

#### Understanding the Risk:

Comprehensive Systems Modeling using Innovyze



**Innovyze**<sup>®</sup>

#### Abstract

As climate change and extreme rainfall events continue to hammer away at the local and regional civil infrastructure, inadequate or unidentified assets are putting people and resources at risk. A recent report in Illinois identified 90% of urban flooding damage occurs outside of mapped floodplain. Urban Flooding is the scourge of many communities where nuisance flooding causes damage and can occur before, during or after a storm. As one US community states on their website, "It's not a matter of if but when, [we] will experience the next flood disaster." In many cases, the tools stand in the way of identifying the problem and potential solutions. The many timesaving and comprehensive tools within XPSWMM help identify problems and provide the time to simulate all scenarios. With the Solve Manager, multiple scenarios and integrated 1D/2D calculations no longer need to be run in series, but rather in parallel. Learn how to leverage these tools to search for the most effective solution.



HURRICANE SANDY

> CALIFORNIA RAINS

MATTHEW HARVEY, IRMA, MARIA...

FLOODS, MONSOONS, TYPHOONS

MIDWEST STORMS

Photo by Randall Hill/Reuters

THEY

HAPPEN

# **UNDERSTANDING RISK**

"Based on existing data, it is evident that the 100-year floodplain is a **poor predictor of property damage** and that, particularly in coastal areas, there is **no solid evidence** to justify a default 1% annual chance design level for flood reduction"

"The **reliability** of modeled flood risk can thus quickly **deteriorate as time** goes on, especially in rapidly developing regions."

# Houston FEMA flood map missed 75 percent of flood damages, says new study

By Fernando Ramirez Updated 10:22 am, Wednesday, September 20, 2017



#### IMAGE 1 OF 18

Houston after Harvey

A new study by Rice University and Texas A&M-Galveston found that 75 percent of flood damage claims were missed by FEMA's 100-year flood plain mapping.

See a by the numbers look at how Harvey impacted Texas.





### HOW IS RISK COMMUNICATED?

#### CLEAR

Nature of reporting flood depths, velocity and hazard are visual & easily understood.



#### ACTIONABLE

Results provide actionable intelligence with reasonable risk assessments for evacuation planning or hazard analysis.



#### SHARED

Results can be shared by video, or export the spatial extents of the hazard, depth or time to inundation.







#### **COUPLED 1D / 2D MODELS**



# InfoSWMM® InfoWorks®ICM

**ICMLive**<sup>M</sup>

**SWMMLive**<sup>M</sup>

#### **Overland flow paths**

# InfoWorks<sup>®</sup> ICM

**Innovyze**®



#### **Overland flow paths**

# InfoWorks<sup>®</sup> ICM





# Live modelling





#### **Smart / Live / Operational models**



#### **CUSTOMER SUCCESS**







#### City of Minot – 18<sup>th</sup> Avenue Southeast

- Tributary area Approx. 138 acres
- Topography
- Overland flow routes









#### **THE ISSUE**





Credit : Thomas Johnson & Ackerman Estvold









For Help, press F1 Vertical Datum: NAVD 88 Topographic Source: Ward County LiDAR 2010 Imagery Source: Ward County 2015

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EX-22 Project No: project number Scale:  $17 = 100^{\circ}$ 

Date:

EX-18

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# Innovyze®



**MASTER PLAN** 



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Normalized Intesnity

# **MODEL 4 BOTH BASINS**

#### **MIXED MODEL**

- 239 SUB-BASINS
- 1914 NODES
- 651,000 2D GRID CELLS

#### **MIXED HYDROLOGY**

• SWMM RUNOFF w/HORTON

**Innovyze**<sup>®</sup>

• HMS MODEL & CITY GAGES



# **2D INTERBASIN SPILLAGE**

Depth (meters) 4.0

3.0

2.0

1.0 0.5 0.0





### PERFORMANCE

#### **XDSWDM**



		XPS 1D/2D Simulation
io Manager	×	✓ Don't S <u>h</u> ow Model Status
enarios		Time Step # Time (hrs) Time Used Time Left rn End
Geometry1	Global Storms	Model Adjustment
CENTRIC	Name Period Rainfall Multiplier   Image: Constraint of the state o	
SCENARIOS	Image: Constraint of the state of	Max. Flow Change Conduit Surcharged   Min. Time Step Conduit Flooded   # Conduits with Normal Flow Flooded
GL	<b>OBAL STORMS</b>	Image: state
Re		CONCURRENT
		1/1       34.52 %       Start     Pause       Continue     Stop       Exit
	Storm Generator	1/34.52
		Start Pause Continue Stop Exit
		Start Pause Continue Stop

#### CETTO KNOW THE DICK



# **Thanks for attending**



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