

Phase 5: Warm Springs Manufacturing Innovation Center Program Phasing Action Plan



View of Warm Springs BART station and pedestrian bridge from Innovation Way, looking east.¹

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¹ <https://fremont.gov/DocumentCenter/View/21074>

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1.0 Introduction

The following Program Phasing Plan is the culmination of 10 months of research and engagement with the Fremont community and builds on the vision originally put forward in 2010 when the city saved the Warm Springs/South Fremont area from becoming a rail yard.² The city's goal of turning the area into an innovation district is well on its way to becoming a reality and this report is one more step towards a plan to establish an innovation cultivator³ in the city.

As described in Team LACI's Phase 2 Gap Analysis, the San Francisco Bay Area is teeming with a robust mix of innovation organizations with a narrow focus on helping early stage companies thrive. The main gap is that there are few places for companies to go for manufacturing assistance, especially in scaling their technologies and businesses. In Phases 3 and 4,⁴ Team LACI recommended creating the Warm Springs Manufacturing Innovation Center (Center) that provides learning, advisory services, thought leadership, events, and ecosystem activation around manufacturing in the sectors of medical technology⁵ and cleantech.⁶ To facilitate the development of a Program Phasing Plan in Phase 5 (Plan), Team LACI held a CEO roundtable to vet and prioritize their programming ideas.⁷ This Plan compiles, prioritizes, and provides a framework for the scale-up manufacturing activities of the Center, and also recommends strategic organizational practices.

In pure Silicon Valley fashion, the recommended organizational strategies encourage strong customer discovery and continuous iteration on the Center's products. While the recommendations were developed from over 95 interviews, care needs to be given to the fluctuating nature of manufacturing in both medical technology and cleantech sectors. Strong connections to industry requirements will need to be established and Center leadership will need to be empowered to make changes and develop their own activities to meet those

² <https://www.fremont.gov/1093/Warm-SpringsSouth-Fremont>

³ Innovation cultivators are companies, organizations, or groups that support the growth of individuals, firms, and their ideas. They include incubators, accelerators, proof-of-concept centers, tech transfer offices, shared working spaces, community colleges, and universities advancing specific skill sets for the innovation-driven economy. This definition is from the City of Fremont Warm Springs Innovation Center Feasibility Study RFP #17-006.

⁴ Phase 3 and 4 recommendations included a list of programming ideas as well as three conceptual designs and cost estimates for the city-owned parcel adjacent to the Warm Springs/South Fremont BART Station. Based on this analysis the city requested that Team LACI develop a Programming Phasing report for the Center organization and not the physical location.

⁵ The World Health Organization (WHO) defines medical technology as "an article, instrument, apparatus or machine that is used in the prevention, diagnosis or treatment of illness or disease, or for detecting, measuring, restoring, correcting, or modifying the structure or function of the body for some health purpose." http://www.who.int/medical_devices/definitions/en/

⁶ Merriam-Webster defines cleantech as "technology that places an emphasis on environmentally friendly products, services, or practices." For the purposes of this report, we are specifically talking about energy specific products, services or practices. <https://www.merriam-webster.com/dictionary/cleantech>

⁷ The agenda for the CEO Roundtable is provided in the Appendix.

customer needs over time. These activities will be highly dependent on strategic partners, the personal strengths of the Center leadership, resources, as well as community and political support within Fremont and the larger Bay Area. Finding the right founders to lead the Center through its precarious early years, will be one of the most critical steps in its development. Not all of the recommended components of this plan will be appropriate or relevant in the future and leeway will need to be given to this team as they iterate on their organizational model and establish themselves in the highly competitive innovation market of the San Francisco Bay Area.

Equally important, will be the Center's ability to focus its attention on its customers and the services it plans on providing. The Center needs to move beyond the start-up world and focus on growth stage companies trying to scale up their products for manufacturing and businesses for expansion. While it is expected that the Center will draw the involvement of a wide range of companies, consultants, contract manufacturers, service providers, funders, and other participants of the ecosystem, it will specifically target a mix of programs and resources designed to attract and engage hardware-oriented companies focused in target market sectors and in their "scale-up" phase of development.

Scale-up companies have achieved some customer traction in their markets and have entered a growth phase in which the company is faced with market and channel expansion, increases in manufacturing, deployment of business decision systems, and rapid growth in staffing. Scale-up companies are usually understood as transitioning from one or a few prototypes to a first run of production for their first delivery of products. According to the Organization for Economic Co-operation and Development (OECD), a scale-up [company] is a company that has an average annualized return of at least 20 percent in the past three years with at least ten employees in the beginning of the period.⁸ Of course, there is a band of variance and companies can repeat their evolution with a new product line. These companies need help with activities such as pilot studies, review of engineering drawings, bill of materials and manufacturability, testing procedures, supply chain development, and cost of goods. This Plan describes how services could be provided to help companies with these activities.

The Plan is divided into two main sections, Operations and Programming. Activities described in these two sections should hold equal weight when being implemented. All too often, new companies or start-ups focus too much of their attention on the development of their product and not enough on the structure or processes of their organization. In the introduction to *The Lean Startup* author Eric Ries states, "Startup success can be engineered by following the right process..." Later he goes on to relate the work of Steve Blank, Silicon Valley investor, entrepreneur, and start-up educator and advisor, on his 2004 ideas where "business and marketing functions of a startup should be considered as important as engineering and product development and therefore deserve an equally rigorous methodology to guide them." The

⁸ "OECD Eurostat-OECD Manual on Business Demography Statistics" 2007. *Eurostat-OECD*.



Center should be treated as a start-up where it is using a clear methodology of customer discovery to build the organizational business model as well as its product.

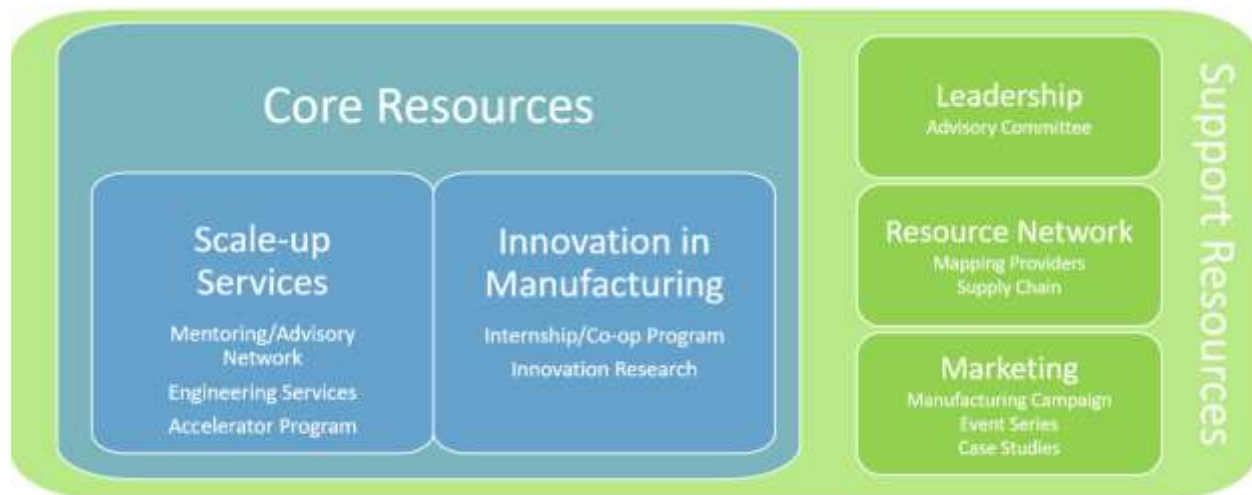
The Operations Section of this Plan describes the steps and processes recommended by Team LACI. It stresses the critical steps that the Center leadership will need to take as it establishes and grows itself within the community. Activities include identifying a business structure (fiscal sponsor and strategic partnerships), defining its mission, goals, target audience, strategy, and clearly scoping its activities around innovation in manufacturing. It recommends a framework for evaluating programming activities, staffing ideas, operational systems, and eventually building options. These items need to be incorporated into how the Center implements its programs.

The Programming Section focuses on solving the problems of the organization's main customers. While some programming activities focus on broad manufacturing innovation, to solve scale-up problems most activities need to have a strong sector focus. This sector focus should permeate all programming. The Center should also seek out strategic partners with manufacturing expertise in these sector specific areas. Strategic partners, such as academic institutions, that could also facilitate the Internship/Co-op program, the Certificate Program, and conduct applied research, could be particularly beneficial. Team LACI recommends that the Center continue to conduct customer discovery interviews indefinitely, with an emphasis on the first year to ensure the organization is developing the right programming activities.

The preliminary customer base for the Center includes scale-up companies and Fremont's existing manufacturing community. Thankfully, these two customers are not mutually exclusive. Scale-up companies will need to identify contract manufacturers, suppliers, designers, and other service providers to assist them with their manufacturing needs. Existing manufacturers could provide these services and may see these new scale-up companies as potential partners or clients. Creating a synergistic relationship among these two different customers through creative programming is what will strengthen the innovation ecosystem.

The Center's programming is broken up into five main modules. The Scale-up Services and Innovation in Manufacturing categories are Core Resources focused on providing assistance to the two main customer groups discussed above. The Leadership and Resource Network Modules support the activities of the Core Resources and the Marketing activity supports all of the Center's activities by promoting, communicating, and coordinating the programming.

Knowing that the Center's founders will need to have the flexibility to evolve the vision of the organization, LACI recommends that it focus on a few core activities serving manufacturing scale-up companies by an established network of physical and virtual resources first. The founders will have to adjust to the realities (i.e. economic and political) of whatever is going on in Fremont at the time of launch, and may need to align its activities base on those conditions, but the Core and Support Resources outlined below in the chart and described in detail later, should be considered Center's highest priorities. Other components should be developed when funding is obtained.



Core Resources

1. *Scale-up Services:* Scale-up companies need specific services to help them manufacture and grow their businesses. Some services provided by the Center will include design thinking, market forecasting, product and process design, scaling production, and supply chain management. Services will be provided through one-on-one advising as well as cohort-based programming.
2. *Innovation in Manufacturing:* A vibrant, efficient, and flexible manufacturing community will need to adopt cutting-edge technologies and hire innovative employees to maintain its leadership role. The Center will conduct research and develop programs to strengthen innovation in manufacturing in Fremont.

Supporting Resources

1. *Leadership:* Leadership needs to be demonstrated and recognized. It cannot just be claimed. The Center will develop, connect, and attract organizations and individuals already recognized as leaders in manufacturing and then work with them to communicate and improve the manufacturing already going on in Fremont.
2. *Resource Network:* Manufacturing success requires a connected network of suppliers, designers, and consultants. Knowing and understanding what is needed and where it is located is foundational for all scale-up engagement activities. The Center will develop a resource network to collect and use information that enhances manufacturing.
3. *Marketing:* Marketing for cities is often used to attract new residents and businesses. The Center will create a multi-pronged marketing and branding campaign that differentiates it from the rest of the San Francisco Bay Area and demonstrates its innovation in manufacturing. This will need to be implemented, not only by the city, but also by those who share the vision to create a network of resources for innovative manufacturing.

2.0 Operations

Major Milestones	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Develop Strategic Plan						
Fiscal Sponsor						
Evaluation Framework						
Internal Operational Systems						
Contractual and Legal Liabilities						
Temporary Space						
Center Internship Program						
Business Model Review						
Permanent Structure Plan Development						
Create Efficiencies						
Three Year Success Report						
Fundraising						

During the first few years of existence the Center will need to focus on creating a strong operational structure. Creating this operational structure will be the foundation for all other activities conducted by the organization. If done right, the operational structure will make for an efficient, well-run organization where the different programming modules are connected and seamlessly phased in as part of the natural progression of the organization. The structure should help the management team identify and direct resources to fulfill the mission of the organization. This should be done by developing strong partnerships, objectives, and activities that can be measured and evaluated over time.

YEAR 1: Q1

Strategic Plan Development: The first few months will be spent developing a strategic plan that defines the organization's initial objectives and resources, how it will earn money or support itself, how it will structure its leadership and staff, and how it will operate in the first year. While the Center will likely start off as a single person, the strategic plan should also include a staffing plan that evaluates the resources needed to implement its programming for smooth implementation. The plan will be used to fundraise and vet the concept of the Center with important customers and develop strong academic and private sector partners.

When developing the plan the Center should identify early strategic partners. At the roundtable, participants discussed creating a partnership (see Leadership in Manufacturing Partnership). This could include a tiered membership structure where companies pay for different levels of services, access, and other resources. It could also be a public-private partnership where a not-for-profit part of the organization would provide unbiased information and networking services, while a private part, facilitated by pay-for-services, can be ramped up and down based on the needs of the community. The different organizational structures will be highly dependent on the

Center's early strategic partners. Potential partners could be academic institutions, manufacturers, non-profits, channel partners, or investment firms to name a few. These partners should be involved in multiple aspects of the Center; everything from the development of the marketing campaign to the Advisory Committee should include these strategic partners. Strategic partners should be a balance of organizations covering both technical and commercial aspects of manufacturing, particularly as the Center may not have a large staff in the beginning. Initial partners will provide both credence and capability to the organization and demonstrate the existing manufacturing resources available near Fremont.

The strategic plan should also identify its initial target audience. As one roundtable participant stated, "it is going to be critical to know more about the customers and clients that the organization is targeting." Delineating the geographic scope of the Center as the San Francisco Bay Area should also be discussed during this planning process. LACI recommends that Fremont be the hub and home base of the Center, but that because it will have to rely on services from across the Bay Area, that it be established to serve the whole region. Events and services should start in Fremont, but the natural progression of the growing organization will be for spokes of activity to emanate from Fremont across the Bay Area. Prioritizing activities, based on this natural progression, in the strategic plan that truly solve challenges for the target audience will provide value and will lead to success. Additional activities can be added as the Center grows.

An important part of the strategic plan will be to come up with a name for the organization and a clear vision statement. A working title for the organization is the Warm Springs Manufacturing Innovation Center. Thought should be given to whether this name is descriptive, appropriate, and/or inclusive enough for what the organization intends to become. A process should be

DEFINITIONS OF INNOVATIVE MANUFACTURING

Advanced: the insertion of new technology, improved processes, and management methods to improve the manufacturing of products.

Smart: the ability to solve existing and future problems via an open infrastructure that allows solutions to be implemented at the speed of business while creating advantaged value.

Intelligent: The use of production process technology that can automatically adapt to changing environments and varying process requirements, with the capability of manufacturing various products with minimal supervision and assistance from operators.

developed to identify an appropriate name for the organization. A vision statement should be vetted and revised over the first year; a working vision statement for the Center is, "Make the Bay Area the center of gravity for world-class innovative manufacturing." When developing definitions, the Center should consider what the following words and terms mean: innovation in manufacturing, world-class, and excellence in manufacturing. Some definitions for innovation in manufacturing are in the side

bar.⁹ The Center will need to spend time on identifying what kind of manufacturing Fremont excels at and how to advertise that to internal and external stakeholders.

Fiscal Sponsor: The Center will need to identify a fiscal sponsor.¹⁰ Finding this partner and fully establishing the Center in the sponsor's legal and fiscal structure will create the needed buy-in from the organization required to get the Center started. Assuming there is a grant or contract to start work on the Center, there will also need to be strong accounting and budgeting procedures put into place facilitated by the fiscal sponsor.¹¹

Evaluation Framework: The management of the Center should clearly define its objectives and key results (OKRs) and articulate how it will evaluate whether or not it has achieved those OKRs. This is particularly important for the Center because of three main reasons.

1. Competition in the San Francisco Bay Area to provide services to start-ups and growing companies is overwhelming. The organization will need to be able to demonstrate its value proposition and show results early.
2. The Center is essentially trying to accelerate the commercialization of new manufactured technologies which in and of itself takes a long time and is not well understood.
3. A significant amount of the work is going to be through the development of tacit knowledge sharing which is difficult to identify and often not codified in a specific curriculum, but transferred through unstructured social interactions and conversation. This kind of knowledge sharing is difficult to measure.

An evaluation method should be developed for both qualitative and quantitative measures. Creating a baseline and a timeline during which activities are measured. Indirect and direct benefits should also be included in the framework and evaluated. Output measures (activities conducted or people engaged) and outcome measures (the impact of those activities and engagements) should be established. The evaluation process should be incorporated into all programming and operations activities including specific indicators and stage gates established to continue certain kinds of activities. Finally, an assessment of the evaluation approach by a third-party expert should be conducted on a periodic basis.

⁹ National Defense University 2002, as reported in PCAST.

<https://www.cmtc.com/blog/what-is-smart-manufacturing-part-1a-of-6>

Fuzzy Logic Dynamics and Machine Prediction for Failure Analysis; Mushiri, Tawanda, Mbowhwa, Charles 2018

¹⁰ The National Council of Nonprofits defines a fiscal sponsor as "a nonprofit organization that provides fiduciary oversight, financial management, and other administrative services to help build the capacity of charitable projects." <https://www.councilofnonprofits.org/tools-resources/fiscal-sponsorship-nonprofits>

¹¹ Team LACI currently envisions the Center as a not-for-profit organization. Depending on the outcome of Center's customer discovery, a different legal structure may be more appropriate.

YEAR 1: Q2–3

Internal Operational Systems: Very early in the Center's development, internal communications, information management systems, and standard operating procedures (SOP) will need to be established. A contact or customer management system will also be crucial given the Center's need to create a manufacturing network with service providers (see Resource Network). This system and SOPs should be structured in a way that makes it easy for the Center management to report on how it is achieving its OKRs through the outcome measures. As one roundtable participant stated, "the Center should have a process for how it is tracking the different transactional steps taken to achieve these OKRs." These systems should also track contracts, legal requirements, and other characteristics of relationships with both partner organizations and clients.

Contractual and Legal Liabilities: The Center should also create and continually update its contractual and legal structures established for members, clients, or other potential partners. As described in the Resource Network section, the Center will potentially provide guidance and services, space, and equipment. These kinds of resources will need a legal framework regarding liability, intellectual property, and numerous other details to develop transparent and valuable partnerships. These activities, contracts, attributes, etc. should be tied back to the contact management system and incorporated into the SOP as appropriate.

YEAR 1: Q4

Temporary Space: By the end of the first year, the Center should either be established in a particular location or be organized enough that it can conduct business in a distributed manner with partners across the innovation district. If the leadership wants to find temporary space, an assessment of temporary structures at the Warm Springs BART station found several options.

Specifically, either a converted shipping container or modular unit could be located on site leveraging minimal site work. There are market options available that comply with the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) standards for energy performance and sustainability, in addition to using recycled materials all of which should fit closely with the Center brand and vision. Additionally, modular units can be converted from offices to use as flex space for limited assembly or work bench space. This would provide the Center with opportunities to host exhibits, meetings, events, equipment demos, and host partners on site. This temporary structure should incorporate dynamic, energy efficient LED lighting, dynamic digital signage illustrating regional events, news, and partners, and some office space for community engagement.

There are a variety of design build contractors in the Bay Area who can deliver fully permitted commercial office or industrial shipping container based modular units at 320 square feet per unit (40' x 8') for a 40' shipping container. The conversion cost per unit will likely range from \$50 to \$250 per square foot (\$16,000–\$80,000 per unit) plus design fees as well as costs for

furniture, fixtures, permit fees, inspections, and equipment. One or two units should provide enough space for the Center at this time.

Another way to situate the organization is to have partners provide space to the leadership while getting established. Partners could offer space for different kinds of activities, such as roundtables, technology demonstrations, networking events, or even a spare office space.

Center Internship Program: Free labor from volunteers as well as students will be required when establishing the Center. Therefore, the Center should try to establish one or two business management internships with San Francisco Bay Area academic institutions at both the undergraduate and graduate level. Many of these institutions have relevant programs as well as their own accelerators and incubators that support industrial innovation, some of which focus on the scale-up gap (See Phase 2 Gap Analysis). Tapping into these programs will not only provide a source of labor, but also bring in a constant stream of new ideas and potential partners. Stanford University and UC Berkeley are the top two schools in the country for spin-out commercialization and entrepreneurship making them ideal sources of new companies interested in local manufacturing.^{12 13}

TAPPING THE UNIVERSITY COMMUNITY
<p>The Bay Area has an abundance of academic organizations and commercialization expertise. One of note is the Stanford StartX accelerator program, which has provided mentoring to both early and late stage medical technology companies since 2011. This program has expanded to include cleantech, consumer, and enterprise IT as well as general hardware companies. With over 1,200+ Stanford entrepreneurs in the network, the program provides over \$1.2M in-kind value without taking start-up equity. University of California - Berkeley also offers specific innovation courses such as the Cleantech-to-Market program, in which current students provide free commercialization support to early stage cleantech start-ups as a part of their coursework. Interview feedback indicated that California State University East Bay (CSUEB), which includes Fremont as a part of its territory, has a rigorous program to support the multidisciplinary field of medical technology, and is well embedded to support a thriving medical technology community in the East Bay. CSUEB has satellites in the other parts of the East Bay and expansion into Fremont would strengthen its presence in the community and across the East Bay.</p>

YEAR 2

Business Model Review: The second year should be focused on refining the business model and gathering feedback to gauge how well the organization is structured to meet its mission and

¹² <https://www.universityofcalifornia.edu/news/uc-berkeley-no-1-global-entrepreneurship>

¹³ <https://startx.com/accelerator>

surpass the OKRs set out in the strategic plan. This should be done through a series of evaluations established in the Evaluation Framework.

Permanent Structure Plan Development: Additionally, the Center leadership should start to identify its options for a more permanent structure to house the Center. This structure will depend on the outcome of the Resource Network being established in the programming. Stakeholder needs for equipment, space, events, offices, etc. will need to be continually assessed and incorporated into the plan. Close coordination between programming and operations will also need to be assessed in relation to any budgeting, resource planning, and fundraising described in the strategic plan.

YEAR 3

Create Efficiencies: By year three, a rhythm of planning, implementation, and evaluation of the basic operations developed should be established. The Center should now be looking at how to become more efficient by iterating on its SOPs and other operational systems.

Three-Year Success Report: In collaboration with the programming staff, the leadership and operations staff should develop a three-year report of both programmatic and operational successes. This report should be used to understand how the Center has achieved its OKRs as well as how it has served the community.

Fundraising: Finally, in year three, fundraising should begin for the construction of the permanent building. The three-year success report mentioned above can be used to help fundraise and advertise to potential partners and clients.

3.0 Programming

3.1 Scale-up Services

Major Milestones	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Pilot Manufacturing Services for Scale-up Companies						
Grant Writing for Scale-up Services						
Establish Mentoring or Advisory Network						
Launch Boot Camp						
Launch Manufacturing Engineering Services						
Develop Scale-up Accelerator Program						
Launch Scale-up Accelerator Program						
New Product Commercialization Certificate Program						
Supply Chain Assistance						
Develop Pilot/Demonstration Program						
Evaluate Accelerator						
Evaluate Performance of Manufacturing Engineering Services						

To attract scale-up companies to Fremont, the Center will need to offer critical resources and services that cannot be attained so easily in other parts of the San Francisco Bay Area. As one roundtable participant put it, “when a scale-up company is ready to manufacture, their first thought should be to go down the 880 highway to access manufacturing expertise.” Scale-up companies will want to know what value the Center offers compared to other organizations offering similar services. From Team LACI’s research, this value is going to come from the opportunity for the companies to develop personal relationships with advisers, service providers, and other companies, especially other manufacturers. A robust and vibrant group of service providers actively involved and networked in the Bay Area ecosystem is one of the primary assets that few other communities offer. The Center will need to serve the role of convener, catalyzer, and teacher. The Center will do this by developing two main sets of activities:

- 1) Manufacturing engineering services provided on an as-needed basis to individual companies, and
- 2) Boot camps and accelerator programs provided to cohorts of companies (see Figure 1).

These activities are presented as options for the Center to develop based on its customer discovery. It may be determined that not all of the activities are needed to serve the community. The activities are not mutually exclusive, but if developed, each activity should provide a unique

value proposition. Development of these services and the required supporting and evaluation activities are discussed below.

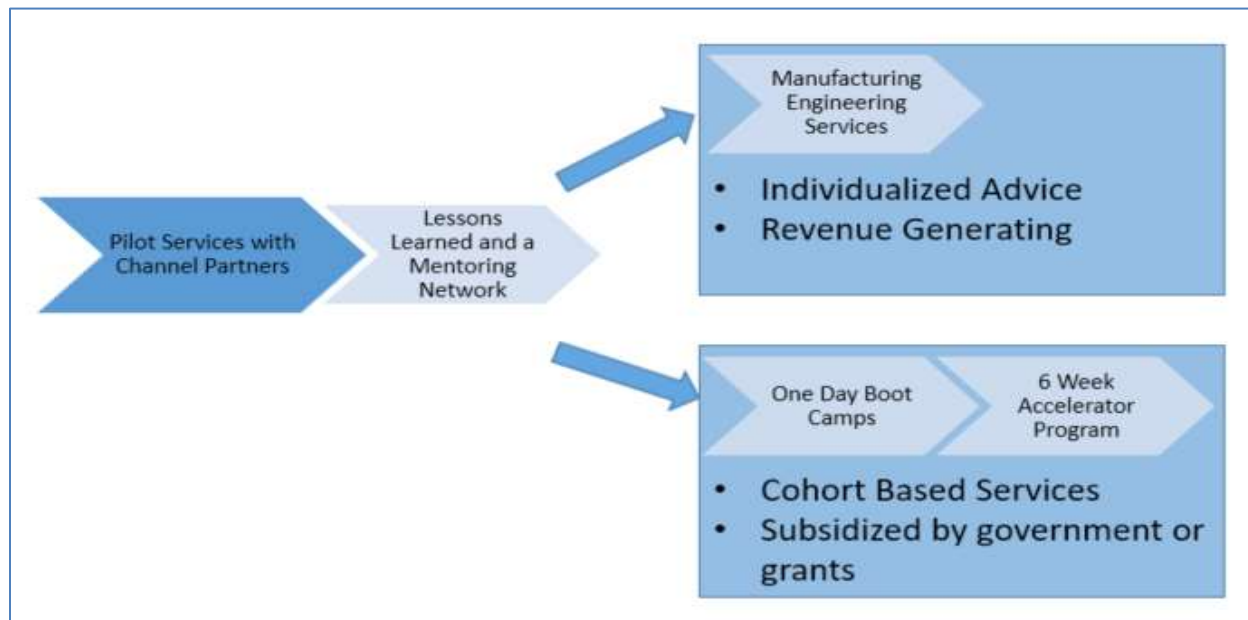


Figure 1: Center Manufacturing Scale-up Activities.

YEAR 1: Q1

Pilot Manufacturing Services for Scale-up Companies: In year one, the Center will need to walk before it can run. Setting up a full accelerator or incubator program may appear to be the first thing that the organization should do, but Team LACI recommends that it conduct a few pilots on simple activities that are the most important to scale-up manufacturing companies. These pilots could be with incubators and accelerators in the Bay Area, such as HAX, Elemental Excelerator, and Cyclotron Road, which have already expressed interest in sending companies to Fremont to find initial manufacturing space and for pilot-scale manufacturing assistance. Developing relationships with these organizations and providing assistance to their scale-up companies will help the Center focus on the most important needs of the scale-up community and, if successful, develop a reputation for its manufacturing services. Feedback from the pilots should be used to shape the later offering of more extensive manufacturing engineering services and the Scale-up Accelerator activities offered by the Center.

Grant Writing for Scale-up Services: While the cost model will need to be developed when the leadership team is put into place and as the strategic plan is being developed, Team LACI recommends that the Center base its cohort scale-up services on a cost model where it is supported by grants from government and philanthropic organizations. Hence, to prepare for the implementation of the Scale-up Accelerator, the Center will need to start developing grant proposals for these activities in its first year.

Establish Mentoring or Advisory Network: Mentors and advisors are a critical part of an innovation ecosystem. Mentors and advisors need to be appropriately matched to a company's commercial and manufacturing activities and not overloaded with work. A process for identifying, onboarding, engaging, coordinating, and appreciating mentors should be established. The Center could partner with the Western Region for the Cleantech Open (CTO) to develop this process. The CTO is "the oldest and largest cleantech startup accelerator program, with the mission to find, fund, and foster entrepreneurs with ideas to solve our greatest environmental and energy challenges."¹⁴ Additionally, while there can be different levels of mentor engagement, at least one individual needs to take ownership of the mentor network. Mentors need appreciation and some kind of "perk" that provides value to the mentors for their activities, especially if they are not being compensated. Roundtable participants said they experienced a lot of satisfaction from working with mentee companies as they also learned from the relationships, but frequency of interactions with mentee companies and the matching process were keys to their positive experiences. If a paid advisory network is established then there will be different expectations for these individuals providing services, but in general they will still need to be identified and coordinated with companies.

YEAR 1: Q2–3

Launch Boot Camp: The pilots with scale-up companies from quarter one will need to be evaluated so that services based on what was learned can be developed. One-day boot camps on specific manufacturing topics should be conducted based on these learnings. These boot camps should include the topic of strategic innovation, which is the reinventing or redesigning of a company's market position and the development of resources to support this position. Manufacturing is often essential for company repositioning with a new product or service, because it can be the conduit between new concepts or solutions and realizable services and products. Therefore, the Center should offer periodic strategic innovation boot camps. These boot camps would communicate an understanding of the value of strategic thinking and manufacturing via keynote speakers and course modules on how to develop company strategy and how to advance from ideas to market offerings. The modules would include elements for strategic innovation such as design thinking, market forecasting, product and process design, new venture finance, scaling production, supply chain management, change management, and strategy implementation.

The objective of the boot camps is to help participants improve their ability to think differently about company strategy in their quest to develop innovative products, services, and organizations. The boot camps would target approximately 50–100 decision-making participants from large and small companies and act as introductory sessions to a Certificate Program (see Certificate Program section).

¹⁴ <https://www.cleantechopen.org/en/page/west-en>

These boot camps should be held at participating manufacturers around Fremont. Innovative technology demonstrations at the participating manufacturers should be conducted to teach scale-up companies about new technology and continue to market the manufacturing in Fremont as innovative (see Marketing Section and Innovation Manufacturing Sections). These events can be held with media representation and local politicians to garner more attention.

YEAR 1: Q4

Launch Manufacturing Engineering Services: Scale-up companies developing a product often face a formidable gap between their concept/prototype and their pilot/scaled production. This gap can be bridged with insight from an experienced manufacturing engineer. A central service of the Center will be to offer one-on-one company manufacturing engineering assistance. Services could include the following:

- *Review of engineering drawings and bill of materials.* These are the blueprints for making a product, and they need to be thorough, accurate, and easy to follow.
- *Manufacturability review.* This entails an assessment of how easily a product can be manufactured, and if it requires specialized machinery or training to be manufactured then it has lower manufacturability.
- *Quality plan review.* This addresses all requirements to ensure product performance and reliability.
- *Test plan review.* This is a plan designed to ensure that a product is functional, reliable, and safe. This involves meeting electrical and mechanical engineering requirements and establishing any on-going testing the product should undergo to ensure continued quality and performance.
- *Manufacturing cost review.* This entails a check to make sure the product price can cover production costs once it gets to market. If not, it is not ready for production.
- *Market readiness review.* This is the expectation of when the product is forecasted to be offered on the market. Ideally, the product will be ready months before going to market and production is planned with this intent in mind.

A manufacturing engineer for the Center can offer critical review of companies' manufacturing plans and either assist with improvements or offer referrals to service providers who can help. In addition to manufacturing engineering review and diagnosis, an experienced professional can advise on other business and engineering-related challenges innovative manufacturing companies face. Some of these challenges include: intellectual property advice, access to angel and venture capital, market research, supply chain management, financial forecasting, business planning, technology transfer, talent acquisition, employee training, plant location, and business networking.

As we heard from our interviews, finding the right person or organization that is trusted by both the community as well as the scale-up companies will be a critical part of the Center's success.

One potential partner for this activity includes California Manufacturing Technology Consulting (CMTc), which offers the California Manufacturers Accelerator® program. This program provides small and medium businesses an advisor and/or a growth coach to provide commercialization support in business planning, strategy advice, and case study information specific to manufacturing. They also provide networking introductions in the manufacturing industry and information on funding and incentive opportunities.¹⁵ Another potential partner is the Biomedical Manufacturing Network, which offers business and manufacturing assistance, and fundraising, strategic growth, and intellectual property advice for no cost and no equity.¹⁶

These manufacturing engineering services may be differentiated from the Scale-up Accelerator launched in year two by the scale and ad hoc nature of assistance and the use of external network volunteer manufacturing engineering consultants to provide more basic business and technical advisory services as requested.

Develop Scale-up Accelerator Program: If boot camps and individual engagements of the manufacturing engineering services are successful, an accelerator program should be developed and investor-oriented pitch days should be conducted. Accelerator programs should be time limited, technology or sector focused, cohort based (5–8 companies), and should include a mix of one-on-one advisor-based mentorship as well as concrete curriculum. Cohort-based models can be particularly beneficial because they allow for peer-to-peer conversations, differing perspectives, and joint learning experiences that foster camaraderie. While cohort-

BUILD4SCALE

The Build4Scale program was launched by the Department of Energy through the Energy Efficiency and Renewable Energy office to provide cleantech entrepreneurs a course explaining product and manufacturing design fundamentals. Program development was led by LLNL, who created the curriculum in collaboration with other organizations including, the Los Angeles Cleantech Incubator, Greentown Labs, and Manex. The online course contains training modules on topics such as detailed design, the DfX suite of techniques, handling supplier relationships, industry standards, and production ramp-up issues such as warranties and financing. In addition, a self-assessment tool is offered to companies to assess their own gaps in knowledge and a resource library with connections to other organizations. The DOE also recently offered the related American Inventions Made (AIM) competition, which provides funding to innovation cultivators that deliver the Build4Scale curriculum and help local innovators to partner with domestic manufacturing. Although the competition appears to be closed as of September 2018, this could be a source of funding to deliver training through the Center.

based learning has many benefits, some scale-up companies may be uncomfortable with sharing information about their growing business. The Center will need to make sure that it has

¹⁵ <https://www.cmtc.com/california-manufacturers-advantage>

¹⁶ <http://www.biomedmfg.org/index.php?ebbm=business>

clear conflict of interest and competition policies in place at an organizational level as well as for the Scale-up Accelerator program specifically.

Delivery of the content and access to mentors can be facilitated or augmented through partner relationships with organizations already equipped to provide such training and mentoring. For example, the Lawrence Livermore National Labs' (LLNL) Build4Scale program could be implemented (see side bar). Other potential partners include Cleantech Open, SF Made, Manex, and California Manufacturing Technology Consulting (CMTc). In addition to finding a potential partner to help deliver content, the Center should find sponsorship for the accelerator program. Sponsorship is not just about getting funds to conduct the accelerator, it is also about making the right connections within the innovation ecosystem that can help the scale-up companies by piloting or conducting demonstrations, becoming suppliers or contract manufacturers, or some other part of the manufacturing process. The funding provided by a sponsor should be seen as an investment in the companies and the broader ecosystem.

YEAR 2

Launch Scale-up Accelerator Program: Program launch once the Center has obtained funding.

New Product Commercialization Certificate Program: The New Product Commercialization Certificate (in innovation and entrepreneurship) in partnership with a local academic institution, will combine the value of strategic thinking and commercializing technology via course modules. It will focus on company strategy and how to advance from new ideas to market offerings, much of which is translated into manufacturing-related activities. Instead of touching on multiple topics like the boot camps and Accelerator program, the certificate courses will go deep in one area. The courses will include strategic forecasting, product design, piloting for product enhancement, and commercializing new products. The objective of the certificate program is to help participants build their ability to develop firm strategy, commercialize new products, and manage the process. The certificate program will be limited to 50 decision-making participants from large and small companies who are mid to upper-level scientists, engineers, executive level individuals from scale-up companies.

- *Course Module 1 - Strategic Forecasting:* Companies use strategic forecasting to support decisions about their future strategic positioning. Forecasting can help companies align their business with future demands and strategically commercialize new products and services.
- *Course Module 2 - Product Design:* Product design must include the translation of customers' needs into technical requirements and design parameters. This module teaches the gathering and analysis of customer needs data, and the translation of needs data into technical requirements and design parameters.

- *Course Module 3 - Piloting for Product Enhancement:* This course will instruct on how product development teams can test a product, develop relationships with customers, and consider additional features that should be added to optimize the original product.
- *Course Module 4 - Commercializing New Products:* Teams developing a new product often face a formidable gap between concept or prototype and commercialization. This module will teach design for manufacturability and quality and cost review to assist the commercialization of new products.

Supply Chain Assistance: In coordination with the Supply Chain Resources work in the Network section, the Center should also conduct company supply chain mapping and provide enhancement recommendations. This begins with supply chain origin mapping, a technique that disaggregates a company's products into sourced components and services and identifies and maps their origins. Next is to assess the geographic spread and reasons for these patterns. Last is to identify closer, qualified, and reliable suppliers who could increase local sourcing for enhancing business dependability and responsiveness, as well as local economic development.

Pilot/Demonstration Program: The Center should determine how important access to demonstration partners is to programming. Demonstration is a key step in the commercialization process and often difficult for energy technologies because the markets are highly regulated.¹⁷ State and local governments can help overcome those regulatory barriers by piloting technology with the assistance of the Center. Demonstrations, especially those developed in collaboration with government entities, should focus on streamlining permitting and procurement processes, and reducing cost and regulatory barriers.

YEAR 3

Evaluate Accelerator: After the first year of the Accelerator, the program should be evaluated using the measures identified in the Evaluation Framework. This evaluation should include detailed interviews from scale-up companies that went through the Accelerator program versus companies that did not go through the program but may be getting services from elsewhere. This will measure this work against other Center activities that may be more expensive, but potentially more impactful. Additionally, a control group of companies should also be interviewed.

Evaluate Performance of Manufacturing Engineering Services: At the end of year three the Manufacturing Engineering Services should be evaluated using the methods similar to what were used for the Accelerator from the Evaluation Framework.

¹⁷ For medical technology companies, demonstration is less (or not) relevant because of the regulatory hurdles. Regulatory process defines the process for approval, though there are contract companies that offer clinical trial services.

3.2 Innovation in Manufacturing

Major Milestones	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Develop and Get Buy-in for Manufacturing Internship/Co-op Program						
Innovation in Manufacturing Event Series						
Launch Manufacturing Internship/Co-op Program						
Manufacturing Innovation Research						
Evaluate Internship/Co-op Program						

A vibrant, efficient, and flexible manufacturing community will need cutting-edge technologies and innovative employees to maintain its leadership role. The Center will conduct research and partner with organizations to develop a research agenda and activities to strengthen Fremont's ability to attract innovative companies. The agenda should focus on manufacturing methods, technologies, processes, and hiring programs based on community needs.

YEAR 1: Q1

Develop and Get Buy-in for Manufacturing Internship/Co-op Program: The Center should talk with companies in the Bay Area to gauge demand for interns and identify skills of interest. This activity should focus on skills not being addressed by workforce development programs.

YEAR 1: Q2–3

Innovation in Manufacturing Event Series: Events should be held that focus on specific domains of interest to Bay Area manufacturers and scale-up companies. These events can be used to demonstrate Bay Area technologies (see Marketing section), recognize industry leaders, or can be used for networking. As was described at the roundtable, some events can be large where there are a lot of different opportunities for engagement, but these should be used to funnel participants into smaller, more focused events or potentially one-on-one meetings to develop meaningful relationships. If there is clear interest from both scale-up companies and established manufacturers, then smaller events can be held to help these relationships grow and share more information. The event series should be coordinated with the marketing campaign, boot camps, and other activities.

YEAR 1: Q4

Launch Manufacturing Internship/Co-op Program: The Center will manage an internship/co-op program tasked with connecting students from local educational institutions with Bay Area manufacturing companies in need of talent. The program will place students in positions with large and small companies to assist with challenging technical and business problems such as: product and process design, optimizing processes for product scale up, performing market

assessments, prototyping for scalability, and product life-cycle assessments. The following will be the process for implementing the internship/co-op program.

- Introduce the program to companies soliciting intern and co-op positions.
- The Center will leverage its relationships with regional universities and colleges to attract students to apply. The schools will review and interview the applicants, offering up to three students per opening.
- Companies will choose students to interview and offer positions.
- The Center will monitor the placements requiring one school and one company mentor for the students and host annual final project presentations.

The goals of the internship/co-op program include developing local talent for manufacturers, growing a pipeline of positions and projects, and building an understanding of company talent needs. Additionally, feedback from local manufacturers suggests that there would be value in creating an internship/co-op program that enables the sharing of interns between different manufacturing companies to allow cross-training of interns in different manufacturing environments. The program could be extended to allow split-time internships between companies. For local companies this could allow exposure to a greater number of interns and the interns would be exposed to a broader set of experiences. This would require a greater depth of knowledge of the local manufacturing landscape to understand which experiences would be complementary for the interns.

YEAR 2

Manufacturing Innovation Research: Staying current and advancing knowledge on manufacturing innovation are essential for being relevant and becoming a leader in this sector. The Center will conduct research and collaborate with academic institutions to increase understanding of important issues in manufacturing, with particular focus on strategic innovation, applied manufacturing methods, and decision-making. The following are several topics that exemplify such a research agenda:

- Adoption of manufacturing technologies and their effects on manufacturing locations.
- Value of shared space with supply chain partners for contingent innovation with other industries.
- Traceability of components and processes in manufacturing to understand the opportunities for innovation.
- Long-term economic impact of a history in manufacturing in a region.
- Total landed cost analysis for making wise decisions about the manufacturing locations.

Applied industry-centered research such as these topics would position the Center as a leader in current and industry-relevant manufacturing research. Possible extensions of this module

could include an annual research conference on applied manufacturing research and the introduction of an industry-focused research journal.

YEAR 3

Evaluate Internship/Co-op Program: Using the Evaluation Framework, the program should be evaluated based on feedback from both the participating companies and the students.

3.3 Leadership in Manufacturing

Major Milestones	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Create Advisory Committee						
Leadership Council/Events						
Informal CEO Dinners						
Advisory Committee Evaluation						
Leadership in Manufacturing Partnership						
Fundraising						
Scale-up and CEO Dinners						
Evaluate Leadership Activities						

The involvement of influential and well-connected organizations and individuals to provide leadership is critical to the Center's success. The Center will create partnerships, activities, events and an Advisory Committee and Leadership Council to help guide the Center's programming strategy, develop buy-in and ownership, and ensure the Center's long-term relevance as a leader in manufacturing innovation. Additionally, the Center will have to push the envelope in terms of thought leadership, demonstrations, and research and development in the area of manufacturing.

YEAR 1: Q1

Create Advisory Committee: Within the first year, the Center will create an Advisory Committee to help guide the overarching strategy. They will monitor and adjust programs and functions of the Center to ensure their buy-in and ownership. Members of the committee will also provide connections that can assist with funding, partnerships, and other opportunities for the benefit of its participants. Additionally, interview feedback suggested that Center activities would need to provide value to senior participants with companies that are manufacturing (such as local CEOs and CFOs) to maintain their contribution and build the success and reputation of the Center over time. The Advisory Committee will be comprised of a small group of individuals with backgrounds in manufacturing or in medical technology and cleantech sectors. The Committee should also represent members from private industry, government, and academia.

An organization or individual should be chosen for the role of Committee Leader and tasked with providing ownership and fiduciary oversight for the organization as described in the Operations Section. It is envisioned that this person/organization should have the broad breadth

to contribute to programming activities, but also with sufficient technical depth in a specific domain to enable meaningful engagement with innovation center participants as an advisor.

YEAR 1: Q2–3

Leadership Council/Events: The Advisory Committee should meet to select organizations that may act as part of a Leadership Council. It is common for innovation accelerators to create groups such as Leadership Councils that can participate in programming and encourage further networking. An example would be LACI's Leadership Council which started as a closely connected group of individuals and has ultimately become a network of organizations who pay a membership fee to provide input into the center's programming. The difference between the Leadership Council and the Advisory Committee is that the Committee also provides operations input as well as programming, while the Leadership Council will act as a larger organization to draw on for programming ideation.

The Advisory Committee should identify speakers to invite to a Leadership Council executive roundtable event. Other innovation cultivators should be engaged as co-hosts to these regular events. They should include thought-leaders in manufacturing, medical technology, and cleantech. This will generate interest and visibility for Center and co-host organizations. For example, Powerhouse, an Oakland based co-working space with an accelerator and investment fund, hosts a regular event called "Watt It Takes" as a fireside chat with leaders in the energy industry. This event could be expanded to include Bay Area manufacturing energy companies.

YEAR 1: Q4

Informal CEO Dinners: The Advisory Committee should create a network of local manufacturing CEOs and plan an informal networking dinner. Feedback from the roundtable was that within the medical technology sector there is already a network of CEOs who meet informally. They have found this type of informal networking to be invaluable in order to trade manufacturing contacts and aid hiring. Networking dinners should continue quarterly over the life of the Center. The Advisory Committee should hold its first executive roundtable/dinner drawing on members of the Leadership Council.

YEAR 2

Advisory Committee Evaluation: The Advisory Committee will take feedback from the Leadership Council to evaluate the programming portfolio from year one and make necessary changes for year two. The Advisory Committee would also evaluate how the Center is functioning operationally to make changes for year two.

Leadership in Manufacturing Partnership: If the CEO dinners provide value back to the CEO core businesses, a Leadership in Manufacturing Partnership may be established to expand the interactions. Partnership activity should improve sales and/or operations, help connect companies to resources, and provide opportunities to share expertise. A partnership should include partners throughout the manufacturing value chain. Participants in the roundtable

articulated that a partnership should be based on a core set of shared values and that participants should be collaborative. It should be inclusive and the focus should not be on selling services to each other, but on finding mutually beneficial opportunities for individual companies as well as the broader manufacturing community.

Fundraising: The Advisory Committee should start fundraising, drawing on members of the Leadership Council. They should also develop policy and political relationships and hold fireside chats with thought-leaders. Individuals from the Advisory Committee should be asked to open their facilities for demonstration tours and speak at fundraisers and the events series (see Marketing Section).

Scale-up and CEO Dinners: In coordination with the accelerator participants, the Advisory Committee should host a dinner between accelerator participants and the ongoing CEO dinners, which are an opportunity for more matchmaking as well as more domain specific conversations.

YEAR 3

Evaluate Leadership Activities: In year three, the Center should use the Evaluation Framework to evaluate the value of the CEO dinners, the Leadership in Manufacturing Partnership, and the Leadership Council. This evaluation should incorporate how the leadership activities affect the success of the Marketing module and are being incorporated with other modules of the Center.

3.4 Resource Network

Major Milestones	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Customer Engagement for Network Tools						
Network Data Integration Into Organizational IT system						
Develop Mapping of Companies and Service Providers						
Establish a Business Model for Resource Network if Tool is Made Public						
Launch Online Resource Network Tool						
Conduct Training for Scale-up Companies and Mentors on Network Tool						
Evaluate Performance of Resource Network and Make Any Required Changes						
Supply Chain Resources and Customer Rating System						

While the San Francisco Bay Area and Fremont might have access to a variety of companies, service providers, and suppliers with scale-up expertise, there needs to be more sector specific networks and connectivity, like what has been demonstrated by the Biomedical Manufacturing Network. Interview feedback indicated that scale-up companies are not necessarily well connected to these resources for manufacturing and this lack of connectivity is a barrier to scale-up companies looking to manufacture for the first time, especially in the United States. Success in manufacturing requires easy access to suppliers, designers, and consultants. Knowing and understanding what is needed and where it is located is foundational for all scale-up engagement activities, so building a network is necessary. These insights will enable the Center to develop services, conduct outreach, create pilot studies, connect supply chains, market internships, education and training programs, and develop applied research with companies.

YEAR 1: Q1

Customer Engagement for Network Tools: Interviewees contacted by Team LACI made a strong argument for the development of a networking tool. The networking tool is a software database platform that will primarily be used by Center advisors to facilitate connections for scale-up companies, identify important manufacturing activities going on in Fremont, and develop events on specific domains. Once developed, this tool will have valuable information that scale-up companies potentially will want to pay to access. The Center will have to determine if the platform should be used by anyone else besides the Center. Different levels of access could be developed for Center scale-up companies paying for services or even for the public. To confirm what this tool should look like, additional research should be conducted to understand the specific kinds of information, resources, tools/equipment, and services that should be gathered and incorporated into the tool. This should build off of any existing studies conducted by other manufacturing organizations in the area and should be developed with a customer advisory panel so quick iterations can be conducted to ensure product market fit.

Network Data Integration into Organizational IT System: While the customer engagement around the design of the tool is being conducted, a parallel conversation should be going on within the Center on how to incorporate data into the organization's IT system. To track, evaluate, update the mapping discussed below, and measure the Center's effectiveness the systems integration component needs to be incorporated at the beginning of the process.

YEAR 1: Q2–3

Develop Mapping of Companies and Service Providers: Knowing the location of companies is a powerful tool for outreach purposes, promoting industry clusters, and seeing opportunities for collaboration. A database of companies, service providers, component suppliers, equipment vendors, and other business contacts is the starting point for mapping, but it is essential to maintain the database on a periodic basis. The City of Fremont has a database of business licenses, coded by industrial sector. Therefore, an initial task for the Center is to analyze the business license data and develop a contact database organized by sector with fields for

location, products and services, site activities, and number of employees. The next steps are to link the database to a mapping program that shows where companies in particular sectors are located and so spatial patterns can be identified. For example, by mapping the 100+ Fremont biomedical companies by sector and analyzing the spatial patterns, it became clear that medical technology companies make-up 90% of the Fremont biomedical industry and that most of these companies are located in proximity to the Fremont Innovation District. The remaining companies focus on biotechnology and pharmaceuticals and are located in Fremont's Ardenwood District. This information gathering and mapping should be coordinated with the Marketing Campaign, so maps can be used to target specific audiences. The database and maps, if updated regularly, can be a key tool for engaging with companies with services, pilot studies, supply chain connections, marketing for internships, education and training, and applied research with companies.

YEAR 1: Q4

Establish a Business Model for Resource Network if Tool is Made Public: The networking tool will be initially developed for internal use by Center advisors and for marketing purposes. To make the networking tool publicly accessible a business, cost, and legal structure will need to be created (see Legal Framework in Operations section). For example, if a Fremont manufacturer lists spare capacity on a CNC machine and a scale-up companies uses the machine and it breaks, is the Fremont manufacturer responsible for finding a different machine for the scale-up company to use? Is the scale-up company responsible for repairing the machine? Will the Center be open to any legal issues for listing the Fremont manufacturer? In the same example, what protections do clients of the Center have that the manufacturer is not going to try to steal any of its intellectual property? Answers to these questions need to be established if the tool is to be made public.

YEAR 2

Launch Online Resource Network Tool: Once the tool's legal framework has been established and if there is a need for a public tool then it should be launched. The release of the tool should be done in collaboration with a marketing event.

Conduct Training for Scale-up Companies and Mentors on Network Tool: Depending on if the manufacturing network tool is made public or not, the Center should periodically hold trainings on how to use the tool. If the tool is not made public, the Center will need to make sure all mentors, advisors, and others interacting with the scale-up companies have access to the tool and are able to get the information they need to assist the companies.

Evaluate Performance of Resource Network and Make Any Required Changes: At the end of year two, an evaluation on both the public and internal versions of the networking tool should be undertaken, using the Evaluation Framework as a guide.

YEAR 3

Supply Chain Resources and Customer Rating System: Companies depend on their supply chain for materials, components, assembly, testing, packaging, shipping, and advice on business matters. Therefore, the quality of a company's supply chain is often the basis for its competitive advantage and business success. The Center will maintain a detailed and updated directory of supply chain expertise. This service module is interrelated with other modules in two ways.

- 1) Manufacturing Engineering Services include the identification and treatment of a company's challenges, which invariably will entail offering referrals to suppliers and service providers who can help with improvements.
- 2) Mapping company and resource networks include service providers, and material and component suppliers.

The database and maps will be a useful tool for supply chain connections. Additionally, the Center should develop a customer rating system for suppliers. Advisors and investors interviewed gave examples of when suppliers backed out of production runs for scale-up companies and identified a rating system as a value-add service the Center should provide. By recording customer satisfaction of supplier performance over time, a rating system can be developed to support supplier referrals. This service requires feedback from supplier referrals, records maintenance and confidentiality, and a method for gathering, analyzing, and reporting ratings.

3.5 Marketing

Major Milestones	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Development of Manufacturing Campaign						
Regular Event Series						
Launch Manufacturing Campaign						
Iconic Symbol						
Develop Fremont Success Case Studies						
Manufacturing Innovation Showcase						
Campaign Evaluation						

While Fremont has no significant weaknesses as a potential center of innovation, it needs a strategy that differentiates it from the rest of the San Francisco Bay Area and shows that it is capable of successful retention and attraction of new manufacturers. This can be accomplished through the development of a multi-pronged marketing and branding campaign that focuses on how manufacturing in Fremont helps a scale-up company connect to suppliers, service providers, and other manufacturers. The campaign needs to make it clear that the city is there to help create an ecosystem for success across the Bay Area.

YEAR 1: Q1

Development of Manufacturing Campaign: The first quarter of the first year will focus on developing a manufacturing campaign with an external consulting firm. This campaign should fill an information gap, clarify the Fremont brand, and build awareness around its unique manufacturing capabilities and ambitions. Strengthening the Fremont brand should be a high priority for the Center and should be a component of all of its activities. Fremont's brand should be tied to innovative manufacturing, its customers, and Fremont's unique scale-up capabilities. The campaign should include concrete milestones and both qualitative and quantitative metrics for success. Guided by a strategic branding perspective, the campaign should highlight how Fremont is a center of excellence in manufacturing. The campaign should focus on existing activities and manufacturing in the city, but also on the continuous stream of activities, events, and accomplishments of the Center led by the city and in collaboration with local manufacturers. The marketing campaign should be coordinated with information developed from the resource network and find ways to highlight the activities of individuals in the network across the Bay Area.

YEAR 1: Q2–3

Launch Manufacturing Campaign: Once buy-in is developed with a core set of advisors (see Leadership section) and local manufacturers, the campaign should be launched. Early activities should focus on networking, communicating the successful case studies, and other events that build campaign support. Additionally, the Center should work to co-sponsor and co-locate with existing events. For example, the Center should work to co-locate with energy sector co-working space and investor, Powerhouse, which hosts a number of events related to solar and cleantech entrepreneurship as well as Prospect Silicon Valley. For general manufacturing, the California Network for Manufacturing Innovation is a statewide organization with a similar manufacturing promotion mandate to the Center. Manufacturing Day in October would be a key event to build upon as Fremont is currently a leader with this event. For the medical technology industry, large conferences in San Jose would be a good opportunity for piggybacking. Fremont could also align with NextFlex, which holds several manufacturing events every year. These activities should be done in collaboration with local manufacturers and should highlight the long history of manufacturing in Fremont, strengthening its brand. Additional approaches to be developed include building out the Think Silicon Valley website and its variety of social media tools.

Regular Event Series: In collaboration with the launch of the scale-up accelerator, and development of the networking tool, the Center should create a lecture series on topics that may be of interest to potential clients and members. This series should be coordinated with the leadership activities and held at manufacturing facilities where innovative technologies can be demonstrated (in coordination with Innovation in Manufacturing Section).

In addition to events held at manufacturing facilities there are opportunities to use the allocated space near the BART station creatively to enhance the visibility of local technology developed by Fremont residents and by companies. The City of Mountain View has held an annual

Technology Showcase for four years, which is marketed as a free outdoor event where local technology companies and start-ups can exhibit their technologies as a networking event and also as a showcase to the larger community. The event includes product demonstrations and food trucks.¹⁸ The City of West Hollywood hosted a similar WeHo Smart City Festival last year, which included both discussion about the city's Smart City Strategic Plan, as well tech demonstrations, a gallery walk of smart city case studies, and discussions about smart cities.¹⁹ In Philadelphia, the Open Air public art piece by renowned artist Rafael Lozano-Hemmer was a temporary interactive art piece that used participant's voices and GPS locations to illuminate the sky with 24 robotic searchlights. Participants recorded messages of up to 30 seconds via a mobile app, and the lights reacted to frequency and amplitude to the recordings.²⁰ Large-scale public art pieces created from solar panels have also been commissioned around the world, one example is the Silicon Forest in Oregon, which illuminates tree-like forms with solar power.²¹ The University of Delaware's science department has also held an "Art in Science" exhibition which showed research through beautiful microscopy images to enhance interest in STEM.²² There have also been examples of using houses to show smart home technologies, CNET purchased a home in Louisville, Kentucky to test home-tech products as an experiment, and created a video tour.²³ Demonstrations like these should be linked to the city's broader marketing campaign and any iconic themes developed. Each event should have a way to measure how information was received by attendees. This could be done through an online audience feedback program or a simple survey. These activities should be a part of the Evaluation Framework.

YEAR 1: Q4

Iconic Symbol: The first year of the marketing campaign should end with a strategic brainstorming session focused on how to develop an iconic symbol or program to help Fremont standout in the Bay Area. Fremont can capitalize on their manufacturing history by reminding the world where the word "silicon" in Silicon Valley came from (see side bar below).²⁴

Regions recognize that to attract modern day high-value manufacturers, it is important to put into place iconic institutions and programs that use local (and sometimes historic) sources of innovation to coalesce new activities. Pittsburgh has proximity to Carnegie Mellon, the

¹⁸ <http://www.chambermv.org/events/details/4th-annual-technology-showcase-3375>

¹⁹ <https://www.weho.org/city-government/city-departments/economic-development/innovation/weho-smart-city>

²⁰ <http://www.associationforpublicart.org/pressroom/technology-meets-public-art-in-spectacular-interactive-light-experience/>

²¹ <https://cleantechnica.com/2013/05/08/11-must-see-art-installations-inspired-by-solar-panels/>

²² <https://bme.udel.edu/2016/01/28/art-in-science-exhibit/>

²³ <https://www.curbed.com/2017/1/20/14339312/smart-home-demo-cnet-for-sale>

²⁴ <https://medium.com/founder-playbook/the-history-of-silicon-valley-transistors-stanford-and-venture-capital-6a761f171e9d> and <https://www.npr.org/templates/story/story.php?storyId=125229157>

University of Pittsburgh, and Penn State, which all have research programs related to 3D printing and advanced manufacturing. In Youngstown, Ohio there is the National Additive Manufacturing Innovation Institute. The proximity of these sources of innovation has attracted GE to create a Center for Additive Technology Advancement (CATA) in the region and has attracted other additive manufacturers to the area.²⁵ Once the iconic symbol or program is identified, Fremont should conduct a manufacturing showcase where the theme is unveiled.

FREMONT, A HISTORY OF MANUFACTURING

Fremont's history in manufacturing is a part of the larger story of innovation in the Bay Area. From the initial history of radio technology advancement and with the invention of the integrated circuit semiconductor companies such as Fairchild, AMD and Intel started the wave of hardware manufacturing that put the "silicon" into the name Silicon Valley. In the larger ecosystem, Stanford encouraged engineers to use their knowledge to create companies and the Stanford Research Park was built to house iconic companies such as Lockheed, Fairchild, Xerox, GE, and eventually Hewlett-Packard. With the development of a network of national laboratories in the area, and growth of the VC industry, Silicon Valley created an iconic hub for advanced manufacturing in the Bay Area connecting academia, industry and commercial ecosystems.

Even as innovation progressed to software in the last two decades, Fremont in particular became a hub for hardware, and it has maintained its roots in advanced manufacturing. The NUMMI plant (New United Motor Manufacturing Inc) was started in Fremont in the 1980s as a joint venture between GM and Toyota in automotive manufacturing. Through a sequence of chance events the Fremont plant has become home to one of the world's most iconic companies – Tesla, who is one of the largest innovators in electrified mobility, renewable power generation, and battery storage. Large manufacturing companies continue to find a home in Fremont, supporting a variety of industries including medical technology (Thermo Fisher), semiconductor (Lam Research) and data storage (Seagate). These companies attract a supporting ecosystem of related manufacturing services, making Fremont one of the Bay Area's premier hubs for manufacturing.

YEAR 2

Develop Fremont Success Case Studies: Roundtable feedback suggested that there would be value in promoting manufacturing focused case studies related to the City of Fremont. One local manufacturing CEO stated that in his experience, "Fremont had been more engaged than the company's previous city and that Fremont employees understand the needs of the manufacturing community." He continued that because Fremont understands manufacturing they have been able to leverage that for economic development within the city. Another interviewee stated that "Fremont helped his company with its real estate and permitting needs, increasing its expected "speed to market." Case studies like these developed by the Center, in

²⁵ <http://www.industryweek.com/expansion-management/pittsburgh-has-right-stuff-when-it-comes-manufacturing> and <https://www.entrepreneur.com/article/225853>

partnership with Fremont manufacturers, need to be created and then packaged in multiple ways so the stories can be easily communicated and associated with the Fremont brand.

Manufacturing Innovation Showcase: The second year should culminate in a manufacturing showcase highlighting not just what is currently going on in Fremont, but also the history of manufacturing that has taken place in the community. This should be pulled from the Research section. Opportunities for existing and new Fremont manufacturers to demonstrate their technologies should be identified leading up to the main event which should be held on National Manufacturing Day.²⁶ These activities could be a part of activities the city already conducts.

YEAR 3

Campaign Evaluation: Based on the criteria established in year one, the city should evaluate the effectiveness of the marketing campaign. They should review web analytics, advertising hits, surveys for events, and discuss the impact of the campaign with the Advisory Committee. Based on this information, the city should determine if and how they should continue with marketing.

4.0 Conclusion

The preceding Center Program Phasing Action Plan is one part of Fremont's vision to strengthen its manufacturing community. The Center will play a role in attracting and retaining innovative manufacturers, which will spur economic growth, and create a more resilient economy. Operations to do this will be founded on standard operating procedures, an established framework for evaluation, and a foundation of customer discovery and fast iteration on its business model and programming.

The Plan's programming consistently recommends partnerships as part of its implementation. This is deliberate. To be successful, the Center will need to establish a core set of services and activities to achieve its mission, but as a startup it will have few resources, therefore it will need to rely on partners for help. While partnerships are important in a resource constrained world, they are also important when creating buy-in. Buy-in from a multitude of organizations is needed in an innovation ecosystem, especially for companies that manufacture products. These organizations are the companies in the resource network, the CEOs at the dinners, the institutions to conduct research, the speakers at events, the suppliers, the service providers, and the many other individuals coming together in the community to support the city's manufacturing vision. It will take thoughtful, collaborative, and respected leadership of the Center to bring this community together. Center leadership, city leadership, and the growing, innovative community of Fremont manufacturers have the opportunity to communicate their vision to the rest of the world and invite them to partner to fulfill this vision.

²⁶ <http://www.mfgday.com/>

5.0 Appendix

5.1 Fremont Manufacturing Innovation Center Study - Executive Roundtable Agenda and Summary

Date: Tuesday, May 15 **Time:** 9:00 am–12:00 pm, **Location:** Seagate Technology – Fremont

Time	Activity	Speaker
8:30 AM	Check In (Light Refreshments Provided)	
9:00 AM	Welcome and Group Introductions <ul style="list-style-type: none"> Group introductions City's perspective on Innovation Center Team LACI: Results of Community Interviews and Research Objective of today's roundtable: Programming Input 	-Christina Briggs, City of Fremont -Jetta Wong, LACI -Gregory Theyel, Biomedical Manufacturing Network
9:30 AM	Overview of Future Manufacturing Innovation Cultivator/Center <ul style="list-style-type: none"> What does the "idea" manufacturing-focused innovation center provide you, the community, and potentially new manufacturers? What does success look like? How would you measure success? 	Jetta Wong, LACI
9:45 AM	Manufacturing Network and Services <ul style="list-style-type: none"> What are the resources and capabilities that growth-stage startups need when manufacturing? Are there enough resources in Fremont to network – suppliers, service providers, equipment, and space? What would a business model look like for this network? 	Gregory Theyel, Biomedical Manufacturing Network
10:30 AM	Break	
10:45 AM	Innovation in Manufacturing <ul style="list-style-type: none"> What strategies exist to strengthen innovation in manufacturing? How do manufacturers tap into the innovative talent pool coming out of local universities and burgeoning startups? 	Jetta Wong, LACI
11:15 AM	Branding and Marketing Manufacturing in Fremont <ul style="list-style-type: none"> What would be included in a Fremont manufacturing innovation campaign? How would you make Fremont stand out from the rest of the cities in the Bay Area as it relates to manufacturing? 	Gregory Theyel, Biomedical Manufacturing Network
11:45 AM	Next Steps <ul style="list-style-type: none"> What are the most important things for Fremont or an innovation cultivator to do first? Who else should we be talking with? What can you contribute to this activity? 	Jetta Wong, LACI
12:00 PM	Wrap up (Boxed lunches will be available to take with you)	

Summary of Fremont Manufacturing Innovation Center Study – Executive Roundtable – May 15, 2018

Welcome and Group Introductions

- The City of Fremont set out to complete a feasibility study to understand how to attract more innovation cultivators.
- LACI was engaged to look specifically at smaller to mid-scale companies to understand what support exists for them, and whether their needs could be accommodated on a small property near the Warm Springs BART station
- Key findings from LACI's interviews include that growth stage hardware companies (post prototype) are not well supported, and that there could be a gap in serving the medtech and cleantech communities.
- LACI has now pivoted from real estate towards understanding the programming elements associated with a Centre of Excellence and how these elements can be phased in.

Overview of Future Manufacturing Innovation Center

- The center needs to consider what success looks like, and appropriate metrics of success.
- Metrics of success could be associated with showing small scale companies the capabilities of Fremont and teaching the right questions to ask in order to get “rightshoring” of companies rather than reshoring.
- To build the center we need a working definition of the kind of manufacturing the center should focus its services on.
- LACI should consider that a lot of start-ups aim to build a prototype not a product, and need help to obtain quality services and connections to the right people.
- Companies need networks, mentorship, and concierge services. These services need to be multidiscipline to understand how to make the right connections.

Manufacturing Network and Services

- The center needs to clarify if it is trying to bring “manufacturing to Fremont” or be an “innovation incubator.” LACI stated that the center has a dual role; innovators to be part of the ecosystem and companies interested in innovative people.
- The center should recognize that manufacturing is not linear, and that the Bay Area has a niche for innovation in manufacturing.

Innovation in Manufacturing

- The center can setup mentoring groups but need to be respectful of the time of people otherwise working full time. There needs to be an advisor that organizes all the mentors.
- The center could consider a funnel approach to events, where large breakout sessions progress to smaller groups, and then to one-on-one level.
- There is a demand to for college interns in the community, and there could also be a cross training program for interns between companies.
- It is important for the center to find people with domain expertise.
- The center could also help with Legal/IP issues, export/import considerations, bill of materials, setting pay scales, process flow, and regulations.

- Center could help to support growth stage companies in the transition to becoming a real manufacturing company, including having more rigorous systems (such as quality) and preparing the workforce for the cultural change.
- Innovation Awards similar to East Bay awards could be considered to reward manufacturing in Fremont.
- Center could develop local case studies, such as how to improve productivity, reshoring etc. from local companies. These would help promote, and market of the center.
- The center could consider a design for manufacturing lecture series around products that are “Fremont Made.”
- In the medtech community there is already a group of CEOs who regularly meet for dinner with a speaker. They also share contacts. A similar approach could be started with other verticals at the center.
- Having static inventory of manufacturing companies to reach out to is not as helpful as having an active group with private sector engagement. A physical space for meeting/networking may not be required at the outset of the center.
- The center needs to structure a program to benefit all participants.

Branding and Marketing Manufacturing in Fremont

- Fremont currently has a branding gap.
- In most cities there is a big roadblock to scaling. In Fremont there are success stories where the city helped companies get to market faster than expected (i.e. getting a permit in 3 months).
- There is a need for case studies to brand innovation and manufacturing within the broader Silicon Valley community.
- Center will have to prioritize its audience. Is it trying to retain companies or attract new growth stage companies.
- Initial priority should be to showcase the manufacturing community in Fremont.

5.2 Core Resources Timeline

The chart below represents when the top 2-3 Operational and Programmatic activities for each Module should be developed. The bolded activities represent the most important Programmatic resources to develop, which are represented in the factsheet.

Module	Activities	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2	Year-3
Operations	Strategic Plan						
Operations	Evaluation Framework						
Scale-up Services	Mentoring or Advisory Network						
Leadership	Advisory Committee						
Marketing	Manufacturing Campaign						
Operations	Contractual and Legal Liabilities						
Resources Network	Mapping of Companies and Service Providers						
Marketing	Regular Event Series						
Scale-up Services	Manufacturing Engineering Services						
Innovation in MFG	Manufacturing Internship/Co-op Program						
Scale-up Services	Scale-up Accelerator Program						
Marketing	Fremont Success Case Studies						
Innovation in MFG	Manufacturing Innovation Research						
Resources Network	Supply Chain Resources and Customer Rating System						

5.3 Warm Springs Manufacturing Innovation Center: Factsheet

Fremont's Warm Springs Manufacturing Innovation Center (Center) has a mission to make the San Francisco Bay Area the center of gravity for world-class innovative manufacturing.

Problem Statement: The San Francisco Bay Area is teeming with a robust mix of innovation organizations with a narrow focus on helping early stage companies thrive, but for growing companies there are few places for them to go for manufacturing assistance, especially in scaling their technologies and businesses.

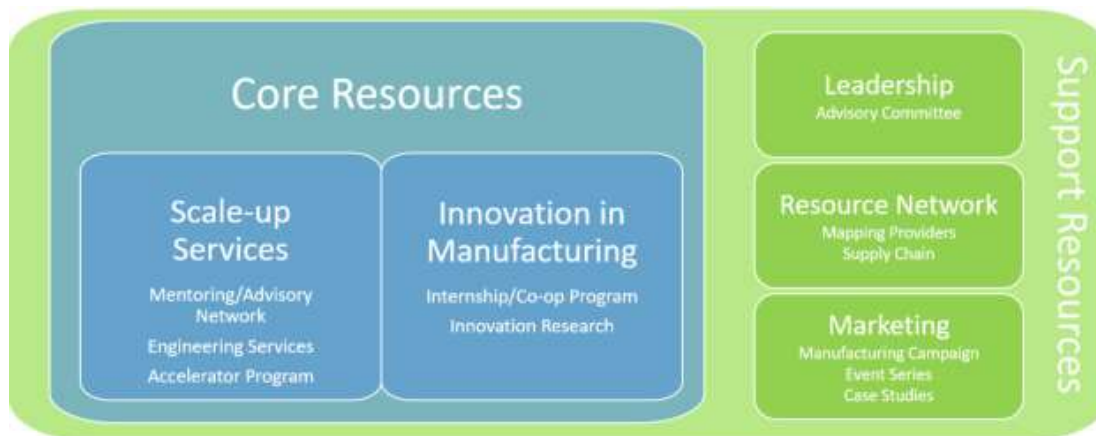
The Center will work with medical technology and cleantech companies to help them scale up their products for manufacturing and businesses for expansion. It will do this by providing expert manufacturing services and connecting companies to a network of equipment, facilities, suppliers, and respected service providers in the San Francisco Bay Area.

Core Resources

1. ***Manufacturing Engineering Services*** which provide one-on-one assistance to help companies smoothly move from prototype to a manufacturable product;
2. ***Scale-up Accelerator Program*** which is a six-week, technology or sector focused, cohort based program that provides the manufacturing engineering services through one-on-one mentorship and manufacturing curriculum; and
3. ***Innovation in Manufacturing*** internship and applied research programs focused on scale-up companies' most critical challenges within their sectors.

Support Resources

Companies engaged with the Center will have access to successful manufacturers and industry leaders through the Center's Advisory Committee. Additionally, they will be able to find critical scale-up equipment, facilities, and service providers through the Center's Resource Network. The Center will support the growth of scale-up companies and the broader manufacturing community in the San Francisco Bay Area by promoting world-class, high-value, technologically advanced manufacturing through a multi-pronged marketing and branding campaign. This campaign will consist of a continuous stream of activities, events, and accomplishments of the Center and will be developed in collaboration with the City of Fremont, regional partners, and local manufacturers (Support and Core Resources represented below).



Partnership and Process

The Center will develop strong partnerships, objectives, and activities that can be measured and evaluated over time. Partners will include academic institutions, manufacturers, non-profits, channel partners, and investment firms. These partners will be involved in multiple aspects of the Center; everything from the development of the marketing campaign to the Advisory Committee. Legal and fiscal structures will be established early and incorporated into core offerings to create highly transparent and fair processes. The Center will clearly define its objectives and key results and articulate how it will evaluate whether or not it has achieved these.

Financial Sustainability

To launch the first year of operations the Center will seek funding from a variety of sources including city, state, and federal grants, as well as private foundation grants.

Costs for establishing the the Center will focus on operations including payments to advisors, possibly speakers for events, marketing expenses, and staff salaries.

Revenue	Costs
Grants (city, state, federal, private foundations)	Staff salaries
Company sponsorships	Payments for advisors
Company Membership fees	Payments for speakers
Fees for events	Marketing
Fees for engineering services	Office rent
	Events
	Manufacturing equipment

Eventually fundraising will be needed for capital costs of an office and event space and possibly manufacturing equipment. The intent is to cover some of the operating costs by charging attendance fees for events such as speaker series, boot camps, and cohort programs. The costs for engineering services are likely to be covered by fees paid by customer companies. Grants, company sponsorships, and dues will help cover capital costs and other operating costs.

Milestone Timeline

The table below illustrates when the Center will initiate the top two Core and the top Support Resources. This is a high level summary of the resources and more details are in the full plan.

Module	Core and Support Resources	Year-1 Q1	Year-1 Q2	Year-1 Q3	Year-1 Q4	Year-2
Leadership	Advisory Committee					
Marketing	Manufacturing Campaign					
Resources Network	Mapping of Companies and Service Providers					
Scale-up Services	Manufacturing Engineering Services					
Innovation in MFG	Manufacturing Internship/Co-op Program					
Scale-up Services	Scale-up Accelerator Program					
Innovation in MFG	Manufacturing Innovation Research					