

Envisioning the Digital Watershed

Thinking about water, systems, and data with the
Calumet Stormwater Collaborative

Mason Throneburg @ Confluency

3/5/2021

Blue Island

Dolton

Calumet City

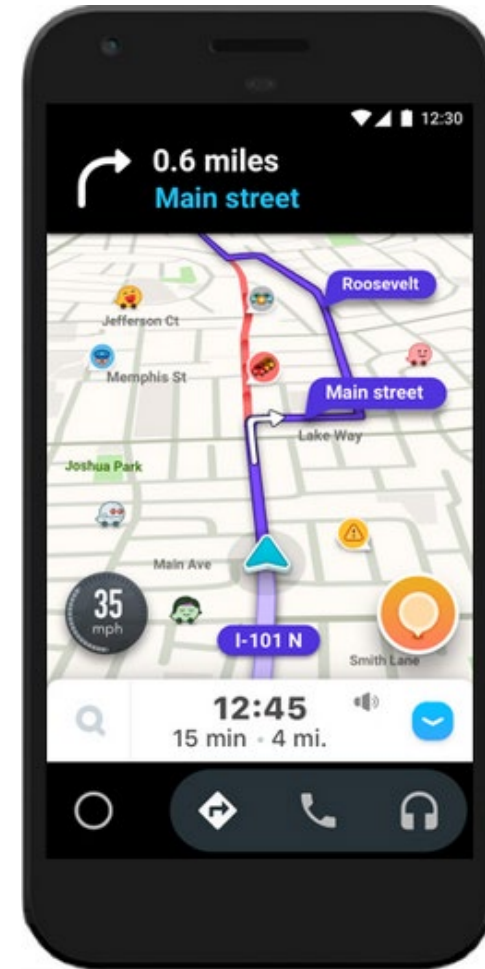
Riverdale

Harvey

South Holland

More Data → Better Stormwater Outcomes?

- Our lives are awash in data
- How does this apply to stormwater?
- Are we creating better solutions using this data?



Hardware

Communications & Controls

Software & Analysis

Meter Reading

Data Transmission

Meter Management

Data Processing

Network Management

Billing

Customer Management

Itron **Mueller SYSTEMS** **MASTER METER**

xylem **Badger Meter**

SENSUS **Aclara**

Honeywell **NEPTUNE TECHNOLOGY GROUP**

elster

Consolidated group, meter companies position as the prerequisite to smart water networks, adjusting strategies with downstream applications, acquisitions and partnerships to gain differentiation

Trimble **optiqua** **Syrinix**

INW **HACH** **Endress + Hauser** **echologics**

AYYEKA **Primayer** **GUTERMANN** **20** **Calm water**

Water quality and monitoring hardware solutions

verizon **Silver Spring NETWORKS**

Sprint **Aclara**

at&t **Tantulus**

xylem SENSUS **SIGFOX** **LoRa**

Communication companies bridge data collection and analytics gap with M2M solutions – mobile & cellular connectivity. Proprietary solutions, and low power wide area networks position for nascent IoT business models

ABB **Schneider Electric**

ERAMOSA **GE**

EMERSON **Rockwell Automation**

SIEMENS

Building on control system, automation, offer smart water applications, network management

Microsoft **SAP**

TERADATA **sas**

CISCO **esri** **ORACLE**

Enterprise software companies with established utility and commercial presence

accenture **Capgemini** **IBM** **pwc** **Hitachi Consulting**

excergy **Util Works** **Westin** **EMA**

Consultancies position themselves as smart technology integrators tying components together with global, smart city approach

Fragmented, burgeoning group of software and analytics companies targeting entire supply chain, diversified players monitor acquisition targets to scale

IDMODELING **TaKaDu** **olea** **VALOR WATER ANALYTICS**

Innovyze **osisoft** **WaterSmart** **Waterfall**

Optimatics **echologics** **mapistry** **FATHOM**

Syrinix **SUS** **Trimble** **Primayer**

UTILIS **GUTERMANN** **Opti**

pure **CLEVEST** **EMAGIN** **pluto** **20** **Calm water**

optiqua **suez** **xylem** **BANYAN WATER** **HYDROMODELHOST** **smart water**

Digital Watershed Concept

Ability to quickly and seamlessly integrate data, models, and infrastructure / system information to meet goals



Potential Drivers for a Digital Watershed

Alerting / early-warning systems

Prioritization of Solutions

Post-Construction Monitoring

Better Solutions

Equity / Inclusion

Adapt to changing environment

Scenarios

Rainfall April 18, 2013

TARP Phase II

Details >

Alternatives

Conveyance Harvey Trunk Sewer A1 +

Storage Underground CSO342 +

Green Infrastructure Medium Intensity, Zone 1 +

Add new +

Themes

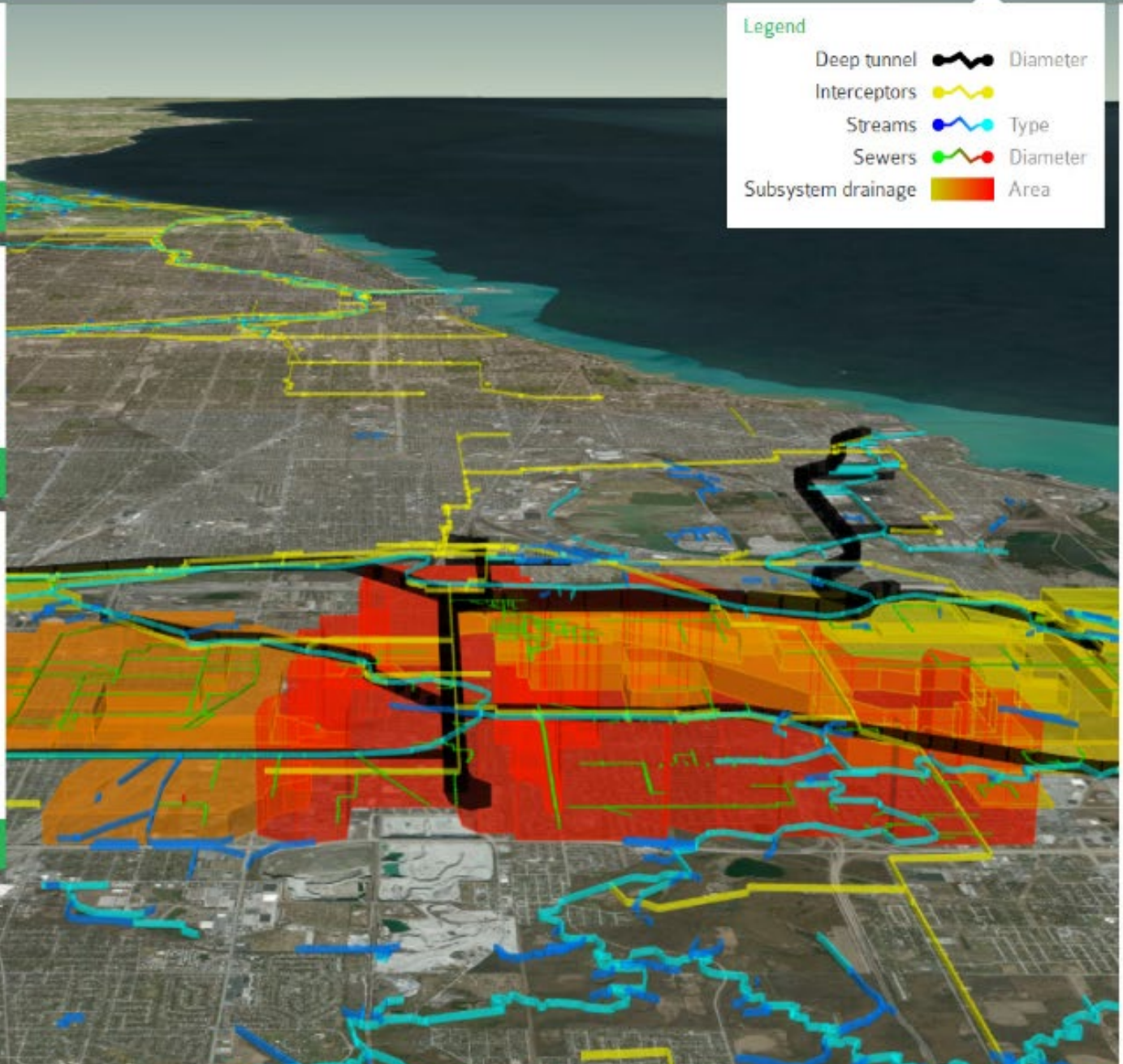
Runoff

Flood risk

Combined sewer overflow

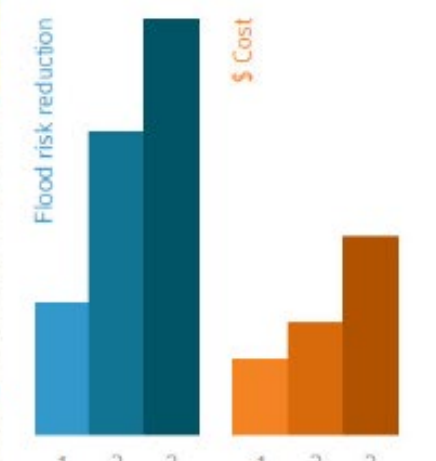
Green Infrastructure

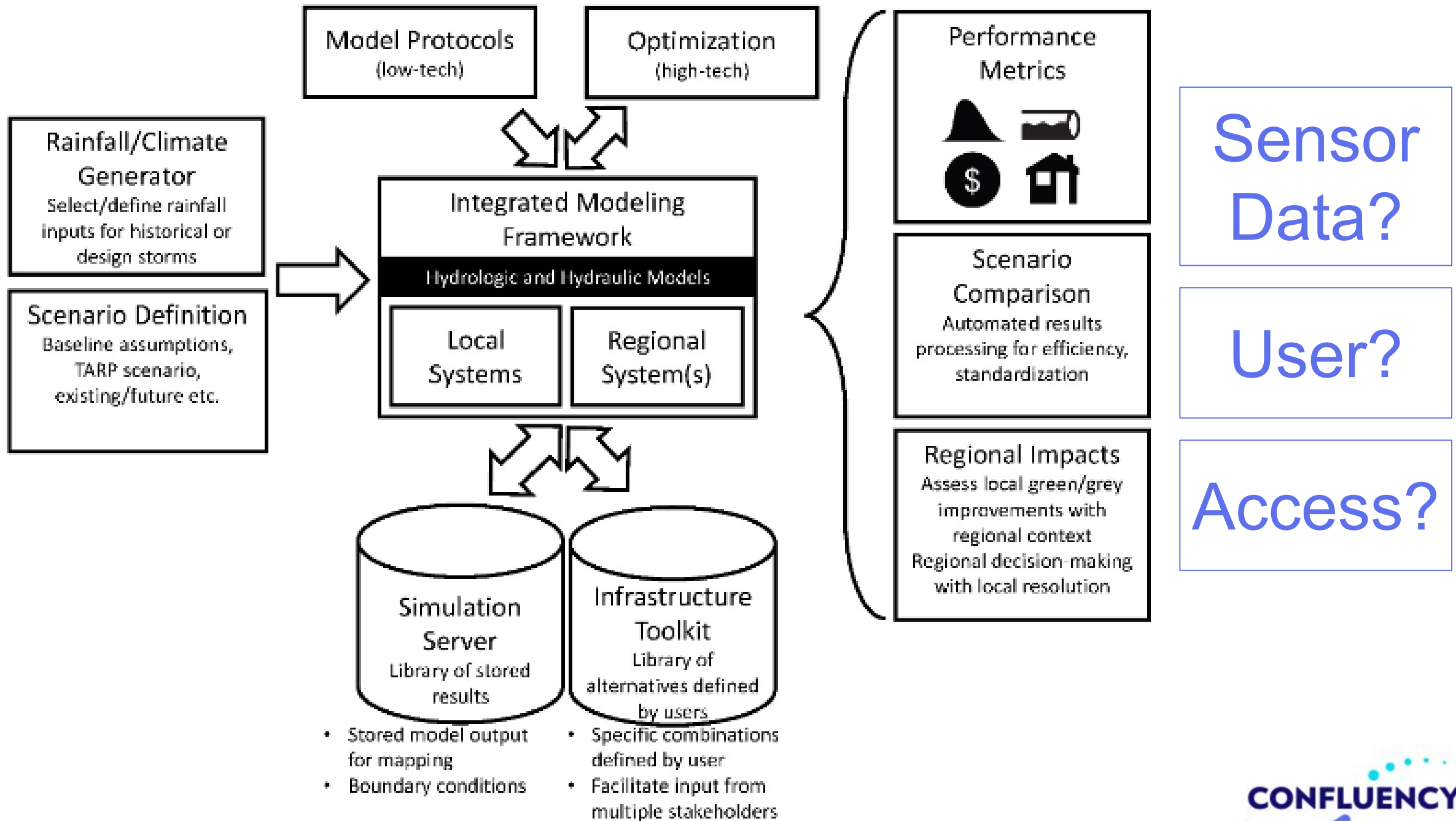
Save as new theme +



Legend

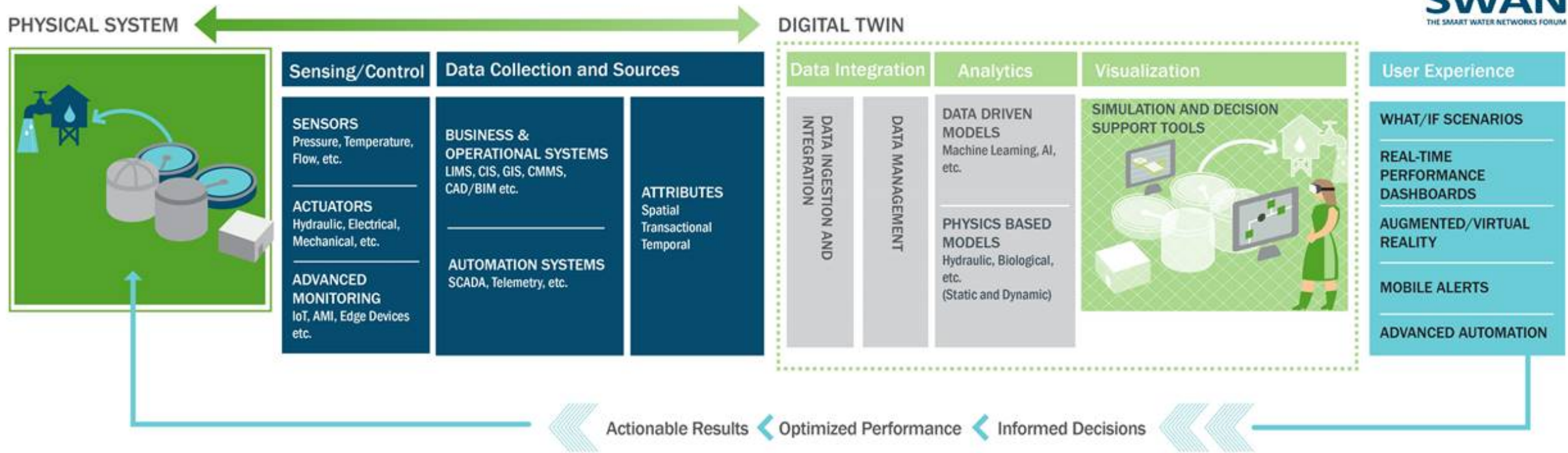
- Deep tunnel Diameter
- Interceptors Diameter
- Streams Type
- Sewers Diameter
- Subsystem drainage Area





Digital Twin

Digital representation of a complex system integrated with real-time sensor data and some sort of process model



Secure and Connected Utility



Technology Perspective

How do we make everything talk?



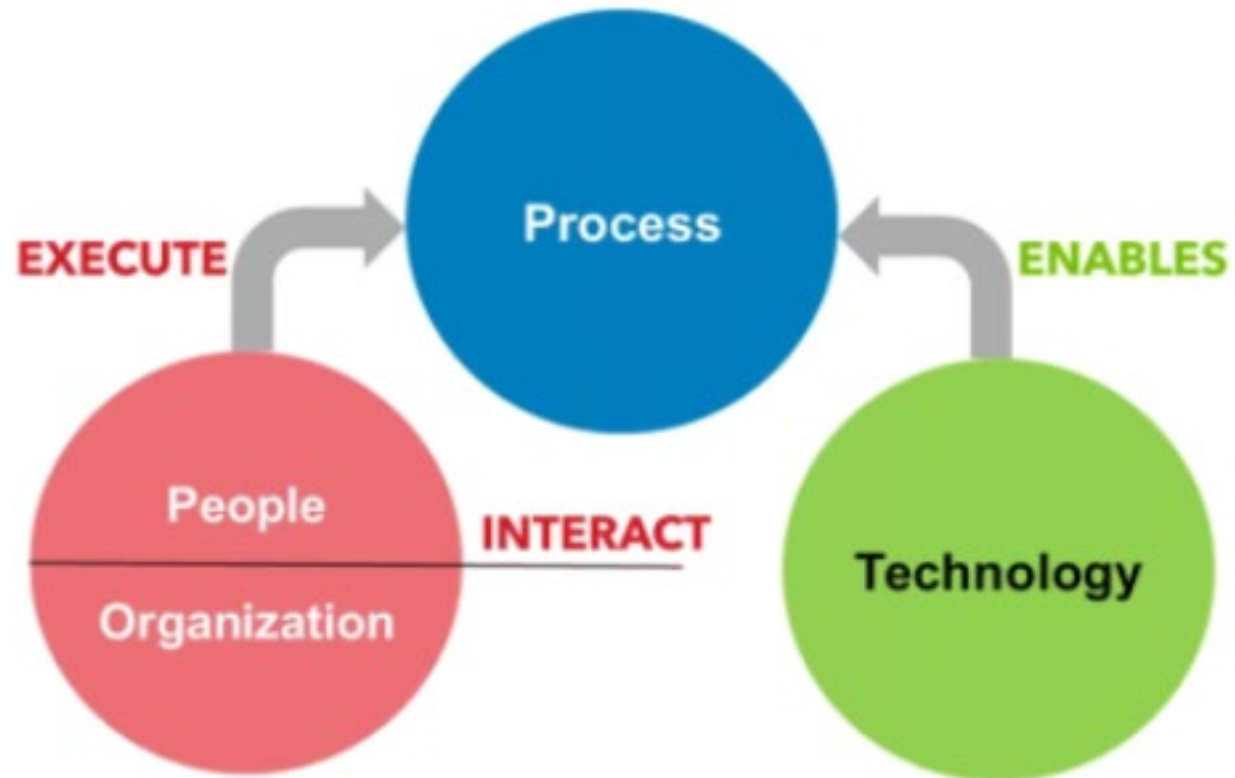
Harmonizing People, Process, Technology for Digital Transformation

WRF 5039 Study Underway for Intelligent Water Systems

Strategy

Tactical

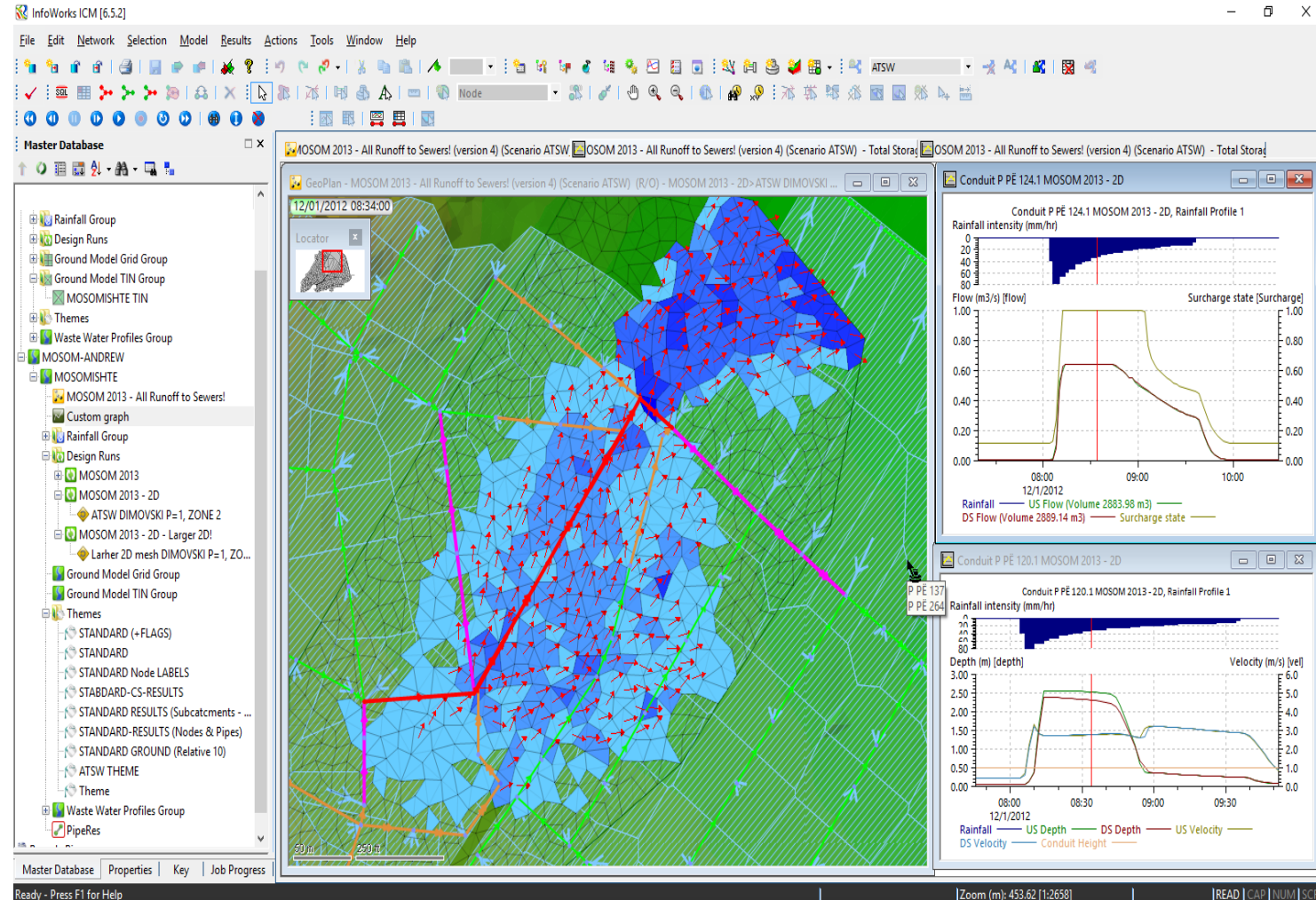
Operational



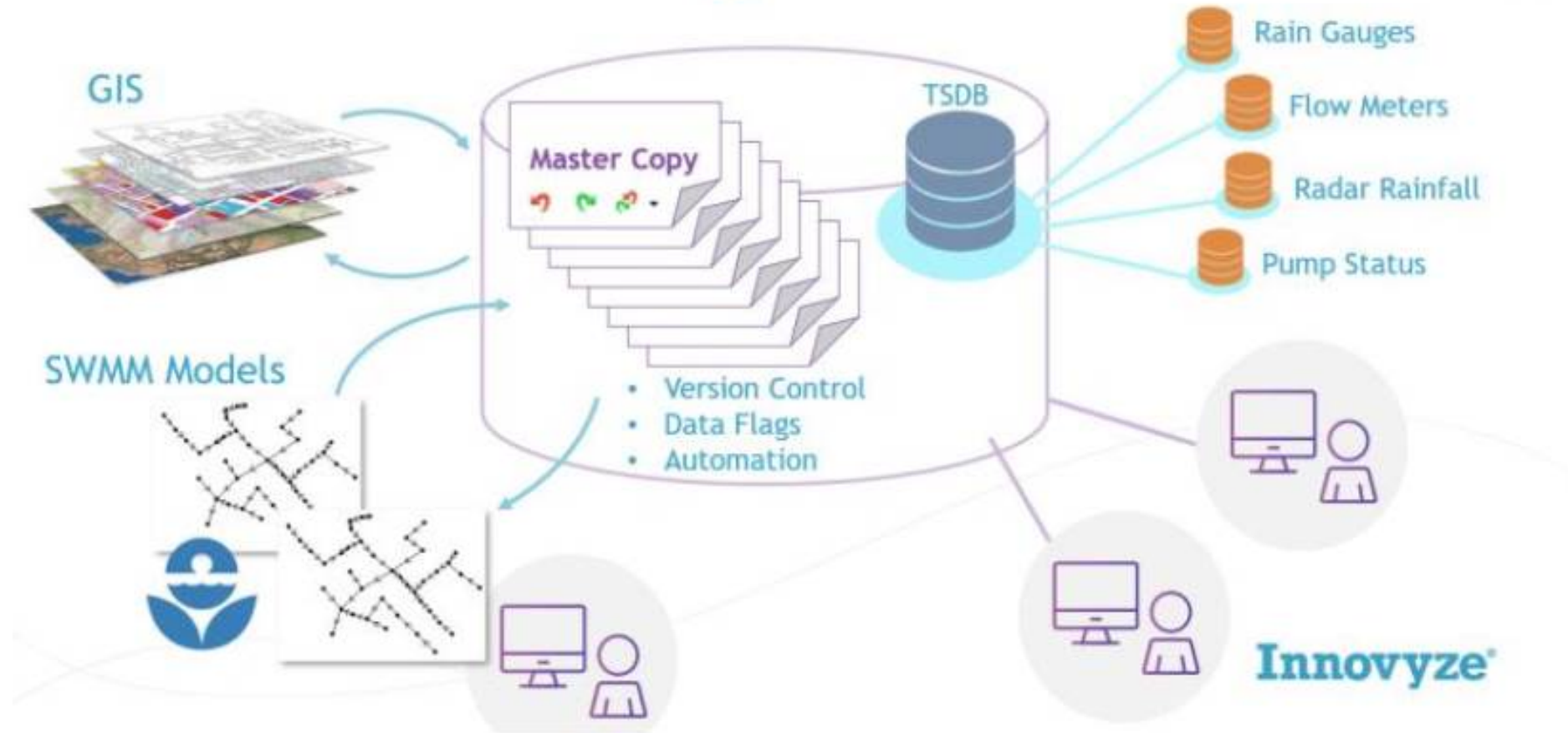
Hydraulic Models

Represent physics of complex systems

- Ask “what if questions”
- Help understand WHY systems respond a certain way
- Key issues
 - Scale / resolution
 - boundaries across systems
 - changing system?



Model Data Management

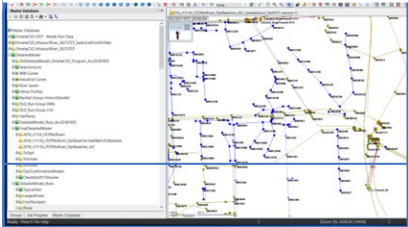


- Solutions exist, but our industry is not good at them
- Continuous integration / continuous delivery for software

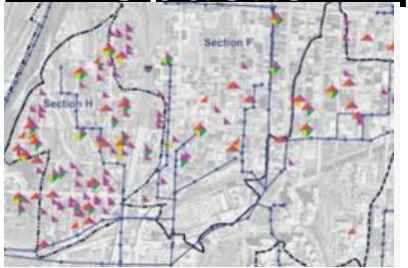
Optimizing the System

Leveraging the hydraulic model with cloud computing and advanced algorithms to systematically search for better and better solutions

Hydraulic Model

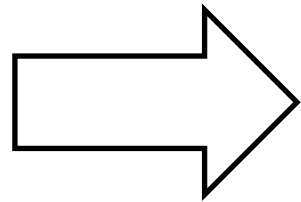


Project Options

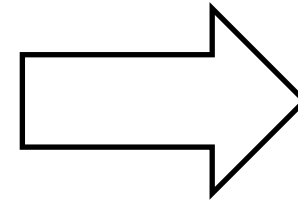


Performance Criteria

- Lifecycle Cost
- CSO Volume

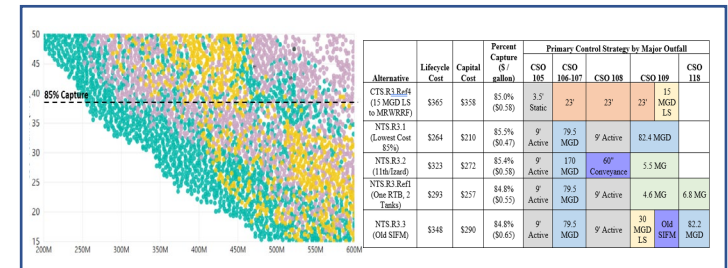


Execute Optimization

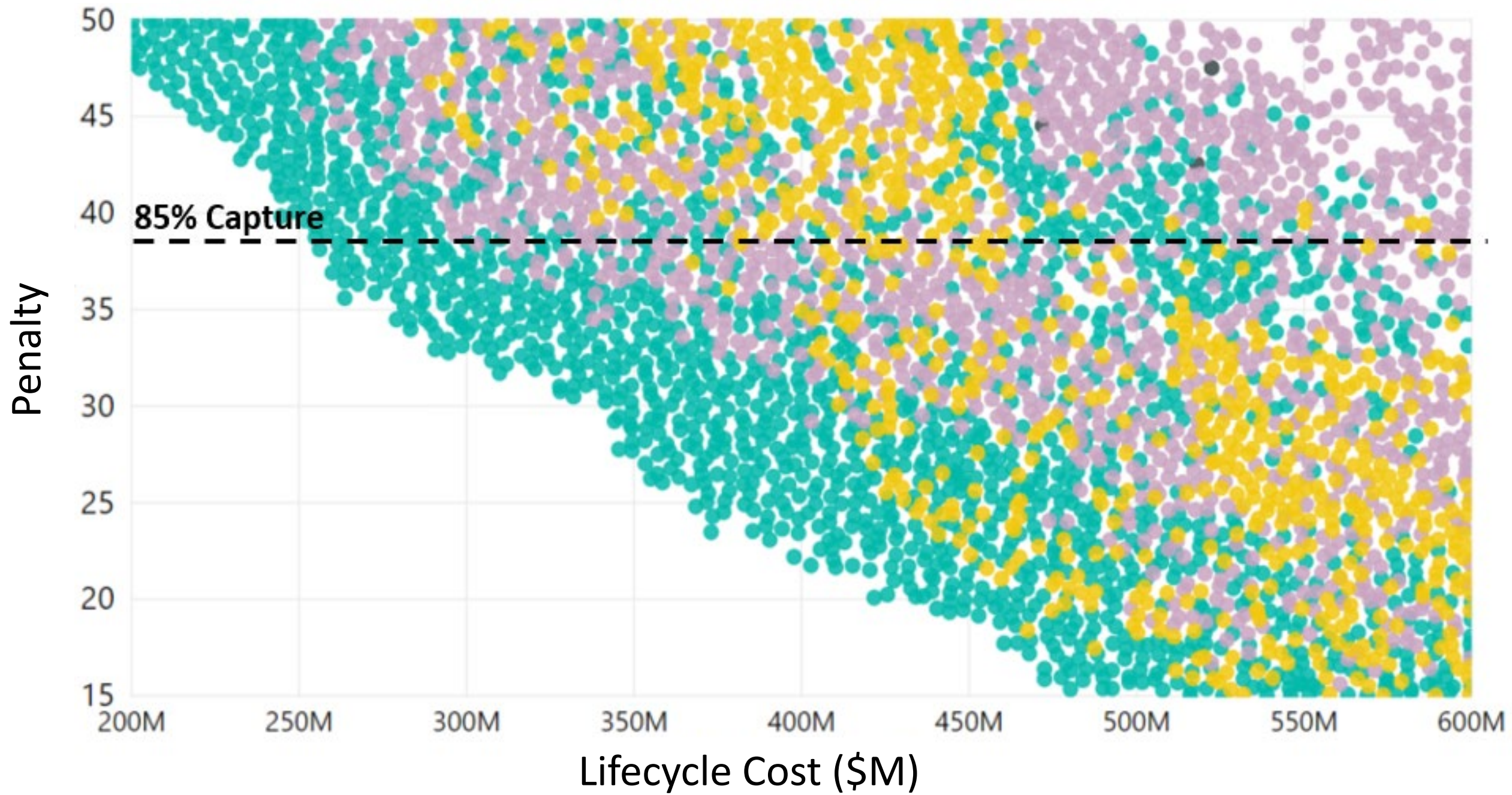


- Use cloud computing and algorithms to scale modeling analysis
- Evaluate 10^5+ options

Review and Interrogate Results



Category ● A ● B ● C ● D

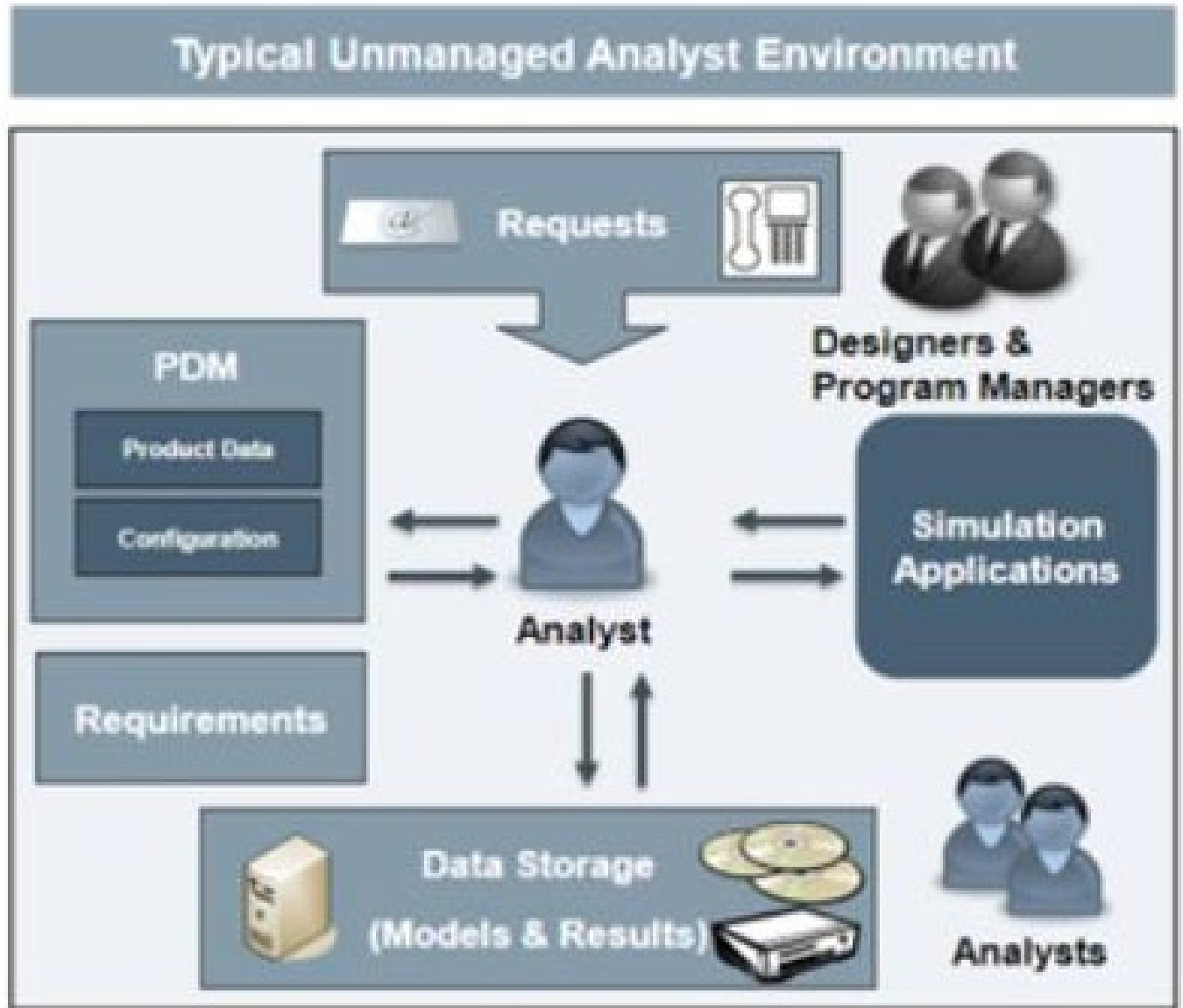




StormStore: Innovative ways to match stormwater management to demand

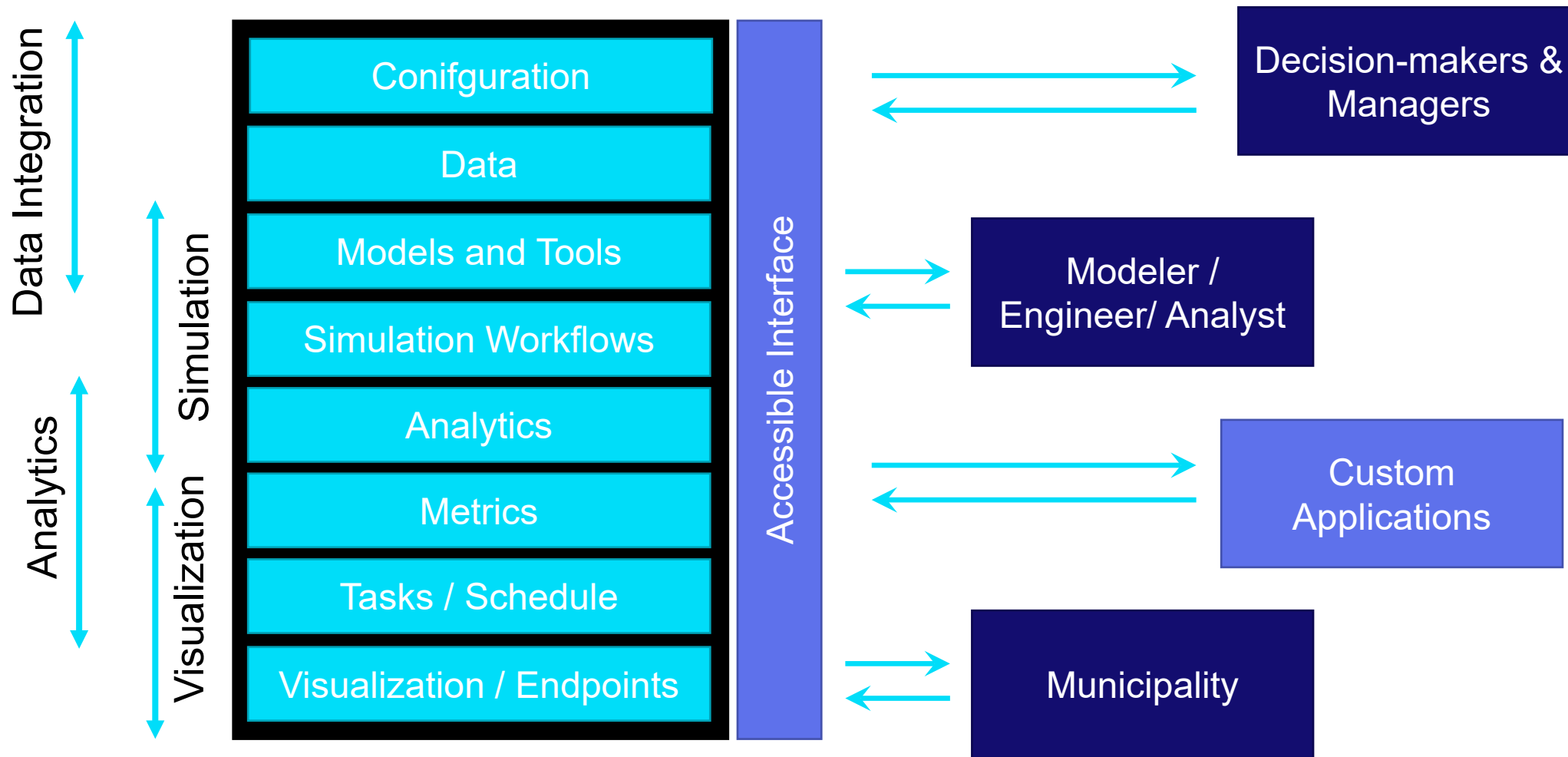
The People
Side...

Work patterns
influence
solutions



Self-Service Architecture

Ability to seamlessly pull data needed without intermediary



Getting to Solutions

Potential of the Digital Watershed

- Stormwater problems are hard!
 - Data is not enough
 - How can more/better/faster data help?
- Incremental progress towards vision
 - Operational time-scale
 - Strategic vision
 - Alignment across time-scales
- Engage people and processes with new tools/technology

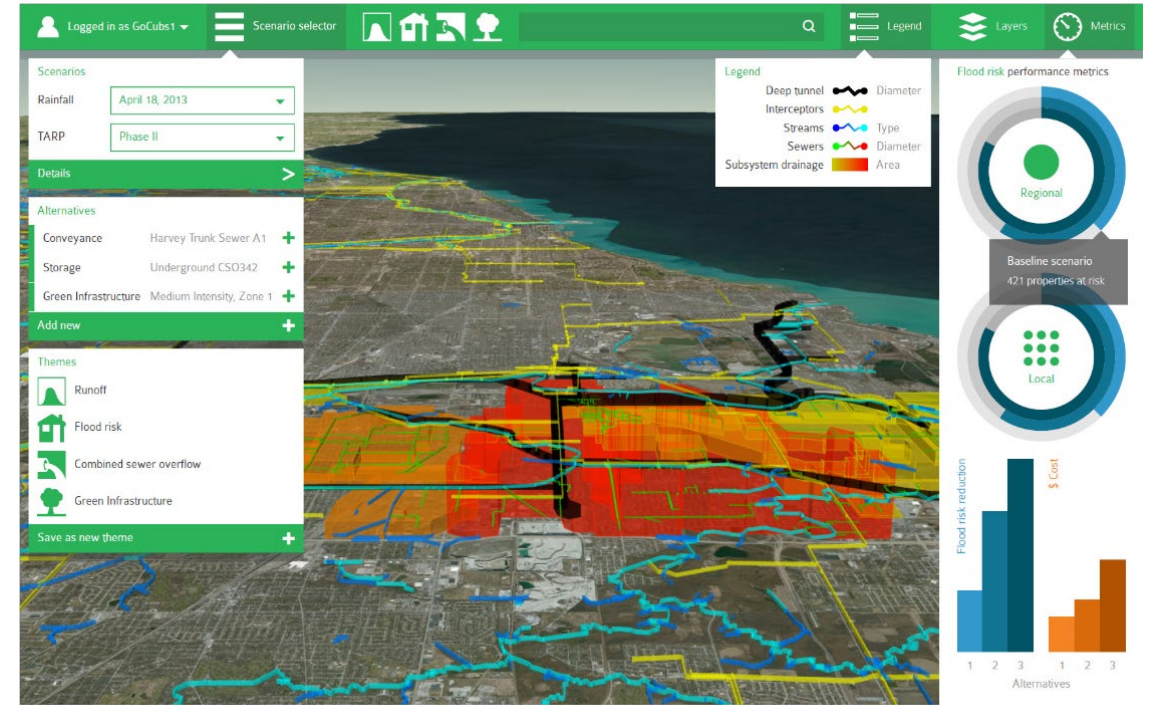
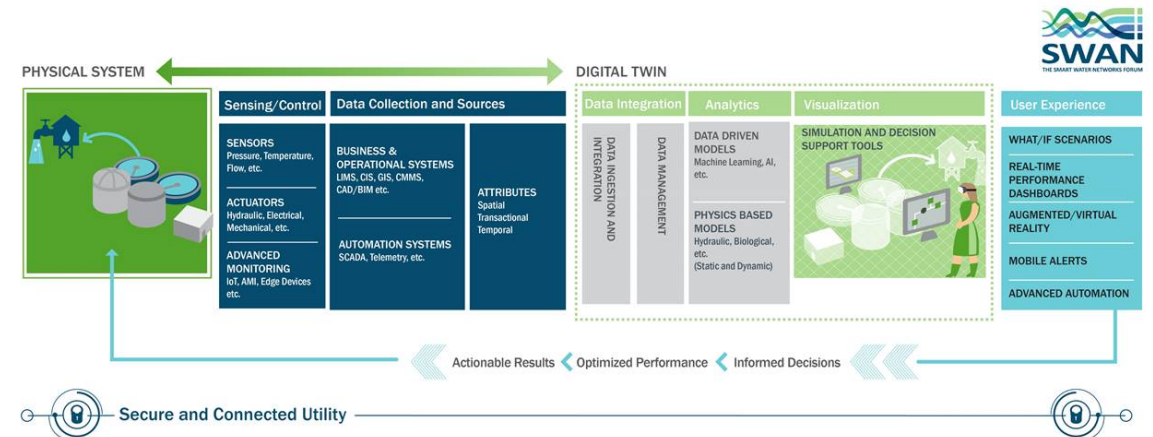


Figure 2-3. Mock-up of Interactive Mapping Application



Digital Calumet Watershed

Value or Distraction?

- Application to stormwater challenges in the Calumet area?
- Experience leveraging data/technology to stormwater?
 - Effective tools/processes
 - Lessons learned?
- Initial steps towards a Digital Watershed be for the Calumet?

Thanks!

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