PLANNING, SOCIAL INFRASTRUCTURE, AND THE MAKER MOVEMENT IN NEW YORK CITY

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In recent years, the maker movement has captured the imaginations of policy makers and planners across the United States. As with any large, potentially paradigmatic idea (think “sustainability” or “resiliency”), the phenomenon has quickly become freighted with overlapping, competing, and sometimes contradictory meanings (Markusen 1999). Making is sometimes characterized as a distinct mode of production, enabled by the widespread commercial availability of design and prototyping platforms and fabrication tools (Stangler and Maxwell 2012; Milstein Symposium 2014). Other definitions place consumption center stage, highlighting people’s desire to eat, wear, and use products that have been created locally (Heying 2010; Roy 2015), or that are customized to personal specifications (Maker Media and Deloitte Center for the Edge 2013; Bryson, Clark, and Mulhall 2014). Still other definitions center on individuals’ yearning to reconnect with the material world, to “engage passionately with objects in ways that make them more than just consumers” (Dougherty 2012, 12).

From a planning standpoint, these disparate definitions render “making” slippery, especially since the term is applied to concepts that assert grand claims about social change, from claiming that it will transform American manufacturing (Stangler and Maxwell 2012) to assertions that it will revolutionize education (Martinez and Stager 2014) and bring STEM literacy to economically marginalized groups (Kalil and Rodriguez 2015). Amidst this fuzzy consensus about what the maker movement is and why it is important, planners concerned with regional economic growth, jobs and workforce training, and place-making and community-building have all taken an interest, bringing different conceptions of what imbues “making” with social value.

This article, derived from a research project encompassing maker firms and their “ecosystems” in three United States cities (Dossard et al. 2015), explores the trajectory and possibilities of the maker movement from a planning perspective using case studies of four New York City institutions: a public sector agency spearheading an initiative to assist startup businesses in the emerging hardware sector, a community-based organization helping specialty food entrepreneurs grow and add jobs, a neighborhood-based makerspace that offers education and business development in a low-income community, and a private firm aiming to reinvent the synergies of Manhattan’s Garment District in an outer borough. Maker businesses are diversifying New York City’s economy, generating tax revenue, adding employees, and contributing to neighborhood change. Each of the intermediaries profiled here embodies a unique set of convictions about the social and economic value of the maker movement and about the role of planning in supporting it.

Maker-Entrepreneurs and their Institutional Context

As a commercial phenomenon, the maker movement begins with maker entrepreneurs: small-scale, revenue-generating manufacturing firms that closely couple the design and conceptualization of physical products with their realization, returning emphasis to a “forgotten” link between design and production (Clark 2014). Under this rubric, there are two distinct types. Artisan makers (Heying 2010; Roy 2015) are concerned with craft, responding to customer demand for some combination of aesthetics (as in a chair with superior design qualities), transparency about product origin (knowledge that the chair was made in a nearby workshop by well-remunerated employees), products that safeguard human and environmental health (assurance that the wood was sustainably harvested and not treated with toxic chemicals), and/or individualized experience (the opportunity to directly interact with the furniture producer). The second group of maker firms, inventors or hardware makers, is distinguished by process and products: programmable devices created with digital fabrication technologies and capable of interacting with people and with other objects (as in a chair that senses and reports someone’s body temperature or blood glucose level, or a thermostat that can be adjusted from a cell phone). The edges of this typology frequently blur: an artisinal chair maker might use a digital fabrication device such as a metal lathe, while the producer of the sensing chair or the thermostat might manufacture components locally or aspire to aesthetic distinction as well as...
functionality. But the two types of entrepreneurs occupy distinct niches in the capital and consumer markets, draw on different industrial traditions, and represent the maker movement in different ways, with artisans speaking to a “small-is-beautiful” ethos and hardware entrepreneurs to the evolution of mechanical and electrical engineering, robotics, and hacker culture.

An element linking the distinct worlds of artisan and inventor makers is collaborative social infrastructure. Due both to availability of talent and to capital and customer access, maker firms tend to cluster in urbanized areas, where they agglomerate to reduce the cost of accessing labor, specialized services, and ideas (Marshall 1890; Jacobs 1969). The ventures that surround and support maker industrial clusters in cities include “makerspaces,” institutions that act as communities of knowledge by providing collective access to specialized equipment and to learning and networking opportunities. But many types of ventures support maker companies, from portfolio investors to affordable multi-tenant workspaces to organizations that assist with business planning, provide investors to affordable multi-tenant workspaces to organizations that assist with business planning, provide sales and marketing venues, or run “buy local” campaigns. These so-called “enabling entrepreneurs” are thick on the ground among urban maker populations, serving a variety of functions in these new design/production economies (Doussard et al. 2015). Their governance is public, private, or non-profit, and one is a private firm. As a group, these institutions target both inventor and artisan makers and together they perform five of the six functions identified by Doussard et al (2015) as typifying maker-enabling entrepreneurial organizations. While the cases in this paper do not represent our underlyin sample of eighteen New York City maker-enabling entrepreneurs in terms of governance structure, they effectively demonstrate the potential roles of planners in furthering the social purposes of the maker movement.

Table 1: New York City maker-enabling entrepreneurs

<table>
<thead>
<tr>
<th>Organization</th>
<th>Maker group targeted</th>
<th>Functions</th>
<th>Governance structure</th>
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<tbody>
<tr>
<td>NYC Economic Development Corporation’s New York’s Next Top Makers program</td>
<td>Hardware entrepreneurs</td>
<td>Advocate, Deal-maker</td>
<td>Program of public agency</td>
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<tr>
<td>Evergreen Exchange, Inc.</td>
<td>Food industry entrepreneurs</td>
<td>Advocate, Advocate</td>
<td>Non-profit</td>
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<td>Staten Island Makerspace</td>
<td>General</td>
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<tr>
<td>Manufacture NY</td>
<td>Fashion industry entrepreneurs and contract manufacturers</td>
<td>Real estate provider, space for learning, experimentation and production</td>
<td>Private and non-profit</td>
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Researchers collected data about the case organizations and fourteen others from June through September 2015, conducting in-person interviews with their principals and staff (we also collected information via websites, annual reports, and press coverage). Interviews focused on the organizations’ missions, activities, and business models. Interviewees also offered their opinions and insights about the state of the maker movement in New York City, discussing the place-embedded histories and future prospects of the hardware, fashion, and food subsectors. In some instances, interviewees shared insights and knowledge about the impact of the maker movement on individual neighborhoods. Interviews lasted about one hour and were conducted in person on the premises of the case study organizations.

New York City Economic Development Corporation: Helping Develop a New Industry Cluster

As noted above, a major economic sector to have emerged in New York City since the turn of the 21st century is hardware, an industry that has its roots in the technology-focused do-it-yourself culture. Originally promoted in the 1960s in venues like the Whole Earth Catalog, hardware then extended (with the growth of computing, remote sensing, and robotics) to technologies that break down boundaries between the digital and the physical world (DiResta, Forrest, and Vinyard 2015). New York City has recently become an important urban node in the nation’s digital hardware industry.

While the city’s hardware cluster can be defined generically in terms of major markets and product types—computer-connected devices, personal...
sensor devices, and robotics—it also stems from a localized cultural phenomenon: the fertile collision of innovations in manufacturing technology with the creative, anarchic environment of the city's fashion and visual and performing arts scenes. Artists and designers had long experimented with media and digital technologies, but beginning in the mid-2000s, the proliferation of open source product design tools, rapid prototyping capabilities, digital fabrication, cloud computing, and a local marketplace full of early adopters led some designers to collaborate with software programmers, engineers, and robotics specialists on commercial projects. The presence of labs for experimental computing and digital fabrication at major design schools (NYCEDC 2013) and loosely organized communities of practice known as makerspaces (Dickerson 2015) also influenced this branch of the maker movement.

New York’s Next Top Makers is a project of the New York City Economic Development Corporation (NYCEDC), the city agency that manages public sector investments in infrastructure—including intellectual and social infrastructure—to further economic development goals in the five boroughs. Staff at NYCEDC’s industrial desk evolved the idea for Next Top Makers in 2011 and 2012, while they were investigating the growth of digital fabrication and other advanced manufacturing technologies. Based on their research, they concluded that while software computing and digital fabrication at major design schools (NYCEDC 2013) and loosely organized communities of practice known as makerspaces (Dickerson 2015) also influenced this branch of the maker movement.

Next Top Makers, now in its third year, set out to catalyze the inter-professional connections and peer knowledge exchange that would enable the city’s hardware sector to grow. In addition to hosting community workshops and “pop-up” events at which companies network and showcase their products, the program hosts an incubation initiative for selected teams of “Fellows” (five in 2015, six in 2016), firms whose principals receive access to mentorship from manufacturing, design, marketing, legal and business experts, as well as a prototyping budget. 2016 Fellows include Beyond Sight, which is creating a wearable device that gives navigation information to the skin by the use of tactors, and StrongArm Technologies, which makes “ergoskeletons,” devices that protect industrial workers’ bodies by shifting loads in ways that allow wearers to lift heavy objects more safely. As a result of community-networking, and intensive technical assistance efforts, these startup companies are better positioned to succeed, having received a lot of publicity and having become more deeply embedded in New York City’s high-tech business culture. As of early 2016, Next Top Makers is being absorbed into FutureWorks NYC, a broad-based advanced manufacturing initiative dedicated to increasing entrepreneurs’ access to new prototyping and fabrication technologies. The goal of FutureWorks is to make these resources, and assistance in adopting and using them, available both to startup firms and to established manufacturers.

The value proposition of Next Top Makers and FutureWorks from a planning perspective is that the programs contribute to the development of industry sectors in which market failures (having to do with missing information, underdeveloped networks, and lack of capital) prevent startup companies from moving from concept validation to commercialization and production. NYCEDC staff see the development and scale-up of successful advanced manufacturing startups in New York as a key to attracting entrepreneurs, talent, and entrepreneurs into the city. They see the emergence of the new sector both as a way of diversifying the city’s economy away from its dependency on the finance and tourism industry (see Bowles and Glaes 2012, Wolf-Powers 2013) and as an opportunity for the growth of linked sectors such as advertising, banking, and other producer services. A continuing challenge is to encourage advanced manufacturers based in the city to cultivate local supply chains. With encouragement from the city, companies using advanced manufacturing technologies to produce in new ways can potentially nurture an ecosystem of contract assembly and component manufacturing enterprises that employ a higher volume of people and offer opportunities to workers who are diverse in terms of skillset and educational preparation.

Evergreen Exchange: Linking a New Manufacturing Cluster to an Established One

Between 2009 and 2013, 1,294 food and beverage manufacturers opened for business in the five boroughs, and firms and employment in the sector have increased twenty-seven percent and six percent respectively over the past decade (Pratt Center for Community Development 2015). Much of this is due to growth in the specialty food industry, the part of the food and beverage sector on which the maker movement has had the greatest influence. Interviews with businesses and industry experts indicate that the rash of specialty food startups in New York City emerged from a confluence of factors. During 2008-2009 recession, a group of unemployed professionals with artistic impulses, elite tastes, and large severance packages was in search of opportunity, just as buy local and farm-to-table trends began peaking in the consumer market (Archibald 2015). Entrepreneurs tapped into affluent consumers’ demand for food that demonstrates their commitment to environmental sustainability and that harmonizes with their desire to reject the industrial food system and consume beautiful, healthful, and minimally-processed products (Wallace 2012). Barriers to entry were relatively low, as individuals could experiment with recipes in their kitchens and produce labels on their computers. Like all small businesses, New York City’s specialty food makers experience high rates of exit within their first five years. According to one study, food and beverage companies that opened in the city in 2009,
Evergreen Exchange (formerly the East Williamsburg Valley Industrial Development Corporation) is dedicated to the development of these new “maker” businesses—almost single-mindedly from the perspective of jobs. A not-for-profit affiliated with St. Nick’s Alliance, a community development and social services organization founded during the Great Society era, the organization is known for its insistence on economic development policy that prioritizes jobs in the context of a local policy environment (Archibald 2015; Pratt Center for Community Development 2015).

With the support of area foundations, Evergreen initiated programming for early-stage food entrepreneurs striving to expand. Staff sponsor workshops featuring expert content on relevant topics such as food safety compliance and search engine optimization; conduct seminars on inventory management, bookkeeping, and personnel policies; and work one-on-one with firms to raise capital, access public economic development incentives, and navigate the regulatory bureaucracy. Evergreen is part of a citywide network of groups that provide services in Industrial Business Zones (IBZs), areas designated in 2006 to protect significant clusters of industrial firms from real estate market pressure. Recently, Evergreen expanded its food industry programming to reach firms outside the North Brooklyn/Greenpoint-Williamsburg IBZ, and there are now 350 food businesses in the group’s citywide network. Archibald notes that real estate in East Williamsburg, formerly an active industrial enclave, has become so expensive in the face of gentrification pressure that she routinely helps businesses find expansion space in less expensive parts of the city. Archibald and other industrial retention advocates are ambivalent about the attention being cast on the city’s “maker” movement. From their perspective, the term has come to encompass firms that are commercial rather than industrial, and thus is used to accelerate a process by which office-based enterprises employing professionals crowd out production-based enterprises offering employment to less well educated residents of the neighborhood. For this reason, Archibald prefers “creative producer” or “manufacturer” over “maker” as an identifying term.

Staten Island MakerSpace: Co-Locating Neighborhood-Based Education with Enterprise Development

Part of the social infrastructure of New York City’s maker movement is a dense population of makerspaces: physical locations where people share equipment and knowledge. Largely inspired by technology-driven hacker culture, these spaces traditionally appeal to the inventors, offering self-directed makers affordable access to resources and a community for experimentation (Dickerson 2015). However, makerspace’s emphasis on multidisciplinary and collaborative learning has come to appeal to artisanal makers as well. A typical makerspace may offer access to routers, laser cutters, 3D printers, DIY robotics kits, design software, craft materials, sewing rooms, wood shops, and metalworking equipment. In New York City, makerspaces take varied forms, mixing experts, novice hobbyists, and startup enterprises in distinctive ways.

Following Superstorm Sandy in 2012, the NYCEDC released a request for proposals (RFP) for the development of a business incubator in Staten Island. At the time, husband-and-wife team D.B. Lampman and Scott Van Campen were working alongside friends and neighbors to recover their architectural metalworking business and sculpture studio, located on the Northeast coast of Staten Island in Stapleton, a low-income neighborhood which had been devastated by the storm. The community’s participation in the recovery of the 6,000-square-foot studio inspired Lampman and Van Campen to begin envisioning their studio as a permanent, open, and neighborhood-rooted space for collaboration and creativity. Upon learning about NYCEDC’s RFP, the couple submitted a proposal and won a $250,000 grant to convert the metalshop into a non-profit business incubator, the Staten Island MakerSpace (Lampman 2015). The facility combines programming for learners and hobbyists with resources for startup businesses.

Unlike makerspaces rooted in hardware development, Staten Island MakerSpace is best known for its well-appointed metal shop, alongside a woodshop, sewing studio, and computer lab. A three-tiered fee-based annual membership structure provides various levels of access to the equipment, shared workshops, and conference rooms—for individuals and for businesses. Technical advisors are available to assist with running specialized prototyping equipment at an additional hourly fee. The site’s nine private eight-by-ten foot rented spaces are in high demand with an lengthy waiting list. Enterprise tenants, who include artists, typewriter technicians, home brewers and manufacturers of composting toilets, actively operate the space night and day. It is common for tenants and non-enterprise members to collaborate on projects: artists have provided professional photography for other members’ crowdfunding campaigns, and two different startups have collaborated on a prototype for a toilet made entirely of recycled plastic. Meanwhile, hobbyists, beginners, and youth take advantage of the space’s low-fee courses in welding, sewing, and other crafts. The New York City Council recently funded a “STEAM Wagon,” a refurbished box truck complete with woodcutting tools, a 3D printer, and a sewing machine. The truck will travel to local schools to give experiential lessons in science, technology, engineering, art, and math (Lampman 2015).

Makerspaces’ affordable access to communal tools and training has captured the attention of national and local policymakers, and as a result several local and national organizations have created guidelines for the planning, development, and management of local and regional makerspace networks (Stevenson et al. 2015). In the U.S., the American Society of Civil Engineers (ASCE) have created a “Rational Framework for Municipal Makerspace Planning.” The framework serves as a tool for municipalities to understand the community impacts of the maker movement and to prioritize and develop a makerspace strategy to address community needs while ensuring the health and safety of the members and the public (ASCE 2016). The framework begins with an assessment of the area’s need for a makerspace and the role it would play in the community based on a review of existing resources, analysis of local trends and demographic information, and engagement with the community. The next step is to determine the feasible location and establish a strategic plan to guide the design and development of the space. Finally, the framework offers recommendations for the long-term management of the site, including community engagement, revenue streams, and maintenance. The Staten Island MakerSpace is an excellent example of the types of space that can be developed and the role that they can play in the community.
its displacement. In anticipation of this issue, Staten Island MakerSpace has successfully demonstrated the efficacy of such policies in large part due to continued financial backing and support from City agencies. “Winning the RFP was really critical,” says D.B. Lampman, Staten Island MakerSpace’s Co-Founder, “not just because of financing but because we had City backing which gave us visibility.” This visibility served a dual purpose: increasing the non-profit’s revenue stream and establishing its identity as a valued community partner (Lampman 2015). With limited capacity and little information available to the public, make-spaces run the risk of becoming well-hidden esoteric communities for the highly skilled. Staten Island MakerSpace, however, easily attracts members at various skill levels. Its organic approach to programming is community-driven, simultaneously supporting start-up companies and exposing youth and adults of all backgrounds in the area to advanced technologies and equipment.

Staten Island MakerSpace's greatest challenge going forward is likely to be the affordability of its space as local landowners seek higher rents. The City’s announcement of a business incubator in Staten Island came at the heels of several mixed-use residential and retail development proposals along the waterfront. While the nature of Staten Island MakerSpace’s activities requires a property zoned for industrial use, its reputation as a center for creativity and education attracts the types of development—e.g., shopping centers and housing—that paradoxically threaten its displacement. In anticipation of this issue, Staten Island MakerSpace is already in search of alternative space and is considering ways to leverage its reputation to guarantee its continued presence in the Stapleton community through collaborations with the City and real estate developers (Lampman 2015).

**Manufacture New York: Reinventing a Legacy Creative Industry**

Home to leading fashion schools, designers, wholesalers, show rooms, trade shows and market weeks, New York City is recognized as a world capital for innovation in fashion (Rantisi 2002a; 2002b). While Manhattan’s Garment District produced a significant amount of the clothes sold in the United States in 1960, changing geopolitics, increased labor costs, and real estate pressures have resulted in outsourcing of much of New York’s garment production (Save the Garment Center 2016). Despite an enormous decline in domestic production, New York City remains a hub for fashion and its linked industries, employing over 180,000 people and generating $98 billion in sales, $10.9 billion in wages, and $2 billion in tax revenues annually (NYCEDC 2014). At the same time, garment production has both decreased and become more competitive, resulting in a concentration of fashion jobs and wealth at the elite end of the economic scale. Hux notes the particularly harsh impact of these trends on immigrant communities (2003).

In recent years, in concert with renewed interest in the maker movement, aspirations for design-linked production in New York’s fashion industry have risen. Designers have plugged into the emerging trend of conscious consumerism, with a concentration on local and sustainable production of high-quality apparel and accessories. The ethical appeal of local production—e.g., job creation and small business support—is bolstered by the logistical benefits of speedy turnovers and increased points of contact with contractors to vet products in real time. Fashion makers’ upscale, high-touch merchandise demands local production for the purposes of marketability and quality control. However, this business model is threatened by the City’s dwindling apparel-manufacturing infrastructure. Unseasoned designers must navigate esoteric local supply chains which require industry knowledge and a robust network of pre-existing relationships with reliable factories. While New York City continues to employ 24,000 people in apparel manufacturing, identifying contractors with the consistent capacity to meet specific dyeing, cut and sew fabrication, and finishing needs can be a challenge, particularly when designers fail to meet the facility’s minimum order requirements due to budget constraints.

A former designer and apparel production manager, Bob Bland, CEO and Founder of Manufacture New York, recognized that New York City’s market conditions tended to favor big-brand celebrity labels and to limit the viability of talented emerging designers. In response, Bland, using crowd funding, created a 2,000 square foot incubator space in the Garment Center that provided affordable work space, access to shared equipment, and support services for fifteen up-and-coming brands. The project succeeded and the fifteen designers’ product lines moved quickly to market. Building on this success, and supported financially by the U.S. Small Business Association and New York City’s Industrial Space Modernization initiative (IMOD), Manufacture New York, in partnership with developer Salmar Properties, is developing a 160,000 square foot manufacturing, research, and design innovation center in Sunset Park, Brooklyn. The venture expands the incubator model into a full production ecosystem to include work areas for up to fifty designers and thirty to forty manufacturers. Manufacture New York staff will select a mix of tenants, from traditional manufacturers and pattern makers to companies building digital applications and hardware for new manufacturing processes to companies researching wearable technologies and biosafes. A small-batch apparel factory will generate revenue, while a not-for-profit workforce development center will provide training to low-income and minority job seekers (Bland and Duffy 2015).

Patrick Duffy, V.P. of Sustainability, Manufacturing, and External Affairs and a trained economic development planner, has adopted an intentional cluster approach, aiming to curate a creative space that will provide designers with necessary domestic production services while catalyzing innovation. Spaces at the facility range from 2,000 to 30,000 square feet, suitable for everything from design, product development, and prototyping, to large scale contract manufacturing. In the tenant selection process, Duffy is actively identifying ways for potential tenants to collaborate; for instance, a zero waste maker and designer may recycle other tenants’ scraps, while a self-contained fashion brand may rent equipment from other tenants or collaborate with them on bulk input purchasing. While technology-driven startups are a key part of this ecosystem, “a good mix of companies, old and new, will ground the space and also encourage older companies to use new processes, adopt sustainable business practices, and improve the quality of traditional apparel production jobs,” Duffy says.
Manufacture New York’s innovation hub is itself an early-stage startup, motivated by the conviction that a new form of making can emerge in New York City, building on the legacy of the apparel industry but incorporating many of the technologies associated with the hardware sector. Creating jobs at a significant scale will rely on successfully integrating design and production at the Sunset Park facility. As the space of the Sunset Park neighborhood increases, driven by speculation and demand from commercial tenants (Hum 2014), Manufacture New York’s vision of a co-located and diverse set of industrial-facility businesses may face challenges. Challenges that it will not overcome without continued financial collaboration with the public sector. Nevertheless, the organization’s vision for a modernized apparel production ecosystem rooted in a major city is a notable example of planning for creativity in a competitive market.

Conclusion

The four intermediaries portrayed here—one public sector, two not-for-profit, one a private for-profit/not-for-profit hybrid—indicate the diversity and complexity of the social infrastructure promoting and sustaining maker-entrepreneurs. In the process, they affirm the multiple roles of planning and place-based intervention in supporting creativity; both the challenges and the opportunities will differ in other cities. Wherever they are located, planners concerned with maximizing the urban benefits of the maker movement will be working in interstitial places where market forces leave public value on the table.

Endnotes

1. These are: advocate, deal-maker, real estate provider, sale and marketing platform, and space for learning and experimentation.
2. Interviews were recorded with permission. All information reported here was verified with interviews in compliance with IRB protocol #15037, approved by Portland State University’s Human Subjects Research Committee (Review Type: Exempt, Category 2).
3. A prime example of this is Makerbot, a 3D printing equipment company that began with an experimental fabrication project pursued by one of the company’s founders while on an art Fellowship.
4. Pratt Institute Center for Community Development 2015 (see Works Cited).
5. BIDCO is intended to incentivize private property owners to transform under-utilized industrial buildings with large floor plates into smaller spaces for businesses with 10 employees.

Works Cited


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The economic and political context for the maker movement—both maker-entrepreneurs and the institutions that surround them—differs from place to place. Makers’ competitive strategies—and their access to capital, production facilities, and markets—are conditioned by inherited industrial agglomerations and by inherited political arrangements at the local level. These characteristics, in turn, shape the commercial and social infrastructures that develop around them. Much of that infrastructure, as noted above, consists of profit-making ventures that provide specialized services such as contract fabrication, financing, customized space, business planning and marketing, and retail sales venues. New York City’s context—particularly its hyper-charged real estate market—presents unique opportunities to plan for creativity; both the challenges and the opportunities will differ in other cities. Wherever they are located, planners concerned with maximizing the urban benefits of the maker movement will be working in interstitial places where market forces leave public value on the table.

Figure 4 - Unfinished space at Manufacture NY's Sunset Park Brooklyn. Provided by Laura Wolf-Powers & Annie Levers.
Figure 5 - Rendering of Common Space at Manufacture NY. Provided by Laura Wolf-Powers & Annie Levers.