U.S. DEPARTMENT OF ENERGY | Office of Technology Transitions

Clara Asmail
Office of Technology Transitions
U.S. Department of Energy

Agenda

- Overview of DOE National Laboratories
- Technology Transfer Successes
- Technology Transfer Mechanisms
- Technology Commercialization Fund (TCF)
- Energy I-Corps
- Lab-Embedded Entrepreneur Program (LEEP)
- SBIR TT
- Manufacturing
- Agreement for Commercializing Technology (ACT)
- Build4Scale – AIM On Shore (Mfg entrepreneur training)
- Cleantech University Prizes

* and Bonus Slides *

National Laboratories

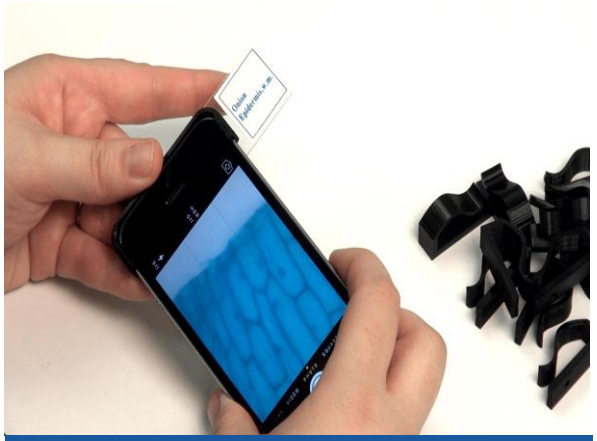
17 world-class institutions that constitute the most comprehensive research and development network of its kind.

An enduring science and technology powerhouse comprised of more than 20,000 scientists and engineers who deliver new discoveries and provide world-class technological capabilities.

Ames Laboratory (Ames)
Argonne National Laboratory (ANL)
Brookhaven National Laboratory (BNL)
Fermi National Accelerator Laboratory (FNAL)
Idaho National Laboratory (INL)
Lawrence Berkeley National Laboratory (LBNL)
Lawrence Livermore National Laboratory (LLNL)
Los Alamos National Laboratory (LANL)
National Energy Technology Laboratory (NETL)
National Renewable Energy Laboratory (NREL)
Oak Ridge National Laboratory (ORNL)
Pacific Northwest National Laboratory (PNNL)
Princeton Plasma Physics Laboratory (PPPL)
Sandia National Laboratories (SNL)
Savannah River National Laboratory (SRNL)
SLAC National Accelerator Laboratory (SLAC)
Thomas Jefferson National Accelerator Facility (TJNAF)

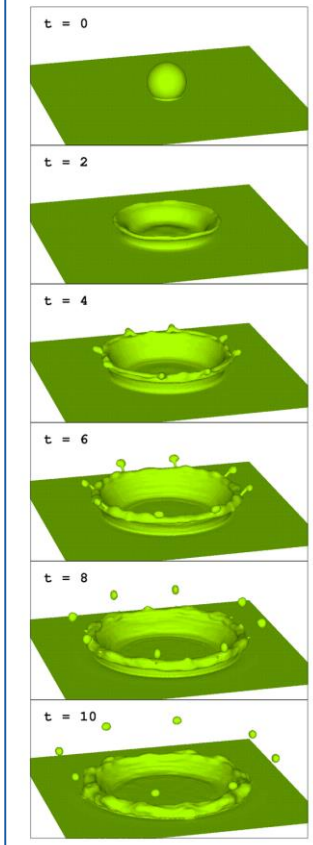
Tech Transfer Success Stories

3-D printed house in Oak Ridge highlights the possibilities of new manufacturing technologies.

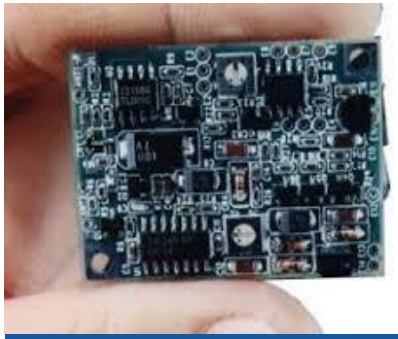


The inexpensive, mobile Smartphone Microscope developed at PNNL allows anyone with a smartphone to explore tiny objects for as little as 5 cents. It slips over the smartphone and can be 3D printed.

Los Alamos National Laboratory's expertise in nuclear weapons helped P&G engineer a better diaper.



Nanosys partnered with DOE's Lawrence Berkeley National Laboratory, 3M, and LG to develop Quantum Dot Enhancement Film that offers displays with 50% wider color spectrum at a comparable price without using more energy. This tech is being used in the new Kindle Fire 7 and demonstrated in new HD TVs.

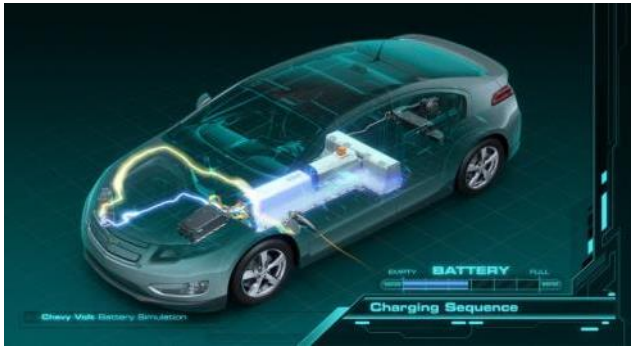


Lawrence Livermore National Lab's MIR is a compact, low-cost, low-power radar used for sensing nearby objects and measuring distances between objects in proximity. MIR technology is the foundation for many modern applications in the home, transportation, and security industries.

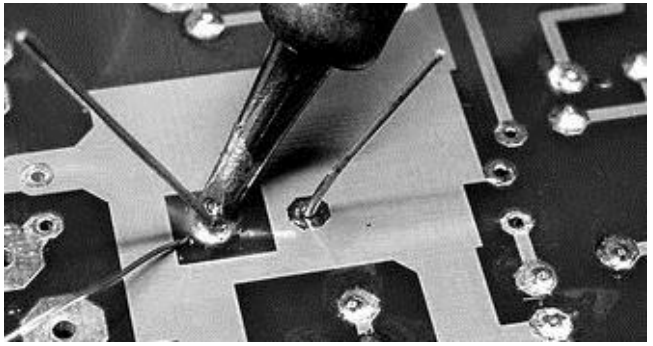
Tech Transfer Success Stories

National laboratories (SNL, LANL, LLNL, NETL) contributed to shale gas technology that significantly improved US energy independence.

National laboratories are drivers of new wind energy technologies.



Argonne National Lab's battery cathode design helps powers the Chevy Volt.

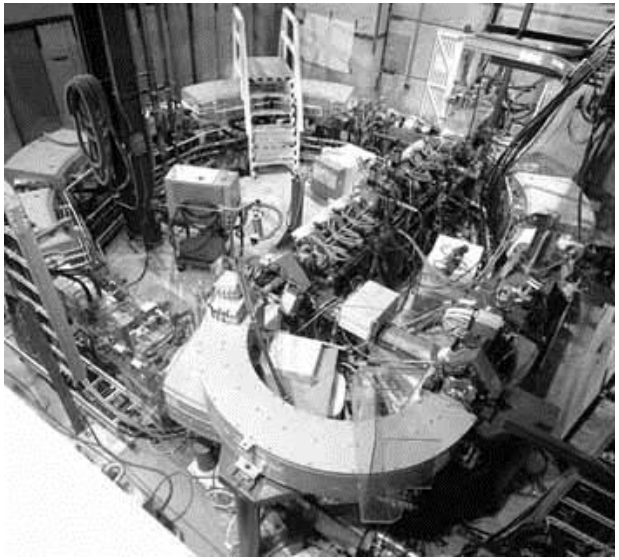


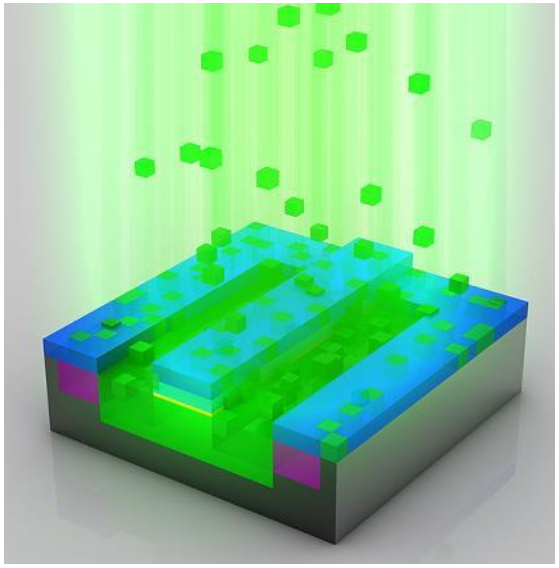
Ames' Lab lead-free solder alloy is the world wide market leader.

Tech Transfer Success Stories

Approximately 50 million nuclear medicine procedures are performed each year worldwide. BNL developed the Tc-99m generator and FDG used in PET scanning.

Fermilab designed the first proton accelerator for cancer treatment.





ORNL was an early leader in the use of ion implantation for semiconductor processing and artificial joint surface treatment.

Cooperative Research and Development Agreement **(CRADA)**
Strategic Partnership Projects (**SPP**, formerly known as **WFO)**

- CRADAs and WFO agreements are between the national laboratory and a third party company and must be approved by the DOE.
- CRADA can allow for DOE contribution of funds
- Provides IP rights distribution and specified confidentiality
- SPP requires full cost recovery, is not collaborative

Agreements for Commercializing Technology **(ACT)**
Federal Agreements for Commercializing Technology **(FedAct)**

- ACT agreements are contracts between the laboratory contractor and a third-party company, require DOE notification, but not approval.
- Pilot for FedACT includes federal-funds to be used by sponsor

Office of Technology Transitions: HQ Program Areas

By partnering with DOE National Laboratories, industry can leverage world class resources to accelerate development of new industries, products, and services that lead to economic growth and job creation.

Technology Maturation: Technology Commercialization Fund (TCF)

Maximizing Access to DOE Labs: Accelerate transition of technology from Labs to market application.

Connecting Investors to Energy opportunities: Maximize economic impact of taxpayer investment in Labs

- Catalyze private investment in Lab technologies from venture capital and strategic corporates, foundations and angel investors.
- Tools helping private entities navigate the National Lab enterprise to locate expertise/technologies.

Technology to Market (T2M): Collection of partnerships and pathways designed to build:

- Strong understanding of industrial technology needs at the DOE Labs (informs their R&D),
- Market potential of technologies being researched at Labs, and
- Engagements between small businesses and the Labs to overcome technical challenges and bring technologies to market.

DOE coordinates and leads federal-wide initiatives to accelerate and enhance the efficiency and impact of technology transfer activities

Technology Commercialization Fund (TCF)

TCF provides funding toward laboratory research and commercialization partnerships by congressional mandate

Technology Maturation

- $100,000-$150,000
- Early stage applied lab research of technology

Cooperative Development

- $250,000-$750,000
- Research for commercial application of technology
- Requires matching private-sector funding

TCF Award Overview

- 12 national labs participating in both FY 2016 and FY 2017
- More than 80 private-sector partnerships to date
- FY 2018 announcement mid-December

Technologist in Residence Program

Technologist in Residence (TIR) pairs senior technical staff from national laboratories and manufacturing companies to work together towards impactful manufacturing solutions.

Immediate Objectives:

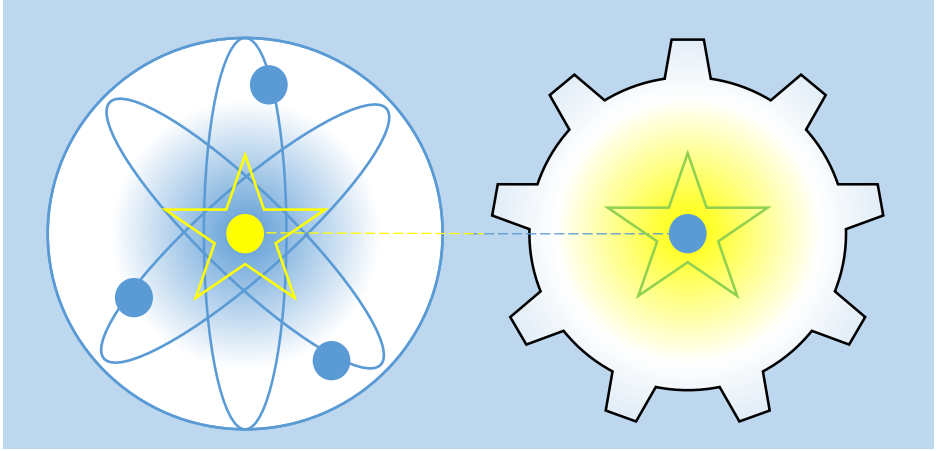
- Identify areas of collaborative R&D
- Develop a streamlined method for companies to establish long term relationships with laboratories that result in collaborative research and development
- Long-term, strategic public-private partnerships

Additional Objectives:

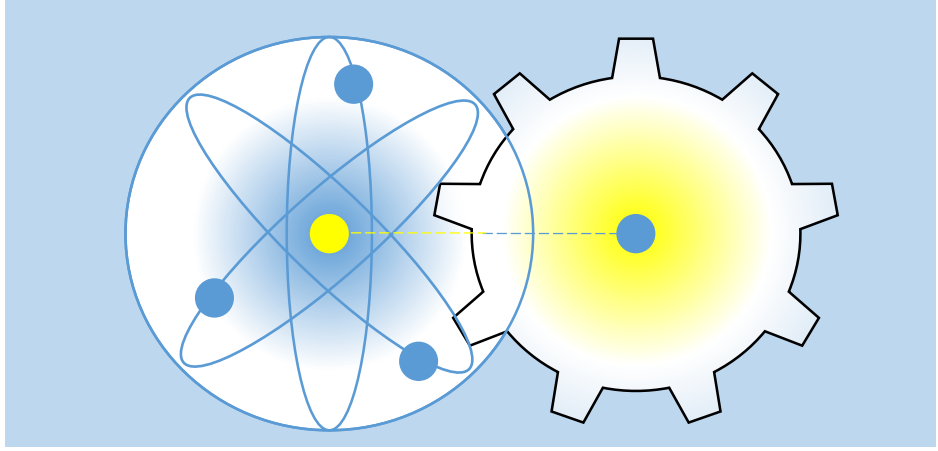
- Enhance transparency into the national lab innovation infrastructure
- Enhance awareness of high-impact industrially relevant technology challen within the national laboratory system; and
- Broaden and strengthen networks of Technologists in national laboratories and in industry to more effectively support industry needs and leverage the national laboratory enterprise.

Technologist in Residence Summary: Model

Senior Technologists are identified within a National Lab and a manufacturing company. The Technologists work together…



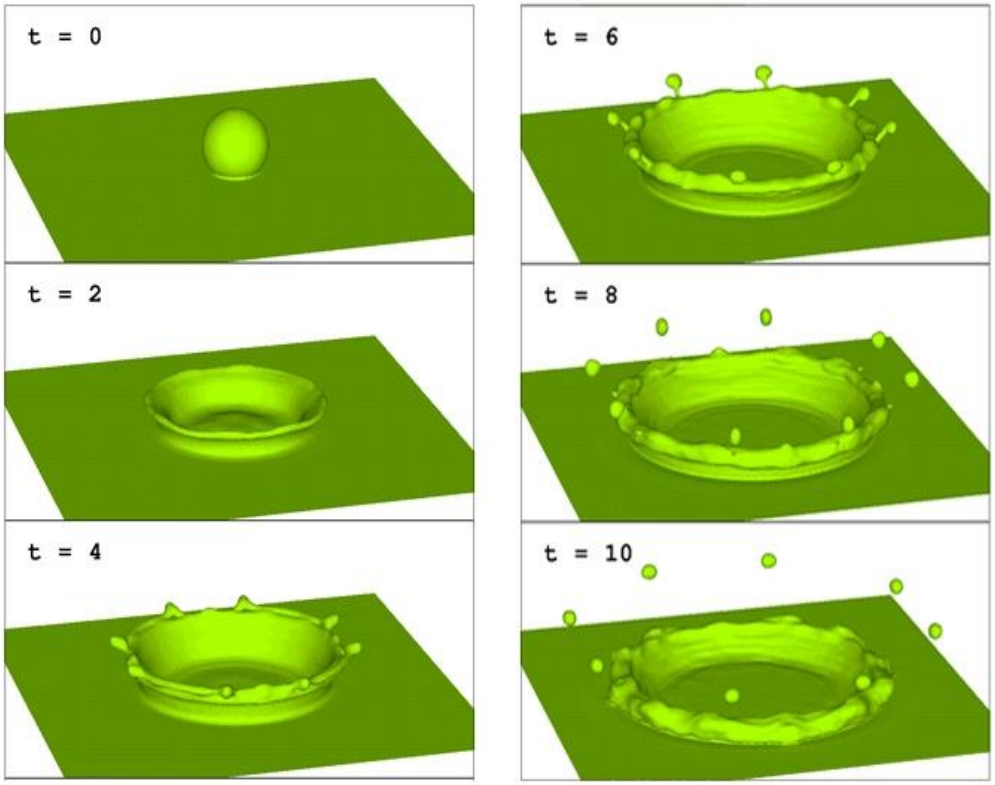
…to identify new areas of collaborative research for industry and Lab, and create an agreement and specific scopes of work



Broadening beyond ‘one company – one lab’…

Through the Council of Technologists, program participants will work together to access/resources across the entire Lab enterprise. The Council will also help optimize the process for Lab collaboration.

History: Los Alamos's Industrial Fellows Program



$1 Billion Saved in MFG Costs

44% increase in plant productivity

30% increase in equipment reliability

This simulation of a droplet of liquid falling into a pool of liquid was modeled using Los Alamos National Laboratory's Computational Fluid Dynamics Library (CFDLib), and utilized by Procter and Gamble to simulate a manufacturing process.

https://energy.gov/articles/improved-manufacturing-processes-save-company-one-billion-dollars

Technologist in Residence Program – Cohort 1 Kicked off 2015

P&G Procter & Gamble

Los Alamos NATIONAL LABORATORY EST. 1943

OAK RIDGE National Laboratory

ARCONIC | Alcoa

NREL NATIONAL RENEWABLE ENERGY LABORATORY

Hewlett Packard Enterprise

Cummins

Argonne NATIONAL LABORATORY

Capstone® Turbine Corporation

Argonne NATIONAL LABORATORY

Argonne NATIONAL LABORATORY

bridg
Bridging the Innovation Development Gap

Technologist in Residence Program – Rolling applications since 2016

LUMILEDS

Sandia National Laboratories

UOP A Honeywell Company

Argonne NATIONAL LABORATORY

Henkel

BROOKHAVEN NATIONAL LABORATORY

OAK RIDGE National Laboratory

PIONEER NATURAL RESOURCES

kyma technologies

Argonne NATIONAL LABORATORY

DUPONT

INL Idaho National Laboratory

Energy I-Corps

Energy I-Corps: Trains laboratory scientists in two month program on how breakthrough discoveries can transition into technologies for private-sector commercialization.

Several labs have additionally implemented their own “light” versions

Energy I-Corps Overview

Launched in 2015, Energy I-Corps was developed in close consultation with the National Science Foundation and their validated I-Corps™ program.

HOW IT WORKS:

Energy I-Corps (formerly Lab-Corps) pairs national lab researchers with industry mentors for an intensive two-month training course.

Researchers:

- Define technology value propositions
- Conduct "Customer discovery" interviews
- Develop viable market pathways for their technologies
- Use market feedback to define future research areas

"[Energy I-Corps] showed me how I can maximize the benefit of my basic research at Argonne to create technology that has real-world commercial impacts for Americans. That's a very rewarding feeling."

Dr. Ralph Muehleisen
Cohort 1 Grad

Peter Fiske
Cohort 3 Instructor

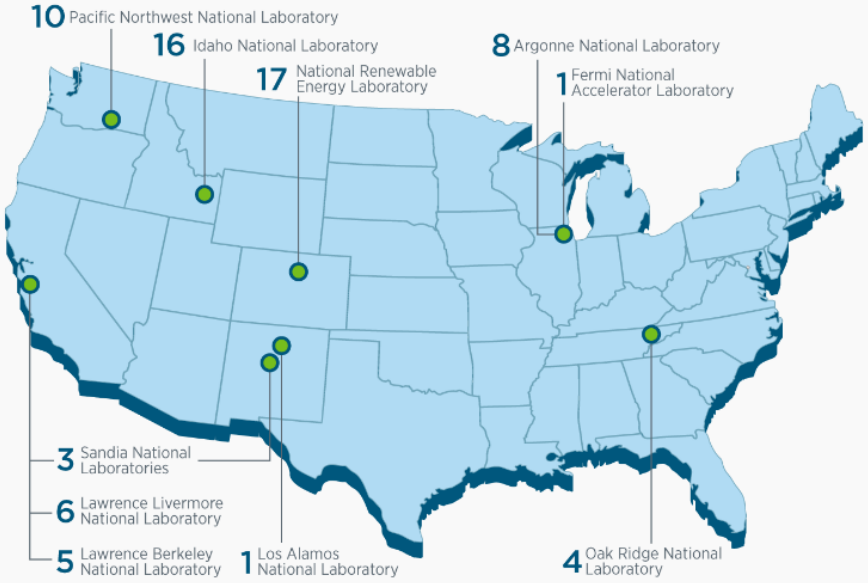
"I started my first company with a technology from a national lab…If the program had been around when I started my company, I'm sure I would have saved about two and a half years."

FOR MORE INFORMATION GO TO:
energyicorps.energy.gov

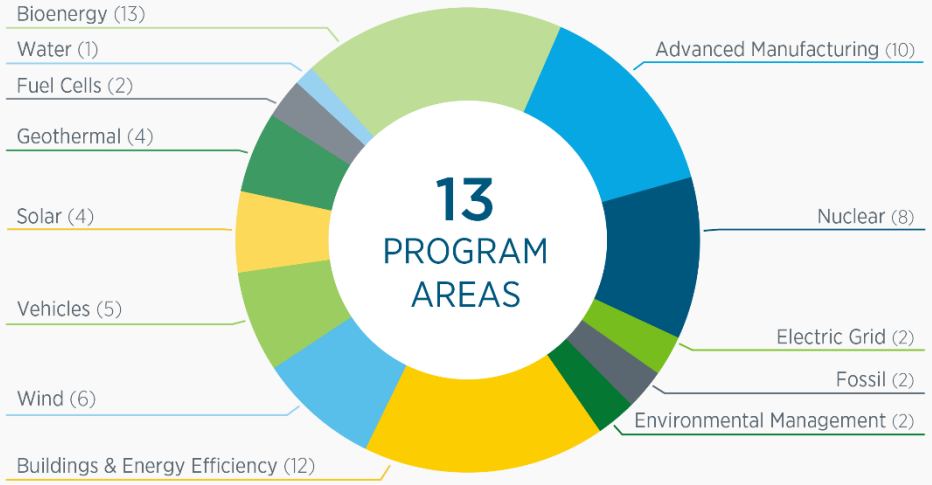
ENERGY I-CORPS
U.S. Department Of Energy

6 CLASSES of ENERGY I-CORPS

71 TEAMS | 10 NATIONAL LABORATORIES



BRINGING **ENERGY INNOVATIONS** TO



LEARNING FROM

>70 Industry Mentors *and* **>4,500** Customer Discovery Interviews with companies like:

Hitachi, Lowes, Johns Manville, Lego, US Army, Trane, Tesla, GM, Dow Chemical, Yingli, 3M, Whirlpool, GE, Home Depot, ReMax, Amazon

Lab Embedded Entrepreneur Program (LEEP)

Embeds top entrepreneurial scientists and engineers within U.S. national laboratories to perform early-stage R&D and demonstration.

- Cyclotron Road at Lawrence Berkeley National Laboratory,
- Chain Reaction Innovations at Argonne National Laboratory
- Innovation Crossroads at Oak Ridge National Laboratory

1. **Spin-in** top entrepreneurial scientists from across the U.S.
2. **Support** with world class facilities, expertise, and mentorship
3. **Position** people and new technologies for market

DOE SBIR/STTR Technology Transfer

- Leveraging Innovation from National Labs and Universities
- Allow federal intellectual property to be matured with SBIR/STTR grants
- Other agencies have done this historically: NIST, USDA, NIH, NASA, NIST and NASA have processes

Manufacturing Fundamental Training for Hardware Entrepreneurs

The majority of technical entrepreneurs starting hardware companies **do not know manufacturing fundamentals**. This leads to two related problems:

1. Without manufacturing know-how, prototypes that are cost-prohibitive or impossible to manufacture are produced and validated. These prototypes end up needing to be redesigned, leading to lost time and money.

2. Strategic partners and investors expect hardware entrepreneurs to have planned for manufacturing. When this is not the case, partners essential to the success of hardware companies are reluctant to engage.

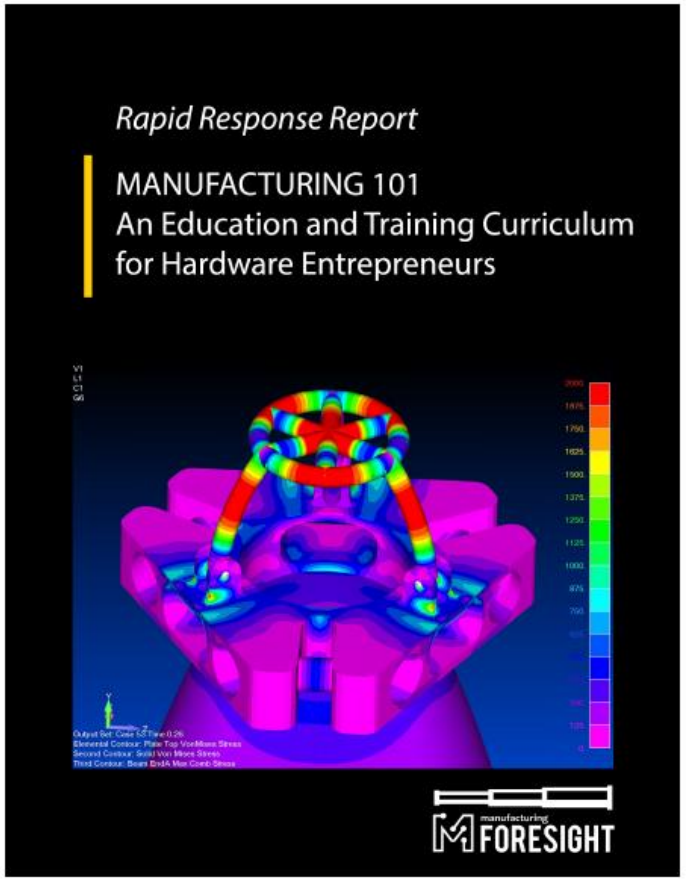
Manufacturing Training for Hardware Entrepreneurs

MForesight was established by NSF and NIST to serve as a national advanced manufacturing think-and-do tank.

Final "Manufacturing 101" report released in September 2016, available at *mforesight.org/download-reports/*

FINDINGS:

- A technology-agnostic training program is needed to address a common problem: the need for hardware innovators to redesign products to address manufacturing challenges.
- The goal of training should not be to "turn every entrepreneur into a manufacturing expert, but rather to provide a basic understanding of manufacturing disciplines, challenges, and best practices."
- Recommended eight technology-agnostic training modules



Build4Scale
U.S. Department of Energy

Publicly Launched February 6, 2018!!

Search

Home | About | Training Modules | Self-Assessment | Resource Library | Glossary | FAQs | **AIM Onshore Prize**

The U.S. Department of Energy's **Build4Scale training** equips energy hardware innovators with the training and information they need to create manufacturing-ready prototypes, avoid costly redesign, and work with manufacturers.

Getting started

Build4Scale training is self-paced, so feel free to move through the modules chronologically or view them individually. Getting started is easy:

- If you already know what information you need, simply refer to the hub below, or go **here** for a complete listing of the Build4Scale training modules. Simply select the content you need and start learning!
- If you're new to hardware manufacturing and design, or just new to the Build4Scale training, start with the Course Introduction (Module 0). From there, take the Self-Assessment (Module 1), which will help determine your manufacturing readiness and identify which Build4Scale training modules and resources are best suited for your needs.

Build4Scale Training Hub

0 Course Introduction

1 Self-Assessment

2 Detailed Design Package

3 Design for Mfg, Assembly, & Reliability

4 Beta Prototype & Test Plan

5 Communication, Selection, & Negotiation

6 Regulation, Certification, & Industry Stds

7 Sustaining Quality & Warranty Plan

Resource Library

The Wells Fargo Innovation Incubator (IN^2)

- Formed by **Agreement for Commercializing Technology** (ACT) between NREL and Wells Fargo
- Designed to support clean energy buildings-related technologies and startup companies overcome market gaps
- Provides **technical assistance** and **business development** resources.
- NREL participates in the down-selection of applications.
- Companies in the program may receive up to $250,000 in technical services from NREL and funding directly to the company.
- IN^2 portfolio companies have gone on to raise $83.65M from external funding
- On average, IN^2 portfolio companies receive 12XIN^2 in external follow-on funding compared to IN^2 initial investment
- 3 portfolio companies to date have seen successful exits through M&As
- www.in2ecosystem.com

Build4Scale: Partners Across the U.S.

Lawrence Livermore National Lab led a team of a dozen partners to develop training on making and evaluating manufacturing decisions. The main content development partners were EWI, LACI, MassMEP, Optimal Inc., and Texas A&M.

American Inventions Made Onshore (AIM Onshore)

AIM Onshore makes it easier for technologies to be manufactured domestically and get to market, by creating an interface between American innovators and manufacturers.

External Organizations:

1. Train scientists and engineers in manufacturing fundamentals EARLY in the innovation process.
   - ✓ Limiting costly errors and product redesign, leading to more investable technologies.
   - ✓ Equipping innovators with the knowledge & background to effectively work with local manufacturers.
2. Facilitate mutually beneficial interactions between innovators and regional manufacturers.
   - ✓ Promoting initial production of new technologies in the United States.

AIM Onshore: Structure

Initial Prize:

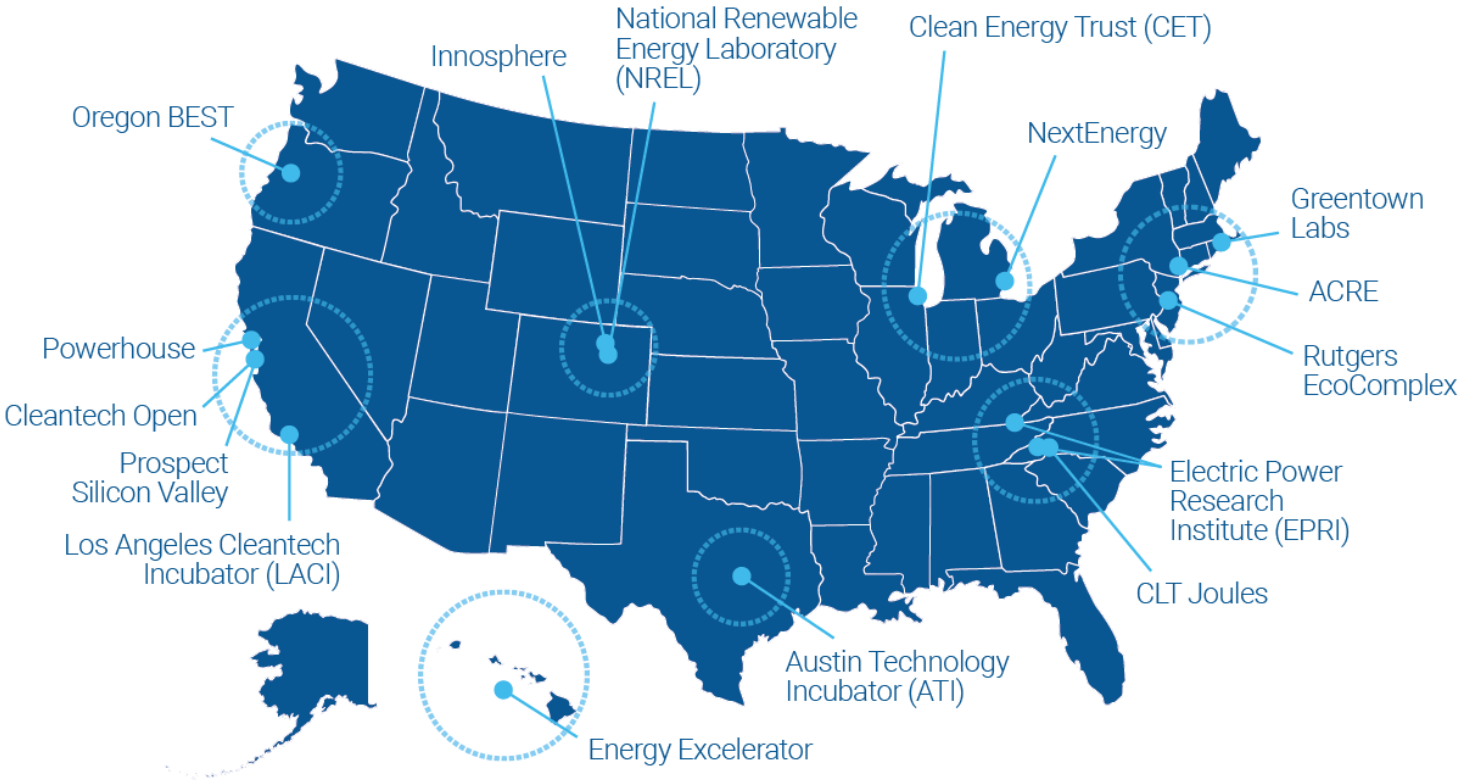
- Propose a financially sustainable revenue model for 1. training delivery and 2.partnership development.
- Four (4) participants will be rewarded $150k each to execute their plan for one year.

Final Prize:

- Demonstrate outcomes of training delivery and partnership development via a financially sustainable revenue model.
- Will reward the top two performers ($250k for first, $100k for second) and disseminate best practices.

Incubatenergy: A network of energy-focused incubators; many focused on hardware innovation

Increases the coordination and collaboration among incubators nationwide, develops best practices for clean energy incubators, and raises overall incubator performance standards.



Membership in Incubatenergy would NOT be required for the AIM OnShore prize —they are representative candidates only. The program would be open to universities, community colleges, and other incubator/accelerator organizations.

Cleantech University Prize (Cleantech UP)

Pitch competitions where energy innovators receive:

Mentorship, Business Development Training and Investor Feedback

** critical private sector feedback and market exposure they need to advance their technologies to the marketplace.

Regional Competitions (*February to June, 2018 timeframe*)

- Carnegie Mellon
- Caltech
- Clean Energy Trust
- MIT
- Rice University
- Rutgers, The State University of NJ
- UC-Berkeley
- University of Central Florida

National Competition (*June*)

- VentureWell (National Hub)

$500,000 in prizes per year.

+1,000 teams participated in the previous 2011-2015 NCEBPC with +200 incorporated.
Participant teams have raised more than $135M in follow-on funding and created +120 new jobs.

http://www.cleantechup.org

For more information:

Clara Asmail
Clara.Asmail@hq.doe.gov

U.S. DEPARTMENT OF ENERGY | Office of Technology Transitions

Tech Transfer Success Stories

STARS Technology Corporation(STC)
Pacific Northwest National Laboratory

The STARSTM system is an efficient, micro- and meso-channel, process intensive thermochemical reactor module that creates “Fuel From Thin Air” by capturing and utilizing atmospheric CO_2 as a feedstock.

- Energy I-Corps Cohort 1
- 100+ STARS related patents.
- Licenses granted under STC include 32 issued and pending patents, with options on 62 additional patents. .
- Received R&D 100 Award in 2014
- $8M+ from Federal Funding Sources and Strategic Partners
- Two Cooperative Research and Development Agreements (CRADAs) with SoCalGas to refine STARS, with the goal of providing a platform to showcase how the technology lowers carbon emissions in natural gas applications.

General Line Ampacity State Solver (GLASS)
Idaho National Laboratory

- Executed CRADA with WINDSim AS.
- Completed R&D CRADA agreement with AltaLINK, LLC Canada.
- Awarded **Technology Commercialization Fund** (Type 2) Cooperative Development Project in partnership with funding partner.
- Completed 1 license agreement with an industry partner.

Whisker Labs
Lawrence Berkeley National Lab

Affixes easily to a homeowner's electrical panel or breaker box and provides real-time power usage and diagnostic information for all home appliances including HVAC systems, refrigerators, and washer/dryers to identify potential energy waste.

- Participated in first cohort of Wells Fargo Innovation Incubator program.
- Whisker Labs was acquired by Earth Networks, an environmental technology company experienced in weather monitoring devices in December 2016.
- In May 2017, Whisker Labs' DIY Home Energy Monitoring Sensor received the Electronic House's 2017 Product of the Year Award in the Home Control and Automation category.

Quake (MASTADON)
Idaho National Laboratory

The MASTODON technology is built on sophisticated physical models for soils and structures to Identify the infrastructure that is most vulnerable to earthquakes. The risk-based design procedure identifies the most vulnerable parts of the infrastructure system and helps provide the most cost-effective retrofitting solutions like seismic isolation.

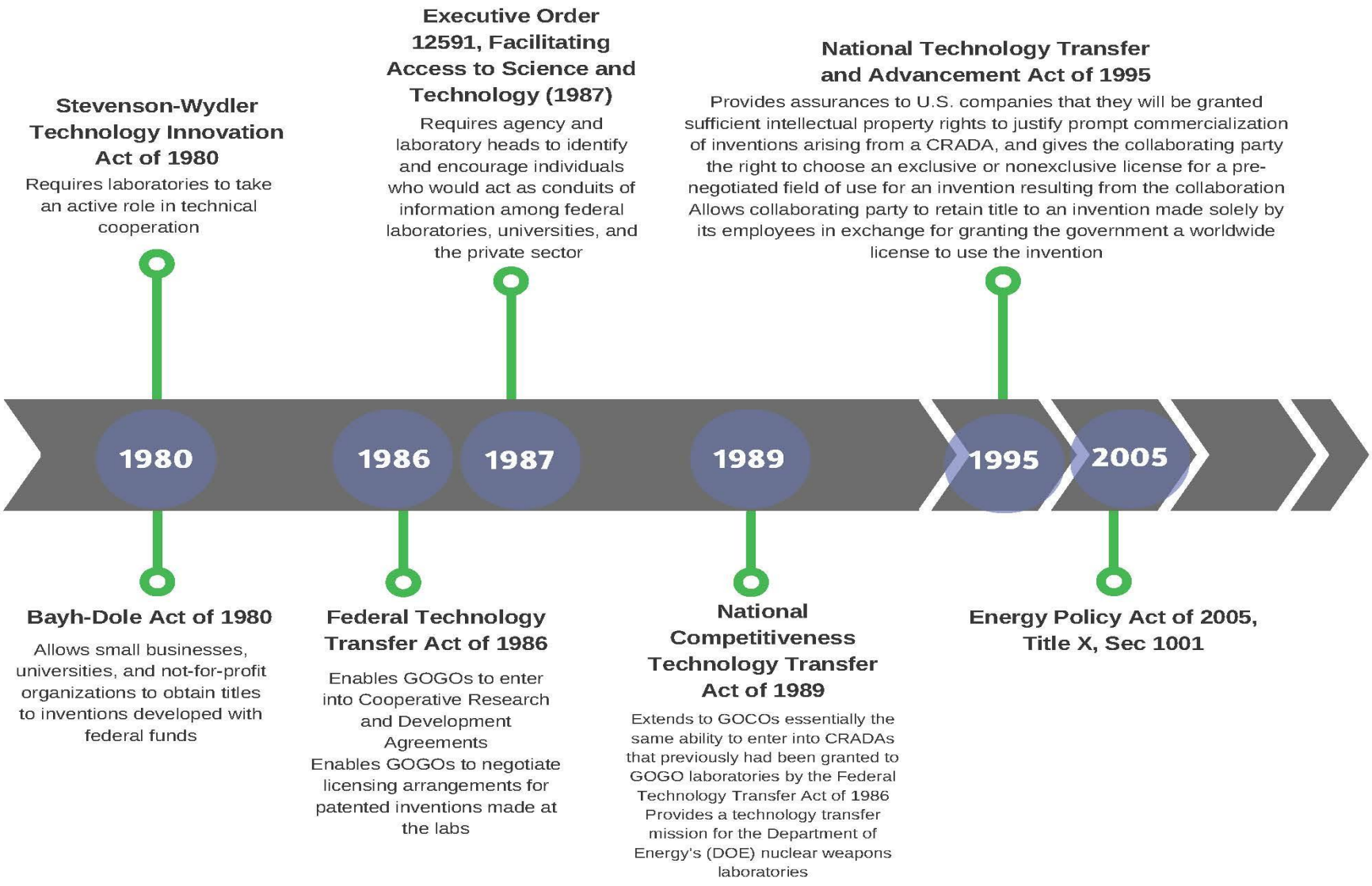
- Energy I-Corps Cohort 2
- Received Technology Commercialization Funding (TCF) with three funding partners (TerraPower, X-energy, and Southern Company) totaling $1,420,000
- Filed for a patent on the key technology in the software

SonicLQ: The Sonic Leak Quantifier
Argonne National Laboratory

Commercial building envelope commissioning agents and curtain wall and air barrier contractors. This market can use SonicLQ as a QA/QC tool during construction to ensure that all leaks are found when repairs can be made quickly and at lower cost.

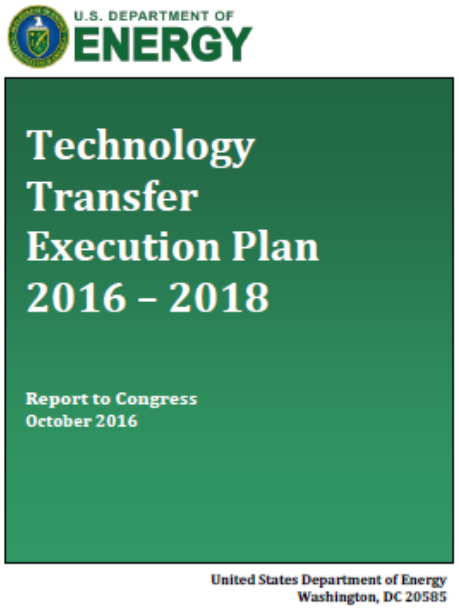
- Energy I-Corps Cohort 1
- Received $285,000 in follow-on funding DOE Building Technologies Office
- Received $1,050,00 from DoD ESTCP/SERDP program for demonstration and testing on DoD sites
- Filed for a patent on key technology

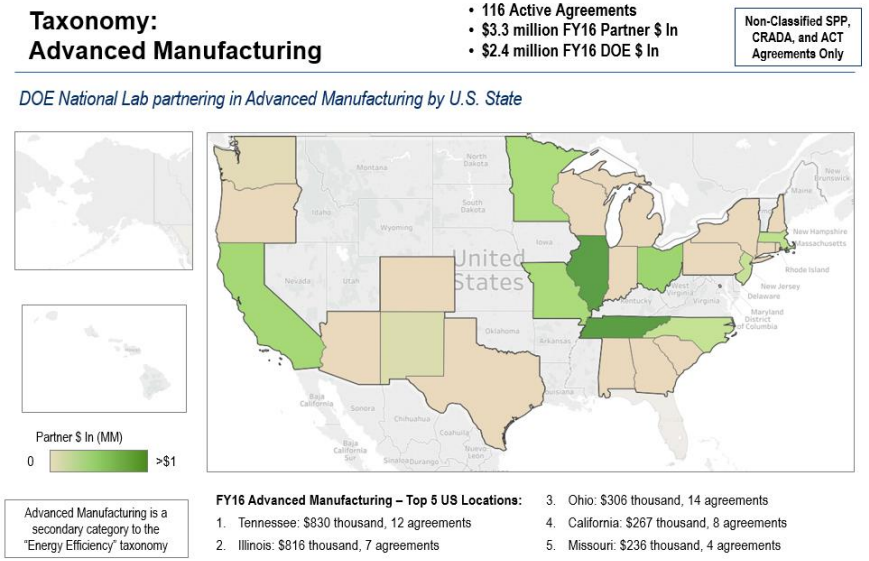
History of Office of Technology Transitions



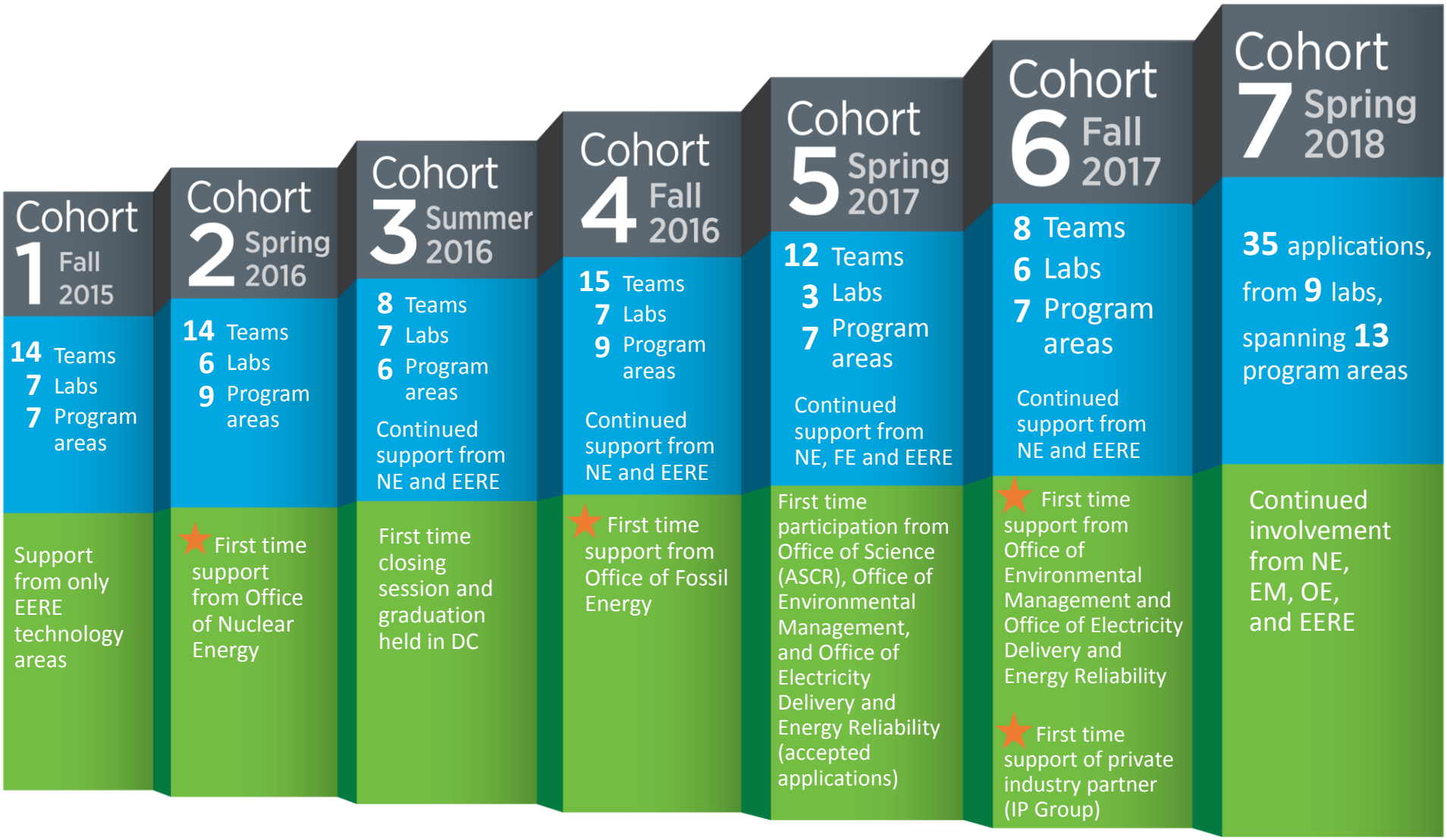
OTT's Data Collection, Analysis, and Reporting

- Technology Transfer Execution Plan to Congress
- Tech Transfer data to NIST Federal report to Congress
- Internal data analysis and reporting

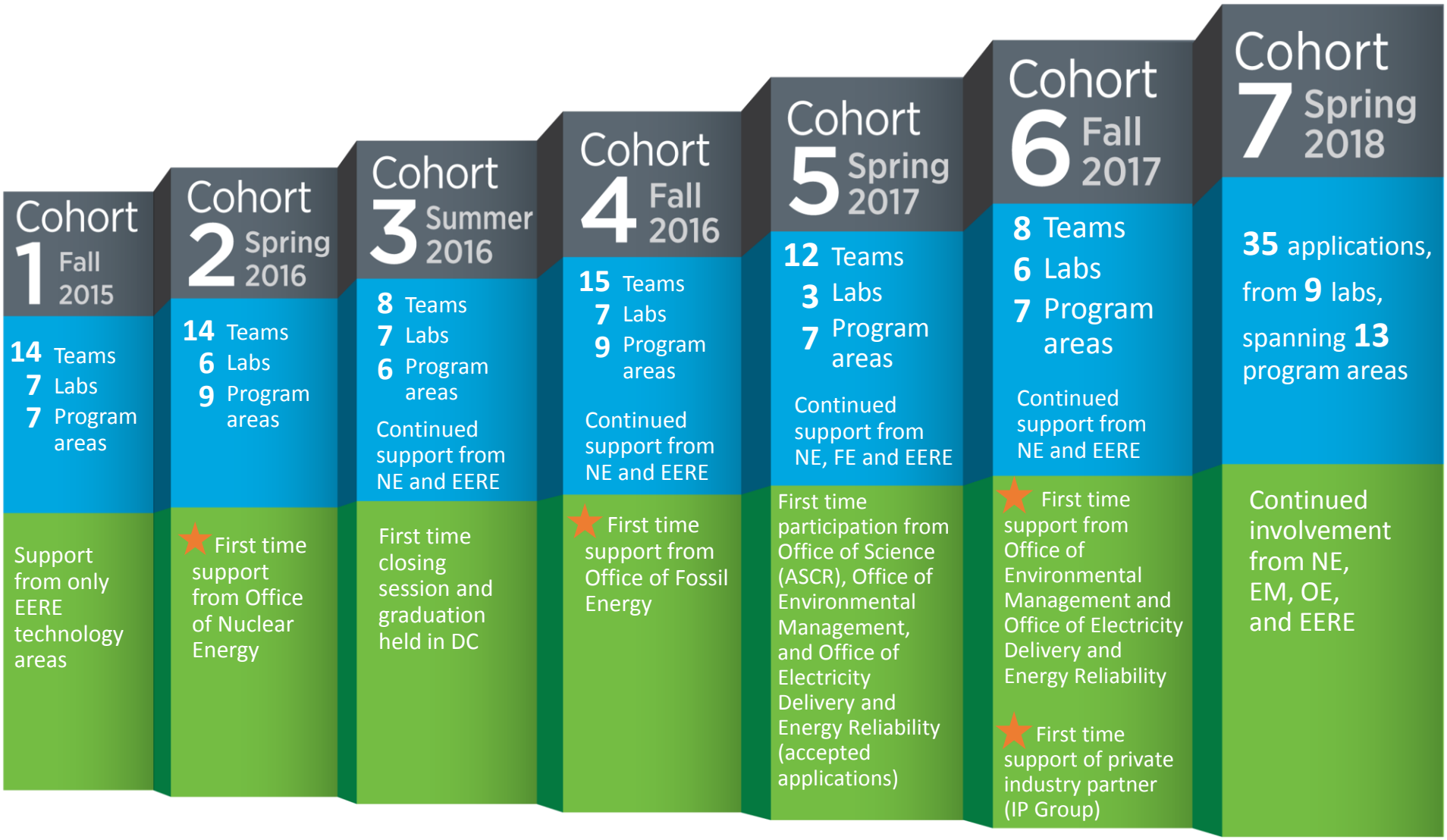




Energy I-Corps Evolution



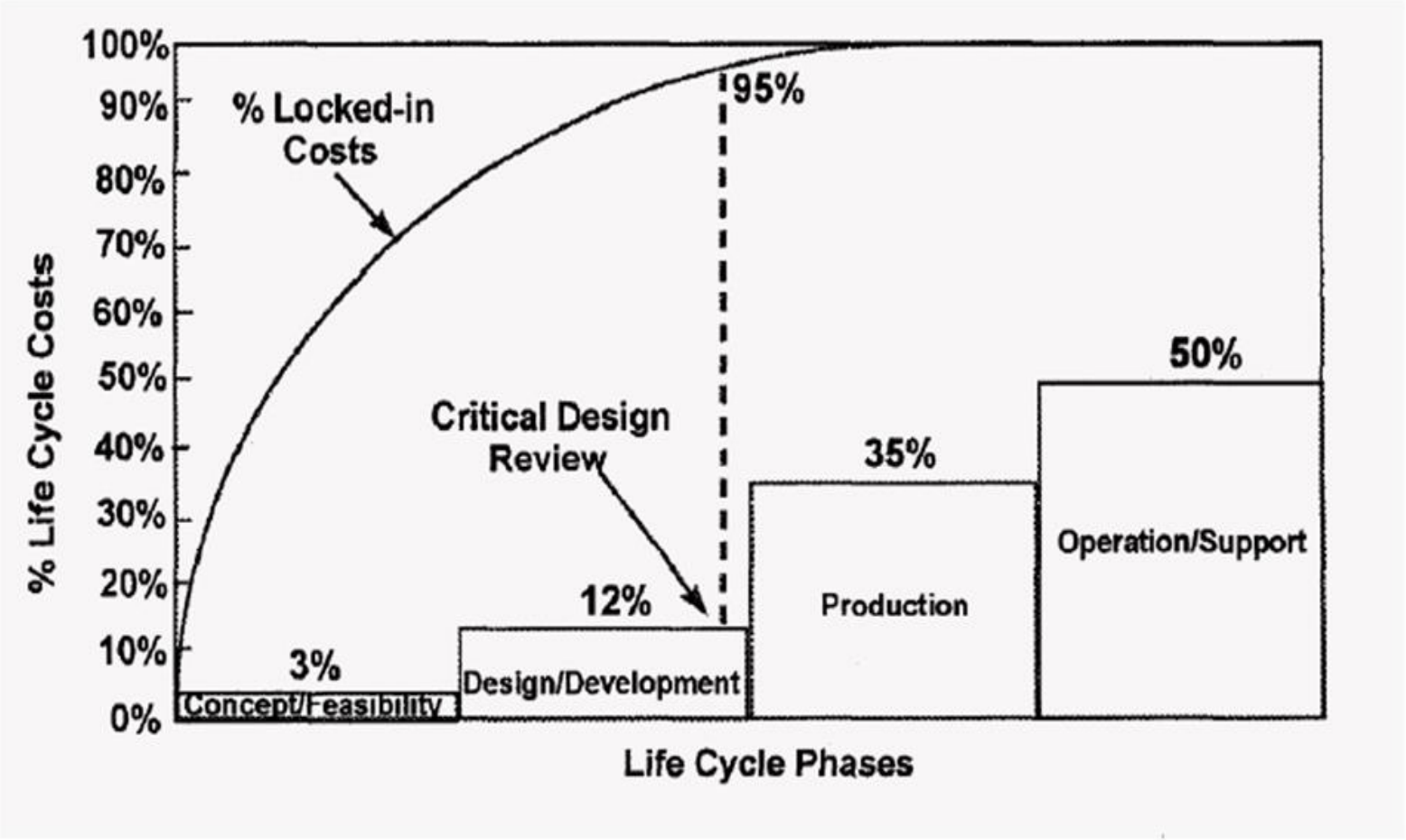
Energy I-Corps Evolution



Training Content Outline

1. **Manufacturing Self-Assessment** (~45 minutes)
   Questionnaire to assess manufacturing and training readiness
2. **Detailed Design Package** (~115 minutes)
   Bill of materials (BOM)/process (BOP), product lifecycle management (PLM)
3. **Design for Manufacturing, Assembly, and Reliability** (~255 minutes)
   Materials and manufacturing process selection, design for X
4. **Beta Prototype and Test Plan** (~55 minutes)
   Simulating actual use conditions, design refinement
5. **Partnerships, Supply Chain, and Distribution** (~180 minutes)
   Contract management, supplier negotiation, packaging, distribution plan
6. **Regulation, Certification, and Quality Plan** (~150 minutes)
   Identifying regulation, certification, and quality needs
7. **Sustaining Quality and Warranty** (~80 minutes)
   Quality monitoring, product returns, warranty support, financing growth

Cost of redesign is lowest at earliest stages

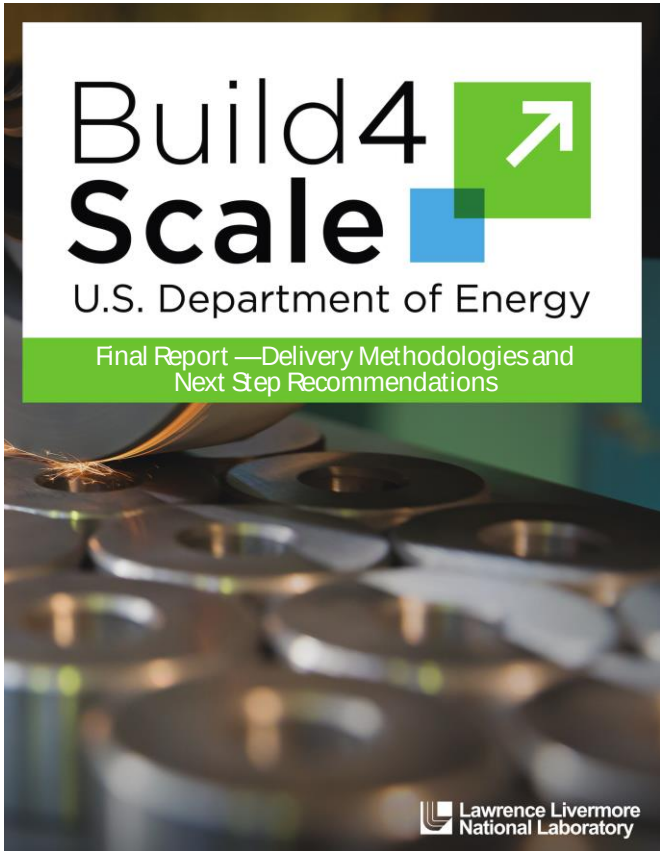


Architectural Design for Reliability, R. Cranwell and R. Hunter, Sandia Labs, 1997

Final delivery recommendations

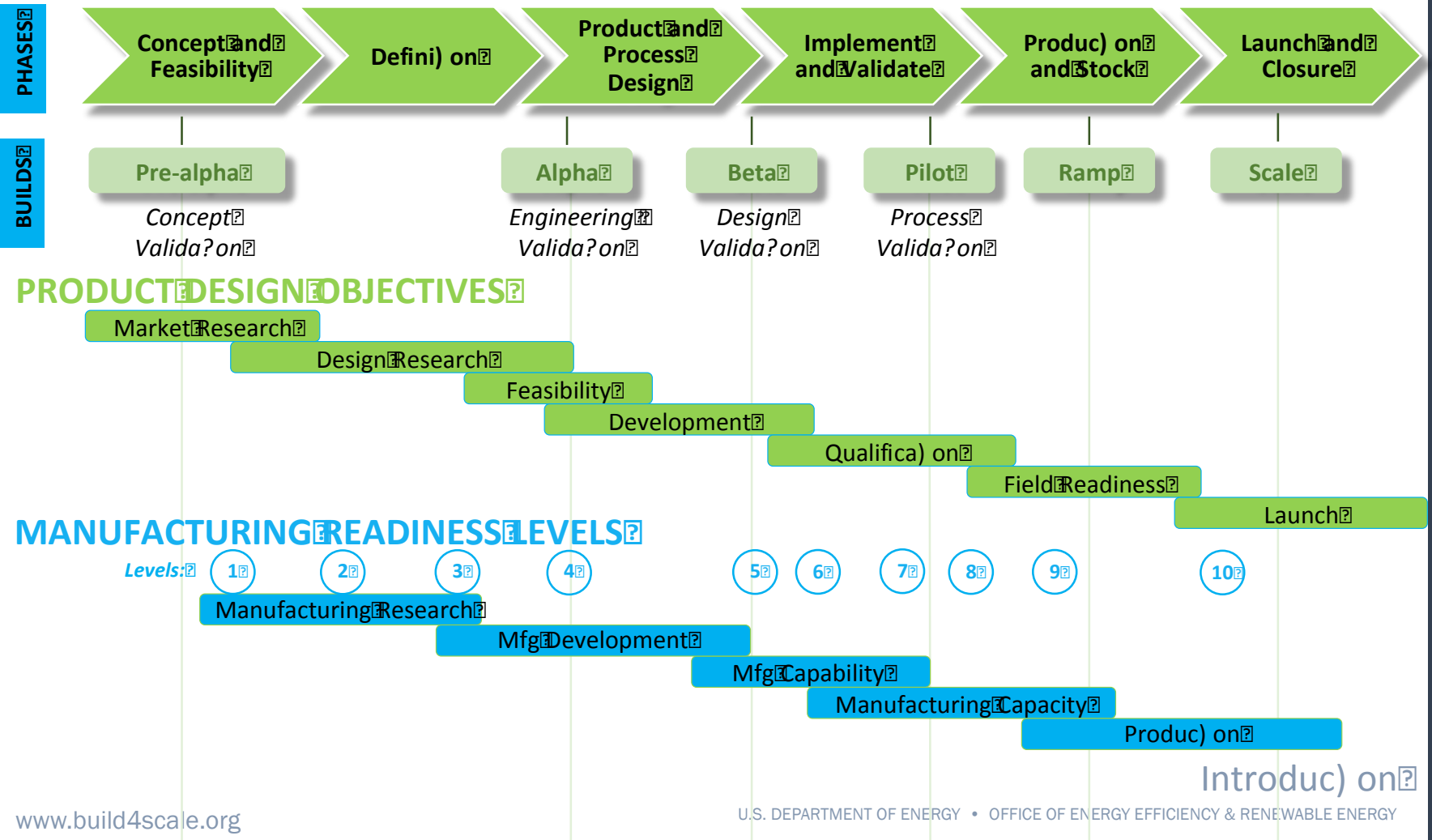
After an August 2017 workshop with the Build4Scale leadership team, the following recommendations were proposed:

1. Develop standalone training hosted online in a central repository, with the option of instruction from a participating organization
2. Develop a promotional campaign for Build4Scale so supporting organizations and new innovators know that it's available, why they need it, and how to gain access, ideally from an organization within their local community
3. Incentivize external organizations to adopt and teach the Buil4Scale curriculum within their communities and build out additional partnerships.
4. Explore ways for organizations to propose edits and additions in ongoing manner, while maintaining consistency and (ideally) common branding.
5. Compile 'best practices' for delivery/absorption based on survey results of participating organizations, and prepare for 'open access' of repository to demographics of choice (MEPs, incubators, accelerators, universities)



Product And Design Process

Versus manufacturing readiness levels (MRLs)



Resources on the Innovation-Manufacturing connection

- Reshorenow.org: Startup Calculator for determining on/off shoring costs
- Berger, S., *Making in America: From Innovation to Market*, Cambridge, MA: the MIT Press, 2013
- Bonvillian, W.B., "Reinventing American Manufacturing" innovations, vol. 7, no. 3, pp. 97 – 125, 2012
- McCormack, R., "With Loss Of Manufacturing, The U.S. Innovation Engine Is No Longer Working," Manufacturing & Technology News, vol. 20, no. 13, 2013
- National Innovation Initiative Summit and Report, 2005, "Innovate America" Council on Competitiveness
- Bonvillian, W. B., and Weiss, C., *Technological Innovation in Legacy Sectors*. New York: Oxford University Press., 2015
- Locke, R.M. and Wellhausen, R.L. eds., *Production in the Innovation Economy*, Cambridge, MA: the MIT Press, 2014
- NSF Science & Engineering Indicators, 2016
- IP Commission Report, 2013
- American Energy & Manufacturing Competitiveness Partnership, Bridge, 2014
- "Fresh impetus for *Made in China* 2025 plan," http://www.chinadaily.com.cn/bizchina/2017-10/21/content_33522564.htm

Build4Scale Training Pilot Sessions

LOCATION	HOST	DATE
East Bay Area, CA	i-Gate	July 11
Southfield, MI	Optimal Inc.	July 12
Los Angeles, CA	LACI	July 19
Somerville, MA	Greentown Labs	July 27
Bordentown, NJ	Rutgers, TAMU	August 1
Southfield, MI	Optimal Inc.	August 18
Austin, TX	ATI, TAMU	August 22
Loveland, CO	EWI	October 6

SUMMARY TO DATE

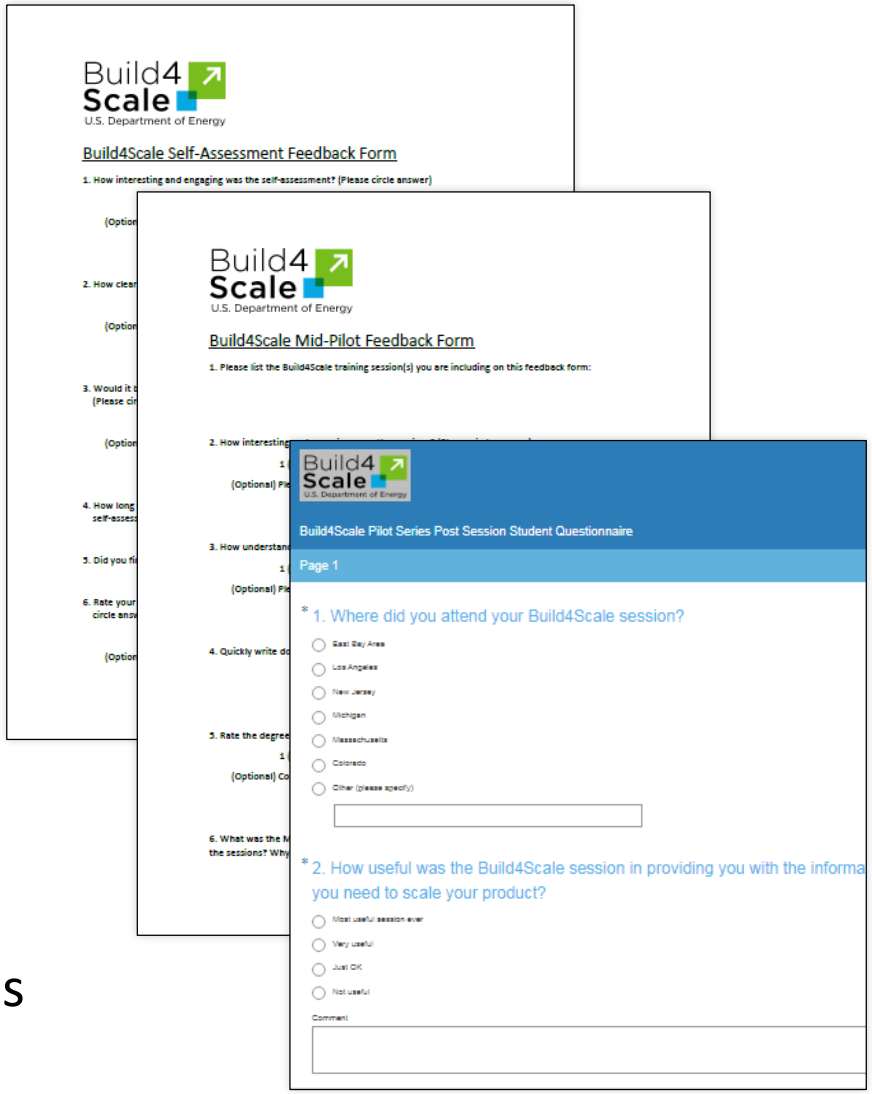
Number of innovator teams exposed to training: **74**

Percent interested in more Build4Scale sessions: **87%**

Number of manufacturing expert participants: **22**

Assessment of Pilot Training Sessions

1. Audience feedback requested:
   - Self-assessment
     - Level of interest
     - Degree of clarity
     - Usefulness to track progress
     - Time needed to complete
   - Training content
     - Level of interest
     - Degree of clarity
     - Usefulness of information
   - Overall session
     - Level of interest
     - Usefulness of information
     - Session format and instructor
2. Instructor de-brief conference calls



The Challenge & Opportunity

A typical story:

- Innovators experience "technology retreat"—backward movement on TRL scale and increased costs due to re-design for manufacturing.
- Innovators work with consulting firm and/or investor connections to streamline manufacturing offshore.

Our alternate vision:

- Teach manufacturing fundamentals early, as part of the innovation process, to equip innovators to engage with manufacturers, and minimize late-stage redesign.
- Facilitate partnerships between innovators and regional manufacturers to encourage domestic manufacturing of new products.

Our alternate vision:

- Teach manufacturing fundamentals early, as part of the innovation process, to equip innovators to engage with manufacturers, and minimize late-stage redesign.
- Facilitate partnerships between innovators and regional manufacturers to encourage domestic manufacturing of new products.

1. **Develop training materials that can close the fundamental knowledge gap for hardware innovators.**
2. **Enable outside organizations to deliver this training at the right time, and connect innovators to domestic manufacturers as they learn. Facilitate active partnerships to deliver value to manufacturing base.**

Prize Competition: Problem Statement

A strong connection between American innovation and American manufacturing yields the highest return on R&D investment.

But there is a breakdown:
Hardware innovation occurs without connection to manufacturing.
(Invent here, manufacture there)

- Due to knowledge gaps, technology prototypes that can't be manufactured are made, leading to lost time and money.
- Investors and industry partners avoid investing in these prototypes – the result is that fewer technologies get to market.
- Innovators work with consulting firms after prototype development to redesign products, and send manufacturing contracts offshore.

Prize authority is a streamlined way for DOE to process small, short-term awards efficiently while prioritizing performance

PRIZE AUTHORITY:

- Authority via Stevenson-Wydler (1980), amended by COMPETES Reauthorization Act (2010)
- Limited overhead appropriate for small awards
- Pay-for-performance encourages competition and high performance
- Requires EE-1 approval for prizes <$1M
- S1 notification memo recommended

PRIZE ADMINISTRATOR (NREL):

- Runs solicitation, review process, and selection process.
- Reviews and evaluates best practices, propagates best practices to large set of organizations, reports out to DOE.

TIR Program Successes

ORNL – Arconic

Core Topics of Focus:

- Additive Manufacturing
- Materials Discovery
- High-Performance Computing
- High-Entropy Alloys
- Ceramic Materials
- Heat Exchangers
- Ceramic Matrix Composites
- Data Analytics
- Water Utilization
- Lightweight alloys
- Joining

Labs Engaged with:

- Ames
- LLNL
- LANL
- NETL
- NREL
- ANL
- PNNL

Results:

- 3 CRADAs at the Manufacturing Demonstration Facility
- 2 proposals funded by the HPC4MFG program
- Seedling proposal w ARPA-E for Nanophase Materials Science
- 2 Strategic Partnership Projects
- 1 License

Argonne – Cummins

Core Topics of Focus:

Powertrain systems and energy storage technologies.

- Increased flexibility for fleet operators
- Lower cost of vehicle ownership
- Partnering with regional air quality goals

Additional Potential Technology Areas for Exploration:

- Better understanding of battery system parameters
- Enhanced power electronics cooling technologies
- Thermal storage and release technologies

Labs Engaged with:

- ORNL
- NREL
- ANL
- Sandia

Results:

- 6 Statement of Work Proposals Developed Across Three Labs (NREL, ORNL, Argonne)
- 1 active CRADA

Participating in the TIR program

Cost share: DOE will fund Lab Technologist and any potential other team members for up to $350k. Industrial partner agrees to fund full participation of Industry Technologist, as well as any costs for Lab above DOE's commitment.

Participation: 18 – 24 months

Eligibility: Department of Energy National Laboratories are eligible to apply as the primary applicant. The proposal must also include an industry partner that is committed to participating. To be eligible, the lab proposal must identify both the senior representative of the industry partner and the senior representative of the DOE National Laboratory that would participate. For this lab call, "industry partner" is defined as a senior representative of a manufacturing company, consortia of companies, or economic development agency on behalf of local companies. At DOE's discretion, DOE may consider other entities that are similar to the types of entities listed in the sentence above.

Merit Review Criteria:

(1) Innovation, Technical Focus, Project Plan, and Approach (60%)

(2) Team and Resources (40%)