CHAIN REACTION INNOVATIONS
Entrepreneurship at Argonne

Chain Reaction Innovations

Contract Number 32135
Argonne National Laboratory
Project Period: 2018 - 2019

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Overview

Project Title: Chain Reaction Innovations

Timeline:

Project Start Date: 05/01/2016

Budget Period End Date: N/A

Project End Date: N/A

Barriers and Challenges:

- National energy and advanced manufacturing challenges are complex and require cross-disciplinary
- Energy innovation is difficult and time consuming.
- VC investment in clean tech is decreasing because of the long ROI period.

AMO MYPP Connection:

- CRI solicitation is open to all technologies covered by AMO's MYPP Advanced Manufacturing Technology Areas

Project Budget and Costs:

Budget	DOE Share	Cost Share	Total	Cost Share %
Overall Budget	$1,300,000	$774,471	$3,174,062	24.4%
Approved Budget (BP-1&2)	$1,300,000	$774,471	$3,174,062	24.4%
Planned Costs	$1,300,000	$774,471	$3,174.062	24.4%

Project Team and Roles:

- Argonne National Laboratory
  - Chain Reaction Innovations, hosts and supports innovators and scientists participating in the program
  - Mentoring Organizations (providing business and industrial contacts to support innovators)
    - Polsky Center for Entrepreneurship, University of Chicago
    - Purdue Foundry, Purdue University
    - Mhub, Chicago

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Project Objective

To accelerate the de-risking of innovations that can solve national energy, security and advanced manufacturing challenges; to instill the spirit of entrepreneurship at Argonne National Laboratory; strengthen the regional innovation ecosystem, and educate entrepreneurs to increase the probability of successful startups.

Key Challenges

- National energy and advanced manufacturing challenges are complex and require cross-disciplinary solutions involving materials science, physic, chemistry, and engineering. Industry investment in early stage R&D is decreasing so public-private partnerships are needed to fill the void.

- Energy innovation is difficult and time consuming. Innovators need financial and business support so that they can focus full time on R&D.

- VC investment in clean tech is decreasing because of the long ROI period. CRI increases the probability of investor and industry interest in energy innovation by compressing the development timescale through access to world-leading equipment, technical expertise and mentoring.

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Technical Innovation

Typical energy startup:

- One or two scientists build a small lab and balance time between a job and R&D. This takes years and millions in capital.
- Postdocs or scientists spin out technology from university or lab. They have little business or investor support on exit.

CRI Innovation:

- Embed innovator inside Argonne National Laboratory to compress R&D time.
- Access to business, industry, marketing, and technical mentoring.
- Up to $110K in education fellowship
- Up to $220K in seed money to spend on R&D at Argonne

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Technical Approach

Focus on high-potential energy and manufacturing innovations: CRI seeks out early-stage sustainable energy and advanced manufacturing technologies with potential for significant societal and economic impact

Fit to Argonne: Ensure tech aligns with ANL core capabilities during selection, and an ANL PI must be willing to collaborate with the innovator

Access to support: CRI team provides technical/startup support, while partner organizations (Uchicago Polsky Center, Booth School of Business, mHUB) provide business and manufacturing support

Leveraging Chicago's innovation ecosystem: Facilitate access to national laboratory resources, top tier universities, an active investment community, an incubator/accelerator network, and industry connections

Potential Risks:

- Shortage of ANL PIs to collaborate.
  Mitigation: Lab entrepreneur workshops and outreach, finding win-wins for PIs and innovators

- More innovators than funds.
  Mitigation: Seeking philanthropic, industry, university investment in program

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Measures of Success

- **Long term goal**: Create entrepreneurs with ventures that develop into sustainable businesses
- **Short term goal**: CRI projects get follow-on funding or are licensed by industry
- **Short term lab benefit**: Infuse the lab with energy, ideas and commercialization spirit
- **Potential energy impact**: More energy efficient manufacturing processes and products that use sustainable resources or reduce national reliance on foreign resources
- **Potential economic impact**: Import startups to the Midwest that hire employees and support supply and distribution chain employment

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Project Management & Budget

Status:
Third year of program. First cohort of innovators is graduating from the program. Second cohort is 12-13 months into their program. Cohort 3 began June 3, 2019.
In total, 15 innovators, 14 teams active at Argonne.

Total Project Budget	
DOE Investment	**$2,800,000**
Argonne Investment	
Cash into CRADAs	**$550,000**
Operations	**$220,000**
Project Total	**$3,570,000**

Key Milestones for Teams during 2 year immersion at Argonne:

- **Q1:** Customized 1-month I-Corps project, finalize CRADAs and IPMP, **provide detailed research plan**
- Begin equipment purchases, grant applications, market survey, competitive analysis, regulatory risk analysis.
- **Q2–3:** Start activities in lab with PIs, continue to hone value proposition and initial techno-economic analysis, achieve initial performance milestones.
- **Q4–5: Year 1 Review.** Refine research plan based on initial results, industry/customer engagement, and business analysis; begin conversations with potential investors, refine techno-economic analysis, achieve early performance milestones defined by industry/customers.
- **Q6–8: Demo Day**, ongoing discussions with industry partners/ investors, alpha-prototype demonstration. Preparing to transition technology to private sector, and for private investment.
- **Q8**: graduation from CRI.

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Results and Accomplishments

Cohort 1:

- ***Several Companies have closed private rounds of funding totaling over $4.5M***
- Proposals funded: $1,800,000 in SBIRs and other non-dilutive awards
- NSF SBIR Phase II funding awarded to ClearFlame ($355k coming back to Argonne)
- Successful Demo Day on Sept 12, 2018
- 3 of 4 Cohort 1 companies plan to continue work at Argonne after graduation

Cohort 2:

- (6) Innovators/Teams started- June 4, 2018
- Iris Light participating in New Venture Challenge at University of Chicago
- 3 SBIR Phase I awards to Cohort 2 teams to date: Accelerate Wind, Mesodyne, and Volexion
- $100,000 Ocean Engineering prize awarded – Jolt Energy
- Demo Day – September 17, 2019

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Results and Accomplishments

Cohort 3:

- 5 Innovators/teams started – June 3, 2019
- Collaborating with new division of Argonne - CELS (Computing, Environment, and Life Sciences) in Biosciences with Stemloop
- Completing a specialized 4-week I-Corps program with the Polsky Center
- Launching a pilot “bootcamp” month for Cohort 3 to establish expectations and framework for fellowship

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CRI Impact: Return on Investment

Inputs

AMO:

- **$2,800,000/year**
  - $1.3M in AOP to CRI
    - *$750,000 operations*
    - *$550,000 in CRADAs*
  - $1.5M to ORISE fellowships

Argonne:

- **$750,000/year for CRI**
  - $220,000 operations
  - $550,000 in CRADAs

Each CRADA: $220,000 of royalty and DOE funds available to do work in the lab to drive outcomes.

Outcomes

CRI Startups:

- **Total Raised: $6,880,162**
  (dilutive and non-dilutive to date)
- **Proposal Pipeline: $15,301,000**
  ($2,604,426 projected, 17% win rate)

$$ Back to Argonne:

- **Total: $355,000**
- **2019 Projected: $355,000**
  (follow-on collaborative $$)

$1.5MM → $355K
Cohort 2 and beyond: more collab expected
More teams: more CRADAs + follow-on $

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Transition (beyond DOE assistance)

Growth: Engaging additional stakeholders to support CRI's model financially

Benefits: Make more energy efficient products or processes. Create jobs. Increase national competitiveness and energy security.

Goals for Cohort 4:

- To double the number of finalists from 10 to 20 for Cohort 4 solicitation – more robust, earlier execution on recruitment for cohort 4 application process.
- To pilot sponsorship of a team for Cohort 4 by an external entity (CRI has identified 20+ partners interested in derisking early stage innovations through the program)

Model sustainability: Bringing larger amounts of external funding into ANL to support up to 20 innovators annually with PI collaboration.