

URBAN WATER INNOVATION NETWORK



INTEGRATION & SYNTHESIS RETREAT

SYNTHESIS REPORT

Prepared by Institute for the Built Environment



**INSTITUTE FOR THE
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I. EXECUTIVE SUMMARY

PURPOSE OF RETREAT

To develop a common vision of success for UWIN by identifying processes and products that will bring us together to achieve those reasonable measures of that success over the next 2-3 years in a way that elevates our capacity to integrate beyond individual disciplines and projects so that we transform urban water management systems through integrated approaches.

RETREAT DESCRIPTION & ATTENDEES

The Urban Water Innovation Network (UWIN) is an interdisciplinary consortium of academic institutions and key partners from across the U.S. working on research, engagement and educational programs that address challenges threatening urban water systems. The UWIN Integration and Synthesis Retreat was held at Colorado State University following the 2 ½ -day annual all-hands meeting. Approximately 30 UWIN members, including members of the UWIN leadership staff and many of the project's principal investigators, attended the retreat. The retreat was designed to help the group identify their common goals and directions for integrating and synthesis efforts during the remaining 2-3 years of the NSF grant term. The retreat utilized the results of an activity that was incorporated into the preceding annual meeting titled "The 5 Helpful Lists". This activity was introduced on the first day of the meeting and used throughout the conference activities to gather the participant's views on UWIN's synthesis and integration efforts, asking them the following five questions: 1) What's right?; 2) What's wrong?; 3) What's confused?; 4) What's missing?; and 5) What is the potential?

The results of this activity (see Appendix) were synthesized by the UWIN leadership and the Institute for the Built Environment (IBE) and presented back to participants during the last day of the conference. These results then became the basis for discussion during the retreat and focused around the Products, Processes, and Functional Capabilities that would make UWIN successful in their primary purpose:

To integrate beyond individual disciplines and projects so that we transform urban water management systems through integrated approaches.

RETREAT HIGHLIGHTS

The retreat started with a whole group discussion on the purpose for the retreat, as well as confirmation on UWIN's overall driving purpose and what would constitute success for the group as a whole. This was followed by a breakout activity with guided small group discussion on what products could lead the Network toward successful integration and synthesis during the completion of the project in the next 2-3 years. Each small group then reported the results of their discussion to the whole group and a synthesized list of potential project ideas was generated from this activity and discussion (see section III below).

Top Potential Products Identified:

- Communication and coordination of current products and activities such as syntheses, collaborations, co-authored scientific publications.
- Design & establish a process for test-bed / case studies that integrate, synthesize, and test project findings, methods, technologies, etc.
- Student-focused empowerment program(s) such as student organized networking events, seminars and/or workshops, student involvement in the development of web-tools, apps, design of test-beds, etc.
- Establishment of UWIN task forces for further development of product ideas including:
 - Integrated/synthesis papers
 - Student empowerment programs
 - Test-bed studies
 - Planning tools/apps
 - Communication and visualization tools (maps, physical models, non-tech graphics)
 - Approaches to non-stationarity
 - Indicators of sustainable urban water systems

Related Processes and Success Discussion:

The discussion around the potential products that would allow UWIN to successfully synthesize and integrate their efforts also generated corollary discussion on the processes and measures of success that would help in the generation of those products. The key take-aways from that discussion are:

- There is a need to establish evaluative criteria processes that allow for synthesis and integration and there needs to be more thought devoted to data exchange versus knowledge exchange in the Network. What are the knowledge exchanges that need to take place and how can UWIN support these activities?
- Communication tools and processes should be developed at multiple scales to establish a systematic process for the Network to communicate what work has been or is being produced. The Network should solicit feedback on that work and identify gaps for future work.
 - Every product should be tied to an integrative process. These processes should involve gathering input and feedback from multiple stakeholder groups in ways that bridge research, decision-makers, practitioners, communities, activists, etc.
- There is some tension within the Network over the integrative framework including a lack of clarity on how it has been communicated and its accessibility as well as lack of Network participation in its creation. There was a suggestion to create some trainings and/or think tanks focused on the integrative framework to engage UWIN in vetting and co-creating it. Network-wide participation in this would be required and would help create network-wide buy-in and awareness of the integrative framework and goals.

Functional Capabilities and Next Steps:

The 5 Helpful Lists Activity and the Retreat discussions tended to focus more on the products and processes that would make UWIN successful and less on functional capabilities. These discussions resulted in a list of Next Step tasks and a two month timeline focused on 6 Task Forces, including:

1. Enrollment, assignment, and establishment of 6 task forces: Synthesis Paper; Practitioner-focused web-based planning tool; Test-bed Studies; Graduate Student Programs; Communication Tools (including maps, models, & non-tech communication); and Indicators.
2. Distribution of information on the integrative framework & Task Force guidance.
3. Task Force development of 1-page plans for each area, gathering feedback on the plans from UWIN network, and refining the plans for approval.
4. Implementation of Task Force Plans.

II. 5 HELPFUL LISTS ACTIVITY

The 5 Helpful Lists activity was introduced to the UWIN conference participants during the first day of the conference and participants were encouraged to add their feedback to the lists by writing them on sticky notes and posting these on large flip chart pages for each question. If someone else had already posted an idea that a participant agreed with, they were asked to simply add a small star sticker to that posting. Meeting attendees could participate in the activity at any time during the first two days of the event. The results were analyzed and synthesized by the UWIN leadership and IBE team at the end of the second day and organized according to whether the suggestion was related to a Product, Process, or Functional Capability. These results were then presented back to the attendees on the morning of the third day.



WHAT'S RIGHT?

This category included good examples of what participants felt was going well for UWIN, in terms of synthesis and integration efforts. The results indicated that the network has generated a lot of useful and interesting data, papers, programs, and projects as well as outside interest in the project.

<i>Products</i>	<i>Between</i>	<i>Process</i>	<i>Between</i>	<i>Functional Capability</i>
<ul style="list-style-type: none"> • A lot of good data has been generated* informing new research questions • Moving forward with papers & projects 	<ul style="list-style-type: none"> • URP Program* • Good citizen science incubator • Diversity Fellowship 	<ul style="list-style-type: none"> • UWIN members coming together (annual meeting) • Cross-pollination 	<ul style="list-style-type: none"> • Generating outside interest* • Commitment & excitement from the team 	<ul style="list-style-type: none"> • Connecting veg. sampling & dynamics to water issues

WHAT'S WRONG?

This category resulted in more responses than the previous category, indicating that the Network needs additional support in their integration and synthesis efforts. The responses focused most heavily on problems in UWIN's processes but also suggested some issues with products. There is a need for products such as synthesized cross-city studies that include innovation, policy, and social solutions but collaborative communication processes and discussion on processes for integration may be lacking. In addition, participants find it difficult to coordinate on integrative activities and products and there is a general lack of accountability and incentives for participation in collaborative and integrative activities across the network.

<i>Products</i>	<i>Process</i>	<i>Between</i>	<i>Functional Capability</i>
<ul style="list-style-type: none"> • Need more higher-level, multi-city synthesis studies** • Limited focus on technological solutions • Need innovation including meaningful policy/social solutions 	<ul style="list-style-type: none"> • Need discussion about integration processes * • It's hard for students to engage in "whole room discussions"***** • Lack of continuous communication & engagement among grad students leading to missed opportunities & duplication** • Some projects siloed and/or will not work with each other* • No accountability/incentives (\$) for participation in networking & UWIN cross-city initiatives 	<ul style="list-style-type: none"> • It is hard for teams to coordinate on integrative research and papers*** 	<ul style="list-style-type: none"> • Moments of "Out of sight, out of mind"

WHAT'S CONFUSED (IN THE FORM OF A QUESTION)?

Out of the five categories, this category garnered the most responses from conference participants. Responses indicated confusion amongst UWIN in the following areas: what kinds of data and products are other members of the Network working on; what products are being collectively contributed to across the Network; what opportunities and challenges exist for sharing data and collaborating; what

scales members are/can/should be working at; and what the integrative process should be and how each of the project teams link and/or fit within it.

<i>Products</i>	<i>Between</i>	<i>Process</i>	<i>Between</i>	<i>Functional Capability</i>
<ul style="list-style-type: none"> • What data do others have? • What are the areas of UWIN intended products? * • Which cities or regions (i.e. NY, Chicago)? • Does storage limit data type?* • How do we communicate to different audiences? 	<ul style="list-style-type: none"> • For any site, what is the scale (i.e. city, metro, and region)? • What is the spatial scale of data? • How do the impacts change with scale? • How to do meaningful cross-city syntheses (scale, politics, landscape) • Is the data translatable between disciplines?* 	<ul style="list-style-type: none"> • What is our integrative framework, process and how does each project link to it?*** • Will GI be effective under future climate scenarios? • What is the process for diversity fellowship selection? • When will we take action on interdisciplinary research? 	<ul style="list-style-type: none"> • Are aspects of urban heat unrelated to water and can we <u>connect</u> them better?* • Can we add a group specifically devoted to cross-city comparisons? 	<ul style="list-style-type: none"> • What do we mean by inter- & trans-disciplinary?

WHAT'S MISSING?

Responses in this category were mainly focused on products, including communication/stakeholder engagement products and products that assist with integration and synthesis efforts across the Network. Suggestions include a method of communicating externally with UWIN study cities and/or other interested cities, as well as repositories for sharing information across the Network. Processes related to these types of products were also mentioned, such as standardization and sampling methods, along with a need for stronger networking among the graduate students involved in UWIN programs.

<i>Products</i>	<i>Between</i>	<i>Process</i>	<i>Functional Capability</i>
<ul style="list-style-type: none"> • A debrief/press release to communicate findings to UWIN cities (and other interested cities) • Listserv & other mechanisms for sharing across the Network* • List of methods for synthesis and integration * 	<ul style="list-style-type: none"> • Ways for standardization & integration between methods of sampling for better cross-collaboration 	<ul style="list-style-type: none"> • Veg. processes and patterns linked to GI performance patterns • High school & lower education engagement 	<ul style="list-style-type: none"> • Grad students do not know each other & their UWIN work **

WHAT IS THE POTENTIAL?

This category garnered responses that crossed between all three areas such as the potential to develop a process and tools for investigating patterns practitioner activities and how these relate to the work and findings of UWIN research. Respondents also saw the potential for the Network to inform other interdisciplinary teams on collaborative processes by documenting the lessons learned through participation in this project. In addition, participants want to build upon aspects of the project that are working well including creating a greater sense of community and shared learning across the Network as well as creating more networking opportunities for the students involved in UWIN.

<i>Products</i>	<i>Between</i>	<i>Process</i>	<i>Between</i>	<i>Functional Capability</i>
<ul style="list-style-type: none"> • Many individual (but related) papers • A guidance document on the UWIN studies & products that summarizes “what worked”, “lessons learned”, etc. to guide future projects* • A list of next steps – sustainability of UWIN • Sense of community & shared learning 	<p>←</p> <ul style="list-style-type: none"> • Using the UREX scenarios in UWIN models* 	<ul style="list-style-type: none"> • Figure out how to take what practitioners are doing and look at patterns to improve veg. structures to better manage H2O • Give students more time to discuss their research beyond poster session 	<p>→</p> <ul style="list-style-type: none"> • Encourage more communication between UWIN students along with data sharing and problem solving 	<ul style="list-style-type: none"> • Great commitment & support for undergrads from PIs, mentors, annual meeting participants, and staff

SUMMARY OF KEY LEARNINGS

The 5 Helpful Lists activity was able to garner valuable feedback from the UWIN members that participated in the annual all-hands meeting. While it is clear that not all of the attendees participated, the responses were helpful in guiding the conversation and decision-making during the Retreat. It is clear from the responses that products, processes and functional capabilities are blurred categories that are difficult to separate. There seems to be some clear confusion amongst the Network regarding the group's integration and synthesis efforts, centering on communication, data sharing, and integration methods. The program has generated valuable data, projects, programs and outside interest but synthesis and integration activities are perceived as difficult due to an apparent lack of integration structures, methods, data sharing and communication. There is, however, great potential for UWIN to be successful in their overall goals by developing ways to support the Network and integrating products and processes in smart ways.

III. RETREAT

The half-day Retreat began on the afternoon of the third day of the conference with a brief discussion of the purpose for the retreat and the agenda for the afternoon activities. The results of the 5 Helpful Lists Activity were also briefly reiterated and discussed by the participants attending the Retreat.

PRODUCTS BREAKOUT- SMALL-GROUP DISCUSSION

Following the opening discussions, retreat participants were asked to self-divide into small groups of 3-4 members to discuss the potential products that would help bring the Network together toward integration and synthesis as well as those that would help cities develop more sustainable water systems. Each group was given a focus sheet with the following three questions and 45 minutes for discussion:

- What are the products & activities that we can generate over the next 2-3 years that will **bring us together**? (Examples include: courses, books, papers, events, workshops, technologies, patents, etc.)
- What are the products & activities that we can generate over the next 2-3 years that will **help cities increase the sustainability of their water systems**? (Examples include: courses, books, papers, events, workshops, technologies, patents, etc.)
- What has **shifted in YOUR thinking** in this area because of this discussion?

Results

The small-group discussions resulted in a range of potential product ideas that were then reported-out by each of the small-groups and discussed by the group as a whole. The suggestions resulting from this conversation fell into two overarching categories and were either **internally-focused or externally-focused products**, aligning with the two key questions focusing the small group discussions. The emergent whole-group discussion also revealed that there are three primary sub-categories, or themes, for the products that could be produced by UWIN through their integration and synthesis efforts, including:

- Academic-focused products
- Practice-focused products
- Communication/knowledge sharing products

The following list of potential products was generated and captured during the report-out by each of the small-groups and subsequent whole-group discussion:

<i>Products</i>	<i>Internally-focused</i>	<i>Externally-focused</i>
<i>Academic</i>	<ul style="list-style-type: none"> • Cross-thrust workshop • Comparing/contrasting study of cities • UWIN continuation plan • Study on lessons learned from disasters (social vs. technological) • Project-wide seminars for students to present their work • Grad. student retreats • URP becoming a stand-alone and sustainable program • Guideline on how to use the integrative framework 	<ul style="list-style-type: none"> • Synthesis paper in a high impact journal (e.g. PNAS, Science, etc.) • A “benchmark” paper that summarizes what research, integration, and synthesis has been done within the Network to date and identifies the gaps and potential for future projects • Session or panel highlighting UWIN’s work at the American Association for the Advancement of Science (AAAS) conference • Integrated paper on interdisciplinary science & collaborative processes
<i>Practice</i>	<ul style="list-style-type: none"> • Using campuses within the focus cities as test-beds • Bring stakeholders to annual meeting 	<ul style="list-style-type: none"> • Handbook of best practices for cities • Case studies (successes and failures) • Demonstrations • Integrative tools, apps and training for decision-making • Decision-trees • Workshops with practitioners, innovators, and decision-makers • Self-assessment tools
<i>Communication & Knowledge Sharing</i>	<ul style="list-style-type: none"> • Comparative plant list • Forums for more discussion on integration and synthesis and PI exchange • Webinars on the Integrative Framework • Plans for cross-network / integration teams • Visiting scholar program across the Network • Use of apps (e.g. Slack) for more efficient communication across the Network 	<ul style="list-style-type: none"> • Branding, messaging and communication guidelines for cities • @UWIN_Network Twitter handle • Messaging and framing that impacts behavior • Stakeholder accessible databases • Non-technical visualizations • Citizen-science apps (e.g. Adopt-a-Drain)

DISCUSSION ON PROCESSES AND SUCCESS

The discussion around the products that would help to bring the Network together and achieve success in their vision of helping cities to transform urban water management systems through integrated approaches, naturally included the integrated discussion of measures of success and the processes that would help in the creation of those products. This further confirms the findings of the 5 Helpful Lists activity, reinforcing the blurred lines between products, processes, and functional capabilities for integration and synthesis efforts. Because of the inter-connected nature of the discussion, the whole-group discussion was allowed to continue somewhat freely and ideas and suggestions on processes and measures of success were captured simultaneously with those on products.

The discussion resulted in agreement from the group that there is a general need amongst the Network to:

1. Document what has been or is being done (i.e. studies, data, papers, collaborations) to date within the UWIN network
2. Engage feedback on those activities (from both members of the Network and stakeholders)
3. Identify gaps
4. Integrate efforts through a co-created framework
5. Produce synthesized products of high-quality and value

The suggestions for processes and measures that should be established by the UWIN network in support of integration and synthesis efforts related to addressing this general need fell into three categories, including evaluation, communication, and integrative framework, as shown in the following table:

<i>Evaluation</i>	<i>Communication</i>	<i>Integrative Framework</i>
<ul style="list-style-type: none"> • Evaluative criteria and processes • Design test-bed studies to test the findings of the UWIN across all four thrusts simultaneously • How are actions and outcomes correlated? • Everyone should work together and contribute to the decision-tree tool • Sustainability must include equity and justice • Measures and indicators of successful integration are needed 	<ul style="list-style-type: none"> • Communication tools and plans that work across multiple scales of the Network (i.e. admin., researchers, students, etc.) • Need a systematic way for UWIN to know what has been/is being produced • Make it clear that everyone is responsible for participating 	<ul style="list-style-type: none"> • Who designs and coordinates the test-bed studies (e.g. postdoc?) • Need to create awareness and buy-in to the Integrative Framework and indicators across the Network (e.g. trainings, think-tank, etc.) • Every product should be tied to a process • Grad students should work with multiple PIs to help with integration

NEXT STEPS DECISIONS

Following a thorough discussion on the products and processes that could help make UWIN successful in their mission and integration efforts, the group was directed to decide upon some next steps for moving forward.

Establishment of Task Forces

The group decided that the establishment of six key task forces would be necessary and that each task force would work together over the next two months to create a 1-page proposal for moving forward with planning for the creation of the following products:

1. Test-bed studies
2. Academic synthesis paper for publication in a high-level journal that uses the results of the test-bed studies and highlights the integrated indicators used
3. Holistic, web-based, practitioner-focused planning tool based on the integrated indicators and results of the test-bed studies
4. Graduate student programs that assist in and provide students with opportunities to be instrumental in the integration efforts of the UWIN network
5. Communication plan and tool development to facilitate integration and synthesis efforts
6. Comprehensive list of indicators and measurements for integrated studies

Next-steps and timeline

The group then decided on the following process and timeline for the establishment of these task forces:

- August 2018: Volunteers sign up for initial task force development (2 month commitment)
- August 2018: UWIN Leadership to create Task Force Guidance documents
- Aug. – Sept. 15, 2018: Each task force to create a 1-page proposal addressing the following questions:
 - What is the primary objective(s) for this product and its creation?
 - How does the product connect to the Integrative Framework? If not, why?
 - What are the guidelines for cross-cutting and integrative membership in the creation of this product?
 - What other products and/or processes are needed to successfully achieve the creation of the primary product in this area?
 - What resources will be needed to create this product?
 - What communication needs would be related to the creation of this product?
 - What would the selection processes need to be for UWIN to collectively decide on the logistics (i.e. location, scale, timing, etc.) for the completion of this product?
 - What coordination would be necessary from the UWIN administration for the selection process and creation of this product?
- September 15, 2018: Proposals are submitted to UWIN administration
- Sept. 15 – Oct. 1, 2018: Feedback on the proposals is gathered from across the Network

- Oct. 1 – Oct. 15, 2018: Feedback is incorporated by each task force and proposals are refined
- Oct. 15, 2018: Task Force proposals are released to the UWIN network for implementation

TASK FORCE VOLUNTEERS

At the end of the half-day retreat, participants were asked to volunteer for the Task Force group(s) that they are interested in working on. The following people volunteered:

<i>Task Force</i>	<i>Volunteers</i>
SYNTHESIS PAPER	Matt Georgescu (A, ASU); David Letson (C, U-Miami); Liz Mack (A/C, MSU); Darrel Jenerette (A, UC-Riverside)
PLANNING TOOL	Brian Bledsoe (B, UGA); Mike Sukop (E, C, FIU); Elie Bou-Zeid (A, Princeton); Sybil Sharvelle (B, CSU); Andre Dozier (B/D, CSU)
TEST-BEDS	Jennifer Cherrier (A/B, CUNY); Jim Smith (B, Princeton).; Jessica Bolson (E/C, FIU); Chris Swan (A, UMBC); Brian Bledsoe (B, UGA); Tom Meixner (B, U-AZ)
GRAD STUDENT PROGRAM(S)	Tyler Dell (D, CSU); Shirley Vincent (Vincent Consulting); Alan Berkowitz (E, Cary Inst.)
COMMUNICATION	Forrest Meggers (A, Princeton); Dave Hondula (A, ASU); Tyler Dell (D, CSU)
INDICATORS	Dave Hondula (A, ASU); Mike Sukop (E/C, FIU); Jessica Bolson (E/C, FIU); Andre Dozier (B/D, CSU); Adam Henry (C, U-AZ)