

# Warm Springs Innovation Center

## Phase 3a: Programming

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

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

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## 1.0 Introduction

Findings from Team LACI's Phase 2 Gap Analysis of the Warm Springs ecosystem demonstrated that the surrounding areas contain a robust mix of resources to help early stage companies thrive. The main gap that we found is that there are few places for start-ups to go for manufacturing assistance, especially in scaling their technologies. Additionally, while there are manufacturers in the San Francisco Bay Area, there is no central point of engagement of those resources to make them readily discoverable and accessible.

This recommendation for the Warm Springs Innovation Center (WSIC) creates a Center for Excellence in Manufacturing (CEM) which provides learning, advisory services, thought leadership, events, and ecosystem activation around manufacturing in the sectors of cleantech and medtech. The CEM focuses not only on moving early stage companies forward but also on engaging, influencing, and connecting the industry incumbents, developing programs that create a more innovative community to move the industry forward, and attract key talent and partners.

A study of organizations supporting early stage manufacturing companies was undertaken to understand and assess different program approaches in commercialization support. Companies studied included LACI, Greentown Labs, NextEnergy, and Cyclotron Road. It should be noted that while each of these organizations support manufacturing start-ups in cleantech or life sciences, these start-ups tend to leave these organizations around the time they've achieved their Series A round of funding, or earlier.

The following programming plan is a result of this assessment. It presents programmatic activities that convene leading practitioners, conveys best practices in manufacturing, and creates a connective platform for the sharing of key resources in the community. Focus areas include prototyping, design for manufacturing, and scale manufacturing. The plan also makes recommendations on how programs may attract innovative talent and fill critical skills gaps in the workforce. The plan also suggests ways to pull together a mix of capital sources. Finally, it concludes with additional growth-stage activities in market facilitation and recommendations on how to engage the community on the value and opportunity of manufacturing.

While it is expected that the CEM 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. These scale-up companies have achieved strong customer traction in their markets and have entered a growth phase in which the company is faced with geographic market and channels expansion, scale-up of manufacturing, the deployment of business decision systems, and a rapid growth in staffing.

While this phase of growth is quite exciting for companies, it often comes with many challenges including accessing working capital, identifying and onboarding staff, developing and deploying

enterprise management systems as well as expansion of the physical footprint that accompanies rapid growth. The strain these needs put on management teams and the capital available to the business can be immense. How these challenges are addressed can be the difference between success and insolvency. Attracting and servicing these companies effectively and sustainably necessitates that the program delivers on a key set of requirements, each of which depends on a mix of specific programmatic elements.

These programmatic elements can be divided into physical / logistics, expertise, access to shared resources, investment and capital access, market facilitation, and community engagement sections. In addition to the direct support of early stage growth companies, a focus on finding innovative talent in the manufacturing workforce and engaging the local community on the benefits and opportunities of being a smart manufacturing city will help build a sustainable source of highly skilled labor that will act as a force multiplier in attracting manufacturing-oriented companies.

## 2.0 Physical Space / Logistics Requirements

Early stage companies in their growth phase often experience rapid growth in sales, an expansion of manufacturing capacity, increasingly complex supply chain management challenges, growing logistics needs, and an increase in staffing. Each of these have an effect on space requirements. Furthermore, the changes in these needs are often non-linear and require the flexibility to quickly expand and contract. To attract such growth stage companies, the CEM will need to offer space that services these requirements and offers the flexibility that will allow companies to manage the early stage expansion and contraction cycles.

1. *Flexible Office Space:* A mix of fixed desks, hot desks, shared meeting rooms, and event spaces that facilitate focused work, collaborative work, meetings, and events.
2. *Advanced Prototyping:* While companies are in a growth phase, continued improvements in existing products and the introduction of adjacent products are common. The CEM should provide prototyping space that is accessible and shareable by members. Ideally, this space would be in the building, but if the building footprint prevents this, prototyping capabilities should be housed in close proximity.
3. *Research and Development (R&D) / Manufacturing / Assembly Space:* Target companies interviewed deploy a mix of contract and in-house R&D, manufacturing, assembly, and test needs that require dedicated industrial space. For post-Seed companies, a space between 1,000 and 20,000 square feet for in-house components would be needed.
4. *Warehousing and Storage:* Target companies in these sectors occasionally experience intermittent sales and shipping as they scale. In addition, components purchasing occasionally comes with minimum order quantities or discounts for volume purchasing. Both of these can create the need for occasional warehousing and

storage. Companies interviewed turn to their contract manufacturers for this service or rent additional space to accommodate the need. Interviews also indicate that a shared warehouse or storage space would be beneficial. If the building footprint prevents this, then the capability should be located in close proximity to the CEM.

5. *Shipping / Receiving:* Unless everything is done in an outsourced model, companies making a business in hardware products have a regular need for shipping, receiving, and other logistics services. A shared service area for this need was of common interest among companies interviewed.

Given the available footprint of the CEM, it may be necessary to locate the industrial spaces (prototyping, manufacturing, test, assembly, etc.) in a nearby location and have the ½ acre footprint house just the office, meeting, and event spaces. This approach comes with some risks. Most of the growth stage companies with manufacturing operations expressed during their interviews a preference to keep the leadership and manufacturing teams in the same location to speed up decision-making and facilitate closer teamwork. LACI and Greentown Labs have addressed this issue by securing additional space adjacent to their campuses. However, both facilities are limited in the amount of manufacturing space they can provide. Greentown limits their companies to two years in the center, at which time they expect those companies to move on and make space for new tenants.

If it's not feasible to include dedicated manufacturing space on campus, it may be beneficial to build a specialty within the CEM for facilitating the identification of this kind of space. Organizations like JLL, already provide this type of service to companies and indicated that there is plenty of space for this in Fremont.

Finally, timing the engagement with companies is somewhat critical. In the growth of their business, companies often make specific improvements which could include power, gas or air services, lifting equipment, vent hoods, or other modifications to suit R&D or manufacturing needs. Once early stage companies have made such improvements, it may be difficult to have the company to vacate the space until they have outgrown the facility. Given the financial resources available to these growth companies, these decisions and space improvements are often timed with seed, Series A, and follow-on rounds. It will be important for the CEM to tie into investor networks to catch these companies as they are facing these decisions.

### 3.0 Access to Expertise

While companies in the target growth phase likely have some manufacturing underway, many face—or will soon face—critical decisions in how to best manage the scale of their manufacturing, how and when to outsource aspects of manufacturing, how to optimize and manage their supply chain, how to assure optimal quality as volume scales up, and so on. In earlier stages of their development, these companies need advisors adept in addressing specific technical design issues, crafting and proving business models, securing first

commercial demos, and preparing for investment. As these businesses enter their growth phase however, the advisory skills need to have more of a focus on optimizing production and the business. The knowledge training and mentoring portion of the programming is designed to help early stage companies navigate the challenges of scale manufacturing and managing the impacts of a company's rapid growth during this phase.

Expertise in these areas should come from a mix of educational materials delivered either virtually or face-to-face. A network of service providers and advisors should be created to provide opportunity for one-on-one expert advisory engagement and partnerships with these professionals focused on delivering specific capabilities to companies at this stage. Some of the specific areas of focus include:

1. *Design for Manufacturability:* To reduce costs, increase product quality and yields, improve time-to-market, and increase customer satisfaction, product design decisions stem from a solid understanding of the manufacturing process, assembly process, supply chain sensitivities and ultimately, the lifetime use of the product.
2. *Lean Manufacturing:* Lean manufacturing focuses on lowering costs and cycle times by reducing waste and steps in the supply chain, manufacturing, and distribution processes. Key elements focus on process optimization, inventory optimization, logistics and distribution, and management-to-worker relations.
3. *Supply Chain:* As business increases, strains on supply chains can cause manufacturing delays and unexpected interruptions in cash flow. Supply chain management should focus on flow of goods and services, optimization of operations, storage of materials, and labor.
4. *Material Requirements Planning (MRP) / Enterprise Resource Planning (ERP):* Eventually, all manufacturing and distribution companies adopt an MRP system, which is sometimes a module of an ERP system. These systems serve to manage supply chain, bills of material, inventory, and project planning. By optimizing the bills of material, reducing inventory, and minimizing work in progress, cash flow is preserved.
5. *Cybersecurity:* As small and medium enterprises scale and implement ERP and create web-based backend systems, they open themselves to cyber attacks. The costs of such attacks can be crippling. Programming focused on how early stage companies design and implement cost-effective safeguards from attacks is critical.
6. *Manufacturing Outsourcing:* Expertise in intellectual property protection subcontractor due diligence, and contracting for the outsourcing of manufacturing, is needed for companies that elect to outsource all or a portion of their manufacturing.



7. *Regulatory Compliance:* Companies manufacturing any product face common regulatory requirements such as Underwriters Laboratory (UL), CE Mark<sup>2</sup>, American Society for Testing and Materials (ASTM) standards, Food and Drug Administration (FDA) requirements, and other safety and compliance certifications. Companies manufacturing products for energy, transportation, water infrastructure, medical devices and other industries that the CEM will focus on are subject to additional market specific regulatory requirements. The center will engage industry experts to coach companies on how to navigate complex regulatory requirements.
8. *Demand Management / Forecasting:* Cash flow is often critical during the growth stage. A system for accurate forecasting and demand management can help minimize the capital needed for operations. This capability goes hand-in-hand with lean manufacturing principles to also minimize the space needed for such operations.
9. *Sales and Channel Partner Development:* As the target businesses scale, responsibility for sales often shifts from the founders to a dedicated sales staff or outsourced channel partners. Expert advice and connections are needed by these companies to help build sustainable sales teams, structure distribution, and manage value added resellers (VAR), as well as, retail or other channel partners.
10. *Export Strategies and Implementation:* As businesses scale, many often find opportunities overseas that compel the company into exporting products. Import and export requirements, and their financial implications, are often an unknown variable to growth stage companies. There are many practitioners that are available to help with the preparation, execution, and financing of imports and exports. The CEM should include advisors or partners adept in this area.
11. *Performance Management:* As sales and production increase, staff often scales accordingly. With this growth, quality, customer satisfaction, employee performance, and company culture itself can be at risk of decline. This is the point in which companies often find themselves facing performance issues across a team or in hot water with employment issues. To protect from this, management systems must be developed and deployed to help identify key performance issues before they become harmful. Industry experts will be recruited as advisors and consultants that can help start-ups with benchmarking, quality assurance, key performance indicator tracking, customer satisfaction, and impact reporting.
12. *Accounting, Systems, and Cash Flow Management:* Among interviewees, assistance with accounting, bookkeeping, and cash flow top the list of support needs. Many founders take on this task themselves but keeping up with demands as the business grows often results in critical missteps as the founder's availability shrinks.

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<sup>2</sup> The letters "CE" are the abbreviation of French phrase "*Conformité Européene*" which literally means "European Conformity".

While this list is likely a subset of the required expertise of growth stage manufacturing start-ups, it represents a comprehensive set of challenges these companies will face in their development. When implementing programs, these new businesses should try to capitalize on the existing strengths and capabilities of the surrounding manufacturing community. Delivery of content and access to mentors can be facilitated or augmented through partnerships with organizations already equipped to provide such training and mentoring. Possible partners for the manufacturing specific elements include California Manufacturing Technology Consulting (CMTC), Manex, Lawrence Livermore National Labs' Build4Scale, and follow-on programs, SF Made, the Product Realization Group, and California State University East Bay.

## 4.0 Capital Access

More than likely, the growth stage businesses engaging the CEM will have raised venture capital through seed or later-stage rounds. In the growth phase, capital needs quickly extend beyond the grants and venture networks that companies worked with in their infancy. Scaling manufacturing capacity, growth in raw materials, addition of staff, expansion of physical space, and entry into new markets will require access to new sources of working capital and import and export financial assistance. To facilitate such connections, the CEM will need to develop a robust network of capital providers to engage with the center's portfolio companies. Specific capital sector engagement areas to develop include:

1. *Venture Investment Sourcing and Preparation:* Companies that will engage the CEM are targeted to be ones who have achieved seed and possibly Series A investment traction. While these companies likely have a foundation of selling the value proposition of the business to early stage investors, connections to follow on investment firms are important. Programs to engage such investors include direct introductions, investor deal book publication, investor pitch days, and panel sessions.
2. *Alternative Venture Financing Mechanisms:* Over the past few years, the availability of alternate sources of venture funding has become commonplace. At the scale stage, companies can turn to deployment-oriented grants, community financing mechanisms, impact investor networks, crowdfunding platforms, and even Initial Coin Offerings (ICO)<sup>3</sup> to help fund the growth of organizations. The CEM should employ a lead investment officer to develop relationships and programs across a broad network of funding sources to service the center's portfolio of companies.
3. *Working Capital Programs:* While the growth stage companies engaging the CEM are likely still in the negative as it relates to their earnings before interest, tax, depreciation and amortization (EBITDA) and represent high risk to traditional lenders, these companies will have a growing need for working capital to fund the growth in

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<sup>3</sup> An Initial Coin Offering (ICO) is used by start-ups to bypass the rigorous and regulated capital-raising process required by venture capitalists or banks.



manufacturing and sales. Connections to organizations that deal with higher risk companies should be built. For companies that have succeeded in their venture capital raise, boutique venture debt organizations like Socket Capital or specialty banks like Silicon Valley Bank can provide access to much needed debt solutions. CEM investment officers may also share best practices around the debt instruments that other venture investment groups have offered their portfolio companies. In addition, as companies mature, some banks such as Community Development Financial Institutions (CDFIs) and even the US Small Business Association provide debt solutions for early stage businesses.

4. *Import and Export Support:* As companies expand into the export of their products or begin to import elements of their solution, they often face issues with currency hedging, export and import financing, regulatory constraints, and other nuances with which they have little or no experience. Advisors in the areas of export and import and relationships with organizations like the Ex/Im Bank, California Infrastructure, and Development Bank (CA iBank) can be of great assistance.
5. *Economic Incentives:* As companies begin to grow their workforce and select locations for their businesses, connections to municipal economic development groups and connections to experts that have taken advantage of workforce development grants, enterprise zone, and other incentives will be of value to the portfolio companies.

## 5.0 Market Engagement

It's common for companies in their growth stage to add sales and distribution resources so they can expand to new customers and new markets. The CEM can facilitate customer development and market expansion through targeted sales and demo programs.

1. *Testing and Demonstration Programs:* Centers of excellence often have the reach and relationships that can help create market signals and drive momentum for the adoption of new technologies into the local infrastructure. Examples of such programs are Wells Fargo's Innovation Incubator programs for the smart cities, Prospect Silicon Valley's Transportation Innovation Zone, and LACI's SoCal Edge program in the built environment. Each of these programs and others like them around the country are focused on the acceleration of new technologies into deployments that demonstrate the viability of solutions and promote the scale of those solutions as they prove viable.
2. *Municipal Deployment Programs:* Since the CEM will have close ties to Fremont and likely derive state support as well, the center may leverage city departments and state agencies as potential customers of the solutions developed by their portfolio companies. Programs around the country have become creative in crafting public-private partnerships that benefit local communities, disadvantaged groups, and solve specific needs while at the same time advancing the success of their member companies. Organizations such as Prospect SV and Elemental Excelsior, which are

both active innovation cultivators in the Bay Area, have strong deployment programs with local and state governments and could be potential strategic partners.

3. *Community Deployment Grants:* Many local, state, and federal agencies offer grants to address specific development goals of those agencies. These grants can be complex and often come with significant administrative burdens. Through such grant offers, the CEM can combine member company support goals with community impact goals while providing the administrative support that the smaller companies may lack.

## 6.0 Workforce Development

One of the best ways to attract companies in the midst of their staffing expansion is to facilitate access to a pool of highly qualified employees. This can be provided in a couple of ways: one, by hosting industry or sector focused events that attract participants from the local talent base; and two, by partnering with organizations that can help bridge common skills gaps in a tech and manufacturing workforce. Prospective partners in the Fremont ecosystem that are interested in, and capable of, driving such programs are California State University East Bay (CSUEB) with their certificate programs, as well as Manex and CMTC who have existing manufacturing specific skills development programs. Target skills development areas include the following:

1. *Base Level Skills Development:* This category includes manufacturing line workers, machinists, and lab technicians. Development areas focus on advanced manufacturing tools training, lean manufacturing basics, and Occupational Safety and Health Administration (OSHA) regulations. The introduction and development of such workers can be supported through partnerships with community colleges, CSUEB, and local manufacturing businesses.
2. *Mid-Level Skills Development:* Senior lab tech, Six Sigma, lean manufacturing, line management, robotic programming experts, root cause analysis, and other skills fall into more mid-level skills development. Such development is often offered via multi-day programs by manufacturing consulting specialists and as certificate programs from local universities. Given the concentrated nature of the companies involved in the CEM, it is likely partnerships can be crafted where multiple companies could take advantage of the same programs offered on a regular basis.
3. *Digital Skills Development:* In the age of intelligent manufacturing, manufacturing lines merge human skills and automation into a system that adapts to drive continuous improvement, cost management, and throughput. Such an approach requires a combination of expertise in lean manufacturing, machine learning, and software design. Given the density of manufacturing resources, state colleges, research universities, and national labs in the Fremont area, the CEM can create a strong position of leadership in these fields of manufacturing.

Several US government agencies such as the National Institutes of Standards and Technology, the Small Business Administration, and the Department of Energy (DOE) have developed a focus on improving the manufacturing workforce skills base. They offer programs partnerships with organizations like the CEM. For instance January 2018, the DOE built upon its existing Build4Scale manufacturing training program by announcing the American Inventions Made (AIM) Onshore program which rewards organizations like the CEM for driving success in their manufacturing focused portfolio companies. Programs such as these represent significant funding streams for the CEM operations.

## 7.0 Community Engagement

While supporting great manufacturing companies is the core mission of the CEM, community engagement will be a major step to achieving this mission and ensuring the sustainability of the effort. The intent is to link companies in a way that creates new opportunities; to attract and engage advisors, investors, customers, and policymakers on supporting the member companies; to attract sponsors that will help fund the effort; and to inspire the policymakers, local community, and future generations on the opportunities in manufacturing.

There are many organizations in the commercialization ecosystem who do this very well. Listed below are areas well suited for the later stage companies.

1. *Tech Showcases:* Fremont companies already use innovative manufacturing processes and technologies. These innovations can be highlighted through facility tours and holding demonstrations. If a facility for the CEM is built, a rotating showcase of technologies could be installed as a visitor attraction. Interviewees expressed interest in having a place in Fremont to take visitors, especially foreign visitors, as well as companies interested in moving to Fremont. A one-stop shop where one could view new technologies and hold meetings with potential suppliers and partners, may be of value.
2. *Speaker Series:* Regular engagements by high-level speakers addressing cutting edge manufacturing technologies or similar topics will attract interest in Fremont. Event topics should be selected based on discussions with existing manufactures and manufacturing organizations. These events should build on what is already going on in the East Bay manufacturing community and should also focus on particular capabilities, innovations, or pain-points important to Fremont stakeholders. The event series will provide a rhythm to activities going on in the city, allowing participants in the events to plan around these events and incorporate them into their own activities.
3. *Thought Leadership / Industry Events:* Organizations such as the Bay Area Urban Manufacturing Initiative (SF Made) and the Cleantech Open Western Regional Showcase are industry events that can highlight activities going on in Fremont. Local companies should be encouraged to participate at these events. The City of Fremont could sponsor a booth and invite different companies to be a part of their exhibit.

4. *STEM Education Days or Open Houses*: It will be key for the CEM to provide Fremont residents the opportunity to learn about what the center is doing, especially if a physical building is erected. One way to engage both students and adults interested in the center is by organizing school trips focused on science learning exercises. Programmatic activities could focus on building simple things developed at the prototyping center or on company technology demos.

## 8.0 Staffing

Depending upon the legal structure of the entity running the center, the staffing needed to deliver the above programming plan can be a mix of employees and volunteers. There are core elements of the program for which dedicated staff are recommended. These include:

- *Executive Director* – defining, prioritizing, and driving the programming plan.
- *Sector Leads* – convenes market sector stakeholders, identifies sector priorities, and drives sector specific programming.
- *Community Managers* – recruitment and management of advisors, partners, and businesses that can provide shared services for the participant companies.
- *Investor Relations* – recruitment and engagement of relevant capital providers.
- *Development Director* – development and management of center sponsors.
- *Grants Manager* – influencing and application of market facilitation and other grants.
- *Events Manager* – managing the CEM’s planning and execution of events.

For the delivery of the expert advice described in Section 3, the Executive Director or Community Manager can attract pro bono advisors through center events, professional groups, investor networks, universities, and other partners.

For the industry sectors, Sector Leads can be brought in as volunteers who wish to build their network in a given market sector. The Sector Lead’s role should focus on both the market facilitation activities described in the Market Engagement section as well as the thought leadership and other events described in Section 7. As the CEM grows, Sector Leads and activities can begin to be funded through sponsors and grants.

## 9.0 Summary

The preceding programming plan represents a comprehensive set of resources and capabilities needed by the companies the CEM is targeting. Several companies interviewed expressed concerns in both the positioning of the center and the resources available within the center. A strong focus needs to be put on creating an exciting, innovative center to overcome the “bedroom community” sentiment discussed in the Phase 2 Gap Analysis. Both physical space and programming to activate the space will need to represent the vibrant local manufacturing community as well as the new companies receiving services. The right design and resources of



the space therefore are critical in attracting companies. Interviewed stakeholders had a wide variety of interest areas, expectations, and visions for the CEM. Ensuring a strong stakeholder engagement process throughout the establishment of the center will be vital to its success. Additionally, creating the right balance between programming focused on the early stage companies vs. expanding opportunities to increase innovation at existing companies should also be considered as funding sources are developed and staff are hired. Finally, prioritizing which programming activities receive resources and are established first will set the tone for the CEM.