UrbanARK

A JOINT RESEARCH PROJECT UNDER THE US-IRELAND RESEARCH AND DEVELOPMENT PROGRAMME

TOWN +GOWN: NYC

UrbanARK and Flood Risk

December 4, 2020, 9 a.m.—12 p.m. for Event
with Optional Sessions at 8:30 a.m. and at 12 p.m.
***via* Microsoft Teams (Recording of Event Planned for Later Posting to T+G Webpage)**

Agenda

8:30—9:00 a.m. *(1:30—2:00 p.m.)*	**Optional Informal Networking**
9:00—9:15 a.m. *(2:00—2:15 p.m.)*	**Introduction**
9:15—9:45 a.m. *(2:15—2:45 p.m.)*	**UrbanARK Presentation** Debra Laefer, New York University-Tandon Ulrich Ofterdinger, Queens University Belfast Michela Bertolotto, University College Dublin
9:45—9:50 a.m *(2:45—2:50 p.m.)*	**Immediate Questions**
9:50—10:20 a.m. *(2:50—3:20 p.m.)*	**Dublin Presentation** Gerard O'Connell, Dublin City Council, Senior Engineer, Flood Projects and Water Framework Directive Division Aoife Ni Rathaille, Dublin City Council, Smart City Team, Environment Lead, Office of Public Works Mark Adamson, Assistant Chief Engineer, Flood Relief and Risk Management
10:20—10:25 a.m. *(3:20—3:25 p.m.)*	**Immediate Questions**
10:25—10:55 a.m. *(3:25—3:55 p.m.)*	**Belfast Presentation** Claire Carleton, Programme Manager, Belfast Emergency Preparedness Group, Belfast City Council Gareth Young, Geospatial Innovation and Integration Manager, Ordinance Survey of Northern Ireland
10:55—11:00 a.m. *(3:55 p.m.—4:00 p.m.)*	**Immediate Questions**

11:00--11:30 a.m. *(4:00 p.m.—4:30 p.m.)*	**New York City Presentation** Melissa Umberger, Recovery and Risk Director, New York City Emergency Management Department Allison Pennisi, Director of Communications, New York City Office Emergency Management Department Alan Cohn, Managing Director, Integrated Water Management, New York City Department of Environmental Protection
11:30—12:00 p.m. *(4:30—5:00 p.m.)*	**Peer-to-Peer Discussion**
12:00—1:00 p.m. *(5:00—6:00 p.m.)*	**Optional Hands-on VR Risk Tool Experience and Informal Networking**

UrbanARK Abstract

Today, over 600 million people live in critical coastal zones (i.e. areas 10m or less above sea level) and almost 2/3rd of the world's cities with more than 5 million inhabitants fall within such zones. The inhabitants and assets of these communities are increasingly at risk of coastal flooding as an outgrowth of rising sea levels and heightened development and population growth in these areas. Current flood models fail to consider the presence of subsurface spaces, thus, potentially producing overly conservative mapping in some instances, while simultaneously failing to identify some of the most at risk portions of urban centers. Furthermore, past failures to achieve effective evacuation (despite foreknowledge of risk) have been attributed in part to weaknesses in risk communication approaches. To effectively protect both population and property, new tools will be developed to exploit recent advances in remote sensing, distributed computing, and visualization. These tools will support the creation of more accurate flood maps and affiliated materials for segments of New York City, USA; Belfast, Northern Ireland; and Dublin, Ireland. This project will also generate a mobile, easily deployable, low-cost immersive flood risk communication tool integrating laser scanning data and flood prediction models, which can also be adapted for training of emergency staff and engagement with local communities about non-flood-related issues requiring spatial context, such as temporary access restrictions due to construction or community events or for assisting those with mobility restrictions.

The project will address flood risk assessment generation and risk communication in the context of 3 study areas; NYC in the US, Dublin in the Republic of Ireland, and Belfast in Northern Ireland (Belfast). For each, a 1 km^2 area is considered. Photographs, aerial laser scans, and hyperspectral imagery will be treated as input streams to explore several paradigms for model building and risk communication. These input streams will be sourced both from existing data collections and through opportunistic data collection using SLAM (Simultaneous Localization And Mapping) technology for both street level and underground spaces. Using these data, techniques will be developed to identify and estimate the size of underground spaces in the urban environment. Data will be stored in a new form of integrated spatial database based upon Map-Reduce and hosted in the cloud. The database will be evaluated on both public and private cloud platforms to ensure that it is fully scalable and interoperable with numerical flood models. This database will be accessible through a GUI which will allow users to query the data at differing levels of spatial and temporal granularity and extract the resulting data to serve as high resolution input for proprietary flood modeling systems such as MIKE/MIKE11/MIKE21 Flood. Systems will also be put in place to integrate data about surface properties and underground spaces, which have not typically not been considered in the flood modeling process. A GUI will be designed for easy integration with open applications such as Delft3D and Skunami, and efforts will be made to provide an efficient front end solution to allow experts to interact with large and complex data via different visualization tasks conducted

in real time within the cloud computing platform. In addition to enhancing flood modeling capabilities, this project will conduct a survey of population risk awareness and past behavior in flood conditions to inform a risk communication tool. This tool will leverage the high-resolution data and flood models developed in the project to provide citizens and other stakeholders with a low-cost and easy to deploy VR experience, which will help them understand their local flood risk and motivate action in flood scenarios. This tool, along with instructional material, will be deployed in at least one workshop and one pop up event in each of the three study areas.