

## UrbanFlood Workshop

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# Flood Defences 4 – Smart Dikes / UrbanFlood

### Date

Workshop: Thursday 22<sup>nd</sup> November 2012

### Location

World Trade Center Rotterdam  
Rotterdam  
The Netherlands

The **UrbanFlood** third and final conference was held on Thursday 22 November. This workshop was held during the 2<sup>nd</sup> European Conference on Flood Risk Management, [FLOODrisk2012](#) (20 - 22 November 2012), World Trade Center in Rotterdam.

UrbanFlood **demonstrated the latest version of the UrbanFlood Early Warning System** at the STOWA / UrbanFlood / IJkdijk stand (number 22) at the FLOODrisk2012 conference exhibition.

### UrbanFlood Workshop

The session started early on a rainy Thursday morning in Rotterdam; nevertheless we welcomed **48 participants of 13 different nationalities** (Belgium, Canada, Czech, Germany, France, Ireland, Italy, Japan, the Netherlands, Poland, Russia, United Kingdom and United States).

On the UrbanFlood website you will find the presented papers and [video presentation](#) of this very interesting and lively session, including the UrbanFlood video and the discussion at the end of the workshop.

# UrbanFlood Workshop Programme

Thursday 22 November 2012

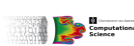
## Technical session on "Flood Defences 4 - Smart Dikes / UrbanFlood"

Chairman Prof. Rob Meijer

Interpreting sensor measurements in dikes - experiences from UrbanFlood pilot sites	Mr. Jonathan Simm United Kingdom
Implementation new Levee strength modules for continuous safety assessments	Mr. Leo Zwang Netherlands
UrbanFlood Video	
Data-driven modelling for flood defence structure analysis	Mr. Alexander Pyayt Russian Federation
High-tech advances in Levee modeling and evaluation tools for flood risk management	Mr. Bob Woldringh United States

For the participants of the Technical Session the UrbanFlood partners **demonstrated the latest version of the UrbanFlood Early Warning System** at the STOWA/UrbanFlood/IJkdijk stand at the FLOODrisk2012 conference exhibition, enabling the participants to experience how one can work with the EWS in a real 'hands-on' fashion. The reactions were very enthusiastic, with useful feedback on possible improvements for the developers.

**UrbanFlood** is a project funded under the EU Seventh Framework Programme, Theme ICT-2009.6.4a. ICT for Environmental Services and Climate Change Adaption. Grant agreement no. 248767. December 1, 2009 until November 30, 2012. Contact: Eemsgolaan 3 - PO Box 1416 - 9701 BK Groningen, The Netherlands – [www.urbanflood.eu](http://www.urbanflood.eu) - [info@urbanflood.eu](mailto:info@urbanflood.eu)



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## OVERVIEW OF THE PRESENTATIONS

Thursday, 22 November 2012

### Interpreting sensor measurements in dikes - experiences from UrbanFlood pilot sites

Jonathan Simm, David Jordan & Alexandra Topple  
*HR Wallingford, Wallingford, UK*

Ilya Mokhov & Alexander Pyayt  
*Siemens LLC, Corporate Technology, St. Petersburg, Russia*

Tarek Abdoun & Victoria Bennett  
*Rensselaer Polytechnic Institute, NY, USA*

Jeroen Broekhuijsen & Robert Meijer  
*TNO, Groningen, The Netherlands*

**ABSTRACT:** The UrbanFlood project is creating an Early Warning System framework that can be used to link sensors via the Internet to predictive models and emergency warning systems. The project includes four pilot sites to apply and validate at full scale the technology being developed in the project: Amsterdam (Netherlands), Boston (UK) and Rhine River (Germany). This paper focuses on a description of the sensor instrumentation installed at the pilot sites and the emerging conclusions from the analysis of the results obtained to date. The sensors installed at the various sites include various MEMS modules to measure displacement and pore pressure and fibre optic cables able to detect strains. The gathered data are used for dike stability evaluation with different models and also, combined with an Artificial Intelligence (AI) component, for detection of anomalies in dike behaviour. Detected anomalies trigger assessment of the likelihood of levee breach and the consequences in terms of flood propagation and damage in the defended urban area. For the full paper in PDF [download here](#)

### Implementation of new levee strength modules for continuous safety assessments

K.S. Lam, P.W. Gill & L.W.A. Zwang  
*Fugro GeoServices, Nieuwegein, The Netherlands*

**ABSTRACT:** Levees provide safety against floods worldwide. This paper presents a system to examine levee strength continuous in space and time. Goal of the research is implementing a system for reliably predicting embankment strength during high intensity periods, enabling more effective safety measures. The research is part of the Flood Control 2015 program. The module REAL<sup>®</sup> developed by Fugro uses a 3D subsoil model and LIDAR height data to make safety assessments for different failure mechanisms. The module FEWS-DAM is developed by Deltares, it is a tool for automated assessment and design of levee. REAL<sup>®</sup> results for a 48 km dike ring situated in the east of The Netherlands were implemented in FEWS. In FEWS the Water Board can assess levee strength continuously in space and time for the whole study area, enabling better decision- and policy making. The pilot shows that implementation of both module is possible and valuable. For the full paper in PDF [download here](#)

### Data-driven modelling for flood defence structure analysis

A.L. Pyayt, I.I. Mokhov, A.P. Kozionov & V.T. Kusherbaeva  
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*TNO, Groningen, The Netherlands*

**ABSTRACT:** We present a data-driven modelling approach for detection of anomalies in flood defences (levees, dykes, dams, embankments) equipped with sensors. An auto-regressive linear model and feed-forward neural network were applied for modelling a transfer function between the sensors. This approach has been validated on a dike in Boston, UK -one of the pilot sites of the UrbanFlood project- that showed both normal and abnormal

sensor behaviour. Comparison of the linear and non-linear models is presented. The suggested model-based anomaly detection approach will extend functionality of the developed Artificial Intelligence component of the UrbanFlood Early Warning System. For the full paper in PDF [download here](#)

## High-tech advances in Levee modeling and evaluation tools for flood risk management

R.F. Woldringh, M. O'Banion & C. Dean  
*Fugro Consultants, Inc., Sacramento, California, USA*

M.T. van der Meer & C. Spoorenberg  
*Fugro Water Services, Leidschendam, The Netherlands*

ABSTRACT: Several pilot programs have been carried out in the region of Western Sacramento, California USA and The Netherlands to evaluate the state of the levees. Utilizing a methodology of automatic assessment based on defined criteria, a proprietary process called Rapid Engineering Assessment of Levees® was employed. It was selected because it offers significant advantages in flexibility and efficiency over conventional methods. The REAL® method incorporates levee geotechnical, geospatial and geological characteristics in its assessment and allows for systematic, consistent and repeatable evaluation at very closely spaced cross-section intervals and various water levels, 100 times faster than conventional work flows. This paper will discuss the results of pilot programs included lessons learned and future developments, including some new developments implemented and tested in The Netherlands. For the full paper in PDF [download here](#)

## LIST OF PARTICIPANTS

Name	Organisation	Country
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**Total participants: 48**