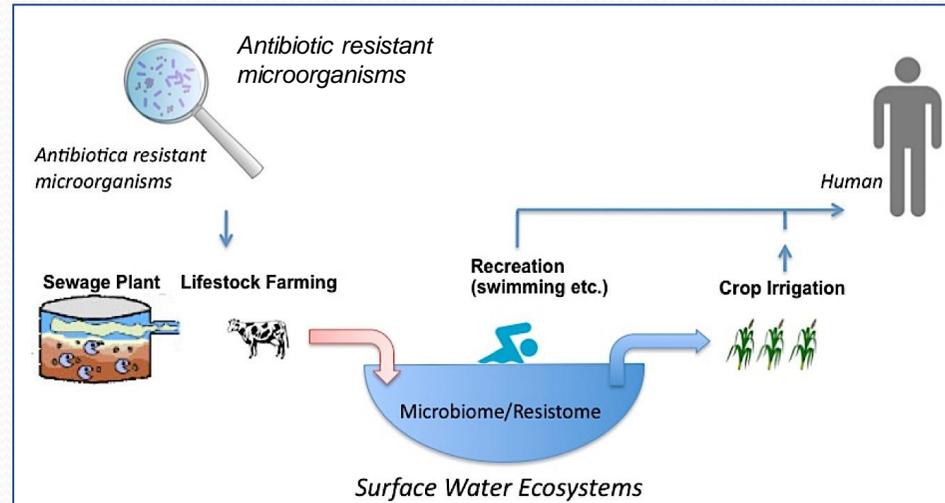


- TRACE combines microbial ecology with photonics/nanotechnology, molecular biology and bioanalytics
- TRACE translates **fundamental** research (e.g. mobilome study) with **applied** (biosensor) towards development by Industry
- post graduate technicians **mobility between partners** – technical/work missions
- **joint** meetings to enhance **collaborative** research and innovation during the project life and beyond
- different ideas from the partners converged into TRACE and will lead to fruitful **cooperation** (several bi-lateral partnerships already at place within other consortia)

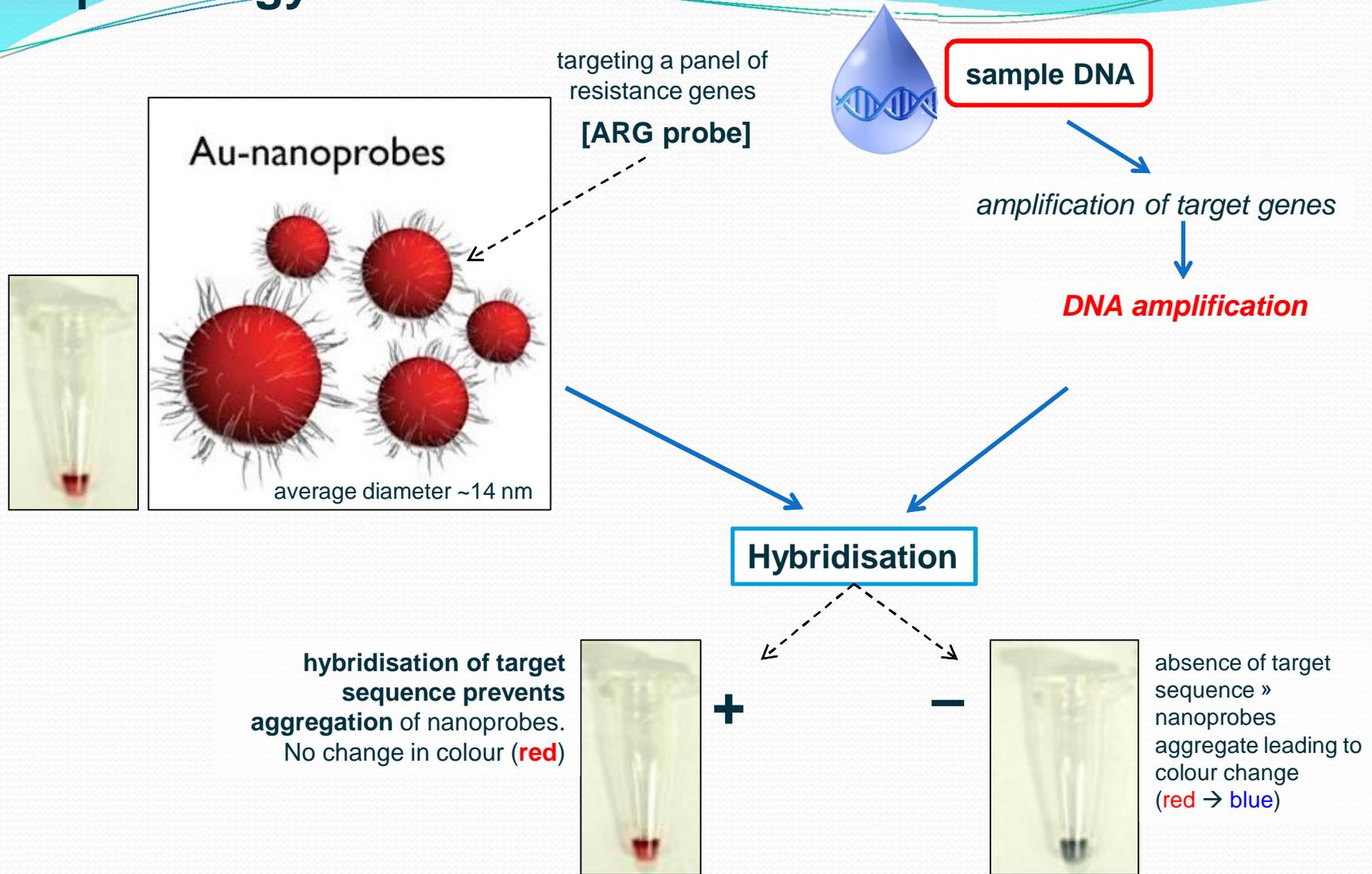
# Project plan

## Model Systems

River Ter  
Luetsche lake  
Ostia beach



# Chip strategy

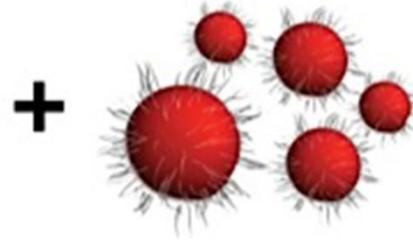




First round  
Amplification



Au-nanoprobes



Hybridisation  
Step



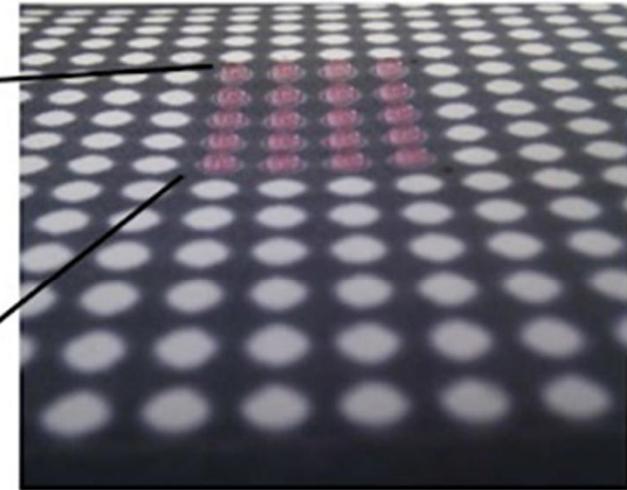
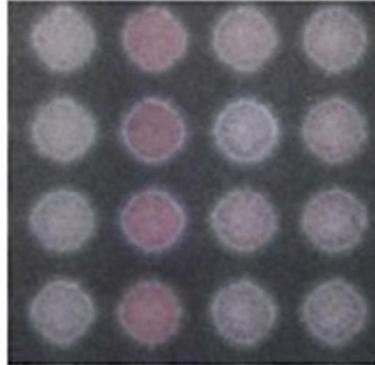
Paper plate

Mobile device  
Photo



RGB Data analysis

Colour development



# TRACE: *Expected outcome*

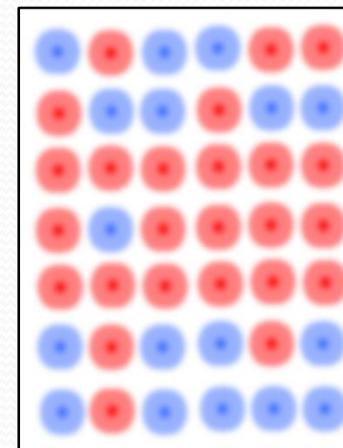
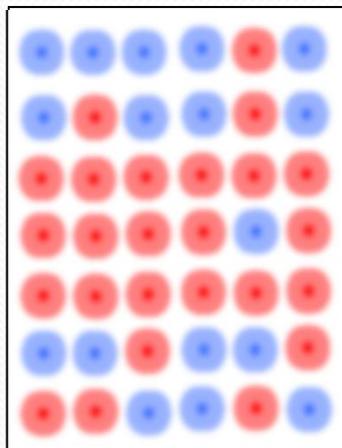
River Ter



Ostia beach



GPS location metadata  
to Lab



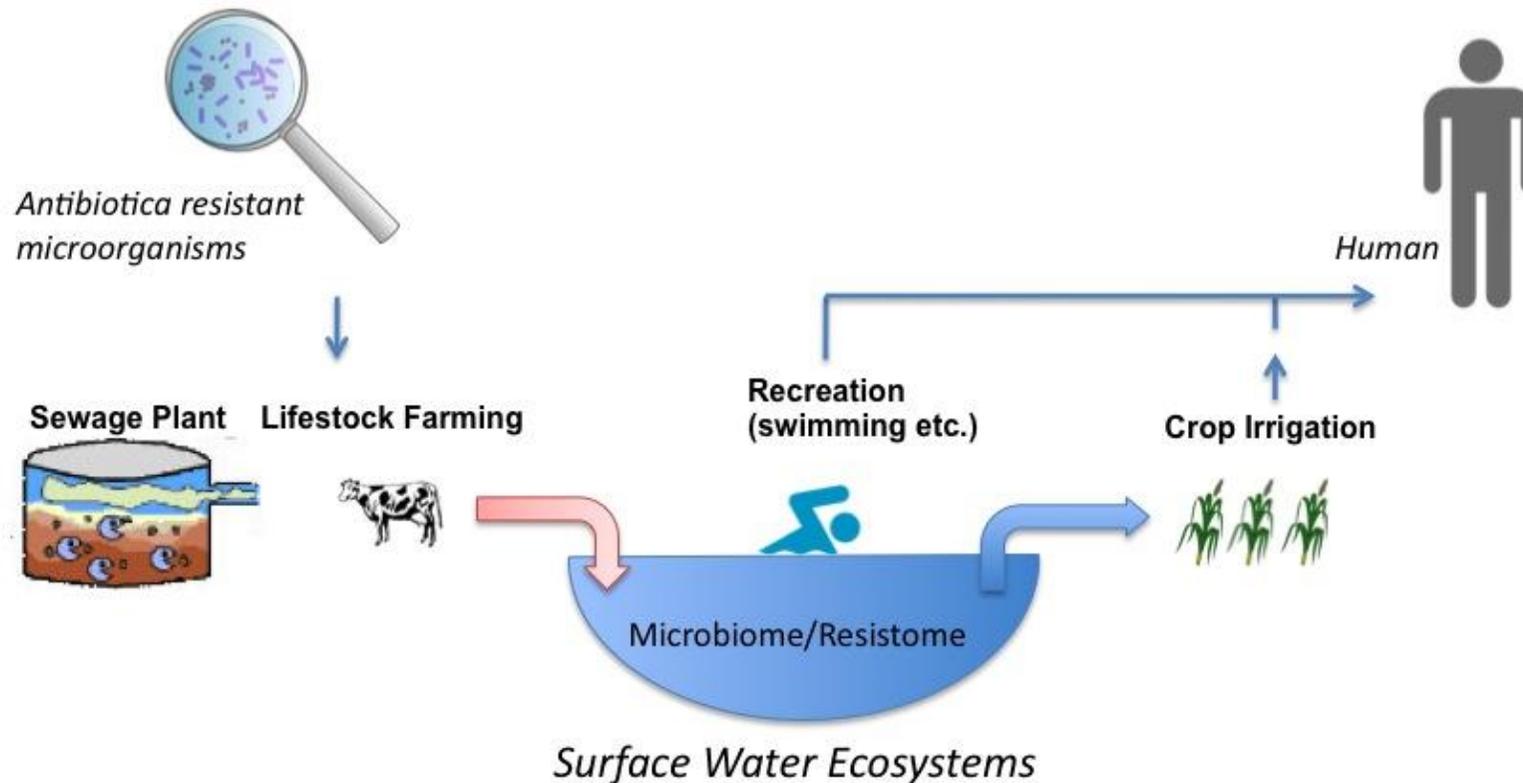
## ***Expected outcome***

- ✓ specificity and sensitivity
  - ✓ multiplex assays
  - ✓ robust and simple
  - ✓ inexpensive equipment
  - ✓ no specialised lab.
  - ✓ easy interpretation
  - ✓ portability
- ✓ simple and rapid ***on-site detection*** of antibiotic resistance
  - ✓ ***higher frequency of measurements***
  - ✓ ***easy data transfer*** to off-site lab using mobile devices + GPS ***location***

- joint meetings and workshops
- organization of international workshop related to antibiotic resistance in surface waters
- **Involvement of stakeholders:**
  - **local water authorities ACA, CCB, LWST (ES, D)**
  - **local health authorities Erfurt, Arnstadt (D)**
  - **Industry**
- publication of results in both scientific as well as stakeholder journals
- involvement of young researchers and students
- demonstration at Open days and Science fairs (World Biotech Tour)

## ***Expected impacts***

- ✓ Predictions on environmental behaviour of Antibiotic-resistant microorganisms in surface waters.
- ✓ Recommendations to sanitary and/or regulatory authorities on potential intervention strategies to reduce human exposure to Antibiotic-resistant microorganisms.
- ✓ Risk models to be used for policy evaluation at national or regional scale.
- ✓ Development, implementation and evaluation of mitigation options in the case of Antibiotic-resistant microorganisms in natural water systems.
- ✓ SME involvement for Chip exploitation



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