

Known Unknowns and Unknown Knowns

The PURIFLUME is a mobile demonstration, education, and proof of concept project. It demonstrates a passively biased closed loop water filtration system that can be employed by municipalities to eliminate non-point source water pollution caused by combined sewer outflow. The PURIFLUME was conceived, designed, and built by the Urban Design Build Studio (UDBS), a public interest design entity affiliated with Carnegie Mellon University. .

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It represents the culmination of a two year long commitment made by 11 undergraduate Bachelor of Architecture (BArch) students, 4 Masters of Urban Design (MUD) students, and 3 Architecture Engineering and Construction Management (AECM) students. These students collaborated through a variety of vertically integrated studios and support courses to realize the project.

What was built in no way resembles what the students were asked to develop at the beginning of their work – in scale, or scope. They were asked to develop the design for, and execute construction of, an adaptive re-use project within the context of a historically protected complex of buildings surrounding a decommissioned pool. While the PURIFLUME is a tangible artifact produced by a Design-Build entity, its realization is representative of sensibilities and process that avoided the pitfalls of building an untenable, near-term building program poised for failure and abandonment.

Design-Build Studios are focused on making. That is the reason they exist. But, if the sole benefit of that enterprise is students experience without benefit in the Public Interest, it can be argued that the making is for its own sake. Because research based institutions offer vast intellectual resources, the value proposition of university-affiliated Design-Build is that it will afford an opportunity to deliver something to the public that might otherwise not be feasible. That is a privilege, not an entitlement. Traditional market-based project delivery is often compromised because economic parameters, socio-political condition, private interest, and public will do not align favorably. Circumstances that would otherwise preclude the development of a construction project are not always considered in the development of university affiliated Design-Build projects. Sometimes that is for good reason – other times it represents negligence.

So, the question becomes one of knowing WHEN it is appropriate to build, and WHAT is appropriate to build? There are a number of factors, existing well beyond the



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boundaries of physical construction that need to be considered in establishing the relevance of a project to a community. Identifying WHEN it is appropriate to build, and understanding WHAT should be built, is fundamentally a matter of understanding KNOWN and UNKNOWN Conditions – or more specifically, their intersections with one another.

The *KNOWN UNKNOWN* represents the fundamental Socratic Paradox,¹ but it is probably a more culturally pejorative, pedestrian exploration that resonates in the context of this discussion. Since February of 2002, Socrates has been sidelined and the etymology of KNOWN UNKNOWN has been exclusively linked to former United States Secretary of Defense, Donald Rumsfeld.² In addressing a question regarding lack of evidence in finding Iraqi weapons of mass destruction he stated: ³

“As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know. And if one looks throughout the history of our country and other free countries, it is the latter category that tend to be the difficult ones.”

Soon after the statement was made, Psychoanalytic philosopher Slavoj Zizek identified a fourth category beyond Rumsfeld's (attributed) three categories - the unknown known; that which we intentionally refuse to acknowledge that we know.⁴

The first step in any participatory design process is to Identify Community Assets, Liabilities, and Future Oriented Objectives.⁵ That process yields four intersections 1) KNOWN KNOWNS, 2) KNOWN UNKNOWNNS, and 3) UNKNOWN UNKNOWN – It is Zizek's 4) UNKNOWN KNOWNS. It is the fourth that reveals ethical dilemma for university affiliated Design-Build; it is where privilege has potential for abuse; and, it is where project abandonment presents as the potential risk in outcome.

There is a clock involved in academic Design-Build. It is tied to the academic calendar. Internal to the institution, and in addition to normative project delivery pressures identified earlier, academic Design-Build maintains a relationship with a school's global curricular objectives. Instructors have responsibilities as educators in contributing to the global curricular objectives and in preparing well-rounded emerging professionals. Students who enroll in design build studios have expectations about what will be accomplished at the end of a process, which more often than not, suggests that building is an entitlement. A studio advertised as Design-Build that does not result in construction is almost always perceived as a failure. But should it?

Figure 1: Composite View of PURIFLUME Proof of Concept Project in Transit and during deployment.

ONE OPTION: AVOID RISK

Unless a school elects to remove the potential for ethical conflict by managing Design-Build projects internally, with private financial resources, NOT building should remain a legitimate option. There are numerous examples of rich Design-Build programs that operate within the framework of the academy alone, without a social component or client participation. Among other things, those programs 1) identify funding sources and operating budgets for projects, 2) collectively determine the relevance of the studio in the context of global academic and pedagogical objectives, 3) calibrate student and instructional workload to match corresponding course unit loading, and 4) maintain the work exclusively bound to the private interest of the academy and domains of allied research – not in the service of a client. This is an effective method for managing work within an academic calendar, eliminates risks associated with conditions beyond the control of instructors and students involved, and recognizes that the agenda of an architect and academy may be different from the agenda held by the public or client. In that context, making – and making alone – is an entirely useful and responsible outcome. It serves to elevate the student’s capabilities and awareness, offers opportunity for intellectual discourse, and there is no risk to the public interest.

ANOTHER OPTION: EMBRACE RISK

Many academic institutions elect to maintain Design-Build as a service based enterprise/proposition. When clients are engaged, public and private interests must be balanced – and variables can compound unpredictably. The realization of the PURIFLUME was a product of a process with compounding variables that ultimately altered the form of deliverable to constituents, stakeholders, and the public. While not what was initially expected to be the outcome, the project 1) advanced the community’s articulated objectives, 2) raised public awareness of issues with regional significance, 3) increased the relevance of work to a broader public audience, and 4) dovetailed with parameters governed by the affiliated academic institution. But, the PURIFLUME was not the planned project.

CONTEXT (AND EXPECTATION)

The collaborating stakeholders and clients involved in realizing the PURIFLUME represent the best characteristics for success in participatory design processes. They are organized, diligent, and proactive. They have an intimate knowledge of their community. They understand that intervention with the built environment requires the engagement of established jurisdictional entities. They understand politics. They are passionate, selfless, and most importantly – empowered. They understand that with financial investment comes responsibility. The list of positive attributes can be expanded to great length.⁶ But, there are conditions and circumstances, way beyond their control, that ultimately influenced the trajectory of what was initially targeted as a scope of work.

In 2009, three residents of the Lawrenceville Neighborhood in Pittsburgh, PA formed a group called the Leslie Park Pool Collective (LPPC). The formed as a volunteer collective to marshal the redevelopment of a decommissioned public pool facility in their community. The facility, constructed in 1908, had been the epicenter of the neighborhood’s collective social activity until it’s closing in 2003. Since that time, it has remained vacant and a center for nefarious activity.⁷ In an effort to eliminate the threat to neighborhood safety and find new vitality for the site and abandoned structures, the Leslie Park Pool Collective (LPPC) assembled a steering committee that included local architects, planners, a neighborhood Community Development

Corporation (Lawrenceville United), and a Citizen's Interest Corporation (Lawrenceville Corporation).

Representatives from the LPPC and their project steering committee attended a community meeting hosted by Carnegie Mellon University's Urban Design Build Studio (UDBS) in 2010. The meeting was the first of three focused on identifying the Lawrenceville Neighborhood's 1) assets, 2) liabilities, and 3) future oriented goals.⁵ At the conclusion of the three meetings, the Leslie Park Pool Complex emerged as the focus in all three areas - 1) It is historically registered, occupies a privileged site on a major commercial corridor, overlooks the Allegheny River and is embedded in the conscious and psyche of local residents; 2) It is deteriorating quickly, emerging as a regionally recognized center for serious crime, and contributing to the devaluation of adjacent property; 3) by virtue of its location the site should be restored as the community social center, and by virtue of its setting, has potential to become one of the city's major attractions and assets. At the conclusion of the first three community meetings, the UDBS and LPPC began to collaborate and lead a participatory design process with the objective of re-orienting the Leslie Park Pool Complex's trajectory, RE_IMAGINE LESLIE. The first step in advancing the relationship and the process was to understand the parameters – the intersections between KNOWN and UNKNOWN Factors.

KNOWN KNOWN 1: URBAN DECLINE CYCLE

The decommissioning of Leslie Park Pool is not an isolated incident. It is one of 16 public pools that have been decommissioned by the City of Pittsburgh since 2003, reducing the number of public pools in the region from 34 to the present number of 18; four more are slated for closure in 2015. The reason for the closings has been diminishing municipal resources. The resources have been compromised as a result of declining population and the corollary erosion of the tax base. The closures have been targeted in neighborhoods of the city where there has either been a remarkably concentrated population decline or where the burden of operations and maintenance has exceeded value in use. Leslie Park Pool falls into the latter category. The specific reason for its closure was a municipally commissioned report indicating that the pool basin alone required 1.7 million dollars for repairs and stabilization.⁸ There was no report for the ancillary buildings, also requiring substantial financial investment for repair.

KNOWN UNKNOWN(S) 1: THE BIG (GREATLY ABBREVIATED) LIST

LPPC isn't a non-profit or business enterprise; they are a well-organized group of volunteers. Can something happen? If something can happen, what is it? What will it cost and how will it be financed? Who has control of the site? Who has control of the buildings? Is a long-term lease possible? Is there a mechanism for the city, which owns the site, to assign responsibility for the site to an agent? Who would that agent be? Is a Public-Private partnership for development, operations, and maintenance viable under state, county, or municipal law given land ownership? Is there a single entity capable of doing that? Which already existent partnerships or alliances have potential to offer capacity? Does one need to be developed? Who covers liability? For Construction? For Operations? Who would an operator be? If improvements are made, who owns them? How much time will it take to figure all of this out? Is the investment of time going to yield something positive/implementable, or will it simply elevate expectations and result in plan fatigue?



Figure 2: Components of Public Engagement including posters for events (top), Images of events (middle), and Programming synopses (bottom)

KNOWN KNOWN 2: PLAN FATIGUE IS REAL

Opportunity is exciting. The prospect of improving challenged condition assigns value to the formal consideration of what might come next. But if there is no tangible legal or financial mechanism to support the change within a reasonable time-frame, efforts can do more to reduce hope and perpetuate inertia on a negative trajectory. “Clipboard Brigades,” or volunteer groups attempting to galvanize communities are common in challenged urbanized areas.⁹ They are often borne out of infrastructure deficiencies, similar to the one encountered with this project and site. Even when there is real funding attached to a proposal for projects, if the list of questions identified above are not understood and addressed, no amount of effort is going to translate ideas into reality – a plan or study is the best one can hope for. Where there is one Clipboard Brigade, it is likely that there are others, and others that have preceded. Residents grow weary over time when subjected to surveys, workshops and charrettes that fail to translate into something tangible. Good intention can have an adverse effect if not managed responsibly, accelerating disinvestment and diminishing hope. If there is a plan – it needs to be real, and actionable within a finite, near-term time frame. goes here.

KNOWN KNOWN 3: ACTION KILLS PLAN FATIGUE

The abbreviated list of questions provided a mechanism for advancing the project – a plan of action. The steering committee was expanded to include the Pittsburgh City Council, Pittsburgh City Mayor’s Office, the State Senate Offices, Pittsburgh Public Schools, and the Boys and Girls Club of Pittsburgh. Working with the expanded steering committee, the Leslie Park Pool Collective (LPPC) and Urban Design Build Studio (UDBS) engaged the Pittsburgh City Parks Department and a private management consulting practice, NoWALL, to begin working through the legal and financial control parameters governing the site and buildings. After initial parameters were understood, the LPPC was granted permission to host a number of “performance” events at the pool. In all, eleven arts based events were staged in cooperation with the City Parks Department; each was paid for with in-kind corporate sponsorship and donation. Minor interventions with the buildings and pool basin were facilitated through partnership with a local general contractor.

The performance events were specifically curated to explore multi-seasonal, day-time, and nighttime activities that could be accommodated on site; all in an effort to understand potential for the highest and best use of the vacant site. Each event attracted over 600 people. The use of the space during these projective programming events, branded RE_IMAGINE LESLIE, had numerous benefits: 1) each was tangibly demonstrative of ACTION, 2) the collective events physically reclaimed the space for the public, 3) the events physically/tangibly demonstrated how the space could be utilized through a facsimile of permanent intervention, 4) allowed the steering committee to work through permission, legal, and liability issues in real time with limited risk and consequence, and 5) enabled detailed cataloguing and mapping of behavior and spatial utilization as a programming validation mechanism in design proposals. Complimentary community meetings and participatory design charrettes utilizing information gathered during the events enabled the identification of three primary objectives in moving the design work forward: 1) FLEXIBILITY with regard to program, seasonal use, time of daily use, and occupancy; 2) CONNECTIVITY, linking local assets that currently exist in isolation of one another – diminish the fortified street presence created by the pool complex basin and integrate seamlessly with the urban context; and 3) SUSTAINABILITY with a focus on exemplary water management, passive energy strategies, utilization of recycled materials, and the development of improved pedestrian connections.

KNOWN KNOWN 4: ACTION = LEARNING

Projective programming, assembly of a broadly focused steering committee, and partnering with jurisdictional entities revealed a number of things. The timeline for resolving land ownership and paths to a viable operations strategy for any permanent adaptive re-use project was going to be protracted and entirely unpredictable. The extended timeline was clearly beyond what could be expected from a University affiliated Design-Build entity to commit. The unpredictability of the paths to completion and implementation presented too much risk from both a pedagogical and performance perspective. The predictable viability of ensuring that students gained value from their experiences on the project mapped against the overall curricular objectives proved very uncertain; and, with discontinuity between subsequent cohorts of students there was too great a risk of institutional knowledge lapsing.

The scope of work that the community and partnering entities were willing to support advancing, university affiliated design build entity to execute. The Urban Design Build Studio (UDBS) had encountered a similar misalignment in scope with other projects preceding RE_IMAGINE LESLIE. In each of those instances, partnerships were developed with General Contractors having capacity to complete the projects. In each case the UDBS worked with consultants in producing the contract documents for the entire project and an appropriately scaled Design-Build project was defined as a sub-contract to the Contract for Construction. The complexity and evolution of RE_IMAGINE LESLIE did not present a clear opportunity to define the same form of strategy. The students engaged in the work committed to advance the project to a point where some strategy for the viability of a build experience might be suggested – or not; there were no guarantees.



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Figure 3: Rendering of RE_IMAGINE LESLIE proposal

UNKNOWN KNOWN 1: SITUATING

The UDBS students continued to collaborate with the LPPC, community, stakeholders, and steering committee. They worked at three scales, developing broader urban design frameworks, urban design proposals, and ultimately, an adaptive re-use proposal. The issues relating to land control and operations became murkier as work advanced, requiring significant time and legal work to explore. However, there was consensus on what the components of the adaptive re-use would be, and a clear scope of work was devised. In simple form, the three project objectives, defined as a result of the projective programming events, became the drivers. There would be an indoor-outdoor community education center developed in one wing of the existing pool clubhouse. An experience based retail space would be developed in the other wing. These spaces would form a backdrop to a newly developed, multi-seasonal entertainment terrain, and the grade changes on site would be navigated by a series of ramps delicately bounding the site and extending to the commercial corridor.

During this process it became clear that funding for the project was most viable through a County Infrastructure grant program (CITF) and complimentary city funding. In an effort to provide service to city residents but make necessary reductions in operational expenses, the city of Pittsburgh has adopted a policy of Limited Liability Conversion for some decommissioned pool sites. Select pool sites have been converted to spray parks/spray pads. This presented potential for a portion of the terrain to be developed as a spray pad to seed the development of the broader adaptive re-use project.

UNKNOWN UNKNOWN 1: OPPORTUNITY

On the surface limited liability conversion is a great solution for a municipality: 1) it provides a valuable amenity to residents, 2) eliminates the burden of operational

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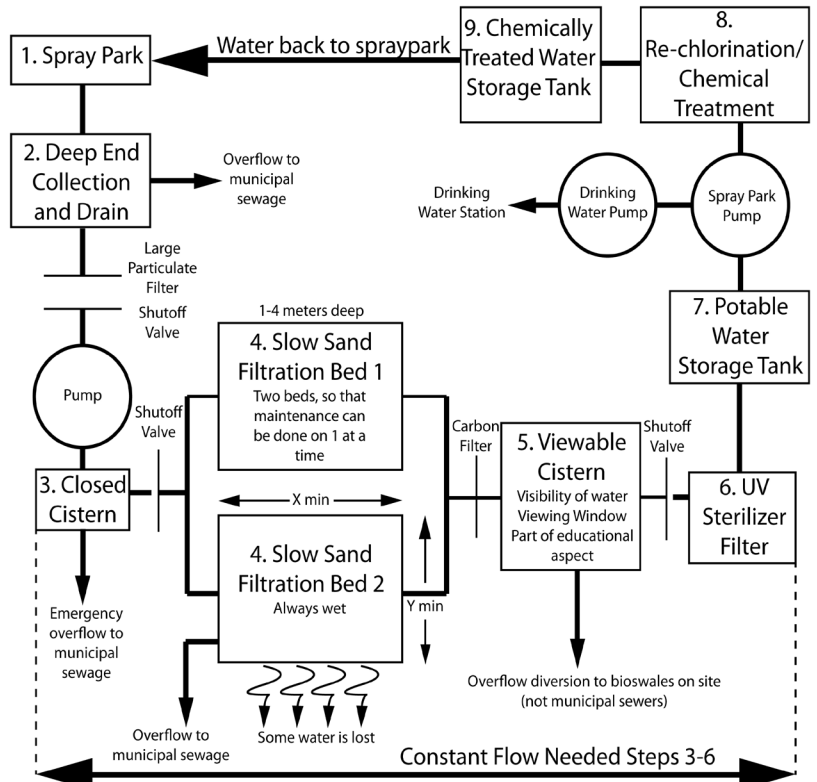


Figure 4: Line Diagram of the Passive Filtration system proposed for RE_IMAGINE LESLIE

expense associated with chemical treatment and lifeguard personnel, and 3) requires a very low initial investment cost. But research conducted during the development of the project revealed a significant downside. Because water from the spray pads comes into contact with human skin, by code, it must be chemically treated if re-used, or discharged as wastewater. Provided the investment threshold for limited liability conversion and desire to eliminate operational expenses altogether, the city has adopted a policy of supplying fresh domestic water and discharging through sanitary waste lines.

This creates a significant regional challenge by contributing to non-point source pollution. Information gathered from existing Pittsburgh spray parks revealed that they can use and discharge as much as 100,000 gallons of water per day, per park. One season results in approximately 12 million gallons of water being dumped into Pittsburgh's combined sewer system – per park; the equivalent of 16 seconds of flow from Niagara Falls.¹⁰

Working with water management specialists and consulting engineers during the spring semester, undergraduate design build students and graduate AECM students developed a technical proposal for managing all water on site with a slow sand filtration system – eliminating all load on the overburdened combined sewer system. The two groups collaborated on the development of construction documents and pre-construction manuals.

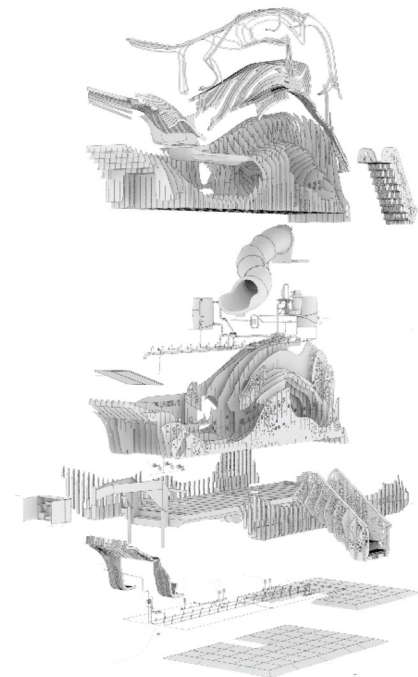
During the spring semester the design build entity focused on completing design development drawings and construction documents for the proposed masterplan with professional engineering consultants. Foundations, non-profit agencies, governmental representatives, and jurisdictional review bodies were engaged in an effort to verify funding and implementation viability of the proposal. While there was support for the project, there was reluctance to embrace the closed loop passive water treatment strategies at full-scale without substantial data providing evidence of the system's ability to remove bacterial contaminants.

The UDBS, LPPC, and Steering committee were presented with a dilemma. The adaptive re-use could begin to move forward utilizing accepted methods of water management, or elect to pursue another path – NOT build.

UNKNOWN KNOWN 2: CAPACITIES

The Urban Design Build Studio (UDBS) elected NOT to participate in construction of RE_IMAGINE LESLIE. The decision was not made in protest, was not defeatist, nor modest. The decision was explicitly, and strategically proactive. The decision was made in conjunction with all partners and informed by an understanding of where value in service resided, and where it could be fulfilled by others with greater efficiency and compliment in reaching the community's articulated objectives.

The UDBS is housed within an institution for research and higher education. Research and Education are its greatest value propositions in the context of this public interest project. Efforts moving forward were focused on leveraging those strengths. The UDBS proposed the development of the PURIFLUME as a mobile demonstration and proof of concept project that would enable implementation of the proposed passive filtration systems with limited financial or political risk. As proposed and ultimately executed, the PURIFLUME 1) provided the opportunity to monitor performance and collect data with multiple jurisdictional oversight, 2) was able to be utilized in educating city and county residents about combined sewer/non-point source pollution issues, 3) provided the opportunity to test



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Figure 5: Execution of PURIFLUME proof of concept project. Deployment (top and middle), exploded view of BIM model illustrating integration of systems employed (bottom)

digital fabrication techniques proposed in enhancing construction efficiency, and 4) provided an amenity to residents as a mobile spray park.

The proof of concept project is a modular version of the proposed spray park included in RE_IMAGINE LESLIE. Water is 1) collected in a 50 gallon pre-treatment cistern, 2) passed through a diatomaceous earth filter, 3) transferred through a photo voltaic powered ultra violet light sterilizer, 4) transferred to a salt based chlorine generator (for control data, and bypassed for test data) , 5) re-collected in a 50 gallon post treatment cistern, and 6) cycled back through the system. There are data collectors placed before and after each junction in the system that test for turbidity, coli-form, ph, orp, conductivity, and salinity characteristics. When not being utilized for public demonstration, the system is tested bypassing the chlorine generator. The chlorinated samples act as control data sets in gathering information that must satisfy county health department standards, state agriculture department standards, and federal environmental protection standards.

Grant funding for the project was provided by Ford Motor Company, AutoDesk Corporation, and a bifurcation of CITF funding in support of the RE_IMAGINE LESLIE project. Work was completed through two co-requisite elective courses. Building Information Modeling (BIM) was utilized to enhance productive workflow, aid in rapid prototyping, and increase the efficacy of bi-weekly “meeting of the minds” sessions with project constituents. The process enabled residents from the community, political leadership, environmental protection agencies, jurisdictional entities and non-profit partners to provide clear and consistent input in the development of the project.

ENDNOTES

1. The phrase “I know one thing: that I know nothing” from the latin: ipse se nihil scire id unum sciat is referenced as the Socratic Paradox in Plato’s account of the Greek Philosopher.
2. The Unknown Known is the title of Errol Morris’ 2013 Biographical documentary about Donald Rumsfeld. Donald Rumsfeld named his autobiography Known and Unknown: a Memoir, and Girard and Girard’s Leaders Guide to Knowledge Management: Drawing on Past to Enhance Future Performance, 2014 exclusively links the etymology to Donald Rumsfeld.
3. Defense.gov News Transcript: DoD News Briefing – Secretary Rumsfeld and General Myers, United States Department of Defense (defense.gov)
4. “What Rumsfeld Doesn’t know that he Knows about Abu Ghraib” – In These Times, www.lacan.com
5. Also known as a SWOT analysis, culturally recognized/credited to Albert Humphrey of the Stanford Research Institute in the 1960’s utilizing data from Fortune 500 companies.
6. The Present tense is utilized because the Leslie Park Pool Collective is still an active organization, and is still working on advancing the projects discussed in the case study.
7. GIS Crime related data gathered during the analytical phases of the participatory process confirmed what was perceived by residents and relayed anecdotally.
8. Study commissioned by Pittsburgh City Parks in 2008, assessment valuation confirmed by private structural consultant Jim Halprin in 2011.
9. Colloquial term often used disparagingly in characterizing participatory design volunteers and the effectiveness of efforts – Megan Burks, “A Case of Planning Fatigue in City Heights”, 2013
10. Until challenges to increased water volumes, and methods for managing them could be more clearly considered, Pittsburgh City Parks and the Pittsburgh Water and Sewer Authority suspended installation of spray pads for a period of 18 months.

UNKNOWN

Realization of the PURIFLUME revealed advantages and limitations with concepts introduced in the RE_IMAGINE proposal. By electing to “not build” in the traditional sense – one associated with permanence – the constituents involved in this pair of projects were able to realize a tangible artifact on an accelerated timeline, maintain faith in the power of volunteer effort, and find an appropriate mechanism for testing the boundaries of emerging technologies with limited risk. The success and value of the project in those dimensions, and the myriad of others that accompany any project placed in the public realm, are to be determined over time and by the individuals who have engaged with it. The PURIFLUME would not have been feasible as a private sector enterprise – RE_IMAGINE LESLIE is. It is that distinction which ultimately became KNOWN, and which ultimately determined which realm was appropriate to reside within - WHAT was to be constructed, and WHEN were merely operative extensions of experience and understanding. and non-profit partners to provide clear and consistent input in the development of the project.