THE RE-INDUSTRIAL CITY:
WHAT CASE STUDIES FROM NEW YORK AND SAN FRANCISCO TELL US ABOUT THE URBAN MANUFACTURING
RESURGENCE

by
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ABSTRACT: After a century of economic and planning trends that sent industry overseas and to the suburbs, manufacturing is stabilizing, if not growing, in American cities. This is good news for many urbanists eager to attract the economic benefits of industry. However, while economic arguments for urban manufacturing are mature, the spatial strategies for supporting it are scattered or nonexistent. Planning codes and urban design ideals remain set in a 20th century mindset, while today's manufacturing has changed dramatically, becoming smaller and more networked than its previous iteration. Outdated perceptions of manufacturing block progressive policy reform at the highest level.

Two thriving manufacturing centers, the Greenpoint Manufacturing and Design Center in New York and the American Industrial Center in San Francisco, provide clues for how 21st century manufacturing is spatializing in cities. These facilities are cultural beacons in their mixed-use neighborhoods and help create a framework for thinking about why urban manufacturing matters in our re-industrializing metropolises. This thesis describes each facility in detail, drawing conclusions about their key characteristics at four spatial scales.

Few urban design ideals adequately describe the industrial activity occurring in cities today. Therefore, this thesis builds a system of meaning that values history, economics, and the lived experience of cities as a way to approach urban manufacturing. The emerging lens of Creative Placemaking is invoked as a way to unify these theories, suggesting that urban manufacturing is a superlative form of Creative Placemaking.

In conclusion, this thesis provides recommendations and tools for cities looking to cultivate industrial urbanism by offering lessons, developing a framework for a new type of land use classification, and outlining a research brief. The thesis ends with a call for action: as industry continues to change its character, becoming leaner and more technologically driven, cities have great competitive advantage. Planners have a critical opportunity to bring manufacturing back into cities through sensitive, mixed-use zoning that connects people to the process of making and awakens policy professionals to manufacturing as a vital element of the contemporary creative city.

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Abstract
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Acknowledgements are due to the inspiring men and women who persist in making things in cities, and the individuals, nonprofits, developers who support their work. Thanks especially to my interview subjects who graciously shared their thoughts and experiences on this topic in long-form interviews.

I stumbled upon this topic while fitfully trying to find a better way to describe artists' role in cites beyond gentrifiers or cultural 'truth-tellers.' Acknowledgments are also due, then, to Councilmember Stephen Levin's office who invited me and my colleagues at Nuit Blanche New York to the kickoff of the Naturally Occurring Cultural District's Working Group, held at the Greenpoint Manufacturing and Design Center.

My intellectual acknowledgements are vast, but thanks are due to Anne Gadwa who has consistently fed my interest in creativity in the city and is leading the bushwhacking into new frontiers. Thanks to Tyrone Simpson who advised my undergraduate thesis and who taught me how to answer the whole question. And of course my ever-expanding group of planner friends, Rosie, Remy, Seth, Sarah who have kept me on my urbanist toes from the beginning.

Thanks to my cohort at DUSP (and the Center for Even More Advanced Urbanism (CEMAU) and 40 Cottage) who danced, laughed, biked, whiskey-slapped, gatewayed, design-skilled, theme-partied, laser-cut, foam-cut, rendered, and deluged our way through these last two wonderful, pancake breakfast student center years. I've learned an immense amount from you. Despite evidence to the contrary, I am hopeful for the future of our cities because I know you will be shaping them.

Thanks to my parents, brother, friends outside of DUSP, lovely boyfriend, and all others that have been outside this DUSP bubble for the last two years, I'll have some time to catch up with you after I finish this thesis.

Thanks to my thesis advisor Brent Ryan, and readers Susan Silberberg and Phil Thompson for your thoughtful feedback on my drafts, and for coaxing out what I really had to say.
Chapter 1

Introduction

"Tales of my death have been greatly exaggerated."

Mark Twain

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1.1 The Phenomenon: case studies for the re-industrial city

Snapshot: American Industrial Center

The American Industrial Center (AIC) is a series of three massive buildings, sprawled out like a reclining grey skyscraper parallel to the historic San Francisco port. The AIC is flanked by light rail, a vibrant mix of small manufacturing businesses, residents, and nightlife—by-products of the thriving creative scene and development pressure from a new biotech campus and other projects in the Mission Bay neighborhood to the north.

When it was constructed by the American Can Factory in 1915, the building was the West’s largest cannery. A simple, open industrial structure, the building has had multiple incarnations, from can factory to shoe factory to contract sewing center. Today, it hosts over 300 businesses from 22 major industry sectors in its vast 800,000 square foot space, from custom metal fabricators to beer brewers.

From gunpowder production to shipbuilding to warehousing to the current diverse mix of small manufacturers, the Dogpatch has reinvented itself in response to technological and economic changes. Once San Francisco’s district for meat butchering, the Dogpatch neighborhood earned its name because of stray dogs fighting over meat scraps. Today, the AIC is the anchor for artisanal manufacturing that characterizes the neighborhood, which also hosts artisanal facto-
ries making bags, chocolate, iPad cases, apparel and more. The press heralds the Dogpatch as “San Francisco’s newest creative epicenter,” causing excitement for some and worry for others concerned it will be the next gentrified neighborhood.2

Walking down Potrero Hill into the flatlands of the Dogpatch, one passes gorgeous restored Victorian homes, flanked by modernist multi-family infill housing. One can grab a cone of locally-made ice cream at Mr. and Mrs. Miscellaneous, have a backpack hand-sewn to your specifications at Rickshaw Bagworks, tour a factory, have a meeting with a tech startup, walk by a row of woodworking shops, their metal doors rolled up to the sky, visit the newly relocated Museum of Craft and Design, explore antique factories on Pier 70, and top the day off at a wine bar before taking the light rail back downtown.

Somehow, this neighborhood that was once the “wild west” has become a mixed-use haven, anchored by artisanal manufacturing.

**Snapshot: Greenpoint Manufacturing and Design Center**

On the edge of a gentrifying neighborhood in North Brooklyn sits a complex of buildings that should have become another tombstone to American manufacturing. The sentence for most industrial buildings in this neighborhood was either death by demolition or loft conversion. But the Greenpoint Manufacturing and Design Center (GMDC) avoided this story to become a home for New York’s
new generation of small manufacturers.

Built in 1868 by Standard Oil as the Chelsea Fibers Mills Complex, this 6-story, 366,000-square foot building housed one of Brooklyn's many marine rope factories and textile mills that served the US Navy during World War I and II. Originally part of an eight-building complex, the building was strategically located at the northern tip of Brooklyn where Newtown Creek, an industrial waterway, met the East River.

The building was used for textile manufacturing in the 60s and 70s, but fell into disrepair as industry began to leave the city. In 1974 the building fell into City ownership through tax foreclosure and artisans self-organized as the Woodworking Center Equity Corporation and managed the building and negotiated leases. In the mid-1980s, the City tried to sell the complex as a loft conversion, but no developer was interested. Useless as an industrial building and not quite close enough to the seed of Williamsburg gentrification to attract developers, the City threatened demolition. A coalition of local businesses, community organizations, building tenants, and elected officials saw a different future for the complex and built enough support to convince the City to sell the building for one dollar in 1992 to the newly formed Greenpoint Manufacturing and Design Center with the goal of creating a home for arts and industry. After a one million dollar renovation financed by City, the building has leveraged over $8 million in renovation costs.

Today GMDC is home to a variety of creative tenants ranging from fine artists, to large wood shops, to small metal shops. Together, 80 firms in the building employ over 500 people and the building maintains a long waiting list.

Greenpoint, once New York’s industrial backwater, has become a mixed-use neighborhood as real estate pressures from gentrifying Williamsburg to the south spurring residential developments all the way up the Brooklyn waterfront. Today, a visitor to the area can take a stroll by the newly renovated Newtown Creek parklet, peek into some industrial open lots, grab a cone of Brooklyn-made ice cream, visit one of the longstanding hardware stores that line Manhattan Avenue, and observe the area’s historic brownstones and contemporary lofts.

1.2 Good News: Manufacturing is Coming Back

These two buildings, the Greenpoint Manufacturing and Design Center and the American Industrial Center, both succeed in the heart of major, hot-market cities, despite prevailing conventional wisdom that says they should relocate to cheaper, less central land. They prove that manufacturing is still something that occurs in our cities, and provide a snapshot of how broader trends of American manufacturing are touching down in cities.
These buildings reflect national trends. After a century of economic and planning trends that sent industry overseas, manufacturing is re-shoring and growing in the United States. In 2011, American manufacturers created 136,000 net new jobs, the first increase since 1997. The Manufacturing Institute reports that nearly one in ten of all private sector jobs are in manufacturing, and the multiplier effects on employment are strong: one in seven private sector jobs depends on the manufacturing sector. Large manufacturing companies once leading the outsourcing boom are moving production back to the United States. In 2012, Jeffrey Immelt of General Electric moved manufacturing of washing machines, fridges, and heaters back from China to a factory in Louisville, Kentucky. Tesla opened a factory in Fremont. Boeing and Caterpillar have recently expanded their operations. Toyota is making cars in Kentucky, Lenovo makes computers in North Carolina, toy manufacturer Wham-O Inc. returned 50% of its Frisbee production from China to California. Even Apple says it will manufacture a line of computers in the United States. Thirty seven percent of American manufacturers with annual sales above $1 billion said they were planning or actively considering shifting production facilities from China to America, a percentage that grew to 48% for firms with sales above $10 billion.

Many economists credit the rise in American manufacturing to the increasing hidden and non-hidden costs of outsourcing. The most common reason given for 'reshoring' manufacturing operations was higher Chinese labor costs, which are estimated to have risen as much as 7% since 2000, and expected to rise as much as 20% per year, compared to American manufacturing wages that have been flat or stagnant in the wake of the Great recession. Amidst these changes, American productivity continues to rise while per-unit labor costs fall, giving our workers greater value.

Increased shipping costs and the time lag to ship products from far away is another major reason manufacturing is rising again in the United States. In an era where firms create new products rapidly, the added value of a shortened supply chain that can bring products to market quickly is becoming more valuable. It takes two weeks for a container ship to travel from China to the West Coast, and many container ships have transitioned to slow steaming to save on fuel, which takes even longer (oil prices are three times what they were in 2000).

Additionally, the unknown costs of intellectual property violation and other risks of locating production farther away are becoming a greater factor of industrial location. Organizations like Reshore Now have developed tools to estimate the monetary costs of such risks such as trade in counterfeit and pirated goods, which they estimate amounts to $800 billion per year of lost profit worldwide.

Considering all of these higher international costs, the Boston Consulting Group projects it will cost about the same to manufacture goods for the American market in certain parts of America.
as in China in many industries by 2015. They forecast the United States will be a "low-cost country among developed nations" by 2016.

Reasons for locating manufacturing in the United States that highlight domestic strengths (as opposed to rising costs in Asia) is led by the positive benefits of co-locating the design and engineering of a product with manufacturing. General Electric calls this process 'big room' design and is leading the field by bringing together manufacturing engineers, line workers, designers, and executives to make a series of home appliances that are better for their customers and also easier and cheaper to assemble.

Additionally, despite political fragmentation over fracking, the natural-gas boom in the United States has dramatically lowered utility costs for manufacturers. Natural gas now costs four times as much in Asia as it does in the United States. Another reason manufacturing is growing in the United States is a growing consumer consciousness for 'made local' brands. Finally, industry can be an effective investment for cities. For every dollar spent by cities on infrastructure and other services, industrial activity generated a higher return. Using St. Paul as a test case, the Institute for a Competitive Inner City modeled that for every dollar of industrial revenue, the city spent between 60-69 cents, compared with $1.06-$1.15 spent on residential uses.
1.3 Manufacturing is re-urbanizing

Much of this increased manufacturing activity is happening in and around cities. In 2011, approximately 80% of manufacturing jobs were located in metro areas. Many of these urban firms were small, with the largest cohort of manufacturers employing 0-4 people, and a vast amount employing fewer than 20. Small manufacturers thrive in cities because of the network benefits cities offer, what Saskia Sassen calls a ‘prisoner’s dilemma’: if one manufacturer were to leave the urban network, they would lose out on the network effect of co-location. Using this logic, it is clear why urban strategies to retain mega-manufacturers may falter: large manufacturers don’t need the network benefits that cities provide and will leave once the subsidies do.

Explanations for this boom in urban manufacturing can be crystallized into several primary reasons. Manufacturers need to be close to their clients, often in the services or information economy, who demand products such as printing, furniture, museum display cases and other products related to the design industries. The “just in time” economy has gained credence in the way firms and individuals consume products. From fresh food to rapid prototyping, locating close to markets gives urban locations a competitive edge.

Additionally, manufacturers, especially those innovating new products, want to be close to knowledge spillovers. Cities provide

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Major Reasons Manufacturing is growing in Cities

1. To be near clients
2. To be near skilled, diverse labor pools, knowledge spillover
3. Smaller manufacturing firms and advancing technology means more clustering and co-dependence
4. Brand value of cities
access to a diversity of skilled workers, innovation centers like universities and clustering potential, which aid knowledge spillover. Early economist Alfred Marshall wrote extensively about economies of agglomeration and the efficient trading of ideas when firms clustered, saying, “The secrets of industry are in the air.” Brookings notes: “Innovation, and its deployment, does not happen just anywhere. It happens in places and, most notably, within metropolitan regions where firms and workers tend to cluster in close geographic proximity, whether to tap local supplier networks, draw on a pool of skilled workers, or profit from formal and informal knowledge transfer.” As many scholars have remarked, there is a skills gap in the manufacturing sector. This means that areas with high concentrations of skilled and diverse labor pools are extremely valuable to producers. Skilled labor pools are one of cities’ greatest competitive assets, especially as skilled workers in manufacturing decline.

Many manufacturers are extremely small operations that rely on larger contract factories for sub-contracting unlike in-house production of vertical manufacturing. Many of these sub-contractors locate in cities because this is where their collaborators are. The fine grain of the manufacturing ecosystem means that many manufacturers require relatively small spaces, which they can find in cities and do not need to seek larger spaces in the suburbs. Cities support this deep peer network of producers and their collaborators. This clustering is aided by changing production technology which allows many production types to be compatible with a range of land uses, as the following case studies exhibit.

Finally, the high-end market for consumer products is also in cities, and these producers benefit from leveraging the brand value of cities. Ironically, manufacturing frequently serves the advanced services and design sector, inverting the 20th century relationship in which services such as insurance or finance served manufacturing.

1.4 The Problem / The Phenomenon

This perfect storm of economic, technological, and social factors bringing manufacturing to American cities is very exciting for some urbanists. All of a sudden planners, mayors, and economic development professionals are clamoring to bring making back to cities. The economic arguments at their disposal are strong: small scale manufacturers provide good jobs to people who would otherwise work in the low-paying retail sector; begin to balance the trade deficit, keep innovation domestic, re-use old building stock, and diversify economies. These arguments have resonated with many urban leaders nationwide. President Obama announced the high profile National Additive Manufacturing Innovation Institute at his State of the Union in 2013, a $30 million pilot institute in Youngstown, Ohio aimed at boosting 3D printing’s use in American manufacturing.
However, planning codes and urban design ideals remain set in a 20\textsuperscript{th} century mindset. Culture has begun to shift, as has economic development thinking, but zoning codes still prohibit manufacturing in most places with the expectation that smokestacks will pollute neighborhoods. Cities continue to eliminate their industrial lands through rezoning, even though many contemporary manufacturers challenge the very notion that zoning needs to separate industrial uses at all. This disconnect is important because one of the biggest issues facing urban manufacturers is space. Next to affordable financing, the ability to find appropriate, affordable, and stable space is extremely difficult in major cities where many firms choose to locate.

While the economic arguments for urban manufacturing are mature, the spatial strategies for supporting manufacturing are scattered or nonexistent. Few studies document the geography of where 'new' manufacturing touches down, or the logic behind firms locating in cities. As Elizabeth Reynolds, Executive Director of MIT’s new lab, \textit{Production in the Innovation Economy}, said, “There is lots of policy related to manufacturing these days – but it is aspatial. It has nothing to do with space.”\textsuperscript{30} This spatial knowledge is essential to supporting and growing this sector.

To summarize, there is a disconnect: amidst all the excitement about technology, 'makers,' and the next industrial revolution, most cities continue to see their manufacturing land withering away

\subsection*{1.5 Thesis Question, Hypothesis, and Methods}

Two thriving manufacturing centers, The Greenpoint Manufacturing and Design Center in New York and American Industrial Center in San Francisco, provide clues for how this new manufacturing may be changing from its 20\textsuperscript{th} century iteration and how it is spatializing in cities. These case studies are cultural beacons in their mixed-use neighborhoods and help create a framework for thinking about why urban manufacturing matters in our re-industrializing metropolises.

Although there is agreement about the important economic benefits of manufacturing in cities, few scholars or policymakers understand where it should be located or why it hasn’t been embraced by many policymakers or culture at large. There is general agreement among planning studies that better financing, better partnerships with universities for training and innovation, logistics infrastructure improvements, and simply more data about what urban manufacturing is, is necessary. However, this thesis focuses on two overlooked barriers to developing urban manufacturing: cultural acceptance and knowledge about where to locate manufacturing prohibit the positive economic impact of an American manufacturing resurgence to be felt by cities.

This thesis looks at these two instances of success in order
to develop lessons for what they can teach planners and other urbanists about how the increase in American manufacturing will affect cities. It also aims to address two persistent issues within the field as well; how manufacturing is spatializing in cities, and how to improve its public image. In doing so it encounters a challenge: how can planners extrapolate lessons from something that is happening organically, and seemingly against all odds? It is a perpetual problem for planners and others who seek to replicate these exceptional hidden success stories.

**Thesis Question**

What lessons can be extracted from the Greenpoint Manufacturing and Design Center and the American Industrial Center? And why aren't there more buildings like them? In the face of a re-industrializing nation, the imperative of cities to capture the economic and public realm benefits of a growing manufacturing sector is strong. However, as will be demonstrated in later chapters, two formidable obstacles stand in the way of this objective: industrial policy and scholarship is aspatial and cultural attitudes toward manufacturing are outdated. How can we develop tools for how to site and secure manufacturing lands? My thesis questions whether or not two buildings in San Francisco and New York represent solutions to the issues raised above, as well as other findings.

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**Thesis Hypothesis**

My hypothesis is that my case studies do provide a clear example of how to appropriately site contemporary manufacturing (in large, multi-tenant buildings in mixed-use neighborhoods), and that they are changing culture around urban manufacturing by promoting a positive image for a new, re-industrial urbanism. Further, these case studies suggest the creation of a new category of urban manufacturer, the “Maker,” that can help precisely define the needs and appropriate adjacencies of this class of manufacturer.

**Thesis Methods**

Because there is little literature about my case studies, I performed extensive interviews with experts, planners, developers, and manufacturing firms themselves to understand what drives the success of the Greenpoint Manufacturing and Design Center and the American Industrial Center. I analyze and compare their success on four different spatial scales: At the city level I look at recent landmark land use revisions that dramatically altered land available to manufacturers in both cities. At the neighborhood scale I look at how my case studies fit into the surrounding neighborhood, focusing on the urban design and land use of the neighborhood. At the building level I try to understand how the spatial qualities of the building support the manufacturing uses within it, as well as the qualities of the developer.
who chose not to fill the building with higher rent-paying tenants.
Finally, on the firm scale, I paint a portrait of the type of tenant that
chooses to locate in these buildings. These case studies get to the
heart of why these buildings succeed, how they can inform one an-
other, and if their models are replicable in other cities. At first glance
they appear to be anomalies in a de-industrializing context. However,
there are lessons to be extracted about what the so-called “third
industrial revolution” means for cities.

In order to understand the full spectrum of benefits of urban
manufacturing, I surveyed existing research on the economic devel-
opment impacts of manufacturing. I found that for individuals, urban
manufacturing provides high-wage jobs to people with low education
levels, allowing them economic opportunity and the “right to the city”
they would not otherwise have in other sectors. I also found that
for cities in general, manufacturing supports the urban service sector,
generates innovation, serves as a strong economic multiplier, drives
innovation, and provides cities with economic resiliency.

Recognizing that the quality of a city transcends economics,
I surveyed a range of literature on ‘magical urbanism’, finding that the
addition of industrial uses to mixed-use areas increases the quality of
the public realm. Finally, as a way to unify these theories, I invoked the
emerging urban lens of Creative Placemaking, which speaks to the im-
portant economic development and public realm benefits of creative
places. I suggested that urban manufacturing, by satisfying both of
these realms, is a superlative form of creative placemaking.
My thesis does not analyze workforce issues related to training or wages except to analyze the economic development potential, as this is outside of the scope of this thesis. 31

Drawing my case studies, I offer a set of recommendations to support existing manufacturers in New York and San Francisco, as well as suggestions for how others looking to boost this industrial class can support the sector. Defining the meaning of urban manufacturing emerged as an important lens of analysis. After a survey of different industrial classification methods, I suggest a new industrial classification to identify the types of firms and activities that occur in my case studies that can be used by other municipalities to support the sector.

In general, I found that my case studies hold valuable lessons for the future of industrial urbanism. They share some striking similarities. They were both built by a single manufacturer on the outskirts of major cities. As the city grew around them, they became subsumed by the city and in the late 70s were abandoned. Around that time their future owners took control of each of these buildings and retrofitted them for multi-tenant use by artisanal manufacturers. In the early 2000s, both New York and San Francisco underwent serious land use reform that changed the spatialization of industry. Both buildings ended up in special industrial zones of different types. Today, these manufacturing facilities are hotbeds of creative manufacturing that range from traditional metalwork to high-design consumer products to high-tech aerospace components. These firms provide employment to a range of workers, including less educated workers who have fewer employment options. The buildings themselves are attractors and create a vital urban realm around them. My hope is that these recommendations serve as tools for planners, developers, firms, and advocates for thinking about how to plan for re-industrializing cities.

Within a milieu of increasing urban manufacturing, outdated perceptions, and little industrial land stability, the role of planners and designers is imperative. If we are to consider ourselves planners advocating the good city, how are we to use the tools at our disposal to ensure that the economic and public realm benefits promised by the coming re-industrial revolution are bestowed up on urban dwellers? 32 This thesis provides lessons for planners, developers, and advocates trying to support manufacturing in New York and San Francisco, as well as tools for other cities trying to replicate their successes.
Introduction to the Case Studies

"Scientists and engineers say that hummingbirds can’t fly; their wings too small for the weight and size of their body. And yet they do. They’re just like manufacturers. Planners say ‘can’t possibly survive in a city.’ And yet they do."  

Adam Friedman, Pratt Center director

The following manufacturing facilities represent some of best qualities of industrial urbanism. They are lauded by planners, industrial historians, and journalists alike as being both relics and vanguards: They are seen as havens for the traditional manufacturers that continue to stick it out in cities despite conventional wisdom that they should move overseas or to the suburbs. They are also praised for incubating emerging forms of manufacturing, from 3D printing to product design to high-tech products. The lessons held within these case studies pertain to the buildings themselves (their quixotic origin stories and the unique desires and reasons of their tenants), the industrial policies that have allowed them to persist, as well as the neighborhoods that have grown up around them.
Chapter 2

Greenpoint Manufacturing and Design Center
Brooklyn, NY

"[Brooklyn] is going back to the future."

Marty Markowitz, Brooklyn Borough President

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2.1 Unique New York: a brief NYC industrial history

When the Chelsea Fibers Mills Complex was built in 1868, Brooklyn was an independent industrial suburb of New York City and the United States' fourth largest city by population. The 1890 census showed Brooklyn to have more manufacturing employment than any other city except Philadelphia, Chicago, and New York itself. North Brooklyn was an industrial center because of its proximity to the Navy Yards and the Newtown Creek industrial canal. The neighborhood of Greenpoint was a hotbed of industrial activity, the site of shipbuilding and waterborne commerce. Greenpoint's dockyards harbored the construction of the U.S.S. Monitor, the Union's ironclad fighting ship that turned the tide of the Civil War. Greenpoint was known for its competitive advantage in traditional craft and manufacturing. Printing, pottery, glass, iron, and other industries were staffed in large part by the area's large immigrant communities, which began with the Dutch in the 17th century, followed by German, Irish, and Italians in the 1800s, Polish in the turn of the century, followed by Puerto Ricans in the 1940s and 50s.

The decline of manufacturing in the mid-20th century caused the city to reconsider its waterfront industrial lands. Many formerly vibrant industrial uses along the Brooklyn waterfront went out of business or slowed operations. In the period between 1960 and 1989, manufacturing jobs in the five boroughs declined from almost one million to 369,000, disproportionately affecting waterfront economies like Greenpoint. While jobs and firms had shrunk by over 60% between the 60s and 1990s, industrially zoned land decreased by only 5%, creating a surplus of underperforming industrial land.

The debate over what to do with industrial lands came to the fore in the late 1990s, when North Brooklyn neighborhood groups came together to reevaluate the changing landscape of Brooklyn's working waterfront. In an effort to take control of the changes that were affecting their neighborhood, Community Board One, encompassing North Brooklyn, drafted and submitted two community...
plans (197-a plans) to the City Council, one for Greenpoint's northern portion of the waterfront and one for the Williamsburg's south side of the waterfront. The plans describe Greenpoint as a "viable working-class neighborhood" and call for the re-zoning of some waterfront industrial areas in order to provide the neighborhood with greater affordability in the face of rising rents, the maintenance of street character, and access to the waterfront. The Williamsburg plan's primary focus was "to propose appropriate re-zoning and development of the waterfront to maintain its historic balance as an ethnically vibrant, low rise, mixed-use, mixed income community, while creating maximum access to public open space and its spectacular waterfront." Greenpoint's plan recommended "zoning that recognizes the mixed land use character of many industrial areas" and recommended the creation of mixed-use zones that would "limit industrial expansion to those businesses that enter into good neighbor agreements and that can demonstrate that they can meet strict environmental performance standards."

In short, the community plans encouraged the measured re-zoning of industrial lands. North Brooklyn's waterfront zoning hadn't been reconsidered since 1961 when New York City was still an industrially based economy. In CB1's eyes, transitioning derelict land into housing, mixed-use, or parkland represented an improved quality of life for the neighborhood.

The 197-a community plans were adopted by the City Coun-
That same year, Michael Bloomberg began his first term as Mayor and was also preparing the City for an ambitious Olympic bid. He and the Department of City Planning were looking at 2030 population projections that anticipated the addition of one million New Yorkers which would cause a housing shortage. Bloomberg announced an initiative to build 68,000 homes over five years (ending in 2008). The Department of City Planning identified Brooklyn's flagging industrial waterfront as a target area for this development.

The Department of City Planning passed the rezoning in May 2005, rezoning 350 largely industrial acres spanning two miles of the Brooklyn waterfront and 174 blocks to residential, mixed-use, and some parkland. The rezoning allowed residential towers of up to 400 feet to rise on the Williamsburg and Greenpoint waterfront. The plan incentivized luxury housing, affordable housing, and market rate housing through large floor-area-ratio (FAR) bonuses and tax holidays. The plan transformed low-rise manufacturing land use with FAR of 2.00 to allow large condo buildings with FAR as high as 6.00. Inclusionary zoning incentivized the creation of affordable housing units and required waterfront developers to allow public access to open space along the water.

The plan committed to fit new development into the surrounding neighborhood scale, maintaining a consolidated industrial core, and creating new open space and public amenities like a new
27.8-acre waterfront park.

As soon as the plan passed, the Department of Buildings was flooded with permit requests. By the end of 2005, the Department of Buildings issued 24,610 permits in Brooklyn, including 1,924 for demolition and 1,740 permits for new buildings; roughly double the rate of five years earlier. A sizable industrial population was displaced because of the zoning. Of the ninety manufacturing businesses located in the rezoning area, 17% of them had 100 employees or more and nonmanufacturing industrial jobs numbered in the thousands. Shortly after the rezoning, the East Williamsburg Valley Industrial Development Corporation reported that more than 50 businesses closed or relocated. The City reported that 25 businesses had come to them for free relocation assistance provided as a benefit of the plan.

The community groups that developed the 197-a community plans were outraged at the city for incentivizing high-rise residential towers in a formerly low-density working class neighborhood, even though some of their enthusiasm toward rezoning the waterfront had helped pave the way for the legislation. Jane Jacobs herself sided with those opposed and wrote an open letter to the Bloomberg administration in which she criticized the plan for ignoring the existing quality of life in North Brooklyn. Jacobs wrote, “The proposal put before you by City staff is an ambush containing all those destructive consequences, packaged very sneakily with visually tiresome,
unimaginative and imitative luxury project towers." At a public review meeting, the Brooklyn borough president Marty Markowitz said, "Many members of the community feel that the administration has developed a proposal for this asset-in-waiting that best serves the constituency of Manhattan. This project must serve all Brooklynites, especially the current residents of Williamsburg and Greenpoint."

One consolation for this outrage was the creation of nineteen Industrial Business Zones (IBZs) around the city, which, in name, answered the industrial sector's needs by providing secure industrial land. Industrial Business Zones exist to this day and encompass 28% of all industrial land in the city. They provide "real estate certainty" in the form of secure, stable industrial land that Mayor Bloomberg has committed to not rezone. The IBZ program provides companies with a one-time $1,000-per-employee tax credit for relocating within or to an IBZ as well as some site planning and business assistance support. IBZs, support manufacturers by suppressing the actual market value of the land by disallowing other higher-value uses, and by encouraging manufacturers to reinvest in their spaces because the land is protected from conversion to other uses.

Although the IBZ works for GMDC, critics say IBZ regulations are too 'porous', allowing everything from big box stores to hotels to locate within the zone. This diminishes space for manufacturers and drives up land value. Additionally, the uncertainty of the IBZs artificially inflates industrial land values: many landlords resist reducing

8. Snapshot of map highlighting hotels built in IBZs. Source: Pratt Center
the cost of their land to meet economic equilibrium because they want to hold out for a more profitable use in the future. The price of industrial land should fall further but it never does because property owners don't believe the land use regulations will last. 5

The City's Special Mixed-Use districts are another way land use regulations support industry. The Special Mixed-Use District zoning designation MX was established in 1997 to encourage investment in neighborhoods with mixed residential and industrial uses. 59 Initially introduced into the planning code under Mayor Rudy Giuliani in response to a housing shortage, MX districts allow new residential and non-residential uses (commercial, community facility and light industrial) to be developed as-of-right and located side-by-side or even within the same building. 760 The several MX districts clustered in North Brooklyn are called MX-8, and were instituted in 2004 in the wake of the waterfront rezoning. They are located around McCarren Park, the Williamsburg Bridge, and along Franklin Street north of the Bushwick Inlet. They maintain a mixed-use character, and house industrial and residential uses.

After the fallout of the waterfront rezoning, the City also created the Office of Industrial and Manufacturing Businesses within Small Business Services, which was charged with supporting the industrial sector. "Industry Czar" Carl Hum was passionate about the issue, however with little political will within SBS, Hum's ability to impact the sector was diminished. He left his position within just a few years. Interviews revealed that the candidate that was selected to fill his position did not engage deeply with the sector and the position has since been eliminated having spawned no significant new programs. 61

In 2011, the Economic Development Corporation (EDC) revived the "industrial" position by hiring Miquela Craytor, a veteran of the economic development community. Her programs target issues of land, finance, and navigating city permitting processes. Since 2011, the industrial desk at the EDC has released two Request for Proposals, launched two competitions, three tax incentives, one educational initiative, and is in the process of redrawing some Industrial Business Zone districts and adding another in Staten Island. The City directs support to industrial firms through approximately $11.5 million annually in Small Business Services industrial workforce training and services, as well as supporting in the Brooklyn Navy Yards through a line-item in the City's budget annually. The City is also involved in several capital industrial projects, including renovating two buildings in the Brooklyn Army Terminal in Sunset Park.

Nonprofit entities that support the City's industrial sector include the Industrial and Technology Assistance Corporation (ITAC) founded in 1985, which serves as the region's Manufacturing Extension Partnership (a federal equivalent to Agriculture Extension programs designed to funnel industry-specific funds and expertise) and regional technology development center (one of 10 regions in the state).
New York Industrial Retention Network, founded in 1997, also advocates for industrial firms and is housed within the Pratt Center for Community Development.

2.2 Made in NYC: Industry Today

Employment and Firms

New York’s manufacturing sector today is comprised of five major industrial sub-sectors, as described by Sara Garretson, founder and longtime director of New York’s Industrial and Technology Assistance Corporation: 1) Food, including ethnic food; 2) Creative Economy, including companies who use creative talent in design or feed into creative supply chains; 3) Building Construction supply chain, which is primarily finishes or interior products including lighting, architectural woodworking and plaster, and metal, and HVAC; 4) Advanced Manufacturing including suppliers to large high tech manufacturers like Boeing, and 5) as well as the emerging “maker” and technology community. The three largest manufacturing sub-sectors are food, apparel, and “miscellaneous manufacturing” which includes everything from jewelry making to sign manufacturing.

Manufacturing is a subset of the larger industrial economy.
which is comprised of construction, manufacturing, wholesale trade, and transportation and warehousing. While all of these sectors have shrunk in the last ten years, manufacturing has shrunk most precipitously, losing 45% of its employees compared to the industry average of -17%, while construction has performed the best, keeping an essentially flat employment base. The trend of smaller and smaller industrial companies can be seen by industrial firms decreasing by only 5% in 2003-2010 compared to employment's 17% drop.

As many have pointed out, it is the way the mix of manufacturing firms have changed over time that can help us support the sector more fully. Looking at the industry mix over time, we can observe that trends of major manufacturing sub-sectors have stayed steady in New York City since 2003, focusing on food, apparel, and printing. In general in New York, as in other places around the country, there is a shift away from traditional manufacturing and toward logistics, transportation, warehousing, and wholesaling.

Although manufacturing is dropping as a sector, manufacturers that have stayed in New York speak about the competitive advantage of locating there. Interviewees from the EDC's surveys responded, “An advantage to being in New York City is that labor is more productive than other locations even though it is more expensive here.” Additionally, the consumer market

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9. Industrial firms are shedding employees. Data: County Business Patterns

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10. New York Industrial Sectors

- Wholesale Trade (34%)
- Construction (26%)
- Manufacturing (16%)
- Transportation and Warehousing (24%)

Food (18%), Apparel (17%), Misc (13%)

Printing and related support activities 9%
Fabricated metal product manufacturing 8%
Furniture and related product manufacturing 5%
Chemical manufacturing 5%
Plastics and rubber products manufacturing 4%
Paper manufacturing 3%
Transportation equipment manufacturing 2%
Computer and electronic product manufacturing 2%
Machinery manufacturing 2%
Nonmetallic mineral product manufacturing 2%
Electrical equipment, appliance, and component manufacturing 2%
Textile product mills 2%
Textile mills 1%
Wood product manufacturing 1%
Leather and allied product manufacturing 1%
Primary metal manufacturing 1%
Beverage and tobacco product manufacturing 1%
Petroleum and coal products manufacturing 5%

Source: County Business Patterns 2018; Figures for employees
and design community of New York give New York-based producers a competitive edge, "NYC is the most important center of (new) design – more than LA or any other city. My business could not exist in any other city." 

Economic development impact

Industrial employment in New York City provides middle-income jobs for non-college graduates, which comprise 75% of the industrial workforce, compared to 60% of the private sector workforce. Industrial employment provides a mean wage of $64,000, compared to an overall NYC mean private sector wage of $59,000. Manufacturing jobs on average pay $49,000 per year compared with $34,000 for retail positions.

The industrial firms that choose to situate in NYC are relatively small, keeping with trends in urban manufacturing. Of the 5-6,000 manufacturing firms in New York City, 85% have less than 20 employees. Many of them also have staying power: almost three-quarters of New York industrial firms are family-owned and 60% have operated in New York for more than twenty years.

These small firms need space that is affordable, allows them to perform their industrial processes as-of-right, and starts small but allows them room to grow. A 60% majority of industrial firms lease their space as opposed to owning it, and so are at the mercy of the market. With the supply of industrial land shrinking, and the demand for this land growing, the role of developers to develop and maintain industrial properties is becoming more important.

Land use changes

New York's landmark 2004 rezoning efforts were part of a decades-long erosion of New York's manufacturing lands, which is consolidated in Manufacturing, or M-type zoning. Michael Bloomberg, Mayor of New York from 2002 to the present, has rezoned 20% of the 12,542 acres of industrially zoned land, estimated by the New York Industrial Retention Network to amount to 24 million square feet of lost industrial space. Although rezonings have lessened the amount

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12 TOTAL INDUSTRIAL ZONING

11% of all land (excluding JFK)

source: GIS analysis, OpenData from DCP
of land available for manufacturing activities as of right, 11% of the City's total land area is zoned industrial as of 2013, excluding the large M-1 zoned JFK airport. The majority (60%) of New York's industrial land is zoned for light manufacturing.

2.3 Greenpoint Manufacturing and Design Center: a visionary developer

"Our mission is to create homes for small manufacturers because small manufacturing create good jobs."

Brian Coleman, GMDC's current Executive Director

It was a well-connected group of community organizers and a member of the city council that voiced opposition to the demolition of the Chelsea Fiber Mills building in 1992. This group of actors, "four hippie woodworkers, four gray suits from the worlds of finance, architecture and law, and me," said David Sweeny, an economist who was the North Brooklyn Development Corporation's Director of Economic Development at the time. This group believed that industry had sufficient demand to keep the Chelsea Fiber Mills leased out and that industry had a right to be in New York. "I realized that these people were extremely good with their hands and that they did not see their future as buffing floors for American Express or sorting mail for Morgan Stanley," said Sweeny.73

The Greenpoint Manufacturing and Design Center was formed to develop the building in 1992. "We didn't really have any models for how to do this," said Sweeny, who became the center's chief executive. "We aren't visionaries with 10-year plans for incubator projects. We're problem-solvers, opportunists."74 Acquiring the building proved to be a challenge. GMDC was only allowed to manage the building, not lease the spaces, and the City, who still officially owned the building, shut down the elevators one Thanksgiving weekend, calling them unsafe. In protest, 60 woodworkers protested by smashing wooden chairs into splinters on the steps of City Hall. Finally, Sweeny and his small team finally convinced New York's Economic Development Corporation to sell them the building for one dollar, assuming $14 million in liabilities to fix up the space.75

GMDC's early years were difficult. The organization lost money and gave rent credits to tenants who fixed up their own spaces. Sweeny went without a salary for 10 months. Although most sources of private capital turned them down, a $7,500 grant from J.P. Morgan Charitable Trust accounted for one third of their budget.76

GMDC slowly grew and became more financially secure. In its early years in the early 90s it was praised by institutions like the Institute for a Competitive Inner City, who called them, "way out ahead

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of the curve.” Hildy J. Simmons, then managing director of community relations and philanthropic services at J. P. Morgan, called GMDC “the best of modest-scale economic development in the city.”

Since developing their first building, GMDC has acquired, financed, renovated, and continues to manage five light industrial facilities that provide small and medium-sized manufacturing enterprises with affordable, secure, flexible production space. Together, these five buildings comprise half a million square feet and are occupied by more than 100 businesses that together employ more than 500 people, 360 of which work within GMDC. The approximate combined revenue of firms within GMDC is $48 million dollars in 2011, which GMDC estimates helps spawn hundreds of New York City-based jobs and millions more dollars of economic activity.

Although they are a developer, GMDC's stated mission is economic development: Brian Coleman, GMDC's current Executive Director, says, “Our mission is to create homes for small manufacturers because small manufacturing create good jobs.” The majority of GMDC’s workers live close to their jobs and 50% take transit to work. The profile of GMDC’s 360 employees is working class: 41% have a high school diploma or less and 46% speak English as a second language, indicating these jobs are an important entryway into the middle class for immigrants and individuals with limited education. GMDC firms provide their workers with stable, family-supporting employment. Seventy three percent of GMDC workers are employed full time and 26% receive health benefits. The average salary was $41,618, nearly 50% higher than an average salary of $27,240 in New York's retail sector. A woodshop worker using a CNC (Computer Numerical Control) computer-aided cutter can make $100,000 annually, and a fabricator of high-end retail displays can make $75,000 annually. Fourteen percent of GMDC firms are minority owned and 21% are women-owned. GMDC also encourages an apprenticeship model of training. Several firms have stories about employees who
started sweeping the floor, then learned how to operate a machine, gaining higher wages through on-the-job training. ⁸⁵

GMDC supports small manufacturers primarily by providing affordable, stable space. Before moving to GMDC, the average firm had moved twice in the last five years, mostly due to area landlords raising rents or converting buildings to residential use. ⁸⁶ GMDC offers tenants a five-year lease with an option to renew for five more years. Their rents are approximately 10% below market rate, and they have been known to offer payment plans and work with tenants if they need support with rental payments. ⁸⁷ It is this security — as much as the price — that is a critical factor in the success of small industrial firms. ⁸⁸

Having a secure lease allows a manufacturer to re-invest in their space, equipment, training, and other things needed to grow a business. ⁸⁹

GMDC has cultivated a sophisticated skill in developing industrial properties. As the real estate market boomed and busted around them, GMDC adapted to the financial climate. The model they used to finance their first projects after the 1205 Manhattan space was simple: they used roughly 15% tax credit subsidies and the rest was commercial debt. However, since then, the cost of real estate has doubled. To adjust, GMDC has become expert in utilizing New Market Tax Credits and historic preservation tax credits to finance their projects. ⁹⁰

GMDC is able to finance its projects in part because it keeps its operations lean. Their eight-person staff manages only operating, development, and acquisition duties, directing technical support ques-
tions related to business service organizations like the Industrial and Technical Assistance Corporation and other teams set up to support small business. Although GMDC serves as an incubator to small firms by providing them affordable, stable land, they do not provide business services or training.

GMDC's future projects target emerging industrial niches. GMDC has dreams to build out an undeveloped building (Building 8) within their complex into 30,000 square feet for 'makers' to experiment, invent, and produce their products. Coleman's vision is that this emerging generation of tech-savvy industrialists would infuse GMDC tenants with cutting-edge production techniques, and that other GMDC tenants would manufacture their products. "If they're designing something on their 40-inch Mac screen, they can bring it down the hall and have one of our tenants who has the equipment and know-how to produce this thing." At a $5 million budget in an awkward space, the project is hard to get off the ground, but GMDC's next step is to make a formal link between the design community and manufacturers. "Our name is GMDC. Design Center. But the word 'design' is a misnomer, because that's not really here...I want to get the design community, the hackers, the RISD guys, they are in Greenpoint, Williamsburg, the Lower East Side, etc., they don't know where this building is, and don't utilize its resources. I'd like to pull them a little bit closer." While they pull the financing together for their Building 8 project, GMDC is in the planning phase of a new building on Atlantic Avenue in Crown Heights, Brooklyn, its first project not within an IBZ, which they hope to fill with food entrepreneurs.

With its four buildings, half million square feet of space, and constant waiting list, GMDC has become a successful example of how manufacturing hubs can weather the storm of off-shoring. So successful is their model that GMDC frequently consults with other cities such as Minneapolis and Philadelphia about creating similar industrial facilities. They serve as a mouthpiece for medium-sized manufacturers in New York, building community among tenants and stakeholders, and advocating for policy change.
2.4 Public Realm Impact

The mixed-use nature of Greenpoint has grown up around GMDC. While the IBZ that encompasses GMDC allows only industrial use, the edges where it meets different urban fabrics creates a unique streetscape. On the four corners of Manhattan Avenue and Commercial Street are GMDC, a high-rise condo in construction, an historic brownstone with ground floor café, and historic housing. North Greenpoint in general is a patchwork of different types of building types and uses. Some areas along Manhattan Avenue exhibit residential, retail and commercial land uses in single block.

Additionally, the many workers in GMDC patronize area restaurants and corner stores, and bring street life to the neighborhood. There is an ice cream shop on the ground floor of GMDC that serves tenants as well as the neighborhood. Thirty percent of GMDC workers live in North Brooklyn in close proximity to work. GMDC is seen as a social hub and an employment center, without creating the serious environmental or acoustic byproducts of traditional manufacturing.

The neighborhood has few signs of friction between industrial and other uses. From a design perspective, this appears to be in part because of the buffers between areas of heavy industry within the IBZ and the residential neighborhood. The approach of the Pulaski Bridge provides a natural buffer between the more intense industrial functions and the mixed-use nature of the GMDC area, for example.

Although there is plenty of antipathy directed towards other industrial uses located within the IBZ, and equal antipathy to new high-rise luxury condos in the neighborhood, GMDC is beloved. Brian Coleman speaks of longtime neighbors who appreciate GMDC for what it does. One neighbor who approached GMDC’s McKibben project was pleasantly surprised to hear that the old industrial building would soon be home to jobs and not condos. Now this person is a friend to the project and calls Coleman if anything is amiss at the job site. “I can tell you that the guys who are building the 6-story market rate housing are not going to have allies,” says Coleman.

What eclipses negative environmental side effects of industry for GMDC is actually concern that the building will cause gentrification. Given the rapid gentrification of the neighborhood, Coleman has grappled with the fact that GMDC may be attracting certain trendy amenities to the area to serve their tenants. However, Coleman considers his developments to be “good gentrification,” because they are bringing good jobs to a community, not only beautifying the neighborhood by rehabilitating an old building. “There’s largess and economic opportunity for the entire community,” says Coleman, and they have the support of the community.
1. Waterfront park embracing leisure and industry

20. View across the Newtown Creek from GMDC

21. Waterfront park embracing leisure and industry

22. Greenpoint historic building fabric
GREENPOINT LAND USE

source: GIS analysis, OpenData from DCP
2.5 Tenant overview

GMDC's 81 tenant firms range high-tech to lo-, from artist to industrial metalworker. They produce custom consumer goods, mass-produced metal bowls, pieces of fine art, screen printed posters, high-end jewelry, custom cabinets, museum vitrines, and more. Like other contemporary manufacturers, these producers aren't making one thousand of anything, they're making one-offs or a handful; the epitome of custom, value-added manufacturing.

There is not a prescribed formula for who can rent a space in any of GMDC's buildings. In most cases Coleman selects tenants himself. His only criterion is that tenants must “make things and deliver good jobs” in addition to passing a financial review and credit check. GMDC hosts a mix of tenant types, with 27 woodworkers, 23 fine artists, 17 artisans, 7 manufacturers, 7 architects and graphic designers.

Although firms are small, Coleman is adamant that his tenants are not in 'incubation.' The average age of one of GMDC's tenant firms is 18 years, and most owners range in age between 45 and 65. GMDC, for many tenants, is the last stop on a long and bumpy road of industrial real estate in New York City.

When asked about the challenges faced by New York City manufacturers, experts and manufacturers alike continuously pointed to the high price of doing business. An average cost for manufacturing land in Brooklyn ranges from $12-22 per square foot per year, compared to $4-$15 just across the river in New Jersey, labor is expensive, as are utilities, taxes, transit, and the time and money to get permits for HVAC, dust collection systems, permits for generators, compressor, spray booths, and other tools. A simple look at these high costs cause critics to say they should migrate naturally to locations with lower rent where they can maximize their businesses.

But despite these hurdles, GMDC tenants stay for a variety of reasons. GMDC tenants rank proximity...
Coleman says, "Most of them have to be here because it's the market they serve. The high-end jewelry guy has to be here because his number one client is Barney's. So he needs to be by the buyers on Madison Avenue and he needs to be near the media outlets so when Town and Country wants to put one of his bracelets on the cover of a magazine he can get his bracelet over to their photo studio. The architectural woodworker who's doing a SoHo loft and a Park Avenue board room, he needs to be in close proximity to service his clients."

Whatever the hype around outsourcing of manufacturing, and the rampant re-zoning of industrial land in New York, the manufactures I met had their own reasons for keeping their production in New York. For some, it made economic sense; the cabinetmaker does not want to move away from one of the largest pools of potential customers (and skilled labor) in the world. For the others, it was a lifestyle choice. GMDC manufacturers show us it is not only bankers attracted to the lifestyle of New York City.

Understanding the tenants of GMDC is essential to understanding its charm and the effect it has on the neighborhood. Many
tenants at GMDC have been in the building for at least a decade, and although they were growing slowly, they had no intention of growing out of the space, they see GMDC as their permanent home and are drawn to the building for its character, community, and affordability. GMDC tenant profiles stories help us understand what makes a building like GMDC work.

[All quotes from personal interviews unless otherwise noted]

**Mark Davis Jewelry**

Mark Davis is a jeweler with a background in fine art and an MBA. He represents a unique type of high-touch manufacturer that chooses to locate in New York city for a variety of reasons. After a stint as an equities analyst at JPMorgan he decided to pursue high-end jewelry, his long-time dream. His big break came right after 9/11 when the department store Bergdorf Goodman's asked him to create a new line that could sell a lot of volume for a low price. Trying to fill this order, Davis discovered Bakelite, a depression-era non-petroleum plastic, which he adorned with patterns and precious stones. He took this old material, ‘upcycled’ it using modern manufacturing methods, and made a product that is now very successful with clientele at Barneys and other high-end jewelers.

Like many entrepreneurs, Davis began by self-financing his
business in his apartment. When his jewelry practice began to push his other belongings into a corner, he decided it was time to find commercial space. The epicenter of the traditional jewelry industry is in midtown, but Davis chose to locate in GMDC. He said Greenpoint provides proximity to his clients in New York and a talented labor pool of skilled craftspeople in North Brooklyn, at one quarter of Manhattan rents. His large space also allows him to bring in new machines to experiment with new techniques.

The jewelry industry cluster in Midtown is a good example of the benefits of clustering, but Davis doesn’t understand the appeal. He says his Manhattan-based colleagues are forced to squeeze into tiny spaces, the rents for which reduce wages and profits. “With the internet, I just look for what I need, and I find the cheapest price, I call the guy, I FedEx, it’s here tomorrow,” said Davis, “The whole idea of clustering just seems really antiquated to me.” His suppliers are from the Dominican Republic, Switzerland, Long Island City, and elsewhere.

To stay competitive, Davis automates his process as much as possible, using a tumbler instead of hand polishing and a CNC router to drill grooves and holes for inlaid material. Davis sells mainly wholesale to large department stores like Barneys, although he has ‘markup envy’ and dreams of opening his own retail outlet to bypass the middleman.

Co-locating with other makers has sparked new collabora-
Davis is collaborating with his downstairs neighbor Francisco Useche on a homeware product.

Davis loves GMDC and expressed a sentiment shared by many, "It's ideal. And it would be great if it were a bit cheaper, but then I wouldn't be in NYC."

**Irca Metal spinning**

Francisco Useche comes from a long line of metal spinners, the fourth generation to take flat pieces of metal and press them over a spinning mold to create rounded products like metal lamp shades, bowls, urns, even decorative cake pans. He represents a type of traditional contract manufacturer thriving in an urban setting.

Useche came to Brooklyn from Colombia in 1965 not knowing a word of English. He found work in metal spinning, a craft he practiced since the age of three. In 1978 he was one of the early tenants of the GMDC building before it was renovated. Useche's stability at GMDC has allowed him to grow his business, buy a house, and put two children through college.

Useche's clients are primarily city sub-contracts. When asking him about his work, Francisco's eyes welled up with tears when he told me that he had spun all 82 metal lamp shades in Central Park by hand as well as the metal lampshades in the New York Public Library. He has done streetlight subcontracts for dozens of BIDs and other
entities. Similar to the general profile of GMDC tenants, most of Useche's recent contracts are for specialized one-offs and two-offs. Gone are the days of 1,000 multiples. He has a trusted reputation in the antique restoration industry, and also spins bowls for baptismal fonts, bowls, urns, and chalices for the Catholic Church, lamps for the Mayoral house, hookahs, and more.

Useche has no aspirations of designing products himself, considering himself a strict craftsperson, "The only thing I know is work...I love my job," he says, "I am very emotionally weak maybe, but even with the age I have, I don't care if there is pain in my knee, I come in Saturdays, I come in Sundays even. If someone says they need it for Monday, I say, 'Okay, I do it for you.' I help everybody."

GMDC works for Useche because it allows him to survive as a small niche contract manufacturer. The stability of the space means he hasn't had to change his address or even his phone number for 35 years, and old clients can still contact him. Although he benefits from specializing in niche industry, he also suffers because there are few other metal spinners in Brooklyn. When he needs help on a big job, he can't bring on extra staff or outsource. The number of skilled laborers is dwindling every day as spinners are retiring and few are retrained.
**Perfection Electricks**

When Marty Chafkin moved into GMDC four years ago, it was the only space that would take him in. After months of planning to stay in his Long Island City space when its owner changed hands, he was evicted with short notice and forced to find temporary space. “We were flat out desperate for space when we moved here. We could not have been more desperate… Brian moved me in here on less than a handshake. He let us in because we needed a space, and we’re a manufacturing company, and that’s what he’s about.” Chafkin moved his shop to the third floor without even giving a deposit.

Perfection Electricks, as its name suggests, began as a company that did sets, electronics, and electrical work for television, film, and theater. As his clientele grew, his requests and specialty grew more niche. When asked what his primary product is, Chafkin replied, “We only do stuff that no one else will do…Lots of the stuff we do, it’s very hard to find someone else to do it. Nobody wants to do this stuff - 3D bending! No one wants to do it! You can’t find someone who will even quote it… I got into this work completely by accident. I have clients who push the envelope and I’m too stupid to say no.” Chafkin is a type of contract manufacturer, like Useche, but his niche is in high-end, high-touch, and high-tech custom fabrication, a key design-oriented manufacturing niche in urban markets.

Since the late 90s, Chafkin and his team have specialized in high end art fabrication. His biggest clients are large-scale sculptors who create complex, mechanical work. He worked on the mechanics of Ann Hamilton’s praised *the event of a thread* at the Park Avenue Armory, as well as projects for artist Ben Rubin, Diller, Scopidio and Renfro, and Forest City Ratner. His current primary client is the American sculptor Alice Aycock, for whom he is engineering four projects including fabricating a series that will appear on Park Avenue called *Park Avenue Paper Chase*. Chafkin replicates Aycock’s complex computer-rendered forms in metal using esoteric fabrication techniques and machines.

The qualities of GMDC serve Chafkin’s needs. “I like the building, I like the electricity, the windows are fabulous, like landlords...”
I really a lot, I like staff,” he says. Windows on all sides of his space means some days he doesn’t even need to turn the lights on. “It’s a greenhouse in the winter – and in the summer.” The antique building works for him in some respects. Chafkin rents 7,000 square feet for $15 per square foot, which he says is average for the neighborhood. Chafkin likes the wooden floors that allow him to fasten into them and they don’t wear on him or his staff like standing on concrete all day. “I walk on wood all day long, so I’m not tired at the end of the day. It’s very springy. You can’t tell but your body knows. It’s wood on wood. You know it because when the upstairs neighbors run something heavy along the floor the sawdust sifts down.” Chafkin is located in 1155, Manhattan Avenue, the section of GMDC occupied primarily by woodworkers.

Although the space works for Chafkin in large part, the combination of a nonprofit developer and an antique building can have its drawbacks. The elevator is so small to get some of his bigger pieces to his clients requires hiring a crane to load through the second story window. Chafkin wishes the ceiling was higher, that the columns were farther apart. “You can’t have everything,” he says, “it’s a nonprofit. It doesn’t have millions of dollars in a bank account.”

The location of GMDC was never a primary criterion for Chafkin. When he moved in he needed a space, any space, as soon as possible. But although he had planned to only stay a few months, he’s been here for four years. “We moved in because we needed the space. Now we love the neighborhood. That’s what keeps me here. It sounds stupid but it’s the food. Everywhere else we’ve ever been the food has been horrible. Now we can walk to it.” The quality of life in Greenpoint extends to other elements of his business. The safety of the neighborhood was a huge benefit for him from loading trucks to working late at night. “When we’re working here late – that’s not a fear anymore. I don’t worry ‘oh someone’s leaving, and the rest of us aren’t leaving yet and he’s not going to be safe on the way to the subway.’ That’s not an issue.” Additionally, the Greenpoint location is more convenient for his commute home to Chelsea. “I was in Long Island City and it took substantially longer to get home from
there than from here... It’s allowed me to do more work in the same
day. I get home at the same time but I can get more work done - and
half an hour less road rage.”

Unlike some of his other GMDC peers, Chafkin does not
locate in Greenpoint to be close to trained labor pool. He doesn’t
think a high concentration of trained labor exists in New York. Al-
though he has five people on staff plus one part-time draftsman, it is
hard for him to find temporary labor when he has work.

“**I’m not attracting people based on geography, I’m look-
ing for people with certain skills. That’s nearly impossible. Go
try and find a tig welder. What’s a tig welder? It’s a process that
looks like soldering or brazing. Metal is heated and you add
filler rod with your other hand. But people don’t know how to
do that and if they do they’ve all left the city. You call the iron-
worker’s hall, or the welding school or the suppliers, and they
say, ‘no one’s here.’ They’re going where the construction work
is because that’s where good money and constant work is. And
everyone who is working here isn’t going to leave their company
for four months while we’re doing a project.”

Metal welders that have the skills Chafkin needs gravitate
towards government and defense jobs where they work with stain-
less steel, tanks, tank trucks, or containment vessels. “They’re welding
every day. They need those guys. We’re too bifurcated between art of
one kind and art of another kind. I have a guy who tig welds. I could
bring in another guy or someone who runs a plate welder. But all the
skilled labor is somewhere else. I tell people about a plate roller they
don’t know what I’m talking about.” The tricky thing about special-
izing in hard-to-complete projects is that few people have the skills,
“**I can’t find anybody who will bend that [3D] piece for me because
it’s not 2D everyone wants to make 2D. People will build in 2D all
day long, but no one will do these projects.” Chafkin has considered
leaving for cheaper space, but his quality of life at GMDC is high, and he tells stories of
friends who have moved away from their clients and suffered for it.
Chapter 3

The American Industrial Center
Dogpatch, San Francisco

“We have spaces as small as 150 square feet. That’s tiny space. But ideas don’t take a lot of room.”

Greg Markoulis, American Industrial Center Owner

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3.1 Potrero Point: a brief San Francisco industrial history

It is no small irony that a neighborhood built as a safe haven for the city’s dirty industrial back-end in the 1800s and left to crumble in the middle of the 1970s is now being reborn as an industrial center for the 21st century.

The area then called Potrero Point was a refuge for toxic and dangerous industrial activities. In the 1850s it was a safe haven for gunpowder manufacturers, who took advantage of its remoteness and deep-water anchorage. Other major industrialists chose to locate on Potrero Point including the San Francisco Gas Light Company which manufactured the gas that lit the city’s homes and street lights and the Pacific Rolling Mills, which opened the first big iron and steel mill in 1866 on what is now Pier 70, just beyond the American Industrial Center. Union Iron Works launched its first ship from Pier 70 in 1888 and built U.S. Navy ships for World War I. In the late 1800s, the entire eastern waterfront of San Francisco from the county line to Market Street was industrial and port land, much of it engaged in the activity of sending ships and manufactured goods around the world.

The American Can factory complex was built 1915 when the waterfront’s economy was transitioning from traditional manufactur-
ing to a specialization in warehousing and distribution. Towering four stories and 1500 linear feet long and built over 40 years between 1915 and 1955, it was the symbolic heart of the neighborhood, employing 2,000 Bay Area residents at its peak and serving as a major packing plant for the food processing and butchery businesses clustered in the neighborhood. American Can benefited from its strategic location at the intersection of rail, highways, and ocean freight.

Following national trends, manufacturing in San Francisco began to recede in the mid-20th Century. The American Can Factory building fell into disrepair in 1969 when American Can ceased its operations at the factory. For six years the building was deserted. The rest of the city followed suit. In the 1990s industrial land shrunk to approximately 12% of the city's total usable land. However, while many industrial firms were being pushed out of de-industrializing neighborhoods like SoMa, the Dogpatch welcomed these firms with its plentiful industrial building stock and industrially-zoned land. At this point, the Dogpatch was a haven for seedy and edgy activity. Starting in the 80s, Burning Man held annual parties there; it was the closest to the desert that San Francisco had.

The dot-com boom of the late 90s put an end to the 'wild-west' era of the Dogpatch. The real estate industry learned how exploit a special live/work zoning code that artists and activists had created in the 80s to preserve affordable space in the industrial area of SOMA. Additionally, San Francisco's industrial zoning was extreme-
ly permissive, allowing office development as of right, and housing development permitted with a conditional use authorization. These two loopholes allowed the real estate market to convert buildings, especially old industrial spaces, in the Dogpatch to tech offices and luxury condos, throwing the market into shock. By 2002, industrial land had shrunk to 4.5% of useable land in San Francisco, a small share when compared to other cities such as Seattle, which had 10% industrial land at the time. The remaining industrial land market was extremely tight, with industrial businesses exhibiting only a 1.4% vacancy rates as compared to 19.8% office vacancy rates. The flagging manufacturing industry called into question the validity of large swaths of industrial land. The city began to plan projects repurposing industrial waterfront sites, including a new research center in Mission Bay and housing and other development on Hunters Point Shipyard. Issues around industrial zoning affected the Eastern Neighborhoods the most, as it contained 40% of San Francisco’s existing industrial land.

Manufacturers, already hurt by changing economic trends, began to leave the city at higher rates than before as they were priced out of neighborhoods. The biggest decline came in 2000 and 2001, when more than 4,000 manufacturing jobs were lost during a single year.

The need for a plan

Officials and community groups alike were concerned about the loss of the industrial businesses and the slow deterioration of industrial land from office and residential conversions. The mayor convened a task group, the Back Street Business Advisory Board, to figure out what action should be taken, if any. In 2002 the Planning Department’s Eastern Neighborhoods Community Planning process began, commissioning reports and establishing interim controls in 2004 to stop conversion and development of industrial land while they determined the best course of action.

The scope of the issue encompassed both targeting employment in industrial firms and land use controls. However, current tools treated businesses and land use separately. As a result, City Planning actually created a new term for what their plan would target. City Planning focused their planning on a new industry group, “Production Distribution and Repair.” PDR referred to the wide variety of activities that need cheaper land and larger spaces to function that provided blue collar jobs to the city. The city defines PDR as:

“PDR businesses and workers prepare our food and print our books; produce the sounds and images for our movies; take people to the airport; arrange flowers and set theatrical stages; build houses and offices; pick up our mail and garbage. PDR and
related activities include arts activities, performance spaces, furniture wholesaling, and design activities. In general, PDR activities, occurring with little notice and largely in the Eastern Neighborhoods, provide critical support to the drivers of San Francisco’s economy, including the tourist industry, high tech industry and financial and legal services, to name a few.”

The city was concerned with PDR because these industries provide good paying jobs to less-educated people. The San Francisco Office of Economic Analysis identified blue-collar employment as the “highest paying source of employment for the 50% of San Francisco adult residents who do not have a four year college degree.” Fifty-six percent of PDR employees have only a high school degree and 86% of PDR employers paid a living wage.

The city was also interested in PDR because of the importance of flexible industrial land in supporting emerging economies. As the final adopted plan reported, since the 1850s the central waterfront has “played an important and dynamic role within the city’s economy and land use system, providing critical ‘flex space’ for new and changing industries, and is one of the last areas of the city still suited for this purpose.” Space for PDR uses allowed base industries to grow and supported local industries like tourism and food.

The plan was hotly contested by real estate interests who...
felt the city was tying their hands, as well as some community activists who envisioned factories on every block. A critical report from the city’s controller warned that the gain in PDR jobs would not be worth the loss in office space. The plan, it criticized, prevented the Eastern Neighborhoods from developing 29 million new square feet of office space and 116,000 related office jobs, 20% of all current wage and salary employment in San Francisco. The report predicted that only 3.5 million square feet of office space would be built with the rezoning, dropping area potential property values by be $5.9 billion. The report warned its audience to reconsider the PDR rezoning.

"Policymakers should consider if the conservation of these PDR jobs is worth the loss of a far greater number of office jobs, and whether the City’s economic goals can be better met by imposing conditions on, rather than simply prohibiting, office development in the PDR zones in particular... The ultimate effect of this zoning will be to significantly reduce the land’s ability to generate employment opportunities for residents of San Francisco and the Bay area."

The rezoning plan wallowed in committees and community meetings for a decade before finally passing in 2009. Jon Lau, now at the Mayor’s Office of Economic and Workforce Development, was one of the planners who wrote the new zoning legislation and was...
also part of the political process. In describing the key drivers for passing the bill, he said, "The economy tanked — I’ll be honest. The dot-com bubble burst in ’01, and housing market crash ’08, and it still took until ’08 to get adopted. Without those market corrections I’m not sure we could have gotten it passed." In addition to the market crash, 2000 was the first year since 1977 in which San Francisco had elected the Board of Supervisors by district instead of at-large. This new cohort of Supervisors had their roots in community organizing, neighborhood involvement, and had a particular interest in land use. They sent a clear, cool message to real estate interests in the city: one of the first things they did was remove the category of live/work from the planning code, putting an end to residential conversions on industrial land.

In December 2008, the City Planning Commission adopted a rezoning plan for the Eastern Neighborhoods, the first time zoning for this neighborhood had been changed since it was first adopted in the 1940s. The plan dealt with industrial lands in two ways. First, it retained approximately half of the city’s industrial land (4.6 million square feet) exclusively for PDR uses, preserving approximately 14,000 PDR jobs and protecting industrial uses from the threat of being priced by non-industrial firms. The other half of the industrial land was transitioned to mixed-use zones in which housing, PDR, and other non-office uses were allowed. The plan essentially took the buildings in which PDR activities were already happening
and spot-zoned them industrial or mixed-use, allowing spaces around them to become residential or mixed-use. Existing non-conforming office and residential uses in re-zoned areas were grandfathered in.

The new zoning created an extremely fine-grained mixed-use zoning. Kate Sofis of the nonprofit group SFMade says why it was important for planners to perform such a careful rezoning: "If they had not done the spot-zoning approach, and just done a blanket mixed-use allowing residential and manufacturing, whatever the market could bear, there wouldn't be any manufacturing in this neighborhood."[132]

City planners created new land-use types to support PDR activities.[13] The following PDR sub-zones reflect these differences:

**Mixed-use Zones:** urban mixed-use, mixed-use general, mixed-use office, and mixed-use residential. Four new zoning types were created to encourage mixing of industrial uses with other uses within buildings. While 31% of manufacturers surveyed said housing could locate next to their activities (firms like nursery, jewelry manufacturing, and printing), 69% of firms said housing should not occur next door (auto repair, wholesale food and beverage, and construction).

**PDR zones:** PDR-I - G, PDR-D, I-PDR. Three new PDR types were created to restrict all new housing and office development and to preserve industrial employment and businesses. The first two types resemble light industrial zones, the third, integrated-PDR was created to reflect the importance of design, marketing, and R&D in contemporary manufacturing processes. I-PDR zones allow 2/3 office

11. SF's new industrial land use classifications according to their share of land area.
source: GIS analysis, OpenData DCP

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space and only 1/3 production whereas PDR zones only allow 1/3 accessory office space.

The plan also created several special use districts, including an “innovative industries” special use district that applies only to AIC and frees them from requirements around office space.

Impact of the Plan

Preserving industrially zoned land in a popular neighborhood in a hot-market city like San Francisco, was a coup. For years, building owners didn’t sell buildings, waiting for the decision to be reversed, and there was little development. Additionally, in the wake of the stock market crash, not much development occurred and planners were unable test the utility of their plan.

The plan has preserved industrial space that would have likely disappeared. However, no developer is building new space for PDR despite a sizeable demand for this space. This is because PDR developments don’t pencil out for developers: PDR buildings are more expensive to build (high floor loads, ample power, multiple elevators, and loading docks) and must be cheaper to rent. The City in partnership with SFMade, Office of Economic and Workforce Development (OEWD), Pfau and Long, and Seifel Consulting created a set of building typologies that could be built as-of-right and pencil out for developers. They found that any new development (inclusive of acquisition costs) would have to be 80% office and 20% PDR to pencil out. “There’s no mincing the conclusion,” said Sofis, “It’s not possible to build straight up industrial in a really expensive city without some kid of concession.”

This has changed as of late with the uptick of the market, and several outcomes have become clear. There is simply not enough industrial space to satisfy the demand. Sofis says the highest demand is for small multi-tenant spaces around 2,500 square feet to incubate growing companies, and large spaces over 50,000 square feet to keep large companies in the city. Sofis says of the space crunch, “We’re doing our best to squeeze as many companies in spaces as we possibly can. They’re co-located next to other kinds of uses. We get companies to be in smaller spaces they want to be in. They pay less, but they’re crammed in there, which affects their production.”

Concessions are a Pandora’s Box for city governments; one developer might be true to her word and develop their portion industrial, but another may not put as much effort into those tenants. Additionally, San Francisco city government is loath to waive development fees, which make up a significant portion of city revenue.

The city is investigating the utility of a nonprofit industrial development corporation that would act in the public good similar to a nonprofit housing development corporation to create more new PDR space. Philadelphia has pioneered a similar model.

One of the few new PDR projects to move forward is an
expansion of the Anchor Steam Brewery in a complex deal facilitated by the City. In order to make the deal work, the Port entered into a deal with the SF Giants and Anchor Steam, and the project is heavily subsidized by market rate office and housing. For Sofis, this type of project is symbolic of the complex deal-making that is necessary to keep large manufacturers in the city.

In addition to the re-zoning, the city has supported the sector through advocacy. The organization SFMade was originally founded in 2009 by Rickshaw CEO Mark Dwight to support the few manufacturers left in the city. After the rezoning, it became the City's de facto trade group for manufactures. SFMade functions as an extension of the City, a nonprofit that provides services to manufacturers, as well as a sought-after brand. As opposed to many industrial development programs that focus on attracting or 'on-shoring' large companies, SFMade cultivates existing or startup San Francisco firms. Under the leadership of Kate Sofis, it now represents 325 manufacturers, 80% of the manufacturers in the city. In this flexible role, SFMade's services range from organizing public-private real estate deals keeping manufacturers in the city, to coordinating job-training programs, to helping its members with supply chain analysis. Recently, SFMade helped tweak zoning legislation to be less punitive to manufacturers that have large offices. They were also active in the recent payroll reform that switched payroll tax from taxing the payroll to taxing total revenue, a measure seen to benefit small businesses.

12-15. SFMade publicity campaign. Source: flickr, SFMade
3.2 SFMade: Industry Today

**Employment and Firms**

The landscape of manufacturing in San Francisco today is characterized by small light manufacturers specializing in design and consumer products. SFMade broadly characterizes its industry clusters as apparel and accessories, food and beverages (anchor brewing company is their largest member organization), green building and transportation products, and a wide range of emerging products combining design with technology that defy traditional classification. This parallels the three largest manufacturing sub-sectors, printing, food, and apparel.

Manufacturing currently only employs 1% of the private sector workforce, the product of a precipitous drop of 59% of manufacturing employees since 2003. Similar to New York, this may be because PDR firms have, in general, been shrinking in size, in line with national trends.

When comparing manufacturing to the larger industrial sector comprised of construction, manufacturing, wholesale trade, and transportation and warehousing, we see that manufacturing makes up only 16% of the industrial sector's employment base. The industrial sector itself comprises only 1% of the larger workforce. Within the industrial sector, manufacturing has dropped approximately as much
as transportation and warehousing, by 60%. Similar to New York, industrial firms, as opposed to employees, have only dropped by an average 7% compared to a 16% drop in the sector, indicating firms are shedding employees.

Although manufacturing as a whole continues to show a downward trajectory in San Francisco, net job creation in SFMade companies increased 10.5 percent in 2011 compared to a 2.1 percent increase in all jobs citywide. This is due, in part, to the fact that many of these firms are new and growing. 30% of SFMade member companies have started in the last 3 years. These small SFMade firms generally employ between 20-30 people and 60% reported revenues under $250,000.

Kate Sofis emphasizes that although San Francisco is an expensive city in which to do business (the minimum wage in San Francisco is $10.55 per hour, $3 higher than the California minimum) companies each have a special reason why they need to be in San Francisco. “There has to be a bigger reason than just cost...It’s about price, but it’s also about process and people...[for most of these firms, it’s] not foolishness, but extra proclivity to be here.”

Manufacturers and advocates speak of the powerful branding power of the ‘Made in SF’ brand. “There’s a concentration of unique customers in the Bay Area, and SFMade increases the visibility of these products, which means more market share and more customers,” said Todd Rufo, director of business development in the
San Francisco Industrial Sectors

Industrial Sectors 9% of entire economy

- Wholesale Trade 29%
- Construction 36%
- Manufacturing 17%
- Transportation and Warehousing 17%
- Food Manufacturing 16%
- Apparel Manufacturing 16%

Printing (20%), Food (16%), Apparel (14%)

Chemical manufacturing 7%
Miscellaneous manufacturing 7%
Furniture and related product manufacturing 6%
Computer and electronic product manufacturing 5%
Transportation equipment manufacturing 5%
Fabricated metal product manufacturing 4%
Paper manufacturing 2%
Electrical equipment, appliance, and component manufacturing 2%
Textile product mills 2%
Nonmetallic mineral product manufacturing 2%
Wood product manufacturing 1%
Beverage and tobacco product manufacturing 1%
Leather and allied product manufacturing 1%
Machinery manufacturing 1%
Plastics and rubber products manufacturing 0%
Petroleum and coal products manufacturing 0%
Textile mills 0%
Primary metal manufacturing 0%

Source: County Business Patterns 2010, figures for employees.
city’s Office of Economic and Workforce Development. SFMade co-founder Mark Dwight compares artisanal manufacturing to French wine terroir, which refers to the environmental characteristics of a vineyard that influence the product. “For companies like mine [custom bag manufacturers], there’s this history here,” Dwight says, “for cut-and-sew companies, there’s a great heritage in San Francisco.” The San Francisco brand also reads to consumers outside the city, who identify it with innovative ideas and products, from the hippie movement to Silicon Valley.

**Economic development impact**

Skilled workers, paired with a strong design sector, have fueled San Francisco’s artisanal manufacturing industry. San Francisco is home to a vibrant contract sewing community fueled by skilled sewers from South America, Asia, and around the world. Eighty percent of the workers within SFMade companies are immigrants, many of whom possess high skill levels and the strong work ethic required to manufacture artisanal products. SFMade’s workforce development program called Hiring Made Better matches the local workforce with the niche skills required by their manufacturers. Wages for PDR workers in San Francisco vary from around $7 per hour for food and beverage workers to $25-plus working in auto repair and electrical contractors.

Members of SFMade collectively employ over 2,500 people and are worth over $232 million. Forty-three percent of SFMade companies are owned by women.

**Land use changes**

The 2009 PDR rezoning protected many manufacturers from being pushed out. However, San Francisco’s industrial building stock is limited and at capacity. Industrial tenants can’t afford to lease space outside PDR areas; manufacturers can only pay $.80-1.75 per square foot per month, compared to an office user or tech company that can pay $2-4 per square foot per month. As the real estate market heats up again after the ‘great recession,’ few developers are able to pencil out a new development of PDR without subsidy, even though there is demand for this space. The value of industrial property is so low, to buy and remodel a building is an enormous expense.

The city is hoping that the shrinking nature of PDR firms combined with a constricted supply of industrial land may act in consort in a favorable way. As a PDR supply/demand report commissioned by the city suggests, “trends [of shrinking industrial firms] suggest that some PDR tenants may be increasingly compatible with vertical mixed-use,” reversing recent manufacturing trends to favor large floor-plate linear buildings. These firms seek more ‘flex’ building space that may also accommodate retail uses. This vision of mixed
8% of all land

source: GIS analysis, OpenData from DCP
use industrialism pervades San Francisco's thinking about manufacturing, and is evident in the American Industrial Center and the Dogpatch neighborhood.

3.3 The Markoulis Family: Visionary developer

The Markoulis family purchased the American Can Factory in 1975 in order to expand their shoe manufacturing business, and to re-purpose areas of the building for small manufacturers. When it was purchased, the building had been sitting vacant for six years and needed extensive retrofitting in order to be converted into multi-tenant use. So extensive was the damage from years of neglect that American Can nearly tore the building down, but the cost to do so exceeded the value of the land. "The building was so cheap it's sad," said Greg Markoulis, who has taken over operations of the building from his father.48

The family's attitude toward developing the building was to use its flexible space to be flexible with the market. "My father and mother believed in growing organically," says Markoulis, "they didn't believe in the 'build the space and they will come' mentality. We evolved with the market, and as the market demanded more and more small spaces, we made smaller spaces."49

The former cannery's high ceilings, good light, large freight elevators, and other key features were perfect for a range of light industrial uses. In the 1970s, the Markoulis family subdivided the 800,000 square foot complex into large 40,000-20,000 square feet units and rented to a variety of manufacturers from apparel contract factories to warehousing. Rents were affordable for the approximately 40 businesses. As Markoulis describes it, rents for the building in the 70s were less than half of the next highest price on the market, prices they were able to maintain because of how cheaply they had acquired the property.

In the 1980s, garment manufacturing occupied one third of the square footage. The structure was bustling with mainly female Asian immigrants who were working as pattern makers, cutters, and sewers, all buying and selling from one another.50 These businesses were frequently connected to Hong Kong-headquartered companies who would receive orders from Asia or New York, including Esprit and Donna Karen, and route some of their production to their San
Francisco sewers. For twenty years the AIC had the most square footage of any garment factory in San Francisco.

"And then NAFTA hit," said Markoulis. When the North American Free Trade Agreement was signed, the apparel industry in San Francisco shrank to a fraction of what it was within five years. NAFTA has just killed us," said one bay area apparel manufacturer at the time. With the majority of jobs being routed to Mexico and other locations to benefit from cheaper labor and higher margins, nearly all the contract factories located in the AIC went out of business. Today, the AIC hosts only one contract factory and several tote bag companies.

The AIC is the Markoulis family’s only property, and he and his family spend all their time running it. Although they are a private company, they speak as if they are mission-bound to support manufacturing and other low-rent-paying industries. Jim Naylor, AIC’s property manager, says the reason AIC is so popular is because of their competitive rent and care for their clients. “We are an active landlord. We talk to you. We make sure to visit you. We know how you’re doing. We know your struggles. It’s an active process. All I do all day is walk around…” The family hosts a Christmas party for its tenants each year.

Unlike the Greenpoint Manufacturing and Design Center in Brooklyn, AIC is a for-profit company, and has a different relationship to the city and to economic development goals. Markoulis
does not see himself as a mouthpiece for small manufacturers but rather as a savvy landlord reacting to the changing market. He has a ‘don’t tread on me’ attitude about city planning and his engagement with government is limited except for targeted activism to ensure he can maintain freedom in running his building. AIC does not perform the extensive tracking of employment and economic development indicators that GMDC does. Markoulis guesses his roughly 320 firms employ 3,000 people. Although he does not consider himself in the economic development business, Markoulis does see himself as operating a sort of incubator.

"We are an incubator in the sense that we have our own built in ‘farm system.’ In baseball, they have the farm teams, the minor leagues, and everyone wants to get to the major leagues, the big show, so they struggle down there until they get noticed, until they get good enough to get brought up. Our farm system is that we have spaces as small as 150 square feet. That’s tiny space. But ideas don’t take a lot of room." 

Many of Markoulis’ tenants came into his building at the very smallest space, and as they grew and neighboring tenants moved out, they expanded their space in-place. Frequently tenants take over the neighboring unit and simply cut a hole in the wall to join the two, incurring no moving costs and causing no address changes. Some of
these companies eventually grow to the point where they move on up and out of the building.

One such example is the confections entrepreneur Joe Schmit who started with 1,000 square feet, the first time he had started a business on his own. He grew his chocolate company incrementally from 1,000 to 30,000 square feet before he purchased a 75,000 building in Mission Creek and went on to sell his company to Hershey.\(^{157}\) "I consider this part of my success story," says Markoulis. \(^{158}\) AIC is a natural incubator because its size and natural business churn. Tenants move out regularly, which leaves spaces open for other tenants to expand.

This flexibility, Markoulis insists, is simply part of the family’s practice as landlords. Property manager Naylor says the Markoulis family simply listens to what the building wants to be, "This used to be a sewing factory. The market asked that it become a bouldering gym. So it became a bouldering gym. Ten years ago, this would have never happened here. Today, the building says, 'open up the ground floor, let's have some fun.' In ten years it could say, lock me up and put me back into production mode. And that's what we would do."\(^{159}\)

This ethos of flexibility and incrementalism has served AIC. One key example is the way the family has treated their ground floor retail spaces. With increasing pedestrian activity the market for ground floor retail is growing. Instead of punching out all the walls on the ground floor to increase availability of these in-demand spaces, Markoulis does so only when tenants ask him. He has seen his real estate peers sit for months with paper over their ground floor store windows because they can't get them leased out.

Although the Markoulis family is uninterested in expanding their successful business model to other properties, they do have development rights up to 85 feet for their southern parking lot. The Pier 70 project will undoubtedly raise rents in the area and may allow them to grow their space.

The Markoulis family is seen as a sort of enigma in the City of San Francisco. Property manager Jim Naylor described a visit that the planning department made to their property, "The planning department came down to tour the building with a whole team to try to figure out, 'Why was this working?' And when they walked away they said, 'we don't know why it's working, but it works.'"\(^{160}\)

3.4 Public Realm Impact

"Envision... that the Central Waterfront has grown to accommodate both new housing and neighborhood commercial services while maintaining its role as an area of important economic activity; it has evolved but its character remains familiar. It
American Industrial Center
PDR-General
PDR-Design
PDR-2
PDR Light Industrial Buffer
Zones with Separate Area Plans (mission bay and hunter's point)
Light Industrial
Heavy Industrial
Urban Mixed Use
Mixed Use - Residential
Mixed Use - Office
Mixed Use - General
Public
Neighborhood Commercial Transit (NCT-2)
Residential 2-Family Home (R2)
Residential 3-Family Home (R3)

source: GIS analysis, OpenData from DCP

26. DOGPATCH
LAND USE
is a neighborhood of well designed, mixed-use buildings that take advantage of transit and a place where new, cutting-edge businesses have appeared next door to more traditional light industrial uses. It is a place better connected to the rest of the city, with an improved public realm, welcoming streets, and well preserved historic structures, providing glimpses into the area's past. It is a place that has grown and carefully maintained an unusual mix of uses; it is a neighborhood that has achieved a balance in the process of becoming a better place."

‘Experience walk’ from the Central Waterfront Area Plan, 2008

The mixed-use nature of the Dogpatch is a combination of accident and design. Industry and worker housing developed side-by-side in Victorian-era San Francisco and a handful of these antique homes still exist. A picturesque row of Victorian houses line Tennessee Street, just a block away from the AIC. The manufacturing uses that characterize the neighborhood have been preserved by the 2009 rezoning, as residential development has filled in around these uses. The neighborhood has a mix of residences and workers. 2000, the Central Waterfront’s population numbered about 850.161

The neighborhood is buttressed by highway 280 to the west, the port to the east, Mission Bay's large-scale biomedical development to the North,162 and Bayview/Hunter's Point manufacturing Density to the South. The Dogpatch is a unique mix of uses that one cannot find.

27. AIC loading dock 28. Stark public realm, sidewalk by AIC 29. Potrero Point, undeveloped 30. Walk to Potrero Point
anywhere else in San Francisco, and in few other cities.

The Dogpatch’s quality as a place is enhanced by the application of a number of urban design best practices that enhance livability: visual access to different uses and the water, well-maintained sidewalks, clear signage, and comfortable mix of trees and sun that encourage strolling and a sense of place. The 2009 Central Waterfront plan provides detailed recommendation for the creation of an appropriate and lively architecture and pedestrian-oriented circulation flows. The urban design guidelines call for protected views to the water, high quality buildings that relate to the historic character of the neighborhood, and a lower scale of building in the Dogpatch, which has lower building heights. The plan indicates separate design guidelines for ground floor PDR and retail spaces be “tall, roomy, and permeable.” The plan also recommends buildings “celebrate corner locations” and minimize the visual presence of parking. Transit guidelines call for enhanced walkability and the extension of a waterfront walking path. The plan’s interest in small-scale public ways such as allies reflects the city’s interest in forwarding pedestrian-oriented design.143

The feeling of the neighborhood is exciting and confusing because of its unique mix of low-density manufacturing and housing. In the distance one sees the rusted-out hulls of obsolete 19th century manufacturing infrastructure on Pier 70. In the foreground, the few retail shops in the AIC sell chocolate and stationary, all produced in-house. In the evenings the neighborhood’s restaurants, in the AIC, 3rd Street, and along 22nd Street are full. The neighborhood centers

around a small strip of activity clustered along 3rd street, stretching down 22nd Street. Neighbors were successful in receiving a special historic district overlay to protect some Victorian-era houses, some of which were built by the skilled laborers who worked in the Dogpatch along Tennessee Street between Eighteenth and Twenty-Second Streets. \(^{164}\)

The AIC is able to serve as an anchor to the Dogpatch despite being completely out of scale with the neighborhood. The building’s southern building is particularly bleak, with a grey, unarticulated painted concrete façade. This is in part because of the distance the 3rd street corridor provides. The street separates the building from the rest of the neighborhood and helps make the AIC seem more distant and modest in scale than it really is. Additionally, the AIC is beginning to punch out walls in its ground floor to allow manufacturers to set up modest retail storefronts to take advantage of the growing street traffic in the neighborhood.

Ground floor retail and the coming and going of the AIC’s tenants provide the neighborhood with significant street life during the day. This activity is increasing at night as the neighborhood becomes more known as a destination, and as it increases its residential stock. Additionally, public amenities in the AIC, including the Museum of Craft and Design and bouldering gym, enhance the neighborhood’s status as a destination.

Many similar neighborhoods that exhibit this mix of ‘making’ and ‘living’ are actually in a precarious balancing point before a precipitous pattern of gentrification. However, with zoning controls in place to maintain the industrial character of the Dogpatch, the neighborhood has the potential to maintain its balance. With more entrepreneurial tenant types in the AIC, the public-facing elements of manufacturing have the potential to continue to enliven the neighborhood.

Neighbors in the Dogpatch seem enthusiastic about the mix. “As time goes on we have been able to accommodate industrial uses that fit into the 21st century,” said Joe Boss, who has lived in the area for 25 years and is on the boards of two neighborhood associations. \(^{165}\) SFMade leads tours of manufacturers in the neighborhood and the neighborhood recently hosted a party celebrating its ‘microhood’ status. \(^{166}\)

The nearby Pier 70 project will have an enormous impact on the Dogpatch and on AIC. For decades a decaying industrial pier owned by the Port, Pier 70’s owner, the Port of San Francisco, has entered into an agreement with the large real estate company Forest City Ratner that will develop the 30 acre property with a core of creative ‘urban makers’ subsidized by office and residential. How this project develops will have an enormous impact on the balance of life and work in the Dogpatch.

### 3.5 Tenant overview
AIC represents the 'third industrial revolution of makers' for many, but like GMDC, AIC's average tenants are companies that have been in business for 25-50 years. These firms have stuck it out and have chosen to be in San Francisco for a complex web of reasons. The Markoulis family looks at these tenants as shrewd businesses, not as charity cases. "They stuck it out because they managed themselves. Look at this building, there's no bling here," said property manager Naylor; "These people come to work, they don't want to be bothered. They want to kill it." 7

AIC attracts its tenants purely by word of mouth. They have not placed an ad for space in their building for over ten years because referrals from friends and word of mouth have kept the space full. Markoulis says he can think of two people who have moved out, but then came right back. "They didn't like the real world out there, I guess," he says.

A large part of this positive word of mouth is the personal care the Markoulis family gives to its tenants. Jim Naylor has a friendly relationship with his tenants, walking right into their spaces as if they were old friends. The management office is on site, and it is clear that the Markoulis family makes themselves available, invests in maintenance and cleaning, and keeps their eyes out for tenants as bigger spaces open up in the building. When asked why he has such a good reputation with his tenants, Markoulis responded, "Honest answer is, I don't know how it happened. Maybe we just know how to treat people." 168

The AIC hosts a wide diversity of tenants. Their spaces range from 115-1750 square feet, with most spaces averaging 1,500 square feet. 153 In general, AIC units are on the small end of the market. Markoulis doesn't see this trend of smaller spaces changing, since slowly increasing rents mean bigger spaces cost tenants too much. AIC's top three tenant types are architecture and design firms, photography studios, and artists. Twenty-six percent of firms manufacture a product of some type. In addition to the diversity of tech companies, stationary stores, photog-
raphers, metal shops, architects, woodworkers, fabric companies, and other types of uses one might expect to find in a light industrial land use, AIC is also home to some interesting outliers. AIC hosts the largest bouldering rock climbing gym in the country, the newly relocated Museum of Craft and Design, a restaurant that brews its own beer in the back, the only jellyfish breeder in the country, a city winery that can create custom wine blends, a textile school, a pilates studio, and they are working on leasing one of the ground floor spaces to a grocery store to serve the neighborhood.

The AIC is in some ways a city within a city, a building that hosts an incredible diversity of tenants who all share the need to be in low-cost, flexible space. It is in some ways the contemporary ‘maker’ equivalent of Koolhaas’ city within a skyscraper, except this skyscraper is lying on its side.

**DODOcase**

Patrick Buckley is an MIT-trained engineer who started six different startups and participated in the prestigious Y-Combinator incubator program before being in the right place at the right time with the right product: DODOcase uses traditional bookbinding techniques to create protective cases for e-readers and iPhones. It has been called “the Rolls Royce of iPad cases” because of its handmade, bespoke look and feel. DODOcase is emblematic of a new type of medium scale with a handmade craftsperson quality. They represent the emerging ‘maker’ type of urban manufacturer. DODOcase is not a craftsperson holding on to endangered skill set, or a commodity good producer. “The big vision is to become a lifestyle brand, not just cases for iPads mobile phones, or whatever,” says Buckley, “The idea is to become a brand that represents something that’s meaningful to people, and builds products around those core values. The core values of our brand are the marriage of tradition and technology. Craftsmanship with the modern lifestyle.”
DODOcase started out in San Francisco's TechShop, a tech-friendly co-working space in SoMa that allows members access to shared tools for a fee. After prototyping their first product there, DODOcase moved into a small ground floor space in the southern part of the American Industrial Center. As spaces opened up around them, they slowly expanded. Now their 10,000 square foot space stretches the length of the building: from a door on 3rd Street to a loading dock out back.

Patrick and his team decided to build manufacturing into their company structure — something that many artisanal manufacturers want to do. Including manufacturing in-house gave DODOcase better control over their product and limited their risk of obsolete stock sitting in inventory. In the accessory market, when one's product is tied to another product, like an iPad, being able to adapt to changes in your parent product is essential. DODOcase resisted the urge to outsource. "When you outsource you run into all these problems: minimum orders, have to sell the product you have, you have so much stuff, etc. You're tied to a difficult set of problems that prevents you from innovating or making improvements," said Buckley. "On paper it's easy to say outsourcing makes sense but the reality is it's incredibly complicated and filled with risk. The way we started DODOcase allowed us to quickly iterate on the design. So we didn't have to be flawless in our first attempt or get strapped with 5,000 DODOcases that weren't exactly what we wanted them to be," said
Dalton. Because DODOcase sells directly to their customers, their business model is lean and 'just-in-time.' They employ a number of workers on custom stamping machines, CNC routers, 3D printers, and other machines. Their space hums with production. Through Markoulis they connected with a packaging and order fulfillment center in AIC that works with disabled persons.

Now they want to help others do it (and put some of their excess capacity to work) by allowing burgeoning manufacturers use their machines in the off-season. With the rise in popularity of 3D printing and Kickstarter, there are more small design projects hoping to scale to market, but few have the connections or resources to do it. "It's a dead man's land," said Buckley. "How do these tinkerers become businesses and employ people?" For a small share in the incubatee's company, DODOcase would allow startup manufacturers to use their tools and teach them how to build their brand and manufacturing operations. Once young entrepreneurs have the know-how, Buckley says, they should be able to scale. "Tools are cheap enough now, they can buy the tools, and build their own factory to make their thing," said Buckley. "For most consumer durable products, you can buy your own sewing machines, 3D printers, CNC routers, injection molding, these processes are inexpensive now, you can buy that equipment for cheap."

Another thing Buckley wants to teach young manufacturing entrepreneurs is how to raise venture capital funds, something he's
learned how to maneuver. "In the Bay Area, people go after tech and software, because they think it scales. And it's true, you can write code once and you can send it around the world a million times if you need to. The thing about [manufacturing] is that you make one and then you need to figure out how to ship it. And if you make a million it means you've got all this overhead of moving physical things around putting to together it's harder to scale. That's true. But the thing that investors don't take into account, is that because of the internet, selling a physical product direct to consumers is a very highly profitable business." Patrick says 75% of the profit from consumer products sold in stores goes to retailers and distributors, leaving a small margin for the producer. But selling direct to consumers makes successful 'maker' entrepreneurs like his profitable.

**Intrinsic Devices**

Intrinsic Devices creates nickel titanium shaped memory alloys that produce metal fittings used for fastening, sealing, and making electrical connections in aerospace and defense products. This specialized technology makes metals that go through a crystalline phase change that allows twisted or bent metals to snap back to their original shape when heated. Its main application: round rings that shrink when you heat them. Intrinsic Devices is a type of advanced manufacturer choosing to locate in cities because its activities are less noxious than past forms of manufacturing, and because its principal has chosen the location in large part because of lifestyle.

Tom Borden founded the company when the research lab he was working in within the large aerospace and electronics company Raychem wanted to shut down his group's operations. Borden negotiated to start his own company using the patents, machines, and clients from their operations. Borden bristles when he speaks about San Francisco's courting of so-called tech entrepreneurs. He considers himself in the "high tech business, in the old sense of high tech. Actual engineering high tech, not programing."

Borden moved to the AIC in 1994, taking over a space that
had been occupied by Brink's for sorting money. Because the space was built as a manufacturing space, it has "super solid, high ceilings, lifting points in the ceiling so you can attaching things to hold them off the floor, super solid floors, the availability of power. This place is dripping with it which is great." It also has a low earthquake risk because it is built on bedrock. Borden's ground floor space allows him to manipulate bars of specialty treated metal that are 12 feet long in crates that weigh 2,500 pounds. The space is flexible and has allowed Borden to grow and reconfigure his company. He started with 3,000 square feet in 1994 and has expanded three times as neighbors have moved out and now rents 5,500 square feet that stretches from a front door on 3rd Street to a loading dock out back. Borden pays $1.15 per square foot for his space and says lease rates at AIC are comparable to the East Bay. They are nothing like the 30 cent-per square foot he could pay outside Sacramento, "But I don't want to live in Sacramento," he says. Borden lives on the west side of town and rides his bike 35 minutes each day to get to work. He likes the management of AIC and plans to sign a 5-year lease in August.

Although he loves the space, he did not move there for access to clients or vendors. His main clients are aerospace, military, oil field, and sensor manufacturers around the world including Lockheed Martin, General Dynamics, Boeing, Airbus, and Haliburton. His subcontractors are across the country—from a vendor that melts down their product in Pennsylvania to machine shops who cut his barstock down in the South Bay. "We are nowhere near our customers. But we are close to a really good hardware store, USPS, FedEx, the airport, and it's a fun place to work." Borden keeps his operation lean and employs on average three people, most of whom are family.

Although Borden's vendors are elsewhere, he likes the neighborhood. "Even in the early days before the restaurants and things came in, it was still a fun place. It was more fun back then...I just liked the gritty, industrial, do what you want sort of wild west feeling." Borden reminisces about the building when he moved in 1994. There was a late nightclub down the block and a group of Wall Street Journal delivery guys who would hang out on 3rd Street and cause "rowdy action," drinking and waiting for their papers to come. Borden himself
is a BMX biker and used to ride in the Dogpatch years ago. "There used to be stuff here to ride on that was fun. It's the unused buildings and unused structures that are fun to play with. A lot have been demolished or spruced up so you feel guilty leaving black marks on them now." He talks about Pier 70 with nostalgia, "I used to be able to ride a motorcycle into one of the buildings. It had this mad max kind of feeling." Today he sits on the board of the urban bicycling group SF Urban Riders and advocates for rideable parks along the waterfront.

Although he recognizes change is inevitable, he thinks the mixed-use PDR can cause some serious troubles, and is concerned that he may be priced out of his street-facing ground floor location.

"They built live/work lofts that no one worked in, they just lived in. They've sprung up. It's unpleasant, they complain about things. A friend above us put an exhaust blower on the roof, and this woman across the street complained about noise, so he had to turn the blower around, and put something on it. This same woman also complained about a restaurant across the street, because it smelled like food. So, there are pluses and minuses to things going upscale. Before the light rail, Third Street was three lanes each way. It was easier to load in front. The back is really crowded now with big trucks going in and out. I mean, it's great that we have restaurants. Now with the Mission Bay project is pushing out this way, we've got an ice cream place, magnolia brew pub that has great beer, serpentine restaurant, sandwich shop, cheese shop, a butcher in the back. But that's putting some upward pressure on the street front ground level space here. It would be super depressing to give up this space and live in the cave back there."

Borden is not looking forward to the Pier 70 development. "That's gonna be miserable..., We may face problems with getting trucks in and out in the back, which would be the end of it. If you can't get big trucks in and out of this building, any real manufacturing or warehousing and distribution, will have to leave."

**Digital Creative Associates**

Tyler Kay makes narrative viral videos promoting products for the life science industries. He started using his undergraduate degree in molecular biology to help create a documentary-style video series publicizing products on the website BioCompare, an online clearinghouse for life science products. When his videos started to become popular with life science companies to generate product leads (he had done 200 videos before YouTube premiered in 2005) he had the idea to create humorous music videos aimed at scientists.
His first viral video, 'The PCR Song' honors Kary Mullis who won the Nobel Prize in chemistry for his development of the method for amplifying tiny bits of DNA that revolutionized genetics and forensics technology. The video helped their client go from being unknown for this particular product to gaining “huge market share.” “I became ‘the guy’ who made all these funny commercials for the life sciences industry,” said Kay. The life sciences and biotech market started hiring him to make viral and documentary-style videos publicizing their products among science communities. Before 2010 he made 50 viral videos with his company Digital Creative Associates. “What my videos did was use the internet to change the way that products were marketed,” says Kay. “I’m most interested in building community around [life science] technologies… At end of day, I am helping clients communicate the latest and greatest science technologies to people that are trying to cure cancer or find solutions to alternative fuels, etc.”

He moved to AIC in 2011 when he was living in SoMa and could bike to work in ten minutes. He liked the building because of its high ceilings, open floor plate, big windows and natural light, conference room, a kitchenette, bathroom and friendly neighbors and landlord. “I’d always liked this building, the feel of it is very industrial and cool. There are a lot of creative people that work out of this building… For the cost it was the best deal going, considering the location and the way the spaces are laid out.” He pays $1.50 per square foot for 1,400 square feet of space, which is slightly higher than other
tenant types. Office uses comprise 11% of all of AIC's tenants, and represent one way to fill upper floors difficult for some manufacturers to occupy. Kay also likes the community of the building, which he says starts with the owners. Kay shares his space with a web animation company who he often collaborates with. He has few employees, one of whom is based out of Brazil.

Kay's profession is so mobile he feels he could perform his work anywhere. And although he recently moved to Marin County so his children can benefit from a less urban environment, he maintains his San Francisco location for the business credibility and for the lifestyle.

"I could do this at my kitchen table... But having an SF address, is something that adds credibility since this is known as the hub of the internet and has the legacy of that... When you say you're on 3rd Street in Dogpatch, that's cool... It's modern gentrification... it's part of that ecosystem, handmade, cool, single speed bike sort of culture."

Additionally, because he is immersed in the life sciences industry, the AIC allows him to be close to his clients down on the peninsula because of the nearby freeway and in Mission Bay.
Chapter 4

CASE STUDY FINDINGS AND ANALYSIS

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4.1 Case Study Synthesis by Scale
4.2 Enduring Challenges
4.1 Case Study Synthesis By Scale

Taken together, these case studies offer a rich portrait of two buildings in which contemporary manufacturing is thriving in a mixed-use urban context. There are ways in which these cases are similar, different, work well, and face challenges at multiple scales. In order to give some order to this analysis. Case studies are analyzed at four major scales, that of the city, the neighborhood, the building and the firm. Each scale provides findings about the case itself and also the building blocks for lessons that apply to other cities.

**City Scale Findings**

Both New York and San Francisco are dealing with a shrinking manufacturing and industrial sector, and have done so through broad rezoning efforts. While both cities have lost between 16%-17% of their industrial employment as a whole in the last ten years, they have shrunk in different ways. San Francisco's manufacturing sector has shrunk more rapidly than New York's, losing 59% of its industrial employment since 2003 compared with New York's 44% loss. Both cities also demonstrate frayed supply chains that hinder continued growth of key sectors. However, both cities also share a strong market for small industrial space of the type these buildings provide.

New York City's strengths are its plentiful land and building

<table>
<thead>
<tr>
<th>CITY SCALE FINDINGS</th>
<th>NEW YORK</th>
<th>SAN FRANCISCO</th>
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<tbody>
<tr>
<td>% of total land is industrial</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>Types of industrial zoning</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Manufacturing employment lost 2003-2010</td>
<td>-44%</td>
<td>-59%</td>
</tr>
<tr>
<td>% industrial employees as share of private sector employment*</td>
<td>1%</td>
<td>9%</td>
</tr>
<tr>
<td>% manufacturing employees as share of private sector employment</td>
<td>.1%</td>
<td>1.5%</td>
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*NYCEDC extracts the financial services sector when making these calculations. They estimate industrial employees account for 16% of private sector employment.
stock (11% of its total land area), and its strong developer community. However, its zoning controls are porous (hotels can locate in IBZs as of right) and the City has a track record of re-zoned large areas of industrial land, a trend that advocates fear will continue.

San Francisco, on the other hand, excels in its recent rezoning efforts that stopped the rapid loss of industrial land and industrial employment. However, where New York has a wealth of land and buildings, San Francisco lacks industrial land (8% of its total land area—suggested by some to only be 4.5% after removing public housing on mixed-use zoning), building stock, as well as a strong developer community willing or able to develop new industrial land (although this is showing signs of changing in the future with education and interventions from SFMade and others).

San Francisco’s argument for keeping manufacturing in the city represents the largest division between the two cities. During San Francisco’s rezoning debates, they were able to forward an argument that the high-end service sector needed manufacturing—it was not an either/or—whereas in New York the debate has been starkly divided between manufacturing advocates and real estate interests.

**Neighborhood Scale Findings**

Both neighborhoods, Greenpoint and the Dogpatch, exhibit a balance between their industrial legacy and recent development.
forces. They both point to the feasibility of a mixed-use industrial urbanism, showing some configurations in which large-scale industrial buildings can integrate into residential and commercial neighborhoods, and that this activity actually makes the neighborhoods more attractive.

However, while both neighborhoods exhibit this mixed-use character, they do so in different ways and with different trajectories. San Francisco has frozen its mixed use character in time through its recent zoning legislation, preserving the existing mixed land uses through 10 types of zoning categories. The large Pier 70 project developed by Forest City in partnership with the Port of San Francisco just to the East of the AIC, will host creative industrial firms at its core, cross-subsidized by high-rise office. The several manufacturing firms that dot the neighborhood outside of the AIC point to the Dogpatch as cultivating an industrial character beyond the AIC.

In New York, it is unclear whether the mixed-use character of the neighborhood is simply a moment in a continuing downward trajectory of manufacturing. The fact that GMDC is the only manufacturing happening in the neighborhood warns against broader claims of a fully integrated industrial neighborhood like the Dogpatch.

**Building Scale Findings**

Both the Greenpoint Manufacturing and Design Center and
the American Industrial Complex are antique 20th century manufacturing buildings, purchased for little or no money by mission driven developers. Both GMDC and the Markoulis family know that they are forgoing potential profit to fill their buildings with manufacturers, which makes these cases particularly interesting — and difficult to replicate. Both buildings demonstrate that contemporary manufacturing can thrive in multi-story buildings, once thought in the era of Fordism to be unsuitable to contemporary linear manufacturing which moved to the suburbs. Instead, today' small-scale urban manufacturing thrives in large, flexible buildings in which they can grow in place.

Although they may be hard to replicate, understanding these buildings is critical as the nature of developing new manufacturing space means that more industrial facilities will have to be mixed use because of necessary cross-subsidization from other uses. Manufacturing buildings require ample power, the ability to carry heavy floor loads, expensive loading docks and freight elevators — and yet developers must rent them for less than other uses because of the nature of industrial clients. Necessary cross-subsidization means that mixing uses in-building and in-neighborhood will be more likely in the future.

The buildings differ mostly in their size, tenant mix, and developer type. GMDC has 81 firms, mostly comprised of woodworkers, fine artists, and artisans. Being a nonprofit developer makes GMDC eligible for grants, however their lean margins means that certain building repairs, like updating their elevator system, can fall by
the wayside.

In contrast, the AIC has 320 firms employing a more broad range of producers, 60% of which are architects or designers, photographers, artists, and office space. 26% of firms manufacture a product. Because they are a private company, the Markoulis family says they are able leverage private capital to make major improvements on the building, which features a high-quality elevator system and pristine public areas.

**Firm Scale Findings**

Small, highly creative tenants are attracted to both the GMDC and AIC. Although they are small, the average age of firms in both buildings is around 35 years. Firms have diverse reasons for locating in these buildings, from lifestyle, to access to labor pools, to its affordability. Firms are attracted to GMDC and AIC because they represent a safe haven for industrial firms, because of their affordable rents, mission-driven landlords, and flexible space which allow manufacturers to continue to grow in-place.

They also exhibit a broad range of different tenant types. Firms interviewed included a high-touch manufacturer, a traditional contract manufacturer, a high-end, high-touch, high-tech custom fabricator, a 'maker,' an advanced manufacturer, and a creative office worker. Major firm types present in my case studies but not inter-

viewed include food manufacturers, artists, and consumer product producers.

Although they represent a wildly diverse portfolio, all of these firms share one common characteristic – they need to be in the city. Some of them need to be in the city to serve an urban clientele like the high-end fabricator. Some need to be in the city simply because it provides them with the lifestyle they prefer. Others leverage the brand value of the city to add value to their consumer products. This last point is aided considerably by the organization SFMade, which controls the SFMade brand. This brand has had an impact on small consumer product manufacturers, or ‘makers.’ While a ‘Made in NY’ brand exists in New York as well, it is the domain of the tech industry, not the manufacturing industry, much to the chagrin of industrial advocates.

This analysis provides important findings for smokestack-chasing economic development planners; look to firms that have an implicit need to be in the city, not firms who will vanish once subsidies do. As these case studies show, small, highly creative firms that need to be in the city provide a positive economic development outcome in addition to creative placemaking in the public realm.

4.2 Enduring Challenges for urban ‘making’
Although these case studies represent a success story for urban manufacturing, they continue to face major obstacles for their own success, and the success of any additional facilities like them. These challenges speak to the difficulties in New York and San Francisco, and shine a light on issues that impact the national conversation about manufacturing.

**Challenge #1: Manufacturing problems are spatial yet industrial policy and scholarship meant to support it is aspatial**

New York manufacturing advocates feel they have hit a wall when it comes to advocating for plentiful, secure industrial land. San Francisco planners struggled to pass landmark zoning legislation, and now are painstakingly developing typologies to help developers actually build needed new industrial facilities. How and where to spatialize industrial functions in these two cities is a persistent problem.

Although there are multiple agencies devoted to supporting manufacturing, from the federal manufacturing extension program to nonprofits like the Alliance for American Manufacturing, most programs target national policy or financing. Few agencies concern themselves with land use issues. A recent report from the Pratt Center declared that “manufacturing and urban policies are divorced” at federal policy level. The recent report from the new MIT lab, *Production in the Innovation Economy* makes no reference to land use issues. When reports are issued related to location and manufacturing, such as Brookings' recent manufacturing report about the location of manufacturing, their smallest geographic scale is the city itself.

Policymakers, planners, and city councilors are dealing with hard questions about how to adapt their land use strategies for a new economy, and to be resilient to future financial booms and busts. With little literature about sensitively locating industrial uses in cities, these agents continue to fall back on old stereotypes about polluting “smokestack” industries that prevent adjacencies with any other uses.

This issue of aspatial industrial thinking challenged advocates and industrialists involved in my two case studies.

**Where to cite manufacturing:** Industrial land has been considered the urban backwater for a century, but in today's re-industrializing city, the traditional backwaters have become prime waterfront locations and gentrifying neighborhoods. Cities around the country continue to eliminate their remaining industrially zoned land. Limited space causes inflated prices which, combined with lower availability, stymies this growing sector. Existing industrial lands struggles with adjacencies to other land uses which often take issue with the sounds, smells, traffic, and other activities of industrial production. Many firms choose to locate in the suburbs where land and other costs are cheap and adjacencies are non-issues, however this often means they are distanced from labor pools and removes the economic benefit
of manufacturing from cities. Where, then, is the appropriate place to locate industrial functions?

**How to secure manufacturing land:** The industrial land market is incredibly uncertain. Many industrial landlords keep their rents high, hoping for a rezoning that will allow them to rent their land to higher land uses such as commercial or residential. Additionally, with a legacy of rezoning industrial lands, many firms put off investing in their space for fear their investment will be a waste. There is vigorous debate around what is the best way to provide industrial space: city ownership of land, stringent zoning regulations, or deep incentives for the private sector?

Both New York and San Francisco have industrial land demand that outstrips supply. New York has been aggressive in its efforts to rezone industrial land. New York lacks space for manufacturers. San Francisco also lacks space as well as real estate developers who will develop new industrial facilities.

**Scholarship is aspatial:** Although some policy analysts and cities like New York and San Francisco are leading research and advocacy on the urban manufacturing front, until recently the perception among many sectors was that manufacturing was antithetical to advanced economies and so little scholarship existed about where to locate it in cities. As Saskia Sassen writes on urban manufacturing,

"Urban Manufacturing is a far more important sector to the advanced urban economy than is generally recognized...

Policy was oriented toward retaining the big, standardized manufacturers (they have more jobs) which were precisely the ones for whom it made no sense to stay in the city. They did not need the urban economy with its multiple supplier and contracting chains and diverse craft talent pools... In many smaller cities today, we have the talent pools that make possible the growth of such small firms, but we lack recognition and support from policymakers and even from analysts and researchers."174

Additionally, amidst a vacuum of good ideas for how to cite manufacturing, firms themselves are not at the table. During my interviews, it was expressed multiple times that few manufacturers are part of trade organizations. Manufacturers are too busy dealing with their day-to-day needs as entrepreneurs, and many older firms are dealing with succession issues for principals that are retiring. As a result, the infrastructure of support is disassociated from its constituents.

**Frayed supply chains:** The contemporary nature of urban manufacturing is small firms who rely on a network of vendors to complete production, prototyping, parts supply, and other critical stages of manufacturing, a divergence from the vertically integrated companies of the 20th century who hosted these activities in-house. However, the number of vendors who can supply products and
services has dwindled in New York and San Francisco. The result is that occasionally services cannot be found locally, or, when they are available, new clients are turned away simply because a vendor is uninterested or too busy to take a new job.

This issue of sourcing is such an issue in New York that Heytham Elhawary, the head of a business incubator at CUNY, started a hardware meetup group for makers to share supplier strategies. In San Francisco, despite a growing number of food entrepreneurs, the city lacks a co-packaging plant and a bottling plant, and has limited capacity in metal and woodworking. Capabilities in other materials like plastics, powder-coating, and shaping is almost non-existent. MIT’s lab, Production in the Innovation Economy speaks of the importance of supply chains, “It’s not just that factories stand empty and crumbling; it’s that critical strengths and capabilities have disappeared that once served to bring new enterprise to life.”

Entities charged with supporting the industrial sector such as the Industrial and Technology Assistance Program (ITAC) in New York and SFMade in San Francisco have identified frayed supply chains as an issue. The issue has even spawned for-profit (www.makersrow.com) and nonprofits (www.themakermap.com) that aggregate contract factories on an attractive websites targeting makers searching for subcontractors. Although these tools help makers find existing subcontractors, they do nothing to incentivize more subcontractors to start businesses and fill in the manufacturing supply chain.

**Challenge #2: A crisis of public image**

Much of the reason that scholarship and urban planning ideals continue to be antiquated is because they rely on antiquated images of manufacturing.

**Public perception of manufacturing is extremely poor, and not reflective of contemporary manufacturing:** Greenpoint Manufacturing and Design Center’s Executive Director Brian Coleman described the inability of a public official to appreciate small scale advanced manufacturing. He toured City officials as part of a campaign to retain manufacturing on the Brooklyn waterfront during the rezoning process in 2004.

“At the end of the day they didn’t get it. Because all he could think of was Detroit or Brooklyn Navy Yards, like ‘How come I don’t see these guys with the lunch pails, and whistle going off and 3,000 people walking out the door.’ Because it wasn’t his father’s or grandfather’s version of what manufacturing used to be. There was no assembly line. There were six guys working on benches in a kind of cool space. There were no bodies of a Ford going by, and a guy who sticks the steering wheel in.”
A survey of the American public revealed that although 90% of respondents rated manufacturing as “important” or “very important” for America’s economic prosperity and standard of living, only 35% said they would encourage their children to pursue careers in manufacturing, despite the advanced skills and above average pay that are characteristic of work in today’s highly technical manufacturing facilities.\(^{179}\)

This reveals a trend that is deeply unsettling: although there is significant pressure to grow manufacturing jobs, the people to whom these jobs are targeted are not interested in working them. Every year many manufacturing jobs go unfilled not because there is insufficient supply of trained labor, but because people choose not to take manufacturing jobs, even if it means higher, more reliable wages than service sector jobs.\(^{180}\) The negative, antiquated public image of manufacturing affects not only workers, but also politicians and civil servants who allow outdated zoning laws to prevail and do not see manufacturing as analogous to current trends around “innovation.” As Miquela Craytor of New York’s Economic Development Corporation said, “The [City Planning] Commissioner likes things to look pretty, and manufacturing in her mind doesn’t look pretty.”\(^{181}\)

These issues resonate deeply with conventionally held beliefs in urban planning and with public sentiment: Manufacturing has a serious image problem that blocks progressive policies at the highest level.

**New York focus: Lack of Political Will**

Although civic support for industrial uses appears to be improving, my interviews and observations of New York’s policy landscape reveal a serious lack of political will at the highest levels. While San Francisco certainly has some political gridlock, it does not share this level of ongoing challenge. Understanding why San Francisco has such different values is a continuing challenge.

From New York City’s Small Business Services allowing their industrial desk to wither and vanish, to City Planning’s unwillingness to provide support of industrial land, all of my interviews supported the notion that Bloomberg’s administration is heavily influenced by the real estate sector, and the real estate sector as a whole is in the business of high-end residential units, not industrial facilities.

Adam Friedman describes these dynamics bluntly: “There’s three white guys inside city planning, they’ve never had another job, how they got there is a mystery because they’re so not planners. They’re the tea party equivalent of planning. It’s been their mission to remove that sort of regulations from the real estate marketplace...So, it’s not a technological problem, it really is a political will problem. If you look at what the EDC is doing, it’s all small bore projects like this, 10 com-
panies here, 10 companies there, winner gets $50,000 - that’s crazy. It’s so grossly inadequate to the scale, as opposed to work on a policy level.”

Even organizations such as Small Business Services do not support their nonprofit counterparts. Sara Garretson, president of ITAC says, “For reasons I don’t understand, the city is not an ally, they are a competitor... I don’t understand why they wouldn’t see us as an asset. But they don’t.”

A tangible example of this lack of political will can be seen in the city’s lack of interest in incorporating the maker community into their ‘Made in NY’ campaign. ‘Made in NY’ is an incentive program that provides tax credits for film producers who buy products and services from Made in NY-listed vendors. It also includes technology companies. When Made in NY was approached by Made in NYC, the manufacturing industry group formerly called the New York Industrial Retention Network, they refused to collaborate and allow the one thousand manufacturers registered with Made in NYC to participate in the incentive program. After hearing the argument from the industrial advocates, Bloomberg’s technology czar “freaked out” at the thought of industry diluting the program. The plan to merge the two programs was rejected by the city.

This deliberate exclusion of manufacturing from the Made in NY program reflects a deeply-held sentiment among the Bloomberg administration that manufacturing is an industry of the past and not fit to support alongside ‘innovation’ initiatives trotted out in the administration’s final years. This is a significant barrier. Although Bloomberg wishes to be seen as shepherding innovation and technology in New York City, it is critical to observe that his administration leaves makers of manufactured goods out of the conversation.

Despite current gridlocked politics, everyone I spoke to in New York (except for the development community) was encouraged by the end of Bloomberg’s term and the landscape of democratic mayoral candidates who they said were more dedicated to working class issues and slightly less beholden to real estate interests. “I have hope that the sector will grow and the political support will grow,” said Craytor, “otherwise I wouldn’t have taken this job.”
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<td>NEIGHBORHOOD</td>
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<td>BUILDING</td>
<td>flex-space works for manufacturers. GMDC has niche in NYC</td>
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- lack of land, developers, and building stock - but zoning controls stopped loss of manufacturing land
- mixed use neighborhood is a draw
- mission-driven developer family, respond to market of small manufacturers
- firms leverage SFMade brand. large demand for space
- Many formerly industrial sites will be redeveloped in cities around the country
Chapter 5

In Search of
an Urban Industrial Value System

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5.1 Why does urban manufacturing matter?
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5.1 Why does urban manufacturing matter?

The Greenpoint Manufacturing and Design Center and the American Industrial Center represent industrial case studies that are thriving in cities against all odds. They provide good jobs to workers that need them, making interesting neighborhoods in the process. How should we as planners look at these examples? What theories are at our disposal to help make sense of these places?

The logic most frequently employed to discuss urban manufacturing is that of highest and best use. In hot-market cities like New York and San Francisco, highest and best use means highest real estate value, which provides the City with higher tax revenues. In this value system, residential and commercial uses always trump industrial.

However, this market-based approach negates the success of these case studies. This section introduces four key perspectives on manufacturing that I argue are more important than ‘highest and best use’: history, economic development, magical urbanism, and finally creative placemaking.

An analysis of history shows that manufacturing has never been construed as urban, giving us clues into the cultural barriers of accepting industry in cities. Economic development literature helps us understand manufacturing as important for the welfare of people and cities. However, cities do not become great by economics alone.

There is an unspoken something, a bewitching wonder of encountering manufacturing in an urban setting. A collection of thinkers writing on ‘magical urbanism’ gives us tools for explaining why urban manufacturing improves the public realm. Finally, creative placemaking is introduced as a unifying theory to bring together the public realm and economic benefits of urban manufacturing.

This section builds up a system of meaning that values history, economics, and the lived experience of cities as a way to approach urban manufacturing case studies from San Francisco and New York. In the end, I argue that creative placemaking advocates for mixing industrial uses in neighborhoods in order to provide surprise, intrigue, good urban design, and economic development impacts.

5.2 Urban Manufacturing through History

An analysis of the major shifts in American industrial formation over time shows a reoccurring pattern: industry locates on the urban periphery only to be subsumed by the city again and again. Although there is plentiful industrial building stock within cities, these structures were almost always built on the urban periphery, only to be annexed by the city. The historical analysis to follow reveals the a-historicity of today’s urban manufacturing excitement. American industrialism has rarely been pro-urban. This perspective calls for...
urban manufacturing proponents to consider a new urban design ideal for the relationship between industry and the city that looks beyond nostalgic replications of the past.

**The Early American City: 1700s – 1900s**

Early New England cities flourished because of abundant waterpower, navigable rivers, and wood from the hinterland that supported textile factories located on the urban periphery. Instead of developing industrial land within urban centers, cities annexed suburban land in order to gain the benefits of industry. Brooklyn, for example, the fourth largest industrial center in the late 1890s, was annexed along with the other boroughs by New York in 1899, securing New York’s centrality as an economic center. Industrial historian Robert Lewis notes that this annexation was key to maintaining New York’s supremacy as a manufacturing hub, as New York City’s share of manufacturing declined steadily after the annexation. Although we think of industrial suburbanization as a phenomenon of the 20th century, most central cities were bleeding industrial jobs to their newly annexed, industry-rich suburbs as early as the 1890s.

Suburban manufacturers saw themselves as creating a new Eden in America. Industrialists believed that industry would save Americans from the backbreaking work of agriculture as well as differentiate America from the dirty industrial cities of England. As historian Charles Stanford describes, industrialists “shared with poets, painters, reformers, professional men, and pioneer farmers the pervasive American hope of redeeming men and society from the sins of a supposedly corrupt Old World and achieving a new heaven on earth in the American promised land.” This moralistic perspective on productivity resulted in more mechanization than in England. Early industrialists believed that they were imbuing their laborers with moral and spiritual improvement. The industrialist Patrick Tracy Jackson told the nation, “The village steeple is an unfailing companion to the water-wheel.”

Manufacturing in early America was always seen to be something that fit into the pastoral landscape, an exercise in technological
superiority and efficiency, in contrast to the demonized industrial agglomeration in English cities.\textsuperscript{208}

**Industrialization and Regulation: 1900s – 1950s**

As cities developed, the impulse to distance manufacturing from city life continued with the implementation of zoning regulations. Although there were many other existing laws dictating urban form and land use, New York's landmark 1916 zoning legislation was the first citywide legislation to regulate both building mass and use. Two main arguments drove the debate in New York, the desire of commercial real estate owners to stop the densification of Manhattan to protect their investments and the desire to stop the spread of dense tenement neighborhoods.\textsuperscript{209} One of the most vocal proponents of the legislation were luxury retailers on 5th Avenue who wanted an end to the tall midtown garment factories crowding out light and air in their shopping district.

The separation of uses gained credence with the advent of rational planning, which distanced industry from urban life by painting them as an 'incompatible use.'

**Suburbanization: 1950s – 1970s**

In the mid twentieth century, the post-war boom in American development caused unprecedented suburbanization, aided by the GI Bill (1944) and the development of the American highway system (1956).

Additionally, the assembly line techniques pioneered by Henry Ford dramatically changed factory technology and spatial organization. The vertical factories in cities were no longer suited to contemporary production techniques, which required large, land-consuming horizontal buildings. Many factories left land-constrained cities for more space in the suburbs.\textsuperscript{210} As Lewis writes in his scholarship on the manufacturing suburb, suburbanization was popular among industrialists since the mid-nineteenth century:

2. New York's 1916 zoning, the first plan to comprehensively zone both use and bulk of buildings citywide.
Here's Why
Industrial Parks in New Jersey
Offer You the Perfect Plant Site

New Jersey has a great number of made-to-order industrial parks—stupendous, well-planned areas that provide industry with everything it needs to succeed: heavy-duty roadways and rail spurs, all utilities, help in building and financing, local community cooperation. The list is endless... and it's important frosting on the cake. But look at the cake itself... look at New Jersey.

1. the market. New Jersey sits right in the middle of Megalopolis, the most concentrated area of wealth and influence in the world. It is served by the nation's two largest deepwater ports. It has the highest ratio of scientists and technicians. Eighty-five of America's 100 largest industrial firms are here. And just as important, things recreational, educational and cultural are here in abundance. New Jersey offers a never-ending choice of places to visit and things to do.

Get the full story on plant site opportunities in New Jersey. Return the coupon today for your free copy of the new 48-page booklet entitled: "NEW JERSEY—LAND OF AMAZING ADVANTAGES".

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

3. An advertisement in a 1965 issue of Fortune magazine soliciting manufacturers to move to the suburbs.

“Suburbs were not only places of residence; they were also places of work... Manufacturers were able to build larger and more sophisticated factories containing the latest organizational forms, catering to widening markets along the transportation networks passing through the suburban fringe. Not only was suburban land cheaper and easier to build on; it was more removed from centers of labor discontent. In addition, a few large firms often stimulated further growth, contributing to a virtuous circle of expansion. The result was the development of a large, specialized, and varied industrial landscape on the urban fringe after 1850.”

This suburbanization complied with dominant urban design ideal of the time, the Garden City. This suburban growth intensified American industrial growth. 1960 was a highwater mark for manufacturing, with 29% of working Americans employed in manufacturing.

Off-shoring: 1970s – 2000s

American industrialism changed rapidly in the 1970s when firms began outsourcing production overseas at rapid rates. Factors that led to America's de-industrialization involve labor disputes, increasing capabilities of international countries, changing natural resource dynamics like cheaper fuel for shipping, production modularity, and faster digital communication. MIT's research lab, Production in the Innovation Economy, points to the privileging of shareholder value as the key event that incentivized the dismantling
of vertically structured industrial companies. American corporations to this point were organized vertically, keeping activities from material processing, R&D, prototyping and manufacturing in-house. PIE's inaugural report states, "Perhaps the single most compelling factor in the 1980s that led to shrinking the perimeter of the corporation and reorganizing it around 'core competence' came from financial markets: higher stock market valuations of leaner, 'asset-light' companies which had weeded out their less-profitable divisions and reduced their diversification." This emphasis on shareholder value and subsequent economic restructuring incentivized companies to cut capital costs and headcounts by outsourcing as many aspects of their value chain as possible to the lowest bidder.

Manuel Castells describes this as a transition from "industrialism to informationalism," whose key characteristic is flexible production distributed across global networks. Saskia Sassen describes this economic restructuring as transitioning twentieth century centers of manufacturing into 'control centers' coordinating global production, what she calls the 'global cities' phenomenon.

The impact of this economic restructuring was devastating to industrial land. Companies shuttered overnight, and many landlords seized the moment and evicted industrial tenants in favor of higher-paying uses in the form of high-end office towers and demand for luxury condos.

**Urban Manufacturing: an insurgence, not a resurgence**

In looking at the spatial patterns of industry over time, it is evident that the American brand of industrialization has never intended to be urban, but was only accidentally so. From the pastoral visions of early 19th century industry, to anti-industrial zoning in the early twentieth century, to the suburbanization of industry in the middle of that century, and the rapid off-shoring of the end of the 20th century, the story of industry in America has been overwhelmingly suburban. Certainly markets, distribution facilities, and other light industrial actives happened within city limits, but these uses were always meant to be peripheral and have caused friction when they have butted up against other uses (see, for example, the century-long battle of the garment district in New York).

As this historical survey reveals, there is a pervasive notion that American manufacturing are or should be pastoral. In early colonial days this value stemmed from a revulsion to the soot and squalor of British industrial metropolises. In the mid-century American urbanists embraced the suburban ideal of the garden city movement. From zoning the single family home to divorcing living and production, the garden city value system is prejudiced against density and advocates for greenbelts and suburbia.

New York City and San Francisco, despite their density and urbanity, share this value system, expelling manufacturing to their
peripheries and until recently treating existing urban manufacturing as backwaters.

The current excitement about urban manufacturing embraces and celebrates density and rejects suburbanization. However, if manufacturing in America has always been suburban throughout American history, the current romanticization of urban manufacturing should be reconsidered. Reconciling our suburban American mindset with our desire for good urban jobs and good urban fabric is a central challenge to address head-on.

5.3 Economic Benefits of Urban Manufacturing

“[There three ways to create value] get it out of the ground...grow it...or make it...Other activities, like services, are helpful, but they do not create new wealth the way mining, agriculture and manufacturing do.”

Bob Lutz, former Vice Chairman of GM

There is a paradox in the economic development benefits of manufacturing. Cities and people want manufacturing jobs for precisely the same reasons they are being pushed out: doing business in cities is expensive. This is good for workers and those in the building trades, but bad for the bottom line of many manufacturing companies. Planners must weigh optimizing urban land use for revenue-generating needs (converting industrial land to high-value residential and commercial use) and providing quality jobs to citizens. The following section reviews the economic development literature and discusses the economic benefit of urban manufacturing for people and for cities.

**Economic Development for People**

There is a fierce debate in economic development circles about whether the contemporary manufacturing boom will create the same middle class as the boom of the 20th century. Arguments center around manufacturing’s ability to provide middle-class salaries. In 2011, the average manufacturing worker in the United States earned $77,060 annually, including pay and benefits, above the average for all industries, $60,168.2 These salaries are more likely to go to less-educated workers who would otherwise earn the lowest wages: Brookings reports that about 48% of manufacturing workers, but only 37% of non-manufacturing workers, have no formal education beyond high school. They write, “Manufacturing’s larger share of jobs for less-educated workers, along with the substantial wage advantage that it offers to those workers, make it an engine for boosting those workers into the middle class.” This finding is replicated in New York and San Francisco.
Urban manufacturers tend to have high wages because of the presence of ‘high-tech, high-touch, high-road’ industries. These industries include designed products, food and beverage processing, chemical and high-tech products, metal fabrication, and other industries. Research finds that quality labor is more important for high-margin, high value-add products that tend to cluster in cities because employees are working with more expensive machinery or raw material that is expensive if broken or wasted. Also, these industries are often more high-margin, so employers will pay workers more to lessen down time and be more efficient. Brookings and others have introduced the concept of ‘high road’ manufacturing which signals the importance of quality labor. ‘High road’ manufacturers are also more likely to provide health benefits to their workers. Even though wages for industries that tend to cluster in cities like food preparation and apparel manufacturing are on the low end of manufacturing wages, they are still higher than retail wages.

Although data show that economic development impacts for individuals are a compelling reason to bring more manufacturing jobs to urban areas, there are some criticisms of urban manufacturing as an individual wealth creation strategy. There is an enormous debate around a so-called ‘skills gap’ in training the next wave of manufacturing professionals. This well documented phenomenon points out that although manufacturing jobs are returning to the United States, our training infrastructure has fallen so behind that the very groups we hope to target with these jobs are insufficiently trained to perform them. Furthermore, the cost of an individual going through a training program in order to compete for a contemporary manufacturing job might be more than their increased wages. Contemporary manufacturing jobs often involve complex computer programming skills and ability to run large automated systems. Reporter Adam Davidson says, “Today’s skilled factory worker is really a hybrid of an old-school machinist and a computer programmer,” a far cry from the repetitive tasks of 19th century manufacturing. Some community colleges, including the New Hampshire community college system, are rebooting their job training programs to focus on high tech manufacturing skills, but the general lack of preparedness of many cities means that manufacturing jobs are going unfilled. In his reelection stump speech, Obama repeatedly cited that 80% of manufacturers have jobs they can’t fill. The National Association of Manufacturers estimates there are roughly 600,000 jobs available for whoever has the right set of advanced skills. Issues with training means that for manufacturers aging out of their trades, many without succession plans, there is a lack of well-trained replacements to continue their businesses.

Beyond the skills gap and the wealth-generation potential of urban manufacturing jobs, there is a fundamental argument that working class people have a right to the city. Henri Lefebvre termed ‘the right to the city’ in 1968, declaring that citizens had the right to dwell in and to inhabit the city, the right to urban life and urban encounters.
Kate Sofis of SFMade describes how urban manufacturing helps grant people the right to San Francisco. "As an urbanist, for me, it’s not the city as better than somewhere else, but in the city as necessary—or else you’re going to back to the model of having the city empty out every morning because everyone’s commuting down the peninsula [to the suburbs]." Urban manufacturing flies in the face of the ‘highest and best use’ of urban land, however, it is one way to ensure working class people have a right to the city.

**Economic Development for Cities**

Cities today compete vigorously for resources and economic competitiveness. Mayors and municipalities lure companies from afar with tax incentives and other tools to provide jobs and boost their tax rolls. Among the options of economic development tools, cities support homegrown manufacturing hubs because of manufacturing’s necessity to other industries including the high-end services sector, strong multiplier effects, economic resiliency, and because it drives innovation.

Cities must make space for certain ‘backwater’ industries that support other functions of the economy. Printing services, just-in-time design for creative industries, even services like woodworkers or cement factories must be located near their clients, whether they are the high end services sector, or the building trades. Brian Coleman, Executive Director of GMDC, describes industry as prepping the city behind the scenes.

"NYC needs this backwater, where things that people don’t necessarily want, but need to have, can go. It’s not pretty; the marshal needs a place to tow cars... No one wants to get their car towed, but it’s a function of a big city. No one wants to have a taxi repair place with 40 taxis sitting in a lot next to them, but you have to fix taxis in close proximity from where they want to drive. No one wants to have 60 school busses start up at 5 am down the block from them, but you can’t bring school buses from Riverhead."

The City of San Francisco, in its 2002 report calling for the expansion of industrial lands, linked each industrial type to key city sectors including financial, residential, tourist/restaurant sectors. They cite a Boston Redevelopment Authority study that showed that nine separate industrially classified businesses collectively employing over 200 workers are involved in moving a lobster from the seabed to its final destination over a bed of rice in a restaurant.

Urban industry also keeps value within cities by serving as a ‘multiplier effect’ (manufacturing has the largest multiplier of any sector) as well as an import replacement. Every dollar of the final sales of manufactured products supports $1.34 in output from other
sectors, compared to retail and wholesale trade sectors that generate only 55 cents and 58 cents, respectively. Additionally, urban manufacturing can provide import substitution – keeping value local as opposed to sending it to companies based elsewhere.

Finally, manufacturing provides cities with the economic benefit of diversity. In The Economy of Cities, Jane Jacobs tells a parable about the “valuable inefficiencies and impracticalities” of cities, using Manchester and Birmingham as case studies. Manchester, she writes, was a thriving city based around the “stunning efficiency” of its textile mills. Birmingham was a “muddle of oddments” with many small firms hiring one another to complete projects. Birmingham was seen as inefficient and backwards, however, it is the city that has stood the test of time and at the time of the book’s writing was one of the most economically vibrant cities in England. In The Economy of Cities, Jacobs tells other parables of cities that became extremely “efficient” in a single industry only for their economies to fail and for their smaller, more varietous neighbors to prosper.

Today, urban manufacturing is often seen as an inefficient land use, derided for limiting cities’ ability to grow their high-end condo market, or prime office space. However, using the parable of efficient Manchester and inefficient Birmingham, Jacobs cautions us against “monocropping” our cities in favor of cities that incubate multiple solutions in a sort of economic parallel processing. Jacobs reminds us that it is the variety of urban forms, uses, and industries that brings life to cities. In The Economy of Cities Jacobs ties variety to resilience, which supports the economic development impact of urban manufacturing.

In addition to these economic benefits, urban economies thrive off of good ideas, many of which come from manufacturers of all types. Sixty-eight percent of U.S. domestic company R&D spending comes from manufacturers. While pharmaceuticals and technology manufacturers account for 37% of this spending, all manufacturers, including such reputedly ‘low technology’ sectors such as wood products, furniture, and textiles exceeded averages for non-manufacturing “new process and product” introductions into the market. Manufacturing, from crafts to clean-labs, is an enormous source of innovation, which is a benefit to cities. This competitive advantage extends especially to design-based manufacturing talent, which is overwhelmingly located in cities. The NEA’s whitepaper on Creative Placemaking writes, “…the arts and culture sector is the nation’s most under-rated economic engine, producing millions of well-paying jobs. It is our most competitive sector.”

Urban Manufacturing is an economic development tool for cities because it supports other key urban industries like the high-end service sector, because it spins off additional economic benefits in the form of an economic multiplier, because it provides cities with economic diversity and resiliency; and because it drives innovation.

This scan of economic development literature provides alter-
native economic frameworks to ‘highest and best use.’

5.4 Magical Urbanism: the lived experience of mixed-use neighborhoods

The pieces that come together to make a good city transcend economics. In their 1987 urban design manifesto, urban theorists Allan Jacobs and Donald Appleyard wrote that the phenomenon of the urban comes, in part, from experiencing a feeling of discovery and connection to the messy, unplanned, mysterious elements of cities. They wrote,

“A city should have a magical places where fantasy is possible, a counter to and an escape from the mundaneness of everyday work and living...It has magic, or should have, and that depends on a certain sensuous, hedonistic mood, on signs, on night lights, on fantasy, color, and other imagery...There should be a place for community utopias; for historic, natural, and anthropological evocations of the modern city, for encounters with the truly exotic.”

While the previous generation of urban design thinkers were reacting against the dirty density of London’s industrial metropolis, Jacobs and Appleyard believed that today’s designers are reacting against the loss of the public sphere, cites built for cars, and the “terrible waste” of suburbs. Today’s good urban design, they wrote, should cultivate ‘diversity, spontaneity, surprise, joy, magic, and spirit’ in our cities in what they call the “phenomenological view of the city.” This view identifies,

“a whole new vocabulary of urban form – one that depended on the sights, sounds, feels, and smells of the city, its materials, and textures, floor surfaces, facades, style, signs, lights, seating, trees, sun, an shade all potential amenities for the attentive observe and user. This has permanently humanized the vocabulary of urban design.”

Including industry in cities creates this suspension of reality, this sensuous excitement of the unknown in the public realm. A functioning factory in a city that has been de-industrializing for decades provides this magic moment. Seeing busy loading docks and hearing the sound of tools at work is an exciting feeling that links any pedestrian or worker to the complex web of urban production and consumption. These feelings together create the richness of a good public realm.

Several prominent urban theories address a notion of ‘magical urbanism’ in the public realm from Margaret Crawford’s Everyday
Urbanism, to Kevin Lynch’s pedagogical urbanism, to postmodern theories of Michel de Certeau and Foucault. Taken together, they call for a mixed-use city that celebrates the public realm impact of industrial uses.

**Everyday Urbanism: ordinary magic**

Everyday Urbanism, as described in Margaret Crawford’s eponymous book, celebrates the unplanned, the vernacular, the banal, and the everyday. This framework of design thinking grew out of dissatisfaction with the design profession to think outside of either “normative professional practice or avant-garde speculation.” As Crawford writes, “Everyday urbanism seeks to release the powers of creativity and imagination already present within daily life as the means of transforming urban experience and the city.” This take of urbanism “thinks about ordinary places in new ways...by trying to produce ‘ordinary magic’ out of circumstances that most designers would find unpromising.”

Celebrating the work of making and manufacturing in the city certainly falls into the category of everyday urbanism. But how does this theory inform urban planning and design? In the book, John Kaliski writes that urban designers have “consistently evaded the realities of existing urban life by attempting either to recover the past or control the future.” The closest designers get, writes Kaliski, is new urbanism and Koolhaasian architecture, which react in a cookie-cutter, nostalgic way to daily habits like walking. Koolhaas, he writes, is a flâneur who incorporates the social serendipity of the street into his own buildings. The New Urbanists, “develop an urban design of architectural fixity that ultimately homogenizes the collective everyday.” Kaliski writes that designers need to better incorporate the “ephemerality, cacophony, multiplicity, and simultaneity” of the everyday. “Architects and urban designers consistently flirt with these concepts only to reject them in favor of closed models of cities past, present, future, and utopian.” Designers, he writes, need to “explicitly incorporate the voices, activities, signs, and symbols of daily life.”
Everyday urbanism is a useful lens for looking at the re-industrializing city because it values the vernacular, banal, and often invisible spaces of factories.

Pedagogical Cities: learning through urban form

Kevin Lynch’s well known work on the mental image of cities speaks directly to the benefits of citizens connecting to and learning from urban manufacturing. One performance dimension that Lynch describes at length in Theory of Good City Form is that of Sense, which measures the degree to which a city can be clearly perceived by its users and how that perception aligns with its users’ values and concepts. Sense has a powerful emotional effect because it can teach people about their city. As daylighting a stream can teach urban dwellers about the cycles of the earth, so can urban industry teach us about the value of work and the production of physical things. He describes the importance of Transparency, a sub-quality of Sense:

“[Transparency is] the degree to which one can directly perceive the operation of the various technical functions, activities, and social and natural processes that are occurring within the settlement. Can one actually see people at work? Hear the waves strike the shore? Observe the course of a family argument? See what a truck is carrying or how the sewage drains away? Some of these processes are important, some interesting, some trivial, others abhorrent. They convey a ‘sense of life’ in any settlement, and, with congruence, are the direct perceptual basis for deeper meanings. Functions presented immediately to our senses help us to understand the world.”

This legibility of processes was important for Lynch in teaching people about how cities worked. The design of cities, he believed, had an important role to play in communicating urban functions to its users, as well as shaping users’ activities. Lynch uses of the term ‘learning ecology’ to talk about citizens’ ability to learn and change along with city form. He remarks repeatedly about the pedagogical
importance of urban form on humans, especially young people. In his world, the learning potential of city form can outweigh a non-optimal quality of a city. For example, in some situations a stressful city can teach people resilience or determination. While many theories of good city form strive for perfect equilibrium or utopia, Lynch dismisses this by saying that non-optimal qualities may actually have a positive impact.

Lynch took a special interest in fallow areas of the city, including empty lots and overlooked spaces, saying that these ‘fringe areas’ were extremely important to cities. He writes, 

“Regions of low control, where small groups can maintain their independence and the forces of change or of resistance may collect themselves. Revolts are mounted in the mountains, the deserts, and great forest areas. Christian heresies survived for centuries in the Alps and the Pyrenees. These places shelter relict societies, those special ways of living may be useful later, if the prevailing context shifts. In that way, a failure of spatial control at the margins may promote long-term adaptability.”

Industrial Greenpoint and the Dogpatch are these fringe areas. They are places that may be perceived as ‘non-optimal’ or ‘wild’ but which help us learn about the value of work, and production.

Mysterious Urbanism: the value of the unknown

Post-modern philosophers Michel de Certeau and Michel Foucault were trying to come to terms with the changing presence of media and society in cities in the 1970s and 80s. In the face of what de Certeau called a ‘cancerous visuality’, their work underscores the importance of the unknown in cities. Manufacturing buildings represent this unknown place.

In Michel Foucault’s Discipline and Punish (1975), he talks about the importance of unknowability in the context of modern forms of control. Like Lynch, he believes that to be totally known is to be totally controlled. “Visibility is a trap,” he writes. He emphasizes the relationship between control and vision: in the French version, Discipline and Punish reads as Surveiller et Punir. ‘Surveiller’ (like surveillance) becomes ‘Discipline.’ The tie between surveillance and control is also displayed Foucault’s The Order of Things where the author notes the common root of ‘to see’ in the verbs of knowledge and power: voir (to see), savoir (to know something), pouvoir (to be able to). In Michel de Certeau’s discussion of power and appropriation of the city, he uses the dichotomous trope of the all-seeing planner in the tower and the ‘subvisual’ streetwalker, indicating that there is power in being ‘sub-visual.’ Both of these theoreticians believe it is important to maintain a level of invisibility in the contemporary city.
Theories of seeing and urban invisibility are relevant to manufacturing spaces because they help describe the special impact of being close to the processes of production normally hidden from view. Having these interesting places of production interspersed within residential and commercial neighborhoods bring life to a place.

The Magic of Mixed-Use

In the conclusion of their urban design manifesto, Jacobs and Appleyard argue that the fine grain, mixed-use city is the ultimate expression of good urban design in the 21st century. They write, "There must be an integration of activities – living, working, and shopping as well as public, spiritual, and recreational activities – reasonably near each other. The best urban places have some mixtures of uses. The mixture responds to the values of publicness and diversity that encourage local community identity. Excitement, spirit, sense, stimulation, and exchange are more likely when there is a mixture of activities than when there is not."²

Looking at the ordinary magic of everyday urbanism, learning through urban form in Lynch’s pedagogical urbanism, and the value of the unknown in Michels de Certeau and Foucault help us build a common language around why mixing uses – including manufacturing uses – creates a good public realm. While they may not be economically optimal, and may even cause some discomfort, these theories help us see that manufacturing’s other qualities help create a phenomenon of ‘magical urbanism’ that urbanists should strive for.

5.5 Creative Placemaking: a unified theory of economic and urban design ideals

Most urban ideals deal with either the physical or economic components of cities. Very few combine both. I offer that Creative Placemaking unites disparate theories of economic development and magical/mixed-use urbanism.

Placemaking, according to the Project for Public Spaces (PPS), "capitalizes on a local community’s assets, inspiration, and potential, ultimately creating good public spaces that promote people’s health, happiness, and well being."²³² William “Holly” Whyte, the godfather of PPS, built his urban planning legacy by studying the ‘social life of small urban spaces’ and the interrelationship between form and use of public spaces. PPS’s cheery axioms like, “the community is the expert”, and “you can see a lot just by observing,” encourage place-based, incremental development based on local assets.

Creative Placemaking, a recent iteration of the concept, adds arts and culture to place. A whitepaper commissioned by the Na-
tional Endowment of the Arts (NEA), written by Ann Markusen and Anne Gadwa describes Creative Placemaking's core tenants:

"[Creative Placemaking] animates public and private spaces, rejuvenates structures and streetscapes, improves local business viability and public safety, and brings diverse people together to celebrate, inspire, and be inspired. In turn, these creative locales foster entrepreneurs and cultural industries that generate jobs and income, spin off new products and services, and attract and retain unrelated businesses and skilled workers. Together, creative placemaking's livability and economic development outcomes have the potential to radically change the future of American towns and cities."^{254}

This joint emphasis on economic and social vitality is what makes the lens of Creative Placemaking powerful, and well suited to this thesis focused on the economic and public realm benefits of urban manufacturing. Hallmarks of Creative Placemaking include a decentralized network of creative spaces in close spatial proximity with non-arts uses, occupying historic and underutilized building stock, training the next generation of producers, and bridging diverse communities in a single space. As the case studies in the previous section reveal, this language accurately describes the attributes of urban manufacturing hubs.

Creative Placemaking emphasizes the economic competitiveness of creativity. Markusen and Gadwa write that although the financial sector has been praised for its competitive advantage, "In fact, the nation's cultural industries are undisputed world leaders and innovators, responsible for millions of good-paying jobs." These cultural industries become tourist attractions, employment centers, as well as image-changers of neighborhoods. The whitepaper describes a sea change in economic development strategies from "large grain" investments in major cultural amenities like museums, to a strategy that supports a mosaic of fine-grain, mixed-use activities in neighborhoods. The Creative Placemaking literature also helps us see that we don't need to promote creativity — or manufacturing in our case — we
need only to give it space.

Many private foundations, encouraged by the NEA's early support of the concept, have funneled money to community-based projects that promote creative placemaking through the new foundation ArtPlace and the NEA's OurTown. The arts have a special relationship with manufacturing, and several high-profile ArtPlace grants including TechTown in Detroit and 5M in San Francisco include funding for artist workshops and light industrial spaces. Other successful city-level economic development initiatives have placed arts and culture at their center, including the New England Creative Economy Initiative (2003), Michigan's Cool Cities Initiative (2003), Louisiana’s Cultural Economy Initiative (2004), and San Jose's Creative Entrepreneur Project (2008), among others.

Although the importance of creativity and the city is not a new concept, Creative Placemaking is a superior lens because it unites the often-disparate goals of public realm improvements (too often in the domain of the designer) and economic development (too often the charge of policy professionals who see their plans as aspatial). Creative Placemaking calls for a mixed-use, magical public realm that supports economic development. The previous two case studies exhibit successful examples of Creative Placemaking, instances where magical urbanism and economic development are enhanced through a creative manufacturing hub.

There is, however, a tension between the public realm benefits and the economic development benefits. One reason highly creative urban manufacturing and mixed-use neighborhoods go hand in hand in New York and San Francisco is because the spaces that are available to urban manufacturers must be low-impact. As Sofis explains, “For every [quiet coffee roaster], there are machines shops, woodworkers, jewelry makers who pound things, or even garment manufacturing. The more you mix up industrial with Class A office, the less appetite to put up with anything that would annoy the office.” With more deal-structures necessitating cross-subsidization, mixing uses within one building will become more common. Sofis says, “[when you mix uses within one building] you kind of march down this path of yuppie production where the only thing you allow are
artisan tamale makers, basically quasi-restaurant uses, quasi-arts uses. That's sweet and all, but it's not solving the primary thing that we're interested in, which is more new spaces for [large-employment] folks like Anchor [Brewery] to expand.”

This tension between the inevitability of mixed-use manufacturing and economic development goals is an important challenge for Creative Placemaking experts and urban manufacturing proponents alike.

One way this tension between economic and public realm benefits is productive is in how so-called 'yuppie' industries are changing culture around manufacturing.

The Greenpoint Manufacturing and Design Center and American Industrial Center are changing culture through a concentration of manufacturers that cater to a high-end sector, as well as a high concentration of artists that co-locate with artisanal manufacturers. While this may invoke moral questions about a manufacturing economy serving the wealthy, or urban manufacturing not achieving certain employment goals, the high-end manufacturing sector is making manufacturing appear more palatable to the public.

Artists have been called, variously, 'the shock troops of gentrification' and the savior of cities. GMDC and the AIC suggest that perhaps artists and artisans can also be the ambassadors of a new economy. Although GMDC and AIC have been home to traditional manufacturing decades, they have just launched into the public eye recently. Why? I argue it is the new tenant types, the artisanal manufacturers and artists, that are bringing these buildings newfound attention, and that will benefit all tenants by improving the image of manufacturing.

As reporter Adam Davidson notes, maybe we should look to these tenants to be them ambassadors of a new economy. "Instead of rolling our eyes at self-conscious Brooklyn hipsters pickling everything in sight, we might look to them as guides to the future of the American economy.”

A substantial percentage of tenants in GMDC and AIC are studio artists (28% and 14%, respectively), and another large portion of manufacturers are trained artists who have found a professional application of their skill. Sara Garretson of ITAC suggests there is a strong relationship between manufacturers and artisans, "Where is the line between making a sculpture out of wood and making a one-off chair? Same processes. Same set of creativity. Where is the line between making one chair and ten chairs? Between making ten chairs and 1,000 chairs?" Artists and manufacturers in GMDC and the AIC in some cases are one in the same.

Although artisanal manufacturing may appear 'twee' and bespoke in the proliferation of articles about urban manufacturing in cities like San Francisco and New York, this perspective clouds the true employment impacts of these industries and underestimates the
power of high-end and twee producers alike to shift cultural perspectives on manufacturing.

Interviews revealed that a cultural transformation has been taking place in San Francisco, aided both by the presence of manufacturing in the public realm and the extensive public education during the rezoning process.

Jon Lau played a key role in the City's industrial rezoning said, "The terminology and imagery of the whole debate has advanced so far. A number of things have helped that. There’s an organic interest in locally made products, and better advocacy from folks like Kate and number of things that have helped turn a corner, so if you say manufacturing or local production now you don’t sound like a luddite who runs a foundry in a residential neighborhood, they don’t think of you as crazy, there’s a positive association with it, and it’s been wonderful to see."263

Seeing making on the street in San Francisco’s mixed-use neighborhoods has had a significant impact on the perception of manufacturing. Kate Sofis talks about the impact of manufacturing on the public realm, "[manufacturing] won’t ever been what it was in the 50s. But it’s not insignificant any more. You walk around the city and you see more making going on. It’s in everyone’s heads now and that’s a good thing."264 Sofis emphasizes the importance of continuing the cultural shift to attract different types of workers. In her perspective, there are many immigrants interested in working in manufacturing that don’t have pathways to employment from small firms. At the same time, many young college graduates are trying it out after school as a "cool thing." She wants to change the profile of manufacturing so that all types of people are interested in putting their kids into it. "We have some work to do," she says.265

Although GMDC and AIC are hard to describe using existing urban ideals, creative placemaking gets the closest. As this section demonstrates, it encompasses economic development and public realm benefits and advances culture around making, one of the central challenges of manufacturing today.
Chapter 6

Recommendations

“Effective policy (or effective design) works on the boundaries between dream and reality, linking deep needs and obscure desires to open experience and test.”

Kevin Lynch, Theory of Good City Form

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6.1 Are these cases generalizable?

The goal of this case study is to highlight a phenomenon and also to help others understand the influencing factors and moving pieces behind the Greenpoint Manufacturing and Design Center and the American Industrial Center so they may replicate its success or avoid its failures. The intent of this thesis is not only to comment on their success, but also to elevate findings and tools for planners elsewhere to attempt to replicate the phenomenon.

Skeptics may say that these case studies are interesting stories, but not replicable ones. Indeed, each building has a benevolent landlord who acquired an antique building cheaply, a quality very difficult to control for or replicate. And planners have been challenged to replicate these buildings for decades. In GMDC’s early days, David Sweeney, its founder, doubted if there were any best practices or recommendations to be extracted from the process. “That’s the part of the model that I’m not sure others can replicate - everyone’s dedication. It was completely crazy. I didn’t know how we were going to finance our operations. I didn’t even know who our tenants were going to be. A sophisticated real-estate person would have told us, ‘There’s no light at the end of this tunnel - no light.’ “In retrospect, I’m astonished we survived. It would be a disservice to tell people they can put together a deal the way we did. I think we managed it because of the unique amalgam of people we have here. You can’t franchise that. But if we can find the right opportunity, we might try it again.”

It is always a challenge to draw conclusions that are applicable to areas outside a case studies’ immediate physical, economic, and political environment. As the case descriptions and findings chapter suggested, some circumstances that led to GMDC and AIC’s existence are difficult, if not impossible, to control. And yet, it is a central challenge for any planner to identify a phenomenon that is successful in one place and try to understand what variables might be coaxed into

[Insert image]
existence under one’s own purview.

Luckily, this activity of elevating best practices has already begun for GMDC and AIC. In New York, the Pratt Center has performed extensive analysis on how to replicate successful models elsewhere. Additionally, the Natural Occurring Cultural Districts working group has been formed to look at areas of perceived ‘spontaneous’ creative activity and understand how to best support and replicate them. In San Francisco, SFMade has authored and commissioned studies to try to replicate the activities of the AIC. SFMade and the Pratt Center, along with other partners, recently formed the Urban Manufacturing Alliance to do this work on a national level.

The suggestions within this last chapter are for them and for the planners and policymakers they hope to influence. The chapter begins with a suggestion to reframe definitions of urban manufacturing, followed by recommendations extracted from case studies, a research brief for further study and final thoughts.

6.2 What’s in a Name: defining contemporary urban manufacturing

The manufacturers that populate GMDC and AIC vary widely from loud woodshops to quiet jewelry makers. Some tenants aren’t even manufacturers at all. Researchers and planners dealing with these places struggle to define them accurately. Are they manufacturers? Offices? Artists? This struggle to define what we’ve seen in these buildings is emblematic of how manufacturing has changed. A study of current classification systems for manufacturing reveals the need for a new type of classification for manufacturing in GMDC and AIC for those who want to replicate it.

Manufacturing has changed dramatically over the last century, yet it is measured and defined using the same words and the same tools as 100 years ago. Manufacturers today make one-offs not widgets, they are located centrally, not in suburbia, more and more they are blending lines between technology and the built environment. Today’s manufacturing is not your grandfather’s manufacturing. It is not widgets or Fordist assembly lines. In fact, today’s manufacturing might actually be closer to your great great great great great great grandfather’s manufacturing, perhaps shoe manufacturing in Italy: many urban manufacturers have the same incentives to locate close to their consumers as artisanal craftspeople in early medieval cities. Much contemporary manufacturing is high value, custom, small-batch products. Instead of a large, vertically integrated corporation, these firms operate in a ‘flat’ spatial and economic network made up of many smaller actors. As the Pratt Center noted, “Today’s small urban manufacturers are essential components of economic ecosystems made up of fluid, interdependent networks rather than standalone factories.”

Kate Sofis of SFMade emphasizes this point:
“What we refer to as ‘manufacturing’ is not a single monolithic industry, as is often implied by top-down industry indicators and macroeconomic analyses. Indeed, modern manufacturing in the United States is now a quilt of larger more traditional concerns; small and flexible ‘artisan’ manufacturers; foreign manufacturers with U.S. operations; a vibrant and distributed web of suppliers; order fulfillment partners; and distribution channels — both online and on the ground.”

These contemporary manufacturers employ a broad range of education and skill levels. The U.S. Bureau of Labor Statistics recognizes more than 100 occupational classifications from computer-controlled machine tool operators, to electronic equipment assemblers, to butchers and bakers.

This unique profile of a dramatically changed manufacturing ecosystem causes any researcher to question existing definitions and classification systems. In measurement and planning literature, ‘manufacturing’ is a broad term that can be applied in many ways. This report identifies five methods for classifying manufacturing which range from measuring its impact on its neighbor through land use controls to measuring its economic utility through San Francisco’s Production, Distribution, and Repair classification, and ends with recommendations for a new classification system.

Types of Firms

Looking at types of manufacturers helps advocates identify unique building typologies as well as suites of services targeted at each manufacturing type. Firms are typed by the type of industrial process they undergo and the buildings they need. In cities, there are roughly six general categories of urban manufacturer. There is a temptation in categorizing manufacturing types in an ‘old economy / new economy’ dichotomy. In looking at the way manufacturing firms have adopted new technologies over time, it is clear that the more common application of advanced technology is in modernizing existing production techniques instead of replacing them all together with a new cohort of industries. For example, printing has always been the process of applying ink on paper, but today’s digital offset printing utilizes computer aided mechanization. Similarly, the introduction of
automatic sewing machines, or the computer-aided Gerber fabric cutting tool, uses technology to lessen human effort.

**Contract Manufacturers:** Many of the industrial firms that have endured through the outsourcing of the 1970s perform ancillary services to other manufacturers such as metal fabrication, extrusions, injection molding, and other materials manipulation. They have adapted to the current economic atmosphere by scaling down and providing more customized products. These firms are sometimes called contract factories because they do not produce any of their own designs, instead operating on a contract basis. Contract manufacturers and contract factories are an important link in the urban manufacturing supply chain. Many of the more traditional manufacturers (those that are making 'widgets' or are Original Equipment Manufacturers (OEM)) have endured, although few remain in cities. The United States still makes big-ticket hard goods, Toyota and Lexus recently built plants in Kentucky, but these facilities are often in exurban industrial parks.

**Logistics and Distribution:** With the large volume of goods imported from overseas, the United States' fastest-growing industrial subsector is logistics and distribution. Although it may seem incongruous to include this land use and activity within the framework of manufacturing, it has some of the same traditional attributes as manufacturing such as truck traffic. However, it does not have the same type of economic development impacts, as it employs only a fraction of people that manufacturing jobs.

**'Advanced' Manufacturing:** High-tech, clean-tech, green-tech facilities, often dubbed 'advanced manufacturing,' are a third major segment of contemporary manufacturing. These facilities create components for information technology, biotech, aerospace, and other tech-heavy industries. The industry that birthed the concept of 'cluster strategies' in economic development, high-tech facilities prefer to locate in cities where access to skilled workers and knowledge spillovers from other companies is possible. High tech facilities frequently build new facilities to match their specifications, and the processes in these facilities are almost always compatible with a range of different adjacent uses, allowing new development in cities. A recent Brookings study found that 95% of “very high tech” manufacturing firms were located in metropolitan regions.

**Consumer Products / 'Makers':** Although sometimes excluded from traditional measurements of manufacturing, artisans, engineers, 'tinkerers,' and product designers creating high-tech products, gourmet food items, and consumer products are a growing manufacturing subsection often referred to in the popular press as 'makers.' Although a small portion of the current manufacturing industry, this subsection of makers is growing, and is the main driver to manufacturing's changing image. The term maker refers to the entrepreneurial activity of engineers, industrial designers, artisans, and hobbyists creating new products. Often operating at the intersection of technology...
and product design, 'makers' use the tag line, "hardware is the new software." Birthed out of the late 90s DIY movement, those that claim the moniker maker are often also devotees to anarchic, meritocratic open source culture and emerging technologies like 3D printing. Chris Anderson, the former editor of Wired Magazine who now runs his own 3D printing company described how he sees makers,

"The "Maker Movement" is simply what happened when the web revolution hit the real world. The term, in its current sense, was first coined in 2005 by Dale Dougherty of the tech book publisher O'Reilly, to describe what he saw as a resurgence of tinkering, that great American tradition. But rather than isolated hobbyists in their garages the way it used to be, this was coming out of Web communities and increasingly using digital tools, from 3D printers...to a new generation of free and easy CAD software programs. What began as a social revolution is starting to look like an industrial revolution." 192

Words like hackerspace, makerspaces, hacktory, fabrication laboratories (FabLabs,) and others have been created to describe places where people share tools and experience to make new products. Miquela Craytor, head of NYC's EDC new industrial arm, describes makers as ambassadors of a new type of manufacturing, "New manufacturing is a blend of technology and making — it's people who want to meld the digital and physical worlds." 192

Makers are generating new markets to serve their needs. Internet-savvy contract factories in China (Alibaba.com) and the United States (MFG.com) have been created to prototype Maker's designs. Facilities like Lime Lab (recently acquired by the outsourcing giant PCH) work with industrial design firms to develop products from concept ideation through to manufacturing support. 193 100,000 people showed up to the 2011 Maker Faire in San Francisco and 55,000 people showed up in New York.

Sara Garretson, president of New York's Industrial and Technology Assistance Corporation thinks that there is such an interest in making because a shift in corporate culture helped open up new professional options for an entire generational cohort:

"Kids used to come out of school in my generation and work for big companies. There were training programs, and then you stayed with the company. In the 2000s there was a big shift to freelance work for tech firms and internet companies, and then a lot of those jobs dried up. Unless you had a specific skill and a good set of connections it was hard to get work. Those kids then started to make stuff. They were inclined to, it was something they could do. They might always have liked to make stuff but it was never an option because you were sup-
posed to work for financial services companies and make money. There was a talent drain in the financial services for many years that I think has stopped."

_Makers_ are distinct from artists because they are interested in making a fixed product type, not a one-off. Although typically incubated at facilities that share tools such as TechShop or FabLabs, most makers are interested in scaling their product to market. _Makers_ looking to grow their projects are driving the market for small-scale manufacturing space. These new companies require small, cheap, flexible space that allows them to grow. This important trend is driving the need for small, mixed-use spaces in cities.194

_Food:_ Artisanal food manufacturing is one booming sub-sector of urban manufacturing, and the only sub-sector that is growing in New York City.195 Jeff Rosenblum is currently leasing out a retrofitted Pfizer building filled entirely with food entrepreneurs: "Food is the arts of today, they're the creative people. When you speak to them, they're painters or sculptors by training but they're now making cupcakes or cookies."196 Food producers require clean space and have stringent health standards they must meet in order to sell their products. Small artisanal food producers often outsource key steps in their production process such as packaging, to co-packing facilities which are an important part of their supply chain.

_Building Supply and Construction:_ Another key manufac-
turing sector in cities is the building supply and construction sector, which provides the construction industry raw material and professional finishes. These firms often need space with ground-level access as they frequently work with long lengths of wood or metal to create finishes, molding, and other products to serve the construction industry.

**Land Use and Neighborhood Nuisance**

Land use classifications define manufacturers by their impact on adjacent uses. M-zoned land, a common classification in cities including New York, controls both building form and building uses with the goal of limiting certain uses that are considered nuisances to neighbors such as industrial traffic, and smells and sounds from

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manufacturing production. Potentially nuisance-generating uses are controlled by performance standards, which set a minimum requirement or maximum allowable limit on noise, vibration, smoke, odor and other effects of industrial uses.  

Light manufacturing zones often contain activities with low nuisance potential such as woodworking shops, repair shops, and wholesale service and storage facilities. Light manufacturing M1 zones are often used as buffer zones between higher intensity M-zoned land like M3 and residential areas. Medium manufacturing zones are often mapped mainly in cities' older industrial areas along the waterfront and include some passenger ship terminals and many municipal facilities. Heavy manufacturing areas are designated for areas with heavy industries that generate noise, traffic or pollutants. Typical uses include power plants, solid waste transfer facilities and recycling plants, and fuel supply depots.

Although it is helpful for regulating nuisances to neighbors, M-zone categorization was enacted at a time when there was significant noxious industrial activity in New York that now has a much smaller footprint. Today, some growing industries do not fit into typical land use categories, such as fabrication labs, food production, high-tech, recycling, or even mixed-use industrial.

**Essential Product Transformation**

SFMade, the nonprofit entity that supports the manufacturing sector in San Francisco has limited its support to entities that fall into their specific brand of manufacturing. Their definition of a manufactured good is one that undergoes its “essential product transformation” in San Francisco that the product or services is repeatable, and that the manufacturer has a clear product offering. This prohibits artists, who create a new product each time, and contract manufacturers, who provide custom services but not a standard product, from membership. It allows manufacturers who may purchase component parts like plastic 'blanks' from suppliers overseas and then include them in a manufactured product.

Measuring manufacturing by targeting the essential product transformation measures advances in innovation and intellectual
The City of San Francisco created Production, Distribution, and Repair (PDR), a new type of economic cluster, when it began its decade-long process to rethink industrial land. In 2002 the City categorized PDR entities using 296 sub-Standard Industrial Codes from 34 major industrial categories. These firms, they argued, provided products and services vital to San Francisco’s core economic sectors, and also provided stable, well-paying employment to residents with few other employment options. They estimated that PDR activities provided about 68,000 jobs citywide, or 11% of San Francisco’s total employment in 2002.^[199]

Zoning text describing the City’s PDR uses reads like an economic development brief, leaving PDR-zoned land open to other uses that share its core characteristics—providing affordable, flexible space for firms that cannot afford to otherwise locate in the city:

**SEC. 210.7. PDR DISTRICTS: PURPOSE.**

*These districts provide space for a wide variety of PDR (production, distribution and repair) and other non-residential activities in districts where these uses are free from inherent economic and operational competition and conflicts with housing, large office developments, and large-scale retail, which are not permitted in these districts. Other uses that share operational characteristics with PDR uses are permitted in these districts, as they require large flexible spaces and prefer separation from intensive housing districts. PDR-zoned land is also an important reservoir of space in San Francisco for new and evolving industry and activity types that cannot be foreseen today and cannot practically function or compete for space in a typical downtown office or neighborhood commercial environment. Business and activities allowed in PDR Districts generally share a need for flexible operating space that features large open interior spaces, high*
ceilings, freight loading docks and elevators, floors capable of bearing heavy loads, and large (often uncovered exterior) storage areas. These uses are often not ideally compatible with housing for operational reasons, including the need for significant trucking and delivery activities, 24-hour operation, and emission of noise, odors and vibrations. Importantly, PDR uses are limited in the amount of rent they can afford relative to office, retail, and residential uses, yet are important sectors of the City’s economy.

Another, similar framework for linking economic development impacts with land use is San Jose's employment lands initiative which framed land use decisions according to their impact on employment generation.200

Standard Industry Classifications

In the North American Industrial Classification System (NAICS), manufacturing is defined by its product output. The overall category of manufacturing (NAICS 31-33) is comprised of a set of 21 subsectors that range from textile mills to machinery manufacturing. However, many cities including New York, measure the entire industrial sector, which includes construction (NAICS 23), Wholesale Trade (NAICS 42), and Transportation and Warehousing (NAICS 48-49). This broader industrial classification recognizes the entire supply chain of manufacturing.

While NAICS codes are useful as a national barometer of industrial performance, it has some drawbacks for measurement: NAICS leaves out the wages of many highly paid engineers and managers who work in the separate headquarters and R&D centers of manufacturing companies. Among other things, this skews average manufacturing wages lower than they should be.

A new urban industrial land use classification: the ‘Maker’

An overview of the existing types of manufacturing classifications reveals five dominant types, ranging from firm type, neighbor-
DEFINING MANUFACTURING

TYPES OF FIRMS
Measured by industrial process. Helpful to understand building typology:
- Contract Manufacturers
- Logistics and Distribution
- ‘Advanced’ Manufacturing
- Consumer Products/Makers
- Food
- Building Supply and Construction

LAND USE
Measured by nuisance to neighbors. Helpful to measure scale of impact on city
- M-Zoned Land Use

ESSENTIAL PRODUCT TRANSFORMATION
Measures advances in innovation and intellectual property
- Manufacturers
- not artists
- not contract factories

ECONOMIC DEVELOPMENT IMPACT
Measured by jobs or multiplier effect. Helpful to measure impact on a city’s middle class and working class
- PDR Land Use
- Employment Lands

STANDARD INDUSTRY CLASSIFICATIONS
Measures economic impact
- Manufacturing NAICS 31-33 (North American Industrial Classification System)
- All Industrial NAICS (Construction 23, Manufacturing 31-33, Wholesale Trade 42, Transportation and Warehousing 48-49)
10. The Maker landuse type balances negative externalities of urban manufacturing with positive benefits.

hood nuisance, essential product transformation, economic development impact, and standard industry classifications. As we can see from the measurements or descriptions of each type, they each have a different utility and a different outcome. What is the best measurement tool for describing the type of urban manufacturers that locate in the Greenpoint Manufacturing and Design Center and the American Industrial Center?

Their core characteristics are that they provide positive economic development and placemaking benefits without the nuisance of other industrial sectors. This classification bridges the spatial methods of measurement (land use/types of firms) with the economic one (essential product transformation/economic development impact). I propose a new method of industrial land classification for the urban 'maker.' The 'maker' is characterized by two essential parameters: an entity that 'makes' something, but whose byproducts do not cause an undue nuisance to its neighbors. Although it is beyond the scope of this exercise to define this new manufacturing type exactly, these parameters describe firms that make things, but that don't cause a disturbance in a mixed use neighborhood.

The first characteristic borrows from SFMade's definition of a manufacturer as a firm that completes an essential product transformation. The Maker definition expands to include subcontractors that assist in the physical product transformation, including industrial supply chain actors.

The second characteristic refines the existing practice of performance standards for a mixed-use environment. Currently, every type of manufacturer must comply with performance standards in order to operate in an M-zone in New York City, and many cities around the country, for example. The new land use type would be a conditional or as-of-right use compatible with a broad spectrum of different dominant uses, from residential to commercial. Essentially operating as a sort of flexible accessory use for 'making,' the Maker landuse code would encourage mixed use manufacturing in neighborhoods. This definition would embrace artists, artisans, contract
manufacturers, and exclude other segments of the industrial economy that don't contribute to positive economic development and land use goals, such as warehousing and logistics.

Some governments have already developed similar standards such as the "non-disturbing craft" and "non-disturbing industry" classifications used in German zoning codes. Like the German system described in more depth in the final chapter of this paper, the 'Maker' would be allowed as-of-right in some use districts and by conditional use in other districts.

6.3 Recommendations and tools for supporting manufacturers and implementing urban making elsewhere

My final suggestions for the important takeaways from my two case studies flow directly from their key characteristics. The key characteristics of both GMDC and AIC are that they are on the periphery of a mixed use neighborhood that is in balance between its industrial history and contemporary development pressures, they are both an adaptive reuse of an antique industrial building, they are both

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</table>
run by benevolent landlords who relied on luck, passion, cheap land, and a mission that supports manufacturing, and they exhibit a mix of ‘old’ and ‘new’ types of production firms, a function of the City’s demands for manufactured products, and its supply of skilled labor and brand value.

The tools for replicating these conditions are highly conditional, and purposely broad. Each city has a different demand for industrial space, a different land portfolio, and different development and policy regulations that make replication of these case studies impossible. However, four primary tools derived from key characteristics of my case studies can help guide other planners to thinking about how to replicate the urban industrial phenomenon.

Recommendation 1. ZONING CONTROLS ARE ESSENTIAL FOR SECURING SPACE AND AFFORDABILITY

Without its location in an Industrial Business Zone, GMDC would most likely not exist in its current form. Although the non-profit entity that runs the building is bound by a charter to support manufacturers, there has been interest on the part of the tenants at certain points to buy the building from GMDC and sell the space for a condo redevelopment. Being within the IBZ is one control against this fate.

Similarly, in San Francisco, without the PDR rezoning, most industrial land in the Eastern Neighborhoods would be gone, although it is an open question whether the Markoulis family would have changed the way they run the building if industrial zoning controls were not in place.

These case studies underscore the importance of zoning regulations to suppress land value and make industrial buildings affordable for manufacturers, keeping them, their workers, and their services in the city. San Francisco shows us that making space for industry is not a zero-sum game pitting manufacturers and higher-value landuses against each other but rather an acknowledgement that the two exist in symbiosis.

Recommendation 2. INCORPORATE INDUSTRIAL USES IN MIXED USE NEIGHBORHOODS

Mixed use neighborhoods

The American Industrial Center and the Greenpoint Manufacturing and Design Center are integrated into residential neighbor-
hoods and demonstrate that high-density industrial uses can mix with other uses in-building and in-neighborhood. Each facility mixes uses within its building by hosting successful ground floor retail and restaurant uses with upper-floor offices and industrial use.

Mixing uses is a central tenant of leading urban design ideals of smart growth and new urbanism. Proponents say mixing uses can restore urban vibrancy, increase social interaction, enrich civic life, benefit efficiency by optimizing use and infrastructure, increase equity by providing a variety of housing options and better access to services for different income groups, and increase sustainability by reducing the consumption of land and the need for cars. However, with the exception of San Francisco, most American mixed use planning does not incorporate industry. Contemporary planning does have several tools to support mixed use planning, including planned unit developments, special districts, form-based zoning, and spot-zoning, which has been declared illegal by many courts for disobeying master plans. However, each of these tools paint mixed use as an exception rather than a norm.

**Lesson: Large buildings can generate their own mixed-use nature**

The AIC shows that even the most enormous, unaesthetic, most pedestrian unfriendly building can enhance a mixed-use environment if it is special enough. In the case of the AIC, its vibrancy as an activity center overshadows its unappealing design. Jeff Rosenblum developers industrial properties in New York, including the newly redeveloped Pfizer building.269 He notes that when creative buildings reach a certain scale they take on a life of their own and become neighborhood centers: “We have found when you get to a certain scale, around 200-300,000 square footage, with the tenants alone, even if your building is an island, and there is no one around, it’s enough to create that vibrancy.”270

These case studies also demonstrate that high-density industrial uses can exist in close proximity with residential, commercial, and office uses, with the right buffers. Both facilities take up an entire block and are separated from other buildings by a road, which minimizes their impact on adjacent uses. They demonstrate that for industry, being blocked by a highway can be a boon. While most land uses bemoan the closeness of a major highway, the fact that the American Industrial Center is tucked away in a corner by a highway is an advantage. Tenants say their access to regional markets is excellent because their trucks have to traverse minimal local roads. With the light rail on 3rd Street, the highway overpass does not impede transit access or walkability. In New York, the Pulaski Bridge overpass buffers GMDC from heavy industry, and provides tenants quick access to New York City.
Lesson: Trust Planners

Giving planners the resources they need to zone the city with a fine grain also means having faith in regulation: although governments can miss cycles, they can still make good decisions. For example, although San Francisco’s industrial rezoning policy missed a market cycle, their work is just now being put into place after being tweaked in the interim years. Public processes are not agile, especially in discursive and pluralistic settings where they are slow to respond. However, the important lesson for this context is that planners and the public sector will respond to civic needs eventually, and with the necessary tools. Sometimes the only time they are able to push through legislation is during a crisis, a central tool for passing the 2009 rezoning legislation in San Francisco.271

12. In German zoning, non-disturbing industry is allowed to co-exist with many more land use types

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Lessons from the German zoning code

Germany's method of zoning for mixed use holds lessons for American planners, allowing them to see what might be possible if we loosened and expanded our definition of manufacturing. In Sonia Hirst's comparative analysis between German and American zoning practices, she demonstrates that although German and American zoning systems have the same zoning classifications of commercial, residential, industrial, and so on, Germany's code allows for so many different types of uses as-of-right and with conditional use that their planning code essentially guarantees for a mixture of uses, whereas American zoning practices enforce a rigid use separation. This zoning practice, she demonstrates, allows for mixed use neighborhoods that allow bakeries, workshops, and other commercial and institutions.

In Germany, industrial uses are allowed in mixed-use neighborhoods through the conditional use of what they call 'non-disturbing industry' and 'non-disturbing craft.' Non-disturbing craft uses are allowed as-of-right in small scale residentially-zoned areas, and non-disturbing industry is allowed with conditional use. Both are allowed with conditional use in a so-called exclusively residential area as the chart on this page indicates.

"Non-disturbing" indicates activities meet standards for industrial emissions, vibrations, and noise for each residential class listed in the federal land use statute called the BauNVO. Planning codes in New York and San Francisco also use performance standards to define what industrial activities can happen where, but in these cases, performance standards apply to industry occurring only in industrially-zoned land, not within differently-zoned land areas.

Germany's flexible code system is reinforced by how it is applied on the ground. Hirt shows that instead of a citywide master plan often used in the American planning context, German planners code for small groups of blocks at a time. The typical German city has hundreds of these Bebauungsplan or B-plans. Hirst writes, "Under the German approach each city block may end up in a different land use category, and this is conducive to a much more fine-grained diversity of uses." This fine-grain approach is called spot-zoning in the American context, which is illegal, but as Hirst points out "From this viewpoint, European cities are all spots."

The German example demonstrates how American planners might work with existing tools to achieve more mixed-use results. Zoning districts, as-of-right regulation, conditional use, performance standards, and area plans all exist within the American planning lexicon. I would also add to Hirst's example that accessory use is another tool planners use to allow non-dominant uses to exist within an area.

Combining a 'maker' landuse type that complies with 'essential product transformation' and appropriate performance standards
using relaxed as-of-right, conditional, and accessory use is one way to encourage ‘makers’ to enhance cities in the way they do in Greenpoint and the Dogpatch. The process of small area plans outlined in Hirst’s research is remarkably similar to local planning practices already in effect in New York City, San Francisco and elsewhere. However, these plans are hamstrung by a restrictive zoning system that prohibits mixed use except in special districts.

Planners should take note of the German system of looser as-of-right, conditional, and accessory uses for nondisturbing industries, and advocate for more flexibility in area plans to encourage makers and manufacturers that enhance cities and neighborhoods.

Recommendation 3. ADAPTIVE REUSE

Both cases are multi-story industrial buildings thrive in mixed use neighborhoods by repurposing abandoned vertical factories for an emerging class of manufacturer. This adaptive re-use preserves existing building stock, demonstrates the adaptability of vertical factories, and highlights their appropriateness for 21st century manufacturing. As Greg Markoulis said, “You don’t make money when you sell the building, you make money when you buy the building. And we bought cheap.” Similar projects such as Pier 70 who build from the ground up either have to set high rents or heavily subsidize industrial space with high-rent office and residential uses. Salvaging antique building stock is economical and also serves the needs of young manufacturers.

With growing ranks of designers and ‘makers’ hoping to scale their products through open source tools and crowdsourcing platforms, small, flexible space, and shared knowledge of how to scale manufacturing will become more important. However, many entrepreneurs lack the knowledge to build manufacturing companies. Kate Sofis expressed her frustration at many ‘makers’ lack of understanding of the complexities of manufacturing and technology. “You can use 15 pieces of equipment at TechShop, get it funded on Kickstarter and pre-sell 100 units, and then they come to me asking how they can source a factory that will make it for $1? Yeah right.” Space for firms to co-locate with other like-minded entrepreneurs is important for continued innovation in this growing field.

In a way, recommending the adaptive reuse of antique industrial buildings is a perfect vehicle for supporting an emerging sector - and it is inevitable. Research shows much of the U.S. re-industrialization will be urban and in the form of small firms. Small urban firms can locate in large multi-tenant buildings where they benefit from synergies, as does the public realm of the neighborhood which is activated by the uses from these buildings. Multi-story, multi-tenant urban manufacturing facilities in mixed-use buildings benefit individuals, neighborhoods, and the city at large.
4. BENEVOLENT DEVELOPERS

GMDC and AIC are both successful in part because their founders bought in early, buying their buildings at little or no expense. Because of this, GMDC and the Markoulis family are able to charge below-market rents and still make a profit. These cases also demonstrate that multiple ownership models, from nonprofit to private market, can produce a thriving, successful manufacturing hub.

In many situations, the city has the opportunity to be this benevolent developer, as the owner of vast areas of underutilized port properties.

Although New York and San Francisco lack a strong development community for industrial lands, it is foreseeable that developers may become more interested in the future. Cities have been de-industrializing for decades while an interest in small-scale artisanal manufacturing is growing. The laws of economics predict that high demand and low supply means that developing industrial real estate can be a profitable endeavor, especially when using existing building stock. Jeff Rosenblum at Acumen indicated he didn’t understand why his specialized industrial development market niche does not have more competition - perhaps it should.

5. COORDINATING ENTITY CONNECTED TO THE CITY

Using SFMade as the pit stop for all things industrial has been a successful strategy for San Francisco. SFMade is at once a nonprofit, a brand, and an arm of the city. The city likes them because they are efficient in delivering services to the sector. The manufacturers, notoriously wary of political involvement, like them because they see them as independent. Consumers like them because of the strength of their branding. Because of this amorphous quality, SFMade has incredible flexibility and political reach.

According to SFMade, there is ideal political alignment within the city. "I love this city right now," says Kate Sofis, "As for the current mayor, I couldn’t wish for anything better." The current mayor is the son of Chinese immigrants and believes in the importance of manufacturing in the city. With his support, manufacturing has been central to city conversations around economic development and other important conversations. And the support is not just lip service. SFMade has a line item in the city’s budget, and manufacturers are eligible for the City’s innovation loan fund (something New York cannot boast about).

Additionally, veterans of the Eastern Neighborhoods rezoning process are rising the ranks and hold prominent positions within the Mayor’s Office of Economic and Workforce Development, SF's
equivalent to NYC’s Economic Development Corporation. Clearly the culture shift around manufacturing in San Francisco has not only infiltrated the consumer market, but the regulators as well - in part because of the role of a coordinating entity connected to the City like SFMade.

Entities such as SFMade also have opportunities to change cultural assumptions about manufacturing, which could have profound impacts on the sector nationwide.

One way to do this is to incorporate manufacturing into growing language about ‘innovation’ by supporting manufacturing’s inclusion in proliferating ‘innovation districts’ around the country, and allowing them to apply for earmarked ‘innovation’ competitive grants. San Francisco allows manufacturers to participate in competitive grant pools meant to support ‘innovation.’ New York excludes manufacturing from such grant pools. Incorporating manufacturing into innovation language would reflect the 21st century character of manufacturing.

6. TIE MANUFACTURING TO ARTS AND CULTURE

Similarly, Creative Placemaking as a urban design and federal funding lens is gaining traction. As described in this paper, mixed use industrial urbanism satisfies Creative Placemaking’s two primary emphases: economic development and the development of a high quality public realm. With the excitement around 3D printing and bespoke entrepreneurship, urban manufacturing hubs will only become more important ‘placemakers.’ Relatedly, factory design that enhances the legibility of interior production processes such as the Volkswagen Transparent Factory in Dresden would help update manufacturing’s image. Creative Placemaking proponents should add urban manufacturing to their repertoire.

6.4 Research Brief

Topics relating to the way manufacturing spatializes today are under-researched and under-theorized, as this report points out. There is much to learn and much to be uncovered about the way manufacturing firms are changing in response to global economics and emerging technologies. Similarly, there is much still to understand about the way manufacturing exists in mixed-use neighborhoods. The following research topics would greatly enhance knowledge in the field.

Urban Manufacturing Supply Chains

Supply chains of sub-contractors emerged in this study as a critical resource for urban manufacturers. An entire supply chain, from mineral extraction to product packaging, is long, expensive, and
complicated. Yet manufactures and procurement professionals make decisions about where to source their products and site their production and other activities every day. As we consider what parts of this supply chain we locate in the United States, and which ones to site in urban areas, more research is necessary to understand what makes sense to locate in the United States and in cities.\textsuperscript{280} The recent \textit{Production in the Innovation Economy} report found holes in the industrial ecosystem to be "the single most challenging obstacle to creating and sustaining production capabilities in the United States that enable innovation to come to market."\textsuperscript{281}

Mapping these supply chains can be difficult in part because subcontractors do not want to take on young and inexperienced clients. Sofis says many of San Francisco's garment manufacturers don't maintain a website, in part "because they don't want a bunch of yahoos calling them out of the blue."\textsuperscript{282} She says repairing these frayed supply chains is critical to achieve economic development goals. "If you want to capture more of the job growth, you have to also need to make sure you the contract manufacturing capacity because so many of these guys don't want to do it themselves. And if you don't have the contract manufacturing capacity, and they don't want to do it themselves, then you're going to lose out on the job potential."

\textit{Tenant surveys}

It is clear from existing studies that the firms that make up industrial sectors vary widely in their preferences. For example, tenant profiles in this report highlighted divergent location preferences. Mark Davis Jewelry preferred to locate away from the traditional Manhattan jewelry hub in order to be close to skilled labor. Tom Borden of Intrinsic Devices preferred to locate in a neighborhood that aligned with his lifestyle. This research shows that, in some cases, manufacturers prefer proximity to urban amenities over proximity to clients or suppliers. Although my case studies mentioned collaborating with other tenants and some derived benefits from co-location, others suggested that the traditional notion of clusters was not relevant to them. This highlights that manufactures, especially startup firms, may be as 'footloose' as other types of service firms, attracted to lifestyle amenities as much as to affordable space.

Understanding more about the type of manufacturer that needs to be in cities, and their unique needs, would help planners and advocates develop appropriate building stock, training programs for workers, and targeting subsidies and other financial support systems. Additionally, it is unclear whether the much-talked-about skills gap applies to the types of manufacturers that locate in cities.
Urban design research into industrial nuisance loading dock activities

This report predicts that if manufacturing is to proliferate in our cities, it will become more integrated into our mixed use neighborhoods. There is still much to be learned about the interrelationships between contemporary manufacturing centers and other types of land use. An analysis of the loading dock requirements in mixed use development will require more research into adjacencies.

Additionally, as this report points out, performance standards are crucial for determining what types of industry are compatible with different uses. More research into what those appropriate mixed-use performance standard levels are and what production types are compatible with other uses, is important for crafting the nuanced and sensitive land use policy that will create successful industrial mixed-use neighborhoods.

Recycling technology

Industrial ecologists are eagerly mapping waste input and output cycles in order to match companies whose waste output, such as scrap metal, could be another companies’ input, dramatically reducing the waste from the production cycle. As recycling technologies improve and become less noxious, and as raw materials derived from the earth become more scarce, cities themselves may become the primary location of raw materials. We currently think of urban manufacturing as being far away from raw materials, but this future dynamic might encourage manufacturers to locate in cities to be close to their primary material flows. Urban manufacturing would benefit from more research into industrial ecology, matching waste flows, and other related research.

Ideal Development Partners

Lessons from both case studies teach us that having the right development partner is crucial for the success of any industrial development project. From nonprofits to government entities to the private sector, many different types of developers are suitable for industrial space development. Nonprofits like Dudley Street Neighborhood Initiative as well as developer ArtSpace are mission-bound to serve communities, have access to special grant resources and ‘patient capital,’ and avoid certain development fees, making them an attractive option for a development partner. Private sector developers have a higher cost of capital and are bound by a need to make a return for their investors, but have easier access to capital and have a larger pool to make building repairs, as evidenced in the state-of-the-art facility of the AIC as compared to the GMDC, which is in need of repairs. A government actor would have unique access to publicly owned land and funds. San Francisco is talking seriously about creating an industrial land trust that would own and operate industrial space within

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city-owned parcels such as hotly contested port properties. More research into the pro’s and con’s of different development partners is necessary.

**What is the importance of 3D printing?**

One of the primary drivers of future urban manufacturing trends will be the improvement of 3D printing technologies. As has been widely remarked, 3D printing technology exists now primarily as a rapid prototyping tool, not as a mass production technique. However, as technologies improve, 3D printing could dramatically reduce raw materials consumption, inventory, and many other resource-intensive practices associated with manufacturing. The result on cities would be to dramatically shrink the space needed for production.

Devotees of 3D printing also see it as a way to fundamentally alter the relationship between consumers and their products. People like Production in the Innovation Economy are predicting manufacturing will transition to a “pull”-based supply chain that calls materials on-demand, instead of a push-based supply chain. The ways this could affect consumer society could be profound: imagine 3D printing children’s toys built as needed. Adam Friedman thinks the maker movement is inspiring a less consumer oriented society. “We can now make something ourselves. So, if you want something, you make it, rather than being told you want. It changes consumer society into a pull rather than a push.” More research into the trajectory of this technology and its application will help predict manufacturing trends.

**Sociological impact**

Finally, much has been written about the sociopolitical impact of the loss of America’s factory base. How can you have a revolution without any factory workers? As these jobs come back to the United States, and back into our cities, how will a greater awareness of the value of making physical objects affect our politics? Will the unions that were so important to America’s 20th Century manufacturing base regain their former stature? Will a rise in high skill factory labor create a greater solidarity between working class people and others? Understanding the sociopolitical impact of a growing middle class is important.

**6.5 The Time is Now**

Industrial historian Thomas Cochran argues that American manufacturing grew up in the early colonies because of several cultural traits, “The compelling urge to do things with less human work, the open reception to new immigration, a younger and more venturesome population, a favorable legal and fiscal environment for entrepreneurs.” Many of these characteristics about our country are true again (except, regrettably, immigration), and point to fertile
ground for an urban manufacturing resurgence.

As San Francisco, New York, and other cities around the country reconsider their industrial property (much of it port property) many of the lessons here are imminently applicable. San Francisco’s Hunters Point and Pier 70 are making space for manufacturers.

New York in particular is equipped with a number of developers interested in multi-tenant, mixed-use properties. In New York, Sunset Park’s Industry City is transitioning away from heavy industry and small-scale industry is growing on Atlantic Avenue. Long Island City and the East Brooklyn IBZ also hold great promise for developing more space for manufacturers. In addition to GMDC, the Brooklyn Navy Yards continue to develop their site, Acumen Capital Partners is developing a former Pfizer factory building in Bedford Stuyvesant, the Old American Can Factory is a home for small manufacturing in Gowanus, and Jonathan Butler of Brownstoner blog fame is developing a food incubator on Atlantic Avenue. Because of a perfect storm of real estate dynamics, available building stock, and a growing market of small manufacturers, more mixed-use facilities will be developed in the coming years.

Lessons from this report help frame the urban manufacturing phenomenon for planners, developers, and advocates alike. Although this research is based in hot-market cities, many findings and recommendations apply to low-market cities also struggling with questions of how to capture the value of urban manufacturing for their cities.

This report offers a narrative that mixed-use industrial neighborhoods are an appropriate place to locate manufacturing in our re-industrializing cities, and points to some key characteristics of successful urban ‘maker’ hubs. Not all manufacturing can abut other uses, but when it does it creates a vibrant public realm that enhances the image of manufacturing. Sensitive mixed-use zoning reveals the nature of contemporary manufacturing to the public: manufacturing is an economic driver filled with creative men and women producing innovative, tangible products, not a sooty smokestack industry. Urban manufacturing may indeed be the next iteration of the creative class, a group of people courted by cities because of their economic impact.

Kevin Lynch wrote that effective policy connects to our deepest needs. It may be that the dematerialization of our economy and the transition from a goods-based economy to a securities-based economy has warped our understanding of value creation. I believe we have a deep need to see where things are made, and to live amongst that making. Bringing manufacturing back into our cities through sensitive, mixed-use zoning connects people to the process of making, in turn making manufacturing more viable to individuals as a career choice, and awakening policy professionals to manufacturing as a vital element of the contemporary creative city.
APPENDIX A:
ENDNOTES

CHAPTER ONE

1 Henderson, 2008
2 Gillin, 2012
3 Prud'homme, January 10, 1999
4 Prud'homme, January 10, 1999
5 Huff, 2012
6 GMDC, 2011
7 NYT Room for Debate, August 4, 2011
8 Manufacturing Institute, November 2012. (11.7 million jobs directly within manufacturing and 5.8 million jobs in sectors such as professional services (accounting, legal, consulting, etc.), wholesaling, transportation, agriculture and F.I.R.E. (finance, insurance and real estate)) Figure from 2011.
9 The Economist, January 19, 2013
10 The Economist, January 19, 2013
11 The Economist, January 19, 2013
12 The Economist, January 19, 2013
13 Manufacturing Institute, November 2012. Manufacturing is driving productivity growth in the U.S. economy, increasing at two and half times the rate of the service sector
14 Thompson, December 17, 2012
15 NYT Room for Debate, August 4, 2011
16 Fishman, December 2012.
17 http://www.reshorenow.org/
18 The Economist, January 19, 2013
19 Boston Consulting Group, May 5, 2011,
20 Fishman, December 2012.
21 Fishman, December 2012.
22 Craytor, 2012
23 Manufacturing Institute, November 2012. P6
24 Sassen, 2009
25 Sassen, 2009
26 Sassen, November 1, 2009
27 as quoted in A. Markusen and A. Gadwa, 2010, P 8
28 Muro, February 13, 2013
30 Reynolds, personal interview
31 For authors who write on this topic, see footnote 29

CHAPTER TWO

32 Davidoff, 1965
33 Friedman, personal interview
34 Lewis, 2002
35 Community Board 1, Spring 2002
36 Reiss, 1990,Yarrow, August 21, 1991
37 Wolf-Powers, June 1, 2005
38 Community Board 1, Spring 2002
39 The inclusionary zoning provision is among the most ambitious in the nation, with. In order to build to the maximum height of roughly 30 or 40 stories, developers must keep at least 20 percent of the homes affordable to low- and middle-income New Yorkers. Cardwell, May 3, 2005
40 Community Board 1, Spring 2002
41 Community Board 1, Spring 2002.
42 Community Board 1, Spring 2002, p32
43 Community Board 1, Spring 2002
44 The City of New York, 2007
45 Marrella, personal interview
46 The original rezoning passed in May 2005, and was slightly amended in March 2006
47 The City of New York Department of City Planning, May 2005
The plan also incentivized badly-needed waterfront parks and low-income housing.

Jacobs, April 15, 2005

Cardwell, January 15, 2005

Pratt Center, 2009, p 3

“Industrial Business Zones,” NYCEDC

“Industrial Business Zones,” NYCEDC. Tax credit capped at $100,000.

To this end, the Pratt Center recently released a study advocating for the city ownership of industrial land to ensure stability using the Brooklyn Navy Yard as an example.

Lueck, December 24, 1996


Some exceptions to these as-of-right regulations, such as breweries, and other details listed on the DCP website.

Craytor, Garretson, personal interviews

Craytor, 2012, quoting 2010 Industrial Survey results and Industrial Roundtables

Craytor, 2012

Craytor, 2012, statistic excludes the financial services sector

Pratt Center, 2009

Craytor, personal interview, data from County Business Patterns 2010

Garretson, personal interview

Craytor, 2012


Craytor, 2012

Prud’homme, January 10, 1999

Ipsen, 2002

Prud’homme, January 10, 1999

Prud’homme, January 10, 1999 In the end, their renovation costs were closer to $8 million, spread out over four years.

Prud’homme, January 10, 1999

Garretson and Friedman, personal interviews

www.loopnet.com

Personal interview CUT

2011 GMDC Tenant Survey

All information for tenant profiles come from personal interviews and studio tours performed by the author.

Coleman, personal interview

as of 2010

www.Brownstoner.org, December 1, 2012

This pressure came from within as well, when a group of tenants tried to raise the capital necessary to buy the building back from GMDC in order to flip the building and walk out with the proceeds. Their efforts failed.

Coleman, personal interview

personal experience with community organizations. GMDC hosts community events, and appears to be generally well-liked by politicians, community organizations, and neighbors alike.

This pressure came from within as well, when a group of tenants tried to raise the capital necessary to buy the building back from GMDC in order to flip the building and walk out with the proceeds. Their efforts failed.

To give a sense of how much more financially complicated their projects have become, the financing for their McKibbin Street building, a roughly $18 million project, was roughly $5 million New Market Tax Credit, $5.5 million hard debt, and $4.5 million subsidy.

coleman, personal interview


Kerr; August 2, 2012

Coleman, personal Interview

GMDC hosts community events, and appears to be generally well-liked by politicians, community organizations, and neighbors alike.

This pressure came from within as well, when a group of tenants tried to raise the capital necessary to buy the building back from GMDC in order to flip the building and walk out with the proceeds. Their efforts failed.

Coleman, personal interview

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Personal interview CUT

2011 GMDC Tenant Survey

All information for tenant profiles come from personal interviews and studio tours performed by the author.

Coleman, personal interview
CHAPTER THREE

105 San Francisco Planning Department, December 2008
106 Selna, February 7, 2010
107 Henderson, August 2008
108 San Francisco Planning Department, December 2008
110 Selna, October 9, 2008
111 San Francisco Planning Department, July 30, 2002. Industrially-zoned space made up 12% of the city, but omitting 600 acres (the equivalent of 7%) of already-programmed mixed use housing developments, the correct figure of useable industrial space is 4.5%
112 San Francisco Planning Department, July 30, 2002.
113 Scared that other uses would be crowded out because of the high demand for office space, San Francisco enacted Prop M in 1986 to limit the amount of office space using an annual quota. Although Prop M tempered the decline of manufacturing space, until the late 90s the City did little to actively protect the industrial uses that were being pushed out. Prop M limits office space to 800,000 square feet per year, which can roll over if not used. This is a problem for a building like AIC because within this provision is an article that prohibits more than 25,000 square feet of office to be built in any single building, an issue for a 800,000 complex like AIC. AIC, gracefully, because of their involvement in the political process, was awarded a zoning overlay that allows them to have as many offices as they wish on the upper floors. For more information on Prop M see the SPUR article www.spur.org/publications/library/article/propositionM07011999
115 Selna, February 19, 2010
116 Selna, October 9, 2008
119 San Francisco Planning Department, December 2008
120 San Francisco Planning Department, December 2008
121 Office of the Controller, October 7, 2008
122 San Francisco Planning Department, July 30, 2002. Living wage in 2002 was over $11 per hour
123 San Francisco Planning Department, December 2008
124 Office of the Controller, October 7, 2008
125 Office of the Controller, October 7, 2008
126 Office of the Controller, October 7, 2008
127 Lau, personal interview
128 Before, the Board of Supervisors was elected at-large
129 Office of the Controller, October 7, 2008
130 New housing as part of the plan had greater affordability requirements than elsewhere in the city. Estimates project between 7,500-10,000 new housing units could be completed by 2020, with an inclusionary housing ordinance that requires that market-rate developments larger than five units provide 15-20% of their units affordable (see economic impact report, 2008).
131 The Eastern Neighborhoods Plan also expanded affordable housing offerings substantially and increased development impact fees. This is not addressed in this report as it is outside the scope.
132 Sofis, personal interview
133 Economic and Planning Systems, April 15, 2005. For a detailed analysis of building type required by each PDR sub-sector see this report.
134 Sofis, personal interview
136 SFMade has their own definition of manufacturing which privileges consumer products. This means that employment in the manufacturing sector is much higher than their membership. Their define manufacturers as people who have a standardized product and whose “essential product transformation” happens in San Francisco. This does not count contract manufacturers, for example, who are an essential component of the industrial ecosystem.
137 Sofis, personal interview.
138 SFMade, 2011 State of Local Manufacturing Report, 2011. Manufacturing grew by 94 new positions at 75 companies during the organization's

Endnotes
first year.

140 Sofis, personal interview
141 Technically, only companies whose 'essential product transformation' occurs in San Francisco can use the SFMade logo on their products.
142 Selna, February 19, 2010
143 Selna, February 19, 2010
144 Sofis, Personal Interview
145 San Francisco Planning Department, July 2002
147 Economic and Planning Systems, April 15, 2005.
148 Markoulis, personal interview.
149 Markoulis, personal interview. All quotes from Markoulis from personal interview.
150 Markoulis, personal interview.
151 Chapple, 1998
152 Colliver, September 5, 1999
153 Although they have a large share of photography studios, these tenants rent very small spaces.
154 He advocated for and received a special zoning overlay that allows him to rent as much office space as he wishes in his upper floors, an act prohibited by Prop M.
155 Markoulis, personal interview.
156 Markoulis, personal interview.
157 Hershey eventually decided to close the company's operations, but Schmidt's growth is a testament to AIC's ability incubate talent.
158 Markoulis, personal interview.
159 Naylor, personal interview
160 Naylor, personal interview
161 San Francisco Planning Department, Central Waterfront Area Plan (Final Adopted Plan), December 2008.
162 Just to the north of the Dogpatch is Mission Bay, a 25-year old plan to redevelop the City's old rail yards that is in development now. The majority of San Francisco's recent big-ticket developments are in Mission Bay including a new baseball stadium, a UC San Francisco campus, as well as a biotech incubator. The neighborhood bills itself as a center for science and innovation and is home to 40 life science companies including Pfizer. Planners anticipate 4,000 units of new housing in the next five years and 25-30,000 new residents in the area in the near future.

163 San Francisco Planning Department, Central Waterfront Area Plan (Final Adopted Plan), December 2008. They also consider roadways on the central waterfront to be an essential multi-modal resource and a public open space to be shared between pedestrians, auto traffic, as well as PDR-related delivery vehicles. The plan also calls for the city to reclaim several of the under-used right-of-ways that have been abandoned or incorporated into private parcels (several roads that lead to the waterfront for example).
164 San Francisco Planning Department, December 2008
165 Selna, February 7, 2010
166 http://www.thebolditalic.com/events/5591-2nd-annual-3rd-base-microhood
167 Naylor, personal interview
168 Markoulis, personal interview
169 http://www.engadget.com/
170 Buckley, personal Interview

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171 Mistry and Byron, April 2011. p 24
172 Mistry and Byron, April 2011
173 Pratt Center, 2009
174 Sassen, 2009. Representative sample of 1,000 Americans across 50 states. Margin of error +/- 3%
175 Garretson, personal interview
178 Coleman, personal interview
180 Paul, Nov 10, 2011, Detroit, MI
181 Personal Interview
182 Friedman, personal Interview
183 Garretson, personal Interview
184 Craytor, personal interview
185 Pratt Center, April 16, 2009
187 Categories from personal interview with Sara Garretson
188 Sofis, Personal Interview
189 Porter, 2008
190 Helper, Susan, Timothy Krueger, and Howard Wial, April 2012.
191 Florida, November 5, 2012
192 Miquela Craytor, personal interview
193 Fallows, December 2012
194 Some, such as Western Massachusetts’ "hidden tech" community are organizing to provide themselves with more space. http://www.western-massedc.com/boston_area_industrial_clusters/hiddentech/
195 Coleman, personal interview
196 Rosenblum, personal interview
197 The City of New York. Zoning Resolution.
199 San Francisco Planning Department, 2002
200 City of San Jose, 2007
201 Hirt, 2007
202 Stanford, 1958 p 8
203 Lewis, 2002
204 Lewis, 2002
205 Sanford, 58 p 2
206 Sanford, 58 p 15, Cochran, 95, p.325
207 As quoted in Sanford, 1958, p 14
208 Cochran, 1995
209 Fischler, 1998
210 San Francisco Planning Department, July 2002, P 18
211 Lewis, 585, 2004
212 Production in the Innovation Economy, February 22, 2013
214 Castells, 1989
215 Sassen, 1991
216 Sassen, 2009. Services were growing as a share of the American economy in the late 20th century: the gross output of finance, insurance, real estate (FIRE) overall grew by 7.6% from 1999-2003 nearly double the 4.1% growth rate of US economy in those years
217 Theories of the post-industrial city were powerful and include the experience economy (Pine, 1998), event cities, and

other literature.
218 NYT Room for Debate. August 4, 2011.
219 Manufacturing Institute, November 2012. Hourly: In December 2011, manufacturing employers paid $32.93 per hour in wages and benefits, while all employers in the economy paid about $30.44 per hour, meaning that there is an 8 percent premium for working in manufacturing.”
220 Helper, Susan, Timothy Krueger, and Howard Wial, April 2012. Pg 4
221 Helper, Susan, Timothy Krueger, and Howard Wial, April 2012. P 3
222 Helper, Susan, Timothy Krueger, and Howard Wial, April 2012. P 5
223 Helper, Susan, Timothy Krueger, and Howard Wial, April 2012. P 32
225 Adam Davidson, November 20, 2012
226 National Association of Manufacturers, May 3, 2012
227 “In July, the state’s Community College System was awarded a $19.9 million grant through the U.S. Department of Labor, Employment and Training Division to develop and deliver job training programs in cooperation with employers in the advanced manufacturing sectors.” Dave Solomon, “Advanced Manufacturing Turning to Community College System for Workers,” New Hampshire Union Leader, September 29, 2012, http://www.unionleader.com/article/20120930/NEWS02/709309974.
229 Markusen and Gadwa, 2010
230 Story, December 1, 2012
231 San Francisco Planning Department, July 2002. P 27
232 Manufacturing Institute, November 2012. P 3
234 Helper, Susan, Timothy Krueger, and Howard Wial, April 2012. P 6
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Lynch, 1984. P 70

Prud'homme, January 10, 1999

http://nocdn.org/ the Naturally Occurring Cultural Districts work-

ing group meets to develop policies to support culture in neighborhoods. They had their inaugural meeting at the Greenpoint Manufacturing and Design Center.

Kayser, March 27, 2012

Rosenblum, personal interview


Sofis, Personal Interview

Hirt, 2007

See also (Hirt, 2012)

There are further examples of how land uses are classified. S. Hirst points to Serbia, in which state statutes categorize land use districts (including residential ones) based on their predominant use.

Hirt, 2007

Markoulis, personal interview

In 2007, there are further examples of how land uses are classified. S. Hirst points to Serbia, in which state statutes categorize land use districts (including residential ones) based on their predominant use.

Sofis, personal interview

Hirt, 2007

Sofis, personal interview

Markoulis, personal interview


Sofis, personal interview

Sofis, personal interview


APPENDIX B:
INTERVIEW LIST

New York Experts
Caron Atlas, Naturally Occurring Cultural Districts, 4.2.13, phone interview
Brian Coleman, Chief Executive Officer, Greenpoint Manufacturing and Design Center, 1.10.13
Miquela Craytor, Director of Industrial Initiatives, EDC, 3.14.13
Adam Friedman, Director, Pratt Center, 2.29.13
Sarah Garretson, President, Industrial and Technology Assistance Corporation, 3.15.13
Michael Marello, Director of Waterfront and Open Space Planning, NYC Department of City Planning, 3.14.13
Nina Rappaport, Vertical Urban Factory, 3.15.13

New York Manufacturers
Marty Chafkin, Perfection Electrics, 3.14.13
Mark Davis, Bakelite Jeweler, 3.1.13
Francisco Useche, Irica Metal Spinning, 3.1.13
Ted Ullrich, TomorrowLab, industrial designer, 3.16.13

San Francisco Experts
Deborah Cullinan, Executive Director, Intersection for the Arts / 5M project, 1.17.13
Tiffany Garcia, Business Development Manager, Office of Economic and Workforce Development, 2.28.13, phone interview
Jon Lau, Project Manager, Office of Economic and Workforce Development, 1.17.13
Greg Markoulis, American Industrial Center developer

San Francisco Manufacturers
Tom Borden, Intrinsic Devices, 3.28.13
Patrick Buckley, Craig Dalton DoDoCase, 1.15.13
Mark Dwight, Founder & CEO, Rickshaw Bagworks, Inc, 1.16.13
Bree Hylkema, SF Fashion incubator/Vermeulen & co., 3.26.13
Tyler Kay, Bison SF/other company, 3.28.13
Chuck Siegel, Charles Chocolates, 1.15.12
Emily Sugihara, Baggu, 3.28.13

Cambridge
Edgar Blanco, Research Director, MIT Center for Transportation & Logistics, 2.27.13
Liz Reynolds, Executive Director, MIT industrial Performance Center, Production in the Innovation Economy, 3.7.13
Jason Rossitto, member, Artisan's Asylum hackerspace, 9.23.12

All interviews in person unless otherwise noted
28 interviews total

Interview list 139
APPENDIX C: WORKS CITED


144 THE RE-INDUSTRIAL CITY


http://www.resorenow.org/


Rich, Motoko. “Factories Ready to Hire, but Skilled Workers Scarce.”


———. Central Waterfront Area Plan (Final Adopted Plan), December 2008.


Seifel Consulting, UP Urban, Pfau-Long Architects for the San Fran-
cisco Planning Department. PDR Economic Analysis, December 2012.


