Frances Whitehead's SLOW Cleanup

Sculpting Science, Bureaucracy and Garden Design as Brownfield Remediation

41 min read · Sep 19, 2024

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[All quotations are from the author's interviews with the artist unless otherwise identified. Illustrations will be provided upon serious inquiries for publication.]

Frances Whitehead's SLOW Cleanup (2008–2012) was among the first ecological artworks that tested the phytoremediation effectiveness of ornamental native flowering, fruiting, and prairie forb plants.[1] The experiment occurred in-ground, on an abandoned gas station site, and in a parallel laboratory trial at nearby Purdue University.[2] The Purdue study confirmed SLOW Cleanup had expanded the phytoremediation plant palette, identifying twelve new plant remediators;[3] but it did not succeed entirely because the field trials of the experimental flowering, fruiting, and native prairie forbs take many years to cede results. The project had an unforeseen and untimely end related to a change in city leadership.

As a work of art, *SLOW Cleanup's* form and approach combined the history of 18th-century aristocratic garden design with land art experiments of the 1960s and 1970s [4]. Still, it was closest to 1990s "cleanup art," [5] in which plants' chemical processes directly mitigate soil. *SLOW Cleanup* deployed the "Four Pillars of Sustainability"

concept, developed by the United Nations, as its principal aesthetic approach.

The project also demonstrates characteristics of "slow activism" art[6] in its deliberate use and framing of the natural phases of plant life. S*LOW Cleanup's* "slow activism" emphasis on natural processes, enacting time as an art medium, directly challenged the commonly used, unsustainable "dig and dump" approach to petroleum remediation.

The project is also an example of "social sculpture." The artist and her collaborators "sculpted" and "re-directed" bureaucratic systems of municipal government and bodies of scientific knowledge applicable to the remediation of post-industrial urban landscapes toward greater sustainability.

Situating herself within Chicago's city bureaucracy as the city's first "Embedded Artist," Whitehead sought to demonstrate that artists can successfully utilize art-based knowledge (See Figure 3: *What Do Artists Know?*) to lead multidisciplinary, science-based, experimental art projects toward sustainable outcomes within highly regulated settings.

The origins of Whitehead's "Embedded Artist" concept

SLOW Cleanup had a profound impact on the artist's career direction. For over a decade before she initiated *SLOW Cleanup* (2008), Whitehead had increasingly committed her practice to bringing art's emphasis on meaning to design and design's "world-making" to art. She describes starting *SLOW Cleanup,* metaphorically, as the point at which she finally "left the museum building [the Chicago Art Institute] and walked across the street to City Hall" to commence what she calls her "civic practice."

During the two decades it took her to become a "civic practitioner," a diverse cast of collaborators, canny tactics, and a strong dose of serendipity helped Whitehead. Her most active influences included the grounding of her artist identity in a childhood where "art was the family business," the stability and support of her academic home at the School of the Art Institute of Chicago (SAIC); plants as her principal collaborators; mentoring from a well-known public art curator and an iconic Chicago architect; and perceptive observations about her working methods by urban planning staff in two Midwestern rustbelt cities; as well as inspiration, ideas

and texts from a charismatic Australian urban theorist, and a French cultural sociologist.[7]

In the early 2000s, Whitehead moved assertively toward "civic practice" within the "world-building" disciplines of engineering, architecture, and urban planning. It is significant that the word "art" is not included in her term "civic practice." She reports an increasing restlessness in her artist identity, spurred by information and theories questioning the divisions between art and design:

In the early 2000s, SAIC did not yet have a design school. There were two faculty teaching interior architecture, but that was about it. Three of us in the Studio Art area bubbled up and went to the Dean with our three differing versions of why art needed to contend with design. All of us wanted to work with the built world. We were somewhat effective, as after our conversation, a"Design Initiative" was established, spawning lots of faculty education. During one of these, I became further convinced that design was making worlds and could effect many alternative futures. And my discomfort about how art might relate to this intensified. All of this deeply impacted the three of us who had initially approached the SAIC decision-makers about the need for a multidisciplinary program that could bring art and design together. The other two subsequently went on to engage interdisciplinarily, basically leaving art behind. I felt a deep restlessness and a need to "work upstream," but I did not want to "leave art" as they had felt the need to do. Also I did not know yet how to express or go about that. [8]

The aspect of SAIC's "design initiative" that so deeply affected Whitehead was her encounter with Australian urbanist Tony Fry, who was invited to participate in the faculty education. Fry's ideas became a primary influence.

Opting In: "What Do Artists Know?" the "Embedded Artist" and Civic Practice

By the time Whitehead strode into the halls of Chicago's government bureaucracy in 2008, her art practice had taken abrupt turns and about-faces, during which she found herself straddling several art genres, scientific and design disciplines, and craft traditions outside her art training. She had begun to see herself as a "double agent," working to intervene for art in design circles and for design in art circles:

During the early 2000s SAIC faculty education sessions, I was first exposed to all the

*futuring and de-futuring urbanist talk based on Tony Fry's work. As an artist, I could engage with these ideas from a strong and confident place. I had already been recognized as an innovative "inside the gallery" sculptor creating meta-objects**[9]** [objects about objects] and had tried out public art [working with Mary Jane Jacob**[10]**] for ten years — as a way to go outside the art school, outside the gallery (I ultimately left traditional public art because I wanted and needed to move beyond "normal" art — as in Thomas Kuhn's definition of normal). I wanted to change things. I wanted art to be taken seriously within the world of city planning and design, and I wanted to work across disciplines as an artist with engineers, architects, and planners **and** to be taken seriously in the art world.*

Looking back on that time, Whitehead notes that what she was doing was "*opting in*." During a 2016 fellowship with the social engagement art advocacy group A Blade of Grass (ABOG), Whitehead explained "opting in" as building on traditional activist art but reversing the flow.

Whitehead claims that reaching toward other disciplines while maintaining one's identity as an artist can accomplish what more overt "outside" activism seeks to do but often cannot. She claims that activist art can be influential in advocating for change, but it generally cannot actually make the change itself. This is because, she argues, activists must rely on the very institutional structures and policies they critique. Those structures and policies are often ill-equipped or insufficient to accomplish the changes needed.

In her 2016 piece for ABOG, Whitehead suggests that, in her "civic art" experiments, she is extending activist art's critique and advocacy by

*… "opting IN" [learning] to speak the languages of other disciplines, both nomenclature and attitude, reflecting multiple intents and values. Cultural geographer Mrill Ingram has called this the "diplomacy of art," a symbolic handshake, reaching outside art practice towards the work of others to become **value-added**. This diplomacy sometimes disrupts these practices by operating within their sphere differently. This also disrupts "art." Some would claim this as an act of "generosity," a joining in, dot-connecting. **[11]***

When Whitehead entered the office of the Innovation Director for the city of Chicago in July 2008, she already knew she was "opting in" and why she had chosen

that location for her first effort to embed herself in her home city's government. The Director undoubtedly knew who Whitehead was.

Whitehead and her husband were well-known proponents of "living green."[12] They enjoyed a high profile in Chicago and beyond as the creators of "Green House" (completed circa 2007), a long, narrow, three-story structure on the site of a former warehouse filled with energy-producing elements and technologies. Whitehead came to the Chicago Innovation Office already recognized as a "green building" pioneer, and she brought with her several documents to further prove artists could be significant innovators in urban problem solving:

I specifically selected the Innovation Director as my entry point ***because I knew cities were, at that time, emphasizing disruption[13]*** *to arrive at new and better ways to operate and were establishing "innovation offices" to lead the way. By then, I had a "knowledge claim" [****What Do Artists Know?*** *See Figure 3] that* ***artists possess knowledge and dispositions that can spur innovation by "disrupting" old ways*** *that had become unproductive.*

The "knowledge claim" Whitehead refers to here is her *What do Artists Know?* List (Figure 3). In the early 2000s, she began to work directly with government planners on infrastructure projects in post-industrial cities. In the second[14] (2005) of these projects that preceded her approach to the city of Chicago, Whitehead worked with Cuyahoga County, Ohio planners to develop a master art and culture plan for the post-industrial Steelyard Commons site section of the Cleveland towpath trail. During this project, her municipal planner-collaborators pointed out what she "knew how" to do as she worked with them. Whitehead began to keep a list of these insights, later refined as *What Do Artists Know?*[15] a list of the "unique set of skills, processes, and methodologies" artists acquire through training and experience. This insight has anchored and informed Whitehead's "civic practice" up to the present.

Whitehead brought *What Do Artists Know?* to the meeting with the City of Chicago Innovation Director and two other documents she had developed that elaborated on the *What Do Artists Know?* list: "Art 4 Sustainability" and "The Innovation Toolkit for Sustainable Cities." These documents, based on Whitehead's previous two experiences "living inside" government programs, offer suggestions for introducing

and supporting “embedded” artists within government agencies.[16]

She also brought a 2006 evaluation[17] of an “embedded artist” project in the UK (the term “embedded artist” was not used in the report, but the concept was the same). This 2004 Cornwall, UK project involved artists in complex, built-environment projects. The evaluation concluded that the engagement of artists in these projects had a positive effect on both the projects and on the artists and other professionals involved.

The Innovation Director was intrigued:

So I gave him [the Innovation Director] all these documents, and he asked me, “Why are you giving me these things?” I said, “Because if you want innovation, it would be a good idea to include artists, as you can see from these documents.” He read them over, and he agreed to establish an Embedded Artist Program and bring me in.

The “opting in” as the first “embedded artist” in Chicago city government took some time, and by the summer of 2009, the city was ready. But, though Whitehead had (in 2001) established a platform for her art projects separate from her SAIC teaching role, the ARTetal Studio,[18] she had not yet incorporated it as either a business or nonprofit, a requirement for receiving government contracts and commissions. This led Whitehead to approach the appropriate decision-makers at SAIC to request sponsorship under the school’s nonprofit corporation status.

The timing of Whitehead’s approach to SAIC for sponsorship was fortuitous. SAIC was actively considering ways to engage more directly with city and neighborhood issues, and with this request from Whitehead, they moved beyond the initial request to serve as Whitehead’s corporate sponsor toward a more formal, collaborative relationship with the city in developing and piloting a jointly organized “Embedded Artist” program.

SAIC’s decision to support Whitehead’s Embedded Artist proposal was supported by the high-profile attention to her *What Do Artists Know? the list was received within SAIC.* In the Summer of 2009, she was invited to co-convene the third conference in SAIC’s prestigious Stone Art Theory Institutes series that attracted art academics from around the world. SAIC art history professor, James Elkins, the organizer of the

Stone Institutes conferences, had decided that the third conference in the series would address the question of "*What Do Artists Know*?" but until Whitehead informed him, he did not know that she had been working on the question independently, for nearly three years. He quickly invited her to co-convene the session.[19]

After hearing Whitehead's *What Do Artists Know?* presentation at the conference, MIT professor Christopher Csikszentmihályi,[20] an Institute participant, suggested a "knowledge claim" for the list. Whitehead used Csikszentmihályi's designation of *What Do Artists Know?* as a knowledge claim when she approached SAIC to sponsor her in initiating the Embedded Artist pilot.

Once the Embedded Artist pilot partnership documents were signed, Whitehead was "embedded"[21] in the team creating the city's 2040 Food Plan. But that assignment did not last. A vital purpose of the Embedded Artist pilot was to engage the artist as early as possible in a project's life to take full advantage of the specific kinds of innovation-producing knowledge artists bring. The creation of the Food Plan was well underway by the time Whitehead joined, and most of the essential program elements were decided, so there was little opportunity for an "embedded artist" to engage at an early enough stage to impact project direction significantly.[22]

Subsequently, Whitehead was assigned to the city's Department of the Environment and its gas station site remediation program (the Urban Management and Brownfields Redevelopment Unit—UMBR) and charged with experimenting with more sustainable ways to clean up such sites across the city.

SLOW Cleanup begins

By 2009, when Whitehead first began to meet with the staff of UMBR, the problem of abandoned gas stations had been a troubling post-industrial characteristic in Chicago for decades. An article in the Chicago Tribune in 1992 reported that 2,700 un-remediated abandoned gas stations were registered in the city, while many more languished without official recognition.[23] It wasn't until 1995 that the federal government provided funding for, and subsequently organized, through the US

Environmental Protection Agency (EPA), attention to the hundreds of thousands of brownfields nationwide. It was 2002 before federal funds became available for cleaning up abandoned gas station sites for reuse.[24]

By 2008, when Whitehead "walked across the street" from SAIC to Chicago's Department of Innovation (DoI), the number of unmitigated and partially mitigated gas station sites had been reduced. However, hundreds of street-corner eyesores were still polluting many Chicago neighborhoods. Four hundred of these sites were reviewed by Whitehead and UMBR staff to identify where to place the *SLOW Cleanup* site. (Fig 2)

Whitehead recalled:

*The Environment Commissioner was hugely enthusiastic, as this was when [2009–2010] we were beginning to understand that carbon in the atmosphere would not be reduced fast enough **[25]**. She knew she had to come up with something that made sense in that new situation (she was producing the city's first Climate Action Plan at the time and felt some urgency for new approaches). So, everyone was on board to try something new.*

That "something new" turned out to be an experiment with phytoremediation on one gas station site that had already been remediated to the "industrial" use stage and was also in an area of the city not imminently scheduled for significant development. The idea was to remediate this site further to the point where it would be suitable for direct human contact and to assess the results for possible application to other similar partially remediated sites around the city.

The DoE Commissioner's charge to the team was: *How can Chicago move beyond the state of the science/practice of what is now in everyday use in the city, and what knowledge is needed to do so?* The DoE Commissioner was interested in the experiment as an opportunity for UMBR engineers to gain experience in more sustainable gas station site cleanup methods (the only method in use in Chicago at the time was "dig and dump," sending contaminated soil and other refuse to landfills); and to see if experimenting with these alternatives could identify new candidates for "asset-based planning,"[26] an economic development approach that builds on existing local resources rather than the more usual community development planning

technique of identifying gaps and deficiencies.*[27]*

Experimenting with gas station soil phytoremediation as an alternative to "dig and dump" was an apt assignment for Whitehead because of her long, self-taught involvement in horticulture. She explains how her horticulture knowledge and skills developed:

In 1987, a couple of years after I was hired to teach in the Sculpture Department at SAIC, I applied for and received an individual artist grant from NEA, and, with the $5K, I purchased the lot next door to the building where my studio was, in a very gritty Chicago neighborhood. I tore down the building on the property and started what I called the "TransParadiso Garden" (referring to garden history, as walled gardens were referred to as "paradise gardens"). This deep immersion in gardening moved me from an individual gallery-based practice to collaboration, and my collaborators were the plants in my garden. From 1987–1990 I worked in the garden, which was classic post-industrial land with residue from previous uses coming up out of the ground with the freeze and thaw cycles, including at one point a large section of shag rug! The garden brought me out of the studio, led me to my life work with plants, and brought me into complexity and a spiritual relationship with nature. I also brought the plants into the gallery for exhibitions. They became integral to my art. During these years, I learned a huge amount about plants and ethnobotany, essentially doing a land reclamation project without realizing it. And it was at that point I began to notice that any real impact on this postindustrial situation was happening in design, architecture, and engineering, which began my slow process of moving to "civic practice."

SLOW Cleanup's science basis

Despite Whitehead's continuous use of plants in her art over a long period, the Environment Commissioner's charge to experiment with phytoremediation techniques challenged Whitehead's self-study-acquired horticultural knowledge. Whitehead realized she was embedded in a context of government bureaucratic formality, requiring ongoing direct monitoring and assessment of results. It soon became apparent that she needed more than a personal "deep dive" into the phytoremediation literature and reliance on engineering staff, who were not yet using more sustainable[28] approaches to petroleum remediation. She needed a scientist collaborator with phytoremediation research expertise.

Dr. Arthur Paul Schwab's name was everywhere in the literature she was reviewing, and he was faculty at nearby Purdue University, so Whitehead first requested his help with the literature review. Soon, he was on board as a full collaborating partner, and with him came a separate laboratory trial at Purdue and a methodology to experiment with the remediation adequacy of some (previously untested) plant species.[29]

Whitehead wanted the *SLOW Cleanup* site to be aesthetically interesting, educationally significant to neighborhood residents, and valuable to phytoremediation researchers and Chicago policymakers. She soon realized that phytoremediation operates on plants' seasonal growth schedules. Because of the long time needed for the plants to clean up, something should be done to work with this time element to make these sites visually interesting over several years.

Whitehead suggested an expanded plant palette, including species not yet tested as phytoremediators. For visual interest, she chose native flowering species that bloom successively from early spring to late fall. She also considered planting fruit-bearing trees to determine the possibility of eventually reusing the remediated site[30] for growing food. Most of the flowering and fruit-bearing plants Whitehead wanted to include onsite had never before been considered for petroleum cleanup, so Schwab and his scientific testing process were very welcome, as was his amenability to this kind of experimentation.

An extensive process was undertaken to choose the *SLOW Cleanup* site. The final selection was a corner parcel in the Cottage Grove neighborhood of Chicago's sixth ward. In the *SLOW Cleanup* final report, the criteria for the selection of the site were cited as follows:

…adjacency to Chicago State University (CSU), the existence of native silty clay soils on site, and the geotechnical and regulatory status of the site [e.g., already remediated to "industrial use." [31]

Many soil borings and site measurements had been conducted over the previous decade, providing background data that offered the opportunity to use

phytoremediation to move the site soils toward residential standards. The soil conditions at the Cottage Grove site were typical of those remediated to industrial use stage: residual concrete and asphalt, large areas of gravel cap, and gravel used to fill the former location of the underground gas tank remained on the site.

The artist's engineer collaborators told her that leaving all that gravel in place and covering it with soil would make the planting medium too alkaline for plants to survive and thrive. It was clear that a potentially time-consuming, labor-intensive (and expensive) process of mixing new composted soil with existing site soil and gravel to a depth of several feet would be needed.

Whitehead played a crucial role in finding a solution to that problem. She explained:

In studio art (especially sculpture), we talk about two kinds of people: tool fools and tool abusers. I am not a tool fool. They are the ones who accumulate tools as a fetish and gasp in horror when they are not used precisely for the purpose for which they are designed. I have a long history of changing tools and adapting tools. I was taught how to make my own tools and how to adapt them. So I came up with adapting a tool for mixing the soil.

That "tool abuse" was Whitehead's discovery that the Wirtgen 2400 soil stabilizer,[32] a mammoth road-building machine never before used to prepare the soil for planting, could do the job.

Whitehead:

The engineers could not believe what this machine could do on the site. It was perfect because the tiller radius was 4 feet, and that was exactly how far down the engineers said new soil had to be mixed in to counteract the alkalinity of the gravel. Since moving the tiller from one place to another costs more than renting it, I also suggested to the engineers how they could work more economically and efficiently in the future with the Wirtgen 2400, namely, get all new sites ready for rototilling and then bring in the tiller and do them one after the other all at once.

Once Whitehead had found the rototiller solution and the soil components were balanced, work on the site was accomplished by what Whitehead called "four communities of practice:" 1) students from the adjacent Chicago State University,

who worked under supervision from their professor to analyze soil samples before planting; 2) Greencorp Chicago trainees, a program for ex-prisoners to develop their horticultural and landscaping skills, who planted the trees and large shrubs, and installed the gravel walkways; 3) SAIC students, who worked closely with Whitehead on design and installation of the metal edging, defining the planting grid, and planting some of the flowering perennial and prairie forbs to conform to design and maintenance requirements; and 4) Purdue students of Dr. Schwab who worked exclusively in the off-site university laboratory-based trial of the plants used in the on-site field trials.

"Un-Development" as a goal; deploying the "Four Pillars" aesthetics

For Whitehead, *SLOW Cleanup* was an opportunity to model "flipping the script" on the common purpose of remediating gas station sites. Most gas station site remediation assumes that something will be built on a cleaned site sooner or later. The survey of 400 abandoned gas stations that led to selecting the Cottage Grove site for *SLOW Cleanup* included many partially remediated sites where "high build-out" use for commerce or industry was considered many years — even decades — away.

Though somewhat remediated, these parcels, aside from industry, were unsafe for human use. Any build-out of this partially remediated land had to wait until some economically feasible industrial use could be found. So, it languished: drab patchworks of infrequently mowed weeds, concrete, asphalt, and gravel cap, surrounded by chain-link fences affixed with Do Not Enter signs. The negative effect on neighborhood revitalization was undeniable.

Flipping the script from development to "un-development"

When abandoned gas station land is cleaned for industrial use, it is remediated only partially. A "higher" use, where humans can utilize the space for housing, recreation, or parks, requires more extensive remediation than industrial use. Whitehead saw that, once successfully piloted, another concept of productive use could work for sites like Cottage Grove's, where industrial use was unlikely for an extended period.

Whitehead wanted to "flip the script" for the Cottage Grove site, to change the

assumption that the site was ultimately to be built upon. Instead, she based her designs on the assumption that it would **not** be built on, possibly at all. Essentially, Whitehead sought to come up with a different, "un-development" use that could start immediately and last years. The kind of "un-development" Whitehead envisioned was transforming the site into a garden.

SLOW Cleanup's identity as a garden was essential to Whitehead not only for aesthetic reasons. She also wanted to carry forward the DOE Commissioner's desire to experiment with "asset-based planning" on the Cottage Grove Site.

"Asset-based planning" emphasizes the assets that can be utilized on a site targeted for revitalization. In the "dig and dump" partial remediation approach, time was emphatically not an asset. Partially remediated abandoned gas stations that had to wait many years for the opportunity to bring in industry retarded revitalization of neighborhoods. But what if the result desired was not "revitalization" in the traditional sense?

Whitehead envisioned that the time plants take to carry out phytoremediation could be advantageous. It could convert the site to "higher human use," not only at the end of remediation.

The use she envisioned, where time was an advantage, was to enact, as an artistic goal and medium, her version of the United Nations' "Four Pillars of Sustainability"[33] while also integrating the DOE Commissioner's desired "asset-based" approach ("leveraging under-utilized assets such as time, land, citizen/ partner participation").[34]

"Four Pillars" as media

Whitehead's "Four Pillars of Sustainability" became *SLOW Cleanup's* time-based "process media."[35]

In this Venn diagram (Fig 5) from the SLOW Cleanup final report, Whitehead represents her version of the four pillars of sustainability. All four pillars overlap, signifying that the sub-elements within each pillar have the potential to impact the sub-elements within the other three pillars.

For example, Whitehead has included *native plants as a key element in the Environmental Responsibility pillar*. Since each pillar and its elements overlap with the other three pillars and their elements, we can surmise that using native plants on the *SLOW Cleanup* site, just one of the elements in the Environmental Responsibility pillar, *can also affect all three elements within the Economic Health pillar* viz:

The **planting of native shade trees could enhance the urban forest** element of the economic health pillar because their planting will establish or add to the urban forest in the *SLOW Cleanup* neighborhood. Studies have shown that shade trees can increase the economic value of urban land and resident safety.[36]

The **Neighborhood Revitalization** element of the Economic Health pillar could be positively impacted by the use of native perennials in public landscaping because of their longevity and ease of care and because they are acclimated to the region's weather and soil characteristics. Native perennials could offer a continuously attractive and intriguing vista on a site that had been barren and derelict for decades. This could inspire other measures to revitalize a neighborhood.

Biofuel Evaluation Because native perennials self-reproduce, requiring periodic thinning to prevent crowding, the discardable vegetative matter must be addressed. This material could be employed for *biofuel production* or compost.

Continuing with the example of how the *native plants element* of the **Environmental Responsibility pillar** interacts with the other two pillars, we can see that establishing an assertive presence of native plants on the site could also enhance the **Cultural Vitality pillar** by increasing visual and sensory appeal while offering educational and employment opportunities (**Social Equity pillar)** for trainees in maintenance and ongoing testing of soil for students at the nearby Chicago State University. The presence of the garden would also offer repeat visitors and residents the opportunity to observe how well the native plant varieties endure with minimal care once established. Sustainability is achieved when each element in each pillar can influence and enhance the effects of the elements in the other three pillars.

Combining the Four Pillars of Sustainability and "asset-based planning" as her conceptual process methods, Whitehead proceeded to develop her design:

— The *economic health pillar* focused on the "un-development" use of the available, partially remediated land, piloting several phytoremediation planting schemes of varying cost and complexity, which could be transferable to other partially remediated sites.

— The *social equity pillar* foregrounded opportunities for onsite workforce development, offering direct horticultural training and scientific experimentation experience to underserved groups in the *SLOW Cleanup* neighborhood. These included the Greencorp workers and the undergraduate students enrolled in science classes at Chicago State University, the adjacent college, whose primary purpose was to educate underserved student populations. The experimentation with fruit trees as potential remediators also offered both education and hope to the local community that the parcel could, at some point, be a home for urban agriculture. Including the experimental remediation palette of previously untested flowering native perennials planted for successive bloom offered the ongoing visual pleasure of continuous flowering throughout the spring and summer.[37]

— The *environmental responsibility* pillar could be accomplished in two primary ways: using the innovative soil preparation method, keeping most existing gravel and soil on site, and rebalancing the soil components through novel use of a soil stabilizer commonly deployed for road building. A native plant palette was chosen for testing because of its potential for added value (beyond phytoremediation) in habitat creation and visual interest (flowering in succession during the growing season months) and to educate city engineering staff and local neighborhood residents on both the functionality and aesthetic value of native plants for secondary remediation.

Whitehead's final *SLOW Cleanup* design approach foregrounded the *fourth sustainability pillar — cultural vitality, with particular attention to the role of art and design precedents:*

I envisioned SLOW Cleanup *as a new type of land art. Unlike the pioneers [in the 1960s] like Smithson et al., the SLOW Cleanup kind of land art does not go out into the wilderness or to disturbed land that is "away" from human communities. It is about land art as sustainability in and for disturbed* ***urban*** *landscapes. I wanted to do something meaningful for the public and nearby neighbors. The lawyers did not want anyone on the site, which dictated the enclosure aspect and the fan shape. So, I took a page from Versailles. The gardens there were designed so the Sun King, Louis, could see everything from a single vantage point.[38] The designer flattered the king by arranging the plantings so he could feel himself as all-powerful. So I wanted to do that for the public. Empower the public. Make it so the public standing on the sidewalk could see the field trial beds from one location — the entry gate. I also specified interpretation signage that explained all the elements that would be brought together.*

What was "brought together" in Whitehead's design was an urban garden/phytoremediation field laboratory that placed the visitor, who was prohibited from entering the space, in an inclusive "royal" position at the apex of the fan-shaped grid design. From this apex position, viewers could take in and appreciate the entire garden — all at once — in its variability of plant types, sizes, and heights: a deliberately ever-changing drama of plants' life phases, played out in "plant time," across the seasons, and the years.

The remediation garden Whitehead envisioned was a field trial for untested phyto-remediating plants, offering a carefully planned visual pleasure and education opportunity. The deliberate placement of plants to bloom from left to right across the growing season would allow local policy and elected officials, residents, researchers, and visitors from elsewhere to enjoy — and learn from — the garden as it changed over time. The intent was also to encourage viewers to become familiar with native plants and their soil-cleaning properties, inspiring their use in home gardens and public landscapes.

An educational opportunity was also intended for the Green Corps worker-trainees who would learn how to plant trees and shrubs to ensure survival. City engineering staff responsible for gas station cleanup across the city would gain hands-on experience with secondary site phytoremediation and participation in developing a

new, more efficient way to prepare the soil for planting using an unexpectedly effective tool (the Wirtgen 2400 soil stabilizer). The site would also be an "outdoor studio/laboratory" for science and art students as they participated directly in bringing together principles and practices they were studying in the classroom.

Two critical aspects of SLOW Cleanup's design aesthetic were the metal edging around the plots and the decorative iron fence around the garden perimeter. Metal edging played a significant role in the site's practical and aesthetic design functions and the garden's unfortunate demise.

Whitehead chose the black metal edging to separate the densely planted field trial beds from each other for ease of ongoing testing and maintenance. She also used the rigid, black steel edging to enhance legibility, as the public could not enter the garden for legal liability reasons. The dark lines emphasized Whitehead's graduated fan/grid shape, expressing the site's identity as a laboratory space (field trials are laid out in grid format) and, simultaneously, as a sign of modernity and the presence of art.[39]

The end of *SLOW Cleanup*, or was it?

Whitehead was devastated to learn, two years later, that the garden was gone, abandoned:

*When the grant period ended in 2012, I moved on to work on two other large projects in abandoned urban sites. In late Fall/Winter of 2013, I took Ben Helphand**[39]** to the site. Ben's group, NeighborSpace, had been assisting all community gardens across the city for years. Ben said his group wanted to organize a community to steward the site. The Fan Shape had been put in with steel edging and welded in place. It took us a couple of months to install in the Summer of 2011. When we arrived at the site two years later, the plants had been mowed down very short, and twisted black metal was sticking up in the middle. I found out later that because the site had not been maintained or watered for two years, it had turned into a weed patch. So the Alderperson sent a bush hog mower in. The driver didn't know the metal edging was there. It must have destroyed the bush hog. It pulled the edging up and got snarled in the mower. I took several people there to see it. Noone could think of anything to do except take out all the edging. It broke my heart.*

So, after all that work, all those years of planning and innovation, all that careful testing and documentation, all the learning by the four "communities of practice," the site had devolved. Whitehead's "un-development" concept had taken on a new meaning, the symbol of which was the twisted and rusting black metal in the middle of an unkempt lot that no longer looked in any way like the fan-shaped Cottage Grove *SLOW Cleanup* laboratory garden when completed in the Summer of 2011. Whitehead explains how she believes this end occurred:

It was a series of screw-ups by a series of situations and people. And it is a testimony to the failure of the top-down approach. A community stewardship group should have been established at the beginning. Though I had initially wanted to and made that clear, it didn't happen for many reasons, primarily liability and local politics. In 2012, a new mayoral administration was elected, and with it came major reorganizations. One of these was the elimination of the Department of Environment. Also, the new administration gave DoI significant new initiatives, and the Embedded Artist project got lost. DoI was supposed to be the ongoing "home" for the Embedded Artist collaboration with SAIC. But that was abandoned with DoI's new direction. So, all the expertise and the institutional memory of what we had done disappeared. Also, the plan to have Greencorp do ongoing maintenance fell apart because they were a nonprofit, and its city funding decreased significantly with the new administration's priorities, so it had to retrench. There was still a brownfield remediation function in the city. Still, it went to another agency, and the education of the brownfield engineers I had worked with on phytoremediation on partially remediated gas

station sites was incomplete because the field trial never had a chance to play out, to be analyzed. The scientist who had done the lab trials left Purdue for a faculty position in Texas, so he and his students could no longer lead the ongoing research. Observing and recording how previously untested plant remediators work takes a long time. So, the brownfield engineers probably just went on about their regular business, using the "dig and dispose" methods they had used before. The SLOW Cleanup site was forgotten, not analyzed, not maintained, and then inadvertently destroyed because it had devolved into an unmaintained mess. So sad.

What was learned

Whitehead reports that, to her knowledge, no formal evaluation of either the SLOW Cleanup project or the Embedded Artist initiative occurred, though the city's DoI was charged with doing one. She surmises that the reason DoI did not do a final overall evaluation was the same as the reason they did not continue to be the lead on the Embedded Artist project, which also came to an end with the grant period in 2012. Whitehead reports that while DoI continued to exist after the new mayoral administration took office in early 2013, the agency was soon loaded with new initiatives, leaving *SLOW Cleanup* and the Embedded Artist initiative languishing without internal city support and leadership.

The *SLOW Cleanup* final report and a separate cache of attachments related to it include much information supporting the claim that new phyto-remediators had been identified, but only within the Purdue laboratory trials. Complete field trials of the new phyto-remediators planted on the Cottage Grove *SLOW Cleanup* field trial site were not done because a long-term study of how the plants were performing could not have happened in the short time between the actual plantings (Summer 2011), and the end of the grant period and completion of the final report (Fall/Winter 2012). A complete evaluation of the field trial plantings' phytoremediation capability would have taken at least several years, as plant roots' uptake of petroleum and hydrocarbons is slow.

Though there was no complete evaluation of the scientific aims and accomplishments of SLOW Cleanup, the final report does call for the development of an assessment approach:

Assessment of the SLOW Cleanup Remediation Program Concept is impossible until new typologies are implemented and appropriate assessment measures are developed. To fully understand the potential of the whole systems integrative approach, we recommend the following:

► *Integrative assessment models such as Life Cycle Assessment should be developed about different site typologies, costs, and criteria*

► *Dynamic Modeling and Participatory Assessment should be considered as a reflection of contemporary best community practices*

► *Assessment of the innovation outcomes could be developed for future use as other academic and cultural partnerships evolve*

► *Publication of scientific results will be assessed via the "peer-to-peer review" process utilized by academic research institutions and publications. We anticipate publications on the scientific trials and findings within the next two academic year cycles (2012–2014).* [40]

During our interview, Whitehead said she was unaware if any measures to assess the overall project concept formally had been taken between the end of the grant period (2012) and our interview with her in 2018. An email[41] from the phytoremediation scientist collaborator, Dr. A. P. Schwab, confirmed that no scientific results had been published before or after the completion of the project.

Innovation and education, in spite of

Whitehead maintains that, despite the lack of a formal evaluation, there is proof that innovation did happen. She cites the soil preparation process she instigated, using a road-building machine, as one of the primary innovations the project can claim. Whitehead asserts that her role as "questioner-in-chief" during the project demonstrated that artists could work productively in multi-disciplinary situations of "civic practice" because of their training and experience as artists. She pointed to specific situations during the life of *SLOW Cleanup* in which she enacted the knowledge and abilities on the *What Do Artists Know?* List:

Coming up with the new soil preparation method and succeeding in getting the city to try out new phyto-remediators that can have multiple positive effects and uses beyond the purpose of cleaning up petroleum are great examples of what this artist knows and are the last item on the What Do Artists Know? List: ***artists can enter fields without knowing much about them because they know they won't be working outside the box because THERE IS NO BOX!*** *This is what it means to be an "expert generalist," a professional amateur, and a transgressor, how you can go better when you don't know. When you are irreverent. I see this as avant-garde transgressiveness being put to epistemological use. Limited thinking being blown apart by freewheeling inquiry.*

The examples of the *What Do Artists Know?* list that Whitehead contends she enacted during the *SLOW Cleanup* project, mirror the "dispositions" cultural sociologist Sacha Kagan[42] proposes are needed for any artist to be successful in the kind of "re-direction" of urban policy and program delivery toward sustainability, espoused by urban theorist Tony Fry,[43] whose ideas Whitehead credits for inspiring her cross-disciplinary "civic practice:"

— *Proactive synthesizing and interrogating*. Throughout the project, Whitehead took the initiative, stepping up to each new challenge when she did not have the knowledge necessary to do so, borrowing and synthesizing technical information, and experimenting with the ways her engineer and scientist collaborators were accustomed to expressing themselves verbally and via other means, including maps and diagrams.

— *In-process creativity*. Whitehead played the decisive central role in the design and execution of the laboratory field trial garden as a "Four Pillar" model of sustainability, including "un-developing" it simultaneously as what could have been a site for scientific testing, public enjoyment, and ongoing education (had the project not met its untimely end).

— *Embracing responsibility for the meaning of the work.* Whitehead readily acknowledges the important roles each of the "communities of practice" (city engineering staff, Greencorp trainees, students from CSU and SAIC, and neighborhood residents) played in the collaborative process of creating *SLOW*

Cleanup. But, when she discovered most of the elements and processes of the Four Pillars of Sustainability she had brought to the project site were gone from sight, only a year after completion, she realized the roles of the "communities of practice" in perpetuating *SLOW Cleanup* had evaporated as well. To re-invigorate visibility for all that had been accomplished, she knew she must take responsibility for doing so.

With the mayoral election in 2012 and the new city leadership's changed priorities, support had evaporated for the intended ongoing maintenance of the *SLOW Cleanup* site. Any possibility of replicating the *SLOW Cleanup* phytoremediation model on other gas station sites died with it.

The resulting loss of institutional support for the model meant that none of the project's "communities of practice" could pick up the pieces. The engineers and the gas station remediation program had been reassigned when the city Department of Environment was disbanded; the Greencorp trainee program lost city funding and had to rework their programming; the student researchers at CSU and SAIC moved on to other courses or graduated; the phytoremediation research scientist moved to Texas, and did not publish his findings from the lab trials; and the local Cottage Grove community, which for various reasons had not been brought into the project early on, did not have the information required, the resources, nor the leadership, to address the situation.

Whitehead was involved in the final stages of an "embedded artist" project in Lima, Peru, and the large "606" project that reconceived and transformed an unused rail track leading to the Chicago lakefront [41] when support for SLOW Cleanup disappeared following the 2012 Chicago mayoral election. She did not realize how severely the project had been affected until she visited the site in late 2013, a year after the mayoral election.

How "successful" was *SLOW Cleanup*?

Several questions we posed in the Introduction are relevant in considering what scientific and aesthetic "success" *SLOW Cleanup* can reasonably claim:

Is it enough to experiment or to frame *SLOW Cleanup* as "research?"

What can be learned from the project's incomplete success in reaching intended outcomes? and

Can the fact that *SLOW Cleanup* was even attempted be considered a measure of success?

What happened to *SLOW Cleanup* so quickly after it was completed suggests that it devolved, and many of the project's aims may have died with its devolution. The artist intended for SLOW Cleanup to be a "phenologic clock," where the test plants would bloom successively in waves from left to right across the seasons, making visible the passage of time necessary to accomplish site phytoremediation.

Whitehead's intent to foreground beauty as a vital element of the "four pillars of sustainability" aesthetic seems impossible. Though the elegance of the wrought iron fence surrounding the site announces that one is in the presence of something to which attention must be paid, the plant life it points to is now mowed into visual indistinguishability. The result is illegible and chaotic compared to the high-concept, aesthetically dramatic, scientific research garden *SLOW Cleanup* was when completed in the summer of 2011.

Whitehead's carefully placed metal strips were removed in 2013 to accommodate the required "weed" mowing. Under city regulations, plant life on abandoned sites must not be allowed to "grow up" and proliferate. "Weeds" must be kept "under control" and mowed. Mowers make no distinction between the plants that were part of the *SLOW Cleanup* phytoremediation experiment and what may have sprouted from random seeds blown in on the wind or deposited by visiting birds and other animals. The legibility of the site's garden as a Versailles-inspired fan shape emphasized by the sharp black lines of the metal strips is now gone, as is the strips' practical function, demarking the trial plant beds for ease of maintenance and testing.

As this chapter was being written, there seemed to be no plan to "bring the project back:" to evaluate the project's aesthetic and scientific results or replicate what was learned from *SLOW Cleanup* on similar gas station sites around the city. There is

evidence that some of the test plants, shrubs, and trees have been harvested, which could make it challenging to conduct a proper field evaluation at this point.

The black wrought iron fence no longer frames a dramatic site expressing the sustainability accomplishments of a cross-disciplinary team of "communities of practice." What it frames now is not possible for most visitors to decipher. For those who were involved, it frames a moribund site.

But possibilities have not disappeared. *SLOW Cleanup's* hypotheses and accomplishments are still there, not just in the memories of those involved but also in the Final Report, its appendices, and archives. The soil was significantly remediated beyond industrial use, accomplished via Whitehead's intuition that a giant road-building machine could do the job.

That scientific monitoring has not continued does not mean remediation is not occurring. Already tested phyto-remediating plants were installed, along with those needing further monitoring. As of the writing of this chapter, the roots of those remaining have been absorbing the remaining petroleum residue for years.

The final report outlines the kind of evaluation needed, which could presumably be undertaken at any time if enough of the plants to be tested are still on site. Given will, resources, and leadership, a new form of community engagement could still grow around the site to restart and complete the project. Though possible, such an undertaking seems remote.

Into the discursive realm with *SLOW Cleanup*

Whitehead realized that resuscitating *SLOW Cleanup* was highly unlikely without support from the new city leadership. So, she moved *SLOW Cleanup's* scientific and aesthetic intentions and outcomes forward by disseminating information about the project's accomplishments widely through her own writings and participation in conferences and events on the SAIC campus and across the US and internationally.[44]

Whitehead believes *SLOW Cleanup* was worth doing and was ahead of its time. With testing, evaluation, and replication incomplete and in abeyance, Whitehead keeps

SLOW Cleanup active in the discursive realm with information and claims for the project. In the current absence of scientific publication of the laboratory results that did suggest 12 new plants showed promise as new petroleum remediators, the artist has kept the project's innovations and processes visible through her own publications, lectures, keynote addresses at major science and art symposia, participation in other research gatherings, and through her ongoing "Embedded Artist" consultation with other cities.

Whitehead continues to evolve the Embedded Artist identity she has embraced, to which *SLOW Cleanup* has significantly contributed. In a 2016 interview, Whitehead demonstrated her continuing commitment to "embeddedness," though for her, post-*SLOW Cleanup*, the concept has changed considerably.

Addressing Weaknesses Going Forward

In her 2013 (and ongoing) project on abandoned urban land in Gary, Indiana,[46] she has directly addressed what she considers one of the weakest aspects of her original Embedded Artist concept, as attempted in the *SLOW Cleanup* experience: the fact that elected officials move out of a given government entity with regularity. When new leadership is voted in, too often, worthy projects die for lack of interest or priority for incoming officials.

The instability of municipal leadership due to election cycles now means, for Whitehead, that her "civic practice" projects must be based on the grassroots. After *SLOW Cleanup*, Whitehead leans into collaboration with citizens who are in the community for longer than the typical elected official—and with civil servants who generally serve across and between the terms of elected officials, providing both policy and intellectual memory for innovations that can only have effect over a "long time."

For Whitehead, this has also meant learning about and working within new institutional structures, like establishing her non-profit to hold and work on abandoned urban land. Entering the nonprofit world brings fundraising challenges, complicated board dynamics, rigorous fiscal planning and responsibility, operating within regulations, and more. Still, she sees these as opportunities for slow activism,

social sculpture, and “opting in.”

Whitehead continues to “opt-in,” embedding herself in any new way required by what she aims to do and where. She claims this “opting in” as a “radical” double agency that can potentially affect both the non-art and the art worlds she continues to straddle.

Whitehead assertively takes every opportunity to work across multiple disciplinary silos, demonstrating her hope that artists can bring the innovative power and knowledge she knows artists have to the worlds of design, science, and public policy; while simultaneously stretching art practice to include purpose, innovation, and solutions:

I believe the myth of artistic self-expression has become a pathology of individualism. Artists and symbology have become separated from world-making. We artists have abdicated worldmaking to designers and engineers. I want to change that. We are in transition to “post-normal” art. It is a great time to be an artist. To completely reinvent art. Many artists, myself included, are creating a new art language. My aim has been to contribute to this reinvention of art and to push forward the artist's social role. Make the new culture of the future by fusing the symbolic and the practical.

References

[1] For a summary and list of common phyto-remediators, See Final Report, 12 (Frances Whitehead. “The Embedded Artist Project 2008–2010; SLOW Cleanup: Civic Experiments in Phyto-Remediation 2010–2012.”). The document is in the artist’s archive, shared with Aagerstoun, and is available in the book’s research archive. Two other research projects on the use of “new” phytoremediators are cited in the Final Report,

[2] See Final Report, 4–5, 7. The report cites an earlier study with similar parameters that “was inconclusive but promising.” See the article on the earlier study: Jamie DePolo and Robin Usborne Millsap. “Cleaning Up Underground.” *Futures.* Spring 2004.Vol 22 No 1. Michigan Agricultural Station. http://www.canr.msu.edu/uploads/publications/2004spring_futures.pdf

[3] See Final Report, ibid., 36 for a list of 12 new species identified.

[4] See Suzaan Boettger, *Earthworks: Art and the Landscape of the Sixties*. University of California Press 2002 for a thorough account of the movement's early pioneers.

[5] Reference to "cleanup art" includes especially Mel Chin's *Revival Field (1991–1993 and ongoing)* http://melchin.org/oeuvre/revival-field

[6] "Slow activism" is a term first suggested by UK artist and art historian Wallace Heim. See Heim, Ibid., 187–188.

[7] Beyond her immediate family and her academic "home" at SAIC, her primary influences were: 1) a series of gardens and art installations utilizing living plant material 1987–2003. 2) public art curator Mary Jane Jacob, with whom she worked from 1998–2008. 3) iconic Chicago architect Stanley Tigerman (2000-present); 4) urban theorist Tony Fry (from 2003); 5) artist in residence projects in art-on-brownfield sites in Ohio (2003 and 2005); 6) sociologist of culture, Sacha Kagan (from 2013).

[8] This quotation is from the interviews with Whitehead by author Aagerstoun during the summer of 2018. All quotations, if not attributed otherwise, are taken from these interviews. Summaries of the interviews are in the book's archive.

[9] This description of Whitehead's "meta-object" sculptural work incorporating plants in the 1980s and '90s is in Kristen Brooke Schleifer. "Readings: The Prints of Frances Whitehead." Art in Print Review. Th*e Print Collector's Newsletter.* Vol. xxiii. 1994. 216–217: "[Whitehead is known for] large-scale quasi emblematic constructions in richly textured metal… *The Dream* is a fragrant veil from cast pine rosin on an armature of zinc and steel, gradually being dissolved by the oil of laurel from a glass dripper, poised above a mantle of laurel leaves, glass pistils, and stamens submerged in laurel oil. Laurel plants encased in zinc armatures…symbol of fame and desire across from glass pots of deadly nightshade, laden with lethal berries."

[10] See http://www.saic.edu/profiles/faculty/mary-jane-jacob. Whitehead was a

principal artist at Jacob's significant citywide public art intervention in 2004 at Charleston, South Carolina's Spoleto Festival. See http://drainmag.com /contentFebruary/interviews/GambinoWater.htm: Regarding Whitehead article notes: "Frances Whitehead [has] an astounding expertise in plants and landscape. Whitehead [has designed] public gardens in color themes and as decorative chart and graph illustrations of scientific facts. Whitehead is fascinated with the integration of art and sciences. She stated that applying art as technology to question the politics of urban development was a new experience for her. She looks forward to investigating these ramifications of her public works further in the upcoming years' installations."

[11] For the entire Whitehead essay, see: http://www.abladeofgrass.org/growing-dialogue/the-embedded-artist-opting-in/ For the "diplomacy of art" idea, see Harriet Hawkins, Sallie A. Marston, Mrill Ingram, Elizabeth Straughan. (2015) The Art of Socioecological Transformation. Annals of the Association of American Geographers, 7–9.

[12] Viz publicity for Green House in the New York Times: Mimi Read. "In Chicago, Tinted Green" New York Times, March 13, 2008, several months before Whitehead approached the city of Chicago's Director of Innovation. https://www.nytimes.com /2008/03/13/garden/13chicago.html The house was sold in 2016. See advertisement in Crain's business journal. http://www.chicagobusiness.com/gallery/20160506 /CRED0703/506009999/A-green-house-with-a-greenhouse

[13] Applying innovation theories (sometimes called "disruption) to government continues to develop. One contribution, published in 2013 by the Stanford Social Innovation Review, https://ssir.org/articles/entry /unleashing_breakthrough_innovation_in_government, is coauthored by Harvard Business School professor Clayton Christensen, widely accepted as the "father" of ideas about disruption as the genesis of innovation (other authors included Nikhil R. Sahni and Maxwell Wessel, former fellows at the Forum for Growth and Innovation at Harvard Business School).

[14] See http://magazine.art21.org/2010/08/24/frances-whitehead-embedded-artist /#.Wuc6zYjwaUk for how Whitehead's first artist-in-government experience, also in

Ohio, came about by invitation to join a water pollution remediation project under an NEA grant, with the Office of Surface Mining in Murray City, Ohio, when the participating artist became unavailable.

[15] Whitehead has acknowledged this source for *What Do Artists Know?* in multiple interviews and published material. Whitehead's copyright date, appearing on the document, is 2006 (Fig 3). She indicates she refined the list over several years.

[16] Whitehead summarized the intention and contours of the Embedded Artist project (Chicago, 2008–2012) during her fellowship with A Blade of Grass (ABOG) (2015–16). Ibid. http://www.abladeofgrass.org/growing-dialogue/the-embedded-artist-opting-in/

[17] http://fredbrookes.co.uk/downloads/PROJECT_evaluation_report_6.pdf

[18] Whitehead established the ARTetal Studio in 2001 as a platform for "post normal art" practice. See http://franceswhitehead.com/who-we-are

[19] See James Elkins, ed. *What Do Artists Know?* Vol.3. University Park: Pennsylvania State University Press, 2012): https://www.academia.edu/3105975/What_Do_Artists_Know_introduction Elkins notes herein the difference between his concept of the question and Whitehead's: "I was surprised … to discover that someone else [Frances Whitehead] at the School of the Art Institute had been working on that exact question… for several years. She hears the question very differently…[namely] that artists have …*tacit knowledge*… "

[20] Christopher Csikszentmihályi suggested Whitehead had a "knowledge claim" with her *What Do Artists Know?* He was at MIT Labs for ten years. As this chapter was written, he was the European Research chair for The Madeira Interactive Technologies Institute at Madeira University in Portugal.

[21] Whitehead was not the only SAIC artist "embedded" in the pilot. Two others joined her, with assignments in other city departments.

[22] How far along Chicago was with this plan is evidenced by the issuance of its final report in 2009. http://www.cmap.illinois.gov/documents/10180/31446

/012610+FOOD+SYSTEMS.pdf/67bf510e-62f8-4cec-ae58-c91f0212aef3

[23] http://articles.chicagotribune.com/1992-05-05/business/9202090959_1_tanks-leaking-service-stations

[24] See https://www.epa.gov/ust/petroleum-brownfields for a summary of US EPA brownfields remediation programs and funding.

[25]This article from *Nature* is often cited as the first time this information was published: Malte Meinshausen et al. "Greenhouse-gas emission targets for limiting global warming to 2 °C." *Nature*. Vol 458, April 30, 2009, 1158–1162. https://www.nature.com/articles/nature08017

[26] For "asset-based planning," see as examples some tools and templates used by the State of Delaware here: https://www.completecommunitiesde.org/planning/sustainable/asset-based-economic-development/

[27] See Final Report, Ibid. 4–5, 7

[28] EPA began to issue information about more "green" approaches to remediation about the same time *SLOW Cleanup* was in its initial stages. The most recent publication on brownfield cleanup (2017) provides an outline of the history of EPA's assistance on brownfields generally, dating to 1997 https://www.epa.gov/sites/production/files/2017-11/documents/brownfieldsroadmapepa542-r-12-001.pdf and another EPA document indicates that the national Petroleum brownfield cleanup program began in 2008, the same year Whitehead first visited the Chicago Innovation Director. https://www.epa.gov/ust/petroleum-brownfields-action-plans Whitehead herself notes that *SLOW Cleanup* was ahead of EPA's embrace of phytoremediation use on abandoned gas station sites.

[29] Final Report, Ibid. 5: "During the Literature Review phase of the Project, Dr. A.P. Schwab began to advise and subsequently became a full collaborator."

[30] In the Final Report, Ibid., 45, it is noted that one of the drawbacks of phytoremediation of petroleum and hydrocarbons is that it is very slow. See the Phytoremediation Recommendations section of the report for suggested ways

phytoremediation could be integrated into the ongoing City of Chicago programs, taking this slow pace into account.

[311]See Final Report, Ibid. 21 for the soil preparation steps.

[32] The Wirtgen 2400 in operation on a roadbed: https://www.youtube.com/watch?v=jfG-jERhJBs

[33] There are many versions of the pillars of sustainability. The term originates in the United Nations Brundtland Commission Report of 1987, http://www.un-documents.net/wced-ocf.htm, officially titled *Report of the World Commission on Environment and Development: Our Common Future*. Initially, there were only three pillars: Ecology, Economy, and Equity. The "fourth pillar" of "Culture" was officially adopted in 2010("**Culture is the Fourth Pillar of Sustainable Development,**" policy adopted on 17 November 2010, in the framework of the World Summit of Local and Regional Leaders — 3rd World Congress of United Cities and Local Governments (UCLG), held in Mexico City). For an interesting definition of the so-called "fourth pillar" of sustainability (often described by advocates as the "missing pillar") as ethics-oriented, see Gemma Burford, Marie K. Harder, et al. "Bringing the "Missing Pillar" into Sustainable Development Goals: Towards Intersubjective Values-Based Indicators." *Sustainability*, 5, Issue 7. 2013. http://www.mdpi.com/2071-1050/5/7 Essay proposes that "the need for a core "fourth pillar" of sustainability/sustainable development can no longer be ignored on the grounds of intangibility. The writers consider the vital but missing pillar [to be composed of the] (cultural-aesthetic, religious-spiritual, and political-institutional) which finds common ground in the area of ethical values."

[34] Final Report, Ibid. 7 In the final report, Whitehead's "garden" purpose is identified as intended to operate in tandem with "asset-based planning" to showcase the *SLOW Cleanup* site as an example of "un-development."

[35] Process as medium is a prominent feature of the social sculpture genre. See Cara Jordan, "The Evolution of Social Sculpture in the United States: Joseph Beuys and The Work Of Suzanne Lacy and Rick Lowe." *Public Art Dialogue*, 2013 Vol. 3, №2, 144–167. Most of the works in this book utilize process as a medium and can be seen

as social sculptures.

[36] See this for a recent assessment of the value of trees to neighborhoods: http://depts.washington.edu/hhwb/Thm_Economics.html. Regarding the contribution of trees and vegetation to safety, see https://depts.washington.edu/hhwb/Thm_Crime.html

[37] See Final Report, Ibid. 41. Because the timing of planting came so close to the end of the project grant period, testing of an edible garden's future use function for remediated gas station sites through fruit trees did not happen. However, the Final Report calls for additional study of phytoremediation potential for fruit trees in which "Edible fruit trees and shrubs, planted in orchard style *allees* are under-planted with perennial mixes, which should clean petroleum before the appearance of the fruit."

[38] "From the Galerie des Glâces, the King and his guests could gaze out on a sweeping vista." From Fred S. Kleiner. Gardner's *Art Through the Ages: A Global History*, vol 2. Boston: Cengage Learning, 2017, 576. The designer "Le Nôtre used the cross axes to set up the basic pattern [and] the diagonal axes to break [it up]." Gang Chen. Planting Design Illustrated. Irving, CA and Guangzhou, PR, China, 2011, 74. The effect, seen from the air, is of diagonal roads and pathways streaming out from the Versailles Palace, like the sun's rays. It is an apt design to acknowledge both central control and the self-identity of Louis as the Sun King.

[39] As theorized in the 1970s by art historian Rosalind Krauss: "The grid functions to declare the modernity of modern art…flattened, geometricized, ordered, it is anti-natural, unreal. It is what art looks like when it turns its back on nature." Rosalind Krauss, "The Grid," *October*, no. 9, 1979, 51–52. See also the chapter on Xavier Cortada's "Reclamation Project," [page] where the grid has a similar effect of branding a work as "modern."

[40] Ben Helphand is the Executive Director of NeighborSpace, a nonprofit urban land trust dedicated to preserving and sustaining community-managed open spaces in Chicago. NeighborSpace shoulders the responsibility of property ownership for a network of more than 100 flower, vegetable, and prairie gardens across the City so

+ Ecological Art + Phytoremediation

t' gr ardening and community building. In a telephone contact on 9-25-2018, Helphand indicated that attempts were made to identify a community group to adopt the site, but that never happened. See http://neighbor-space.org/about/board/

[41] Final Report, Ibid. 46

[42] Email from A. P. Schwab to Mary Jo Aagerstoun, September 3, 2018.

[43] Kagan, Ibid.

[44] Fry, Ibid.

[45] Dissemination of the project's intentions and outcomes that occurred before the publication of the Final Report in 2012 are at Ibid., 50. There have been many recorded interviews and essays about the project in peer-reviewed journals and other publications, a directly related art fellowship with A Blade of Grass, a PBS Art 21 documentary, and many conference presentations, including keynote addresses directly about *SLOW Cleanup* and her subsequent experiments with the "civic practice" and "embedded artist" concepts that emerged from it, the most recent, as this chapter is written, in October 2018 in Zurich.

[46] See https://franceswhitehead.com/what-we-do/fruit-futures-initiative-gary

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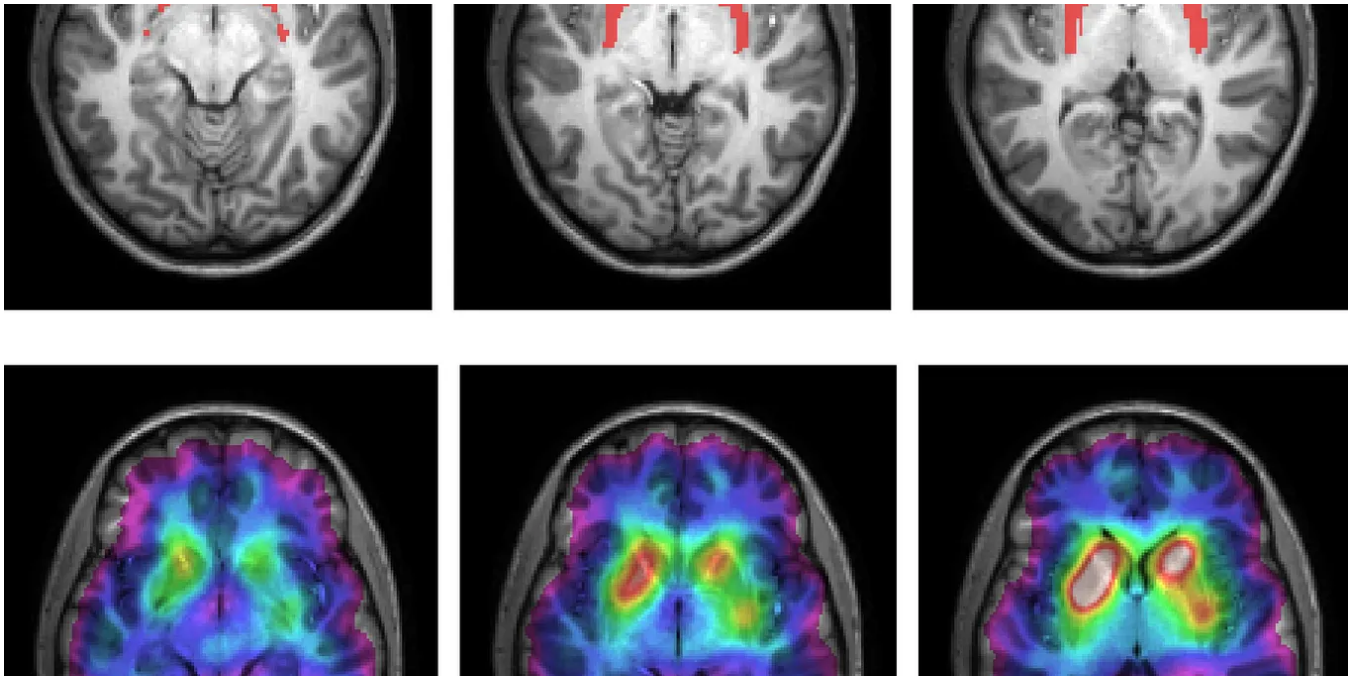

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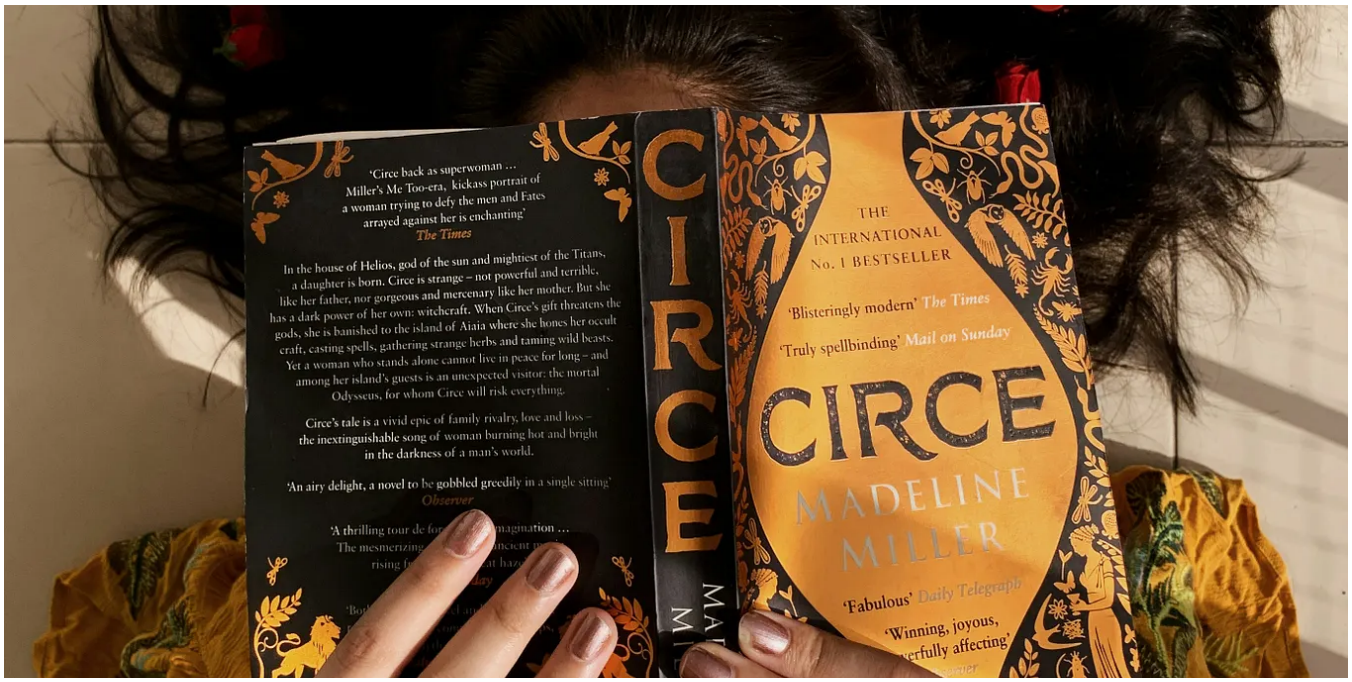

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