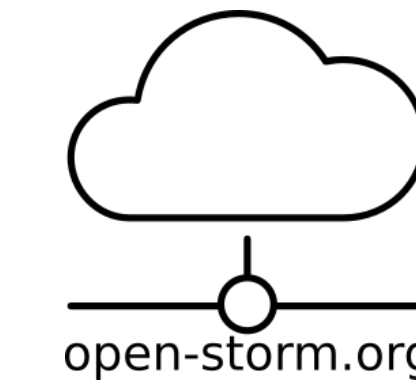


S&CC Track 1: Overcoming Social and Technical Barriers for the Broad Adoption of Smart Stormwater Systems

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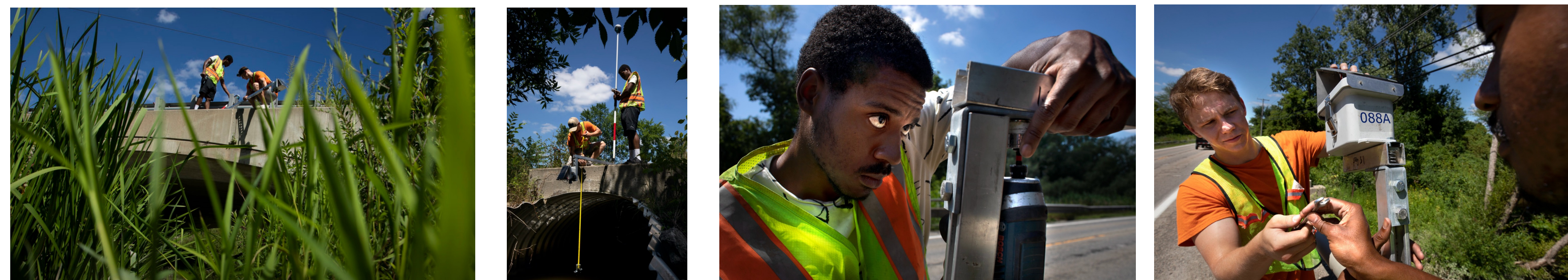
SCC-IRG Track 1: FY16



Background on Community-identified Problem: Flooding is the leading cause of natural disaster fatalities nationally. In addition, nutrients, metals, and many other pollutants are washed from urban surfaces when it rains, eventually ending up in streams, lakes, and oceans. With highly limited revenue streams, stormwater solutions that rely on new construction cannot keep pace with evolving community needs and uncertain weather. As communities seek more resilient infrastructure solutions, novel alternatives must be explored.

Intellectual Merit: Our fundamental understanding of stormwater relates almost exclusively to static gray and green infrastructure. Given the advent and affordability of modern sensors, actuators, and data architectures, there is little, if any, fundamental knowledge about how real-time, adaptive stormwater control, when informed by sensor data and real-time models, will perform when compared to traditional, “static” solutions. Our research will bridge the knowledge gaps that underpin the physical and social scalability of smart stormwater systems. By laying the foundation for a transdisciplinary framework, this proposal also stands to attract new researchers from the social, engineering, computational, and natural sciences into this emerging area of smart and connected research.

Project Updates: We have been completing the evaluation of our community pilot projects, including the deployment of a massive sensor network in Detroit. In partnership with the Sierra Club of Detroit, we have deployed one of the largest Green Infrastructure sensor networks in the country. We have also been working with the Sierra Club to solidify the long-term sustainability of the pilot project.



Control High

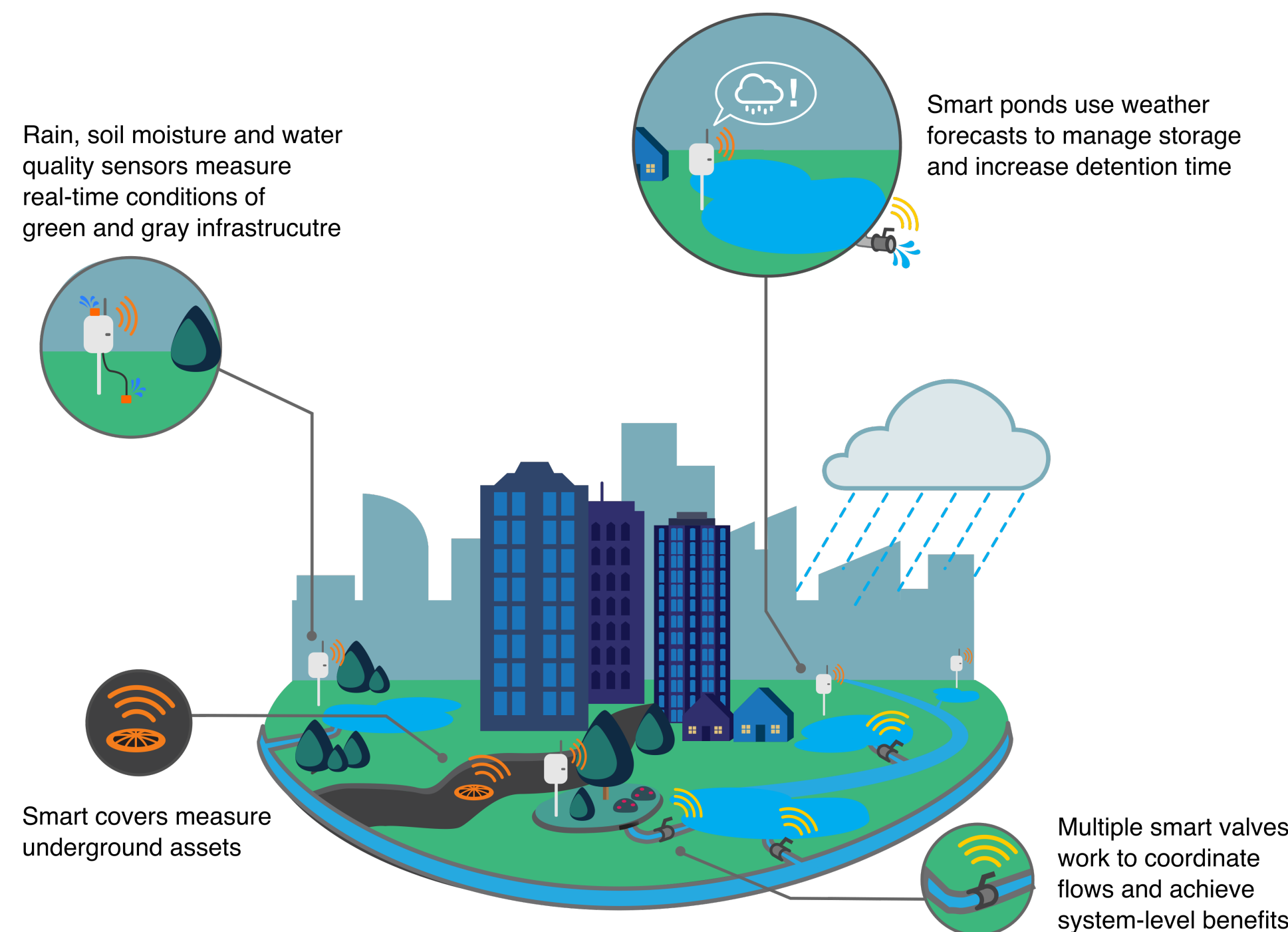


Control Medium



Control Empty

We have continued to investigate a suite of real-time control algorithms, including methods based on reinforcement learning and agent-based control. We have developed a python control framework that ingests streaming weather data, models flow forecast and makes real-time recommendations.



Broader Impacts: Immediate Impact - We are bridging critical knowledge gaps that presently impede the boarder adoption of smart stormwater systems. **Sustained Impact** – we have built a community python control toolbox and open-source hardware. **Next Steps:** For the final year of the project, we plan to operationalize sensors and control systems, as part of our NSF transition to practice supplement.

