

CENTAUR – A Local Real Time Control Innovation Story

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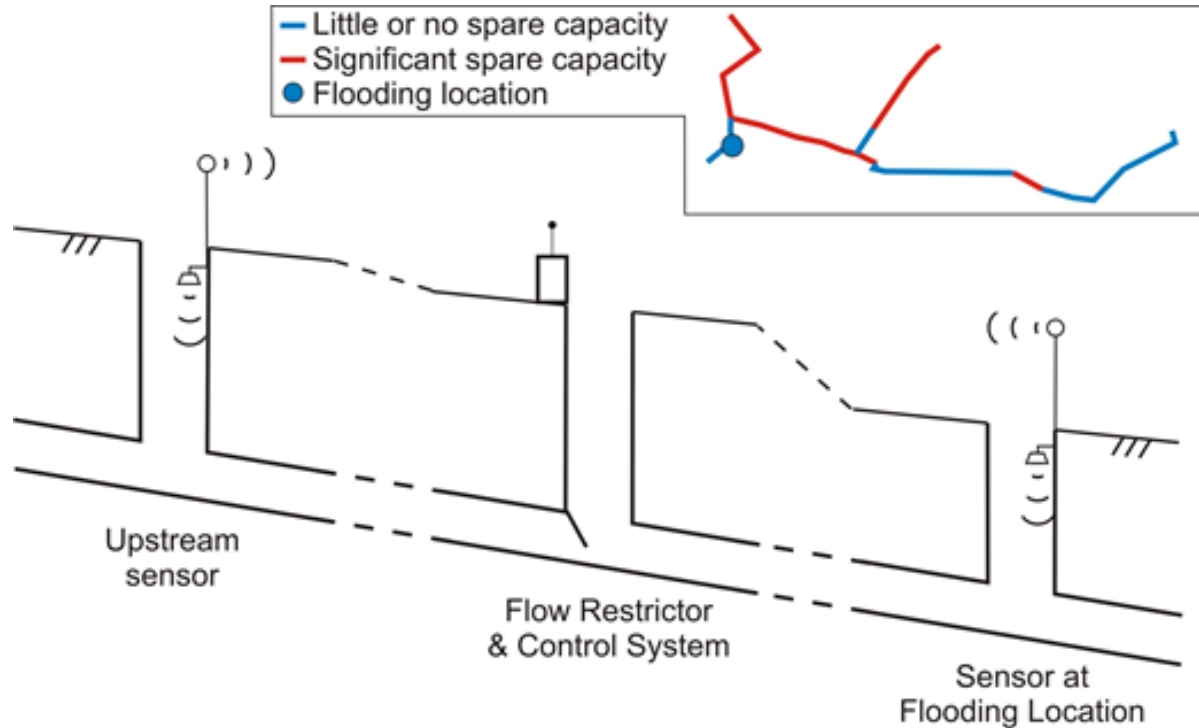


What is CENTAUR?

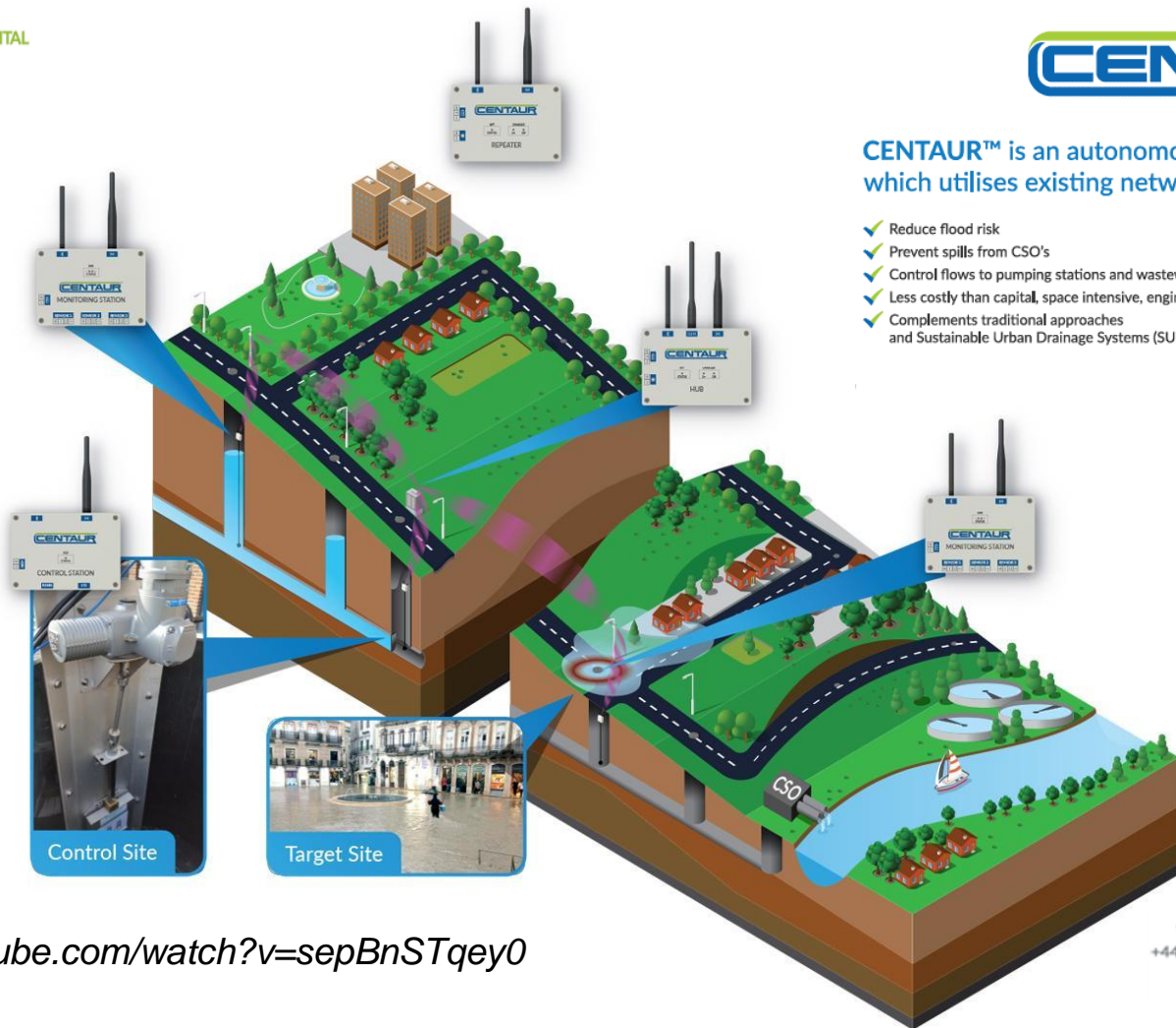
- CENTAUR is a **local RTC system** for flooding/CSO spill reduction in urban drainage networks
 - Designed to be an adaptive system with low capital costs
 - Fits inside manhole chambers
 - Flow control gate to make better use of existing network capacity during rainfall events
 - Gate position regulated based on fuzzy logic & local water levels only. Simple decentralised decision making, to reduce complexity
- Studies show significant improvements in UDS performance (see references list)
- Fully commercialised product.....



CENTAUR 'academic concept' sketch



Local flow control system regulated by fuzzy logic algorithm, direct input of data from upstream and downstream level sensors. (No central model based control!)



CENTAUR™ is an autonomous, localised system which utilises existing network storage capacity

- ✓ Reduce flood risk
- ✓ Prevent spills from CSO's
- ✓ Control flows to pumping stations and wastewater treatment works
- ✓ Less costly than capital, space intensive, engineering solutions
- ✓ Complements traditional approaches and Sustainable Urban Drainage Systems (SUDS)

<https://www.youtube.com/watch?v=sepBnSTqey0>

Journey from academic idea to commercial product - 1

EU H2020 Innovation Action 'CENTAUR' (2015-2018):

- 7 partners (SMEs, water utilities, universities & research institute),
Key role of end users in designing the system
- From an idea to a working prototype tested in the lab & at two field sites
- Strong focus on how the system would be commercialised
- **But.....requires further projects to build evidence base and develop technical guidance**



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aquatic research ^{ooo}

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Journey from academic idea to commercial product - 2

- **IWAN** <https://www.em-solutions.co.uk/innovation/eureka-eurostars-project/>
 - Funding test installations at two field sites in UK and Portugal
- **STREAM PhD** (2018 – 2021) <http://www.stream-idc.net/>
 - Modelling studies on CENTAUR location optimisation within networks
- **REWAISE** (2020 – 2025) <http://reweise.eu/>
 - Part of a larger EU project on water innovation
 - Multiple gate CENTAUR system to improve river water quality in a UK catchment
- **Knowledge Transfer Partnership** (2021 – 2023) <http://ktp.innovateuk.org/>
 - Develop installation guidance and evaluate performance of a live installation in the UK

Developing evidence base and establish procedures ensuring CENTAUR can be an easily implementable solution for pollution/flooding problems

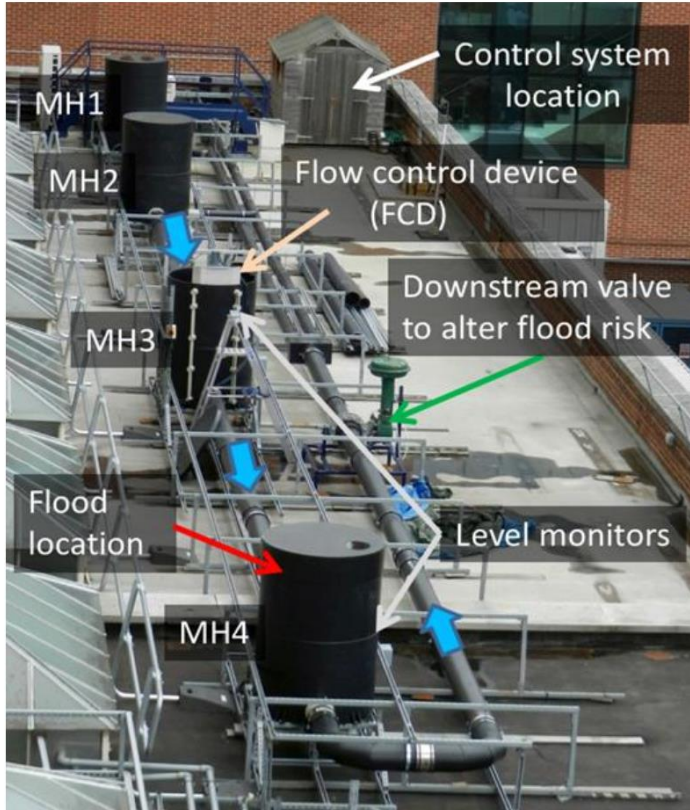
Current implementation & next steps

- **Operational Installations (2021)**
 - Coimbra, Portugal operational for >5yrs performing to a high standard
 - Severn Trent (UK) – currently installing system to solve property flooding
- **Installations Agreed/Planned**
 - Multi-gate system for CSO spill control in UK
- **Additional software development to enable wider uptake**
 - Fuzzy logic control algorithms Integrated in InfoWorks ICM [commercial hydraulic modelling software]
 - Control location optimization tools created in MatSWMM ['academic stage']; KTP project ongoing to write user guidelines, and 'translate' optimization tool to Infoworks ICM.
- **Next steps**
 - Using water quality and surface water sensors for dynamic CSO control
 - Improving SUDs and stormwater tank performance using local RTC

Key lessons learned

- Involve **end users** (operators/asset owners and IT integration) and **supply chain** (capital teams, civils contractors) at an **early stage**
 - Capture ALL stakeholders 'business as usual' wants and needs for adopting new assets/methods
- **Large evidence base needed to convince users. Academic studies not enough**
 - Multiple operational field sites and technical proof required
- **Need development of technical guidelines, modelling tools and design standards**
 - But where does the funding/resource come from?
- **How does the system fit into end users plans, investment cycles & appetite for risk?**
 - Consider how to convince people that doing the same solutions is not the best approach?

COUDLabs – Transnational Access



Sheffield RTC rig set-up used for CENTAUR testing

**Real Time Control Testing facility (RTC RIG)
at (on..) University of Sheffield**

Originally developed for testing CENTAUR system

Can be used & adapted to test:

- different control strategies
- sensing systems
- data strategies
- how all of the above can affect the performance of RTC CSO spill mitigation techniques.

<https://co-udlabs.eu/access/research-facilities/rtc-rig/>

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References

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