

Nuclear and Innovating the Clean Energy Landscape

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SFEN Young Generation Workshop, Video Meeting

Environment, Health, Prosperity

How do we help the world develop **sustainably**?



<http://www.insidesources.com/wp-content/uploads/2015/11/bigstock-Energy-4298515-300x300.jpg>

We Need Cleaner Energy

- Nuclear's lifecycle emits very little CO₂ or air pollution

g CO ₂ eq /KWh	Solar (PV / CSP)	Wind	Nuclear	Coal	Natural Gas
Min	5 / 7	2	1	675	290
Max	271 / 89	220	220	1689	930

- Nuclear energy is an important component, it
 - Exists and is large scale
 - Is reliable / always on
 - Uses little land
 - Can be an economic boon

What's Not Working?

...But it's not perfect

- Rate of change
- Poor public communication
- Small range of products
- Innovative mindset?
- Economic viability
- Capital intensity
- Used fuel and waste / long-term fuel supply
- Safety and security

We must *shift* **how we think** about nuclear energy and nuclear innovation

What If?

- National and international scientific resources are leveraged
- An inspired, innovative workforce is available
- Regulation is fast and responsible
- Policy supports global cooperation and market health
- Communication is clear
- Technology needs are met
- Big improvements become viable

Companies are
rewarded for
new motivations

But How Do We Get There?





Introducing the Advanced Nuclear Industry

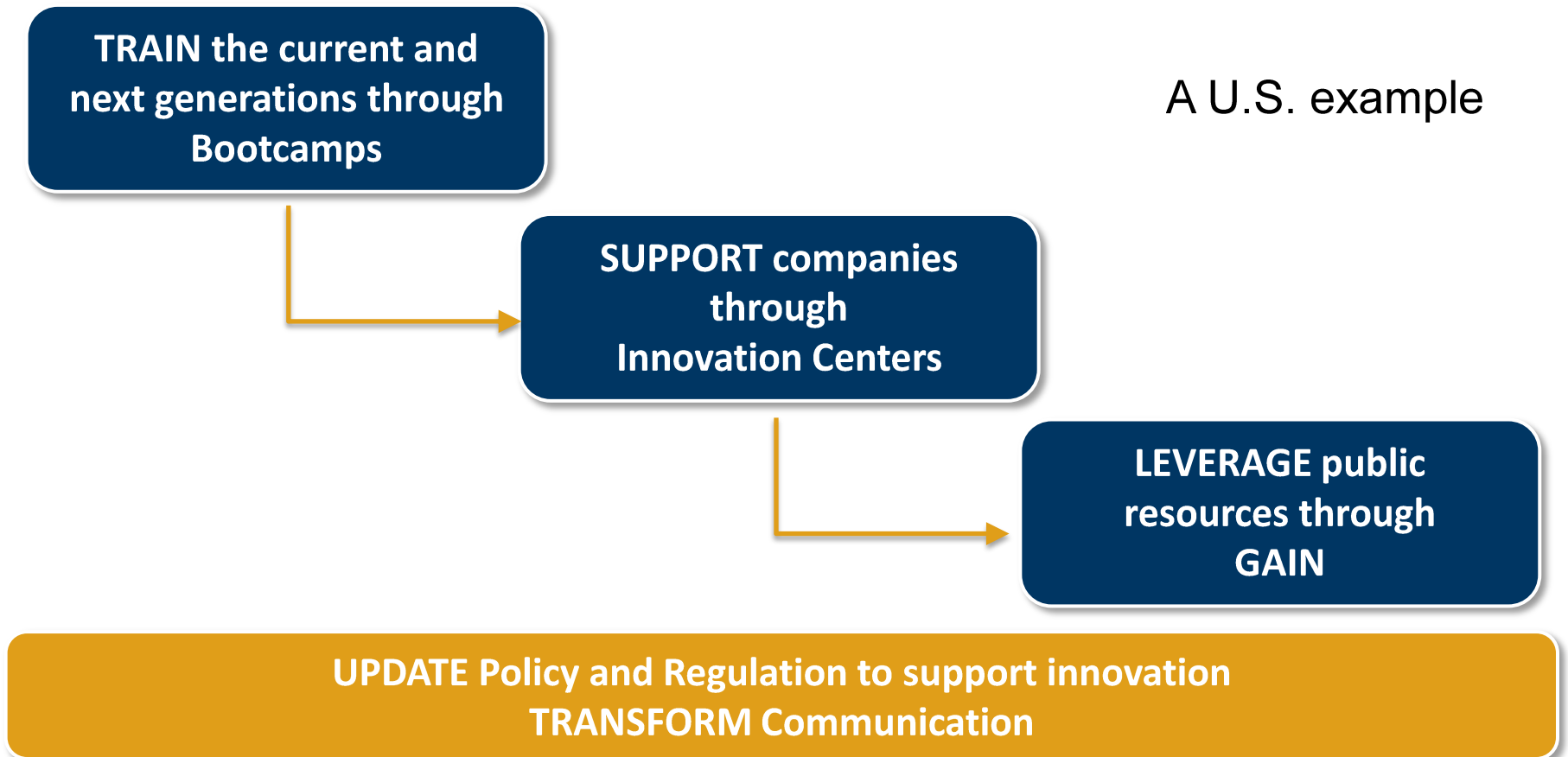


~50 companies

~\$1.3B of private capital

Build A Pipeline

A U.S. example



GAIN: Public-Private Leverage



**New DOE-NE Initiative
within the Clean Energy
Initiative**



Integrated institute managing a distributed test-bed and demonstration platform, dedication to innovation in Nuclear Energy

Public-private partnership including Industry, Entrepreneurs, National Laboratories, and Academia

Headquartered at the
Idaho National Laboratory

- Tens of \$B in DOE and partner assets (experimental and computational)
- More than \$1M in yearly investments for R&D and infrastructure
- \$12.5B in loan guarantees
- \$10M in SB vouchers
- Expertise and intellectual infrastructure

Innovation Centers



Regulators



Incubator/Accelerator
key physical capabilities
key intellectual capabilities
coordination
funding
support



- Learn from other programs: YC, Lemnos Labs, Breakout Labs, etc.
- Leverage Cyclotron Road program
- Investigate future paths forward

cyclotronroad

Nuclear Innovation Bootcamp



[http://www.nuclear
innovationalliance.org/
bootcamp](http://www.nuclearinnovationalliance.org/bootcamp)

- Teach students *how* to innovate:
 - Entrepreneurship
 - Nuclear aspects
 - Non-traditional material
- Pilot program August 1-12, 2016 held at UC Berkeley
- Team design projects
- Large company involvement
- Experts teach and mentor
- Judged completion



Unprecedented Success

Learning through sessions, projects, and play



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Nuclear Innovation Bootcamp

- <https://www.youtube.com/watch?v=aicVAXorRq4>
- Multiple articles, blog posts, and features... still coming
- Large social media impact
- And the narrative continues!

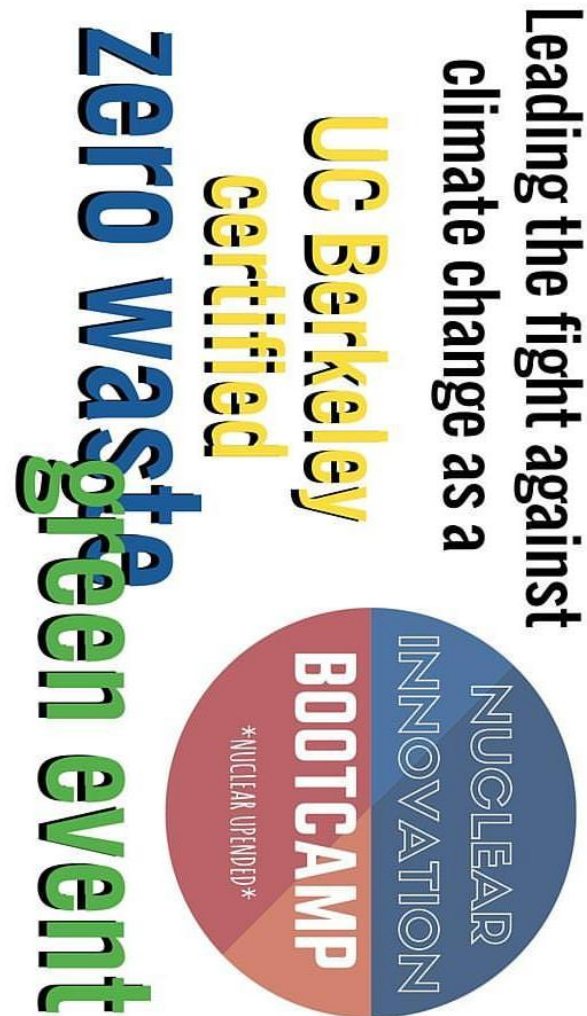


Nuclear Innovation Bootcamp

- Full program Summer 2017
- Deeper content, bigger projects
- Expand to include professionals
- Partner with other campus initiatives
- Intellectual collaboration with other universities

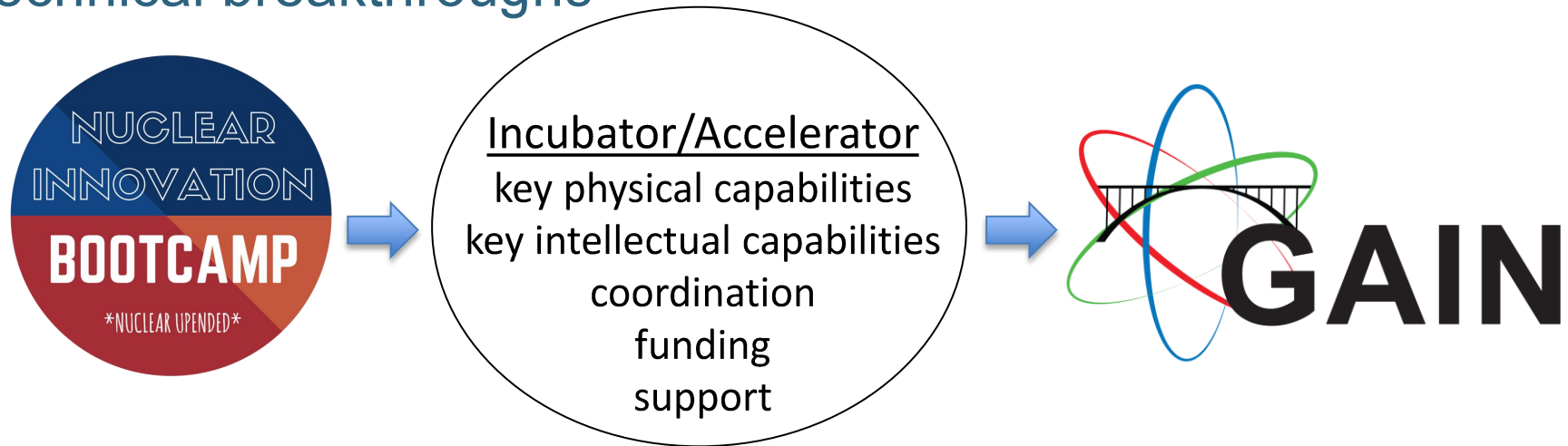


DEPARTMENT OF
Engineering Physics
UNIVERSITY OF WISCONSIN-MADISON



Nuclear Innovation Pipeline

- Goal: reduce the non-technical barriers while enabling technical breakthroughs



- Global participation; expand model
- Beyond GAIN: need a coordinated interagency (U.S.) and international strategy for global deployment

Global Nuclear Innovation

Now is the time

Motivated by Global Health, Prosperity, and Environment,
we have the opportunity to **reinvent** the way we do things

What do we want the
world to look like?



How Do I Make a Difference?

Get involved with our 2017 Bootcamp

- **Sponsor!**
- Content development
- Spot mentors:
 - Provide expertise on specific issues
 - Define your terms of availability
 - Can be virtual
- Continuous mentors
 - Work with a team more closely through the program
 - Can be virtual, some in-person encouraged

NuclearInnovationBootcamp@gmail.com

Thank You

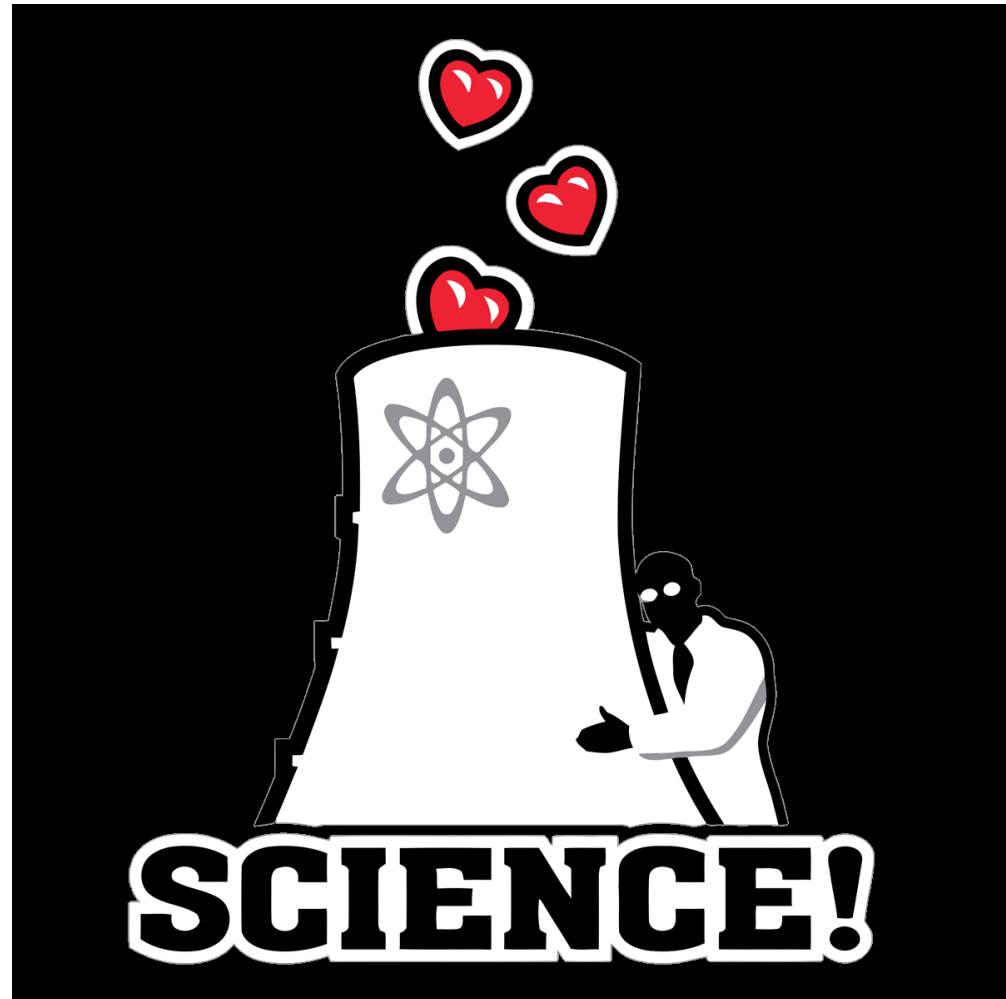
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