The Issue

- Urban flooding impacts the lives of many thousands citizens in the EU each year.
- The impact and severity of urban flooding will become more widespread due to the impact of climate change.
- Operators of urban drainage systems in the EU are constrained by the current economic environment.
- Traditional solutions to urban flooding are expensive and inflexible.
- New innovative solutions are required.

Intelligent Fuzzy Logic Control

- Water level data recorded at the flooding location and within the upstream available storage is the basis for inputs to Fuzzy Logic control algorithm.
- Membership functions are assigned to the input data.
- Membership functions relate to a fuzzy rule set written using expert knowledge.
- Output of Fuzzy Logic algorithm adjusts Flow Control Device position to dynamically store or release water in real-time.

Virtual Testing

- Fuzzy Logic algorithm written in Matlab.
- Matlab wrapper code links Matlab to the SWMM hydrodynamic urban drainage modelling software.
- Allows algorithm to be tested and developed quickly and safely.

Pilot Testing in Coimbra

- Level monitoring station inside manhole wirelessly communicates to Central Control Hub (CCH).
- CCH receives level data, runs Fuzzy Logic control algorithm and sends control commands.
- Wireless station receives control commands and inputs to flow control device PLC.
- Flow control device dynamically stores excess flows in upstream network.

Further Information

A further demonstration site for CENTAUR will be installed in Toulouse in late 2017.
For more information on the CENTAUR, including details of academic publications, see our website: www.sheffield.ac.uk/centaur
To discuss the project further, contact us by email: centaur@sheffield.ac.uk

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Project Partners

[List of project partners]

CENTAUR Concept

- The upstream part of piped urban drainage networks potentially have available capacity when downstream locations are flooding.
- Flow control devices have the potential to store water in upstream parts of the network to reduce flood risk downstream.
- The technology uses a local control system using local sensor network.
- A data driven Fuzzy Logic control algorithm embeds expert knowledge.

Proof of concept data – potentially available storage based on model study

<table>
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<th>Rainfall event return period (years)</th>
<th>Existing Flood Volume (m$^3$)</th>
<th>Residual Flooding (m$^3$) – using available network storage</th>
<th>Potentially captured flood volume (%)</th>
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