GC3 Green Chemistry & Commerce Council

Moving Business Toward Safer Alternatives

GC3 Green Chemistry Innovation Webinar Series

October 23, 2013

InnoCentive: Using Crowdsourcing to Solve Green Chemistry Challenges & Create New Market Opportunities

Alph Bingham, Founder & Board Member, InnoCentive

Webinar Discussion Instructions

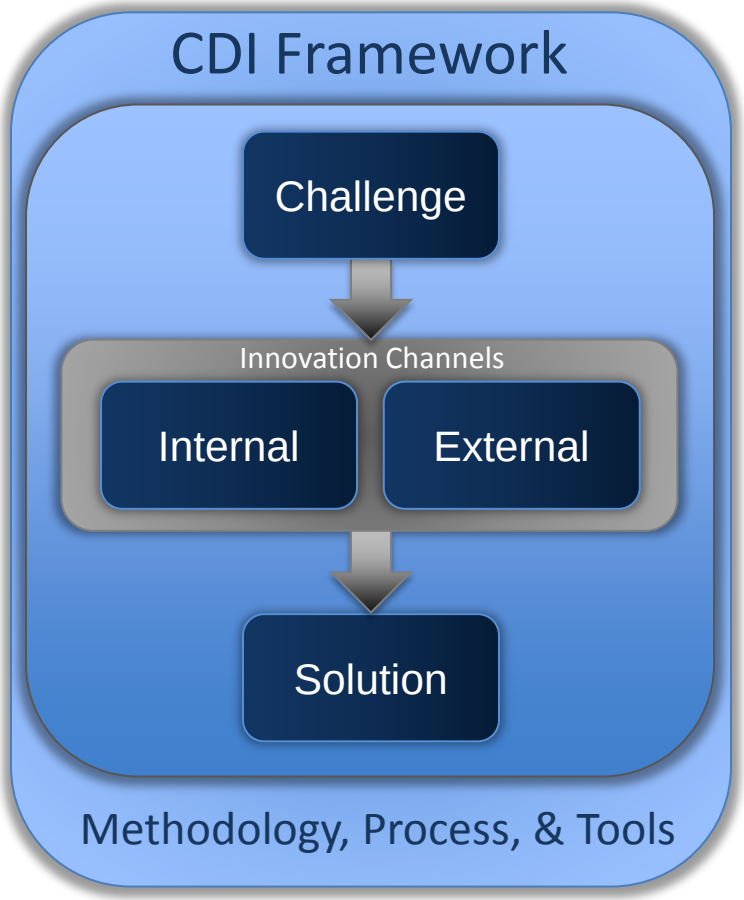
- Due to the number of participants on the Webinar, all lines will be muted.
- If you wish to ask a question, please type your question in the Q&A box located in the drop down control panel at the top of the screen
- All questions will be answered at the end of the presentation.

Crowdsourcing and Green Chemistry

- What it is
- Why?
  - Broad exposure
  - Broad engagement
- Solver as ambassador
- Open innovation vs closed
- Concentric rings of openness

What is Challenge Driven Innovation?

- An innovation framework which embraces open innovation and crowdsourcing principles
- Proven methodology, process, and tools focused on developing actionable solutions to key problems, opportunities, and challenges
- A unique approach which recognizes that ideas are everywhere, but solutions are more elusive and highly valued
- Complements existing innovation channels (e.g., traditional, CROs)



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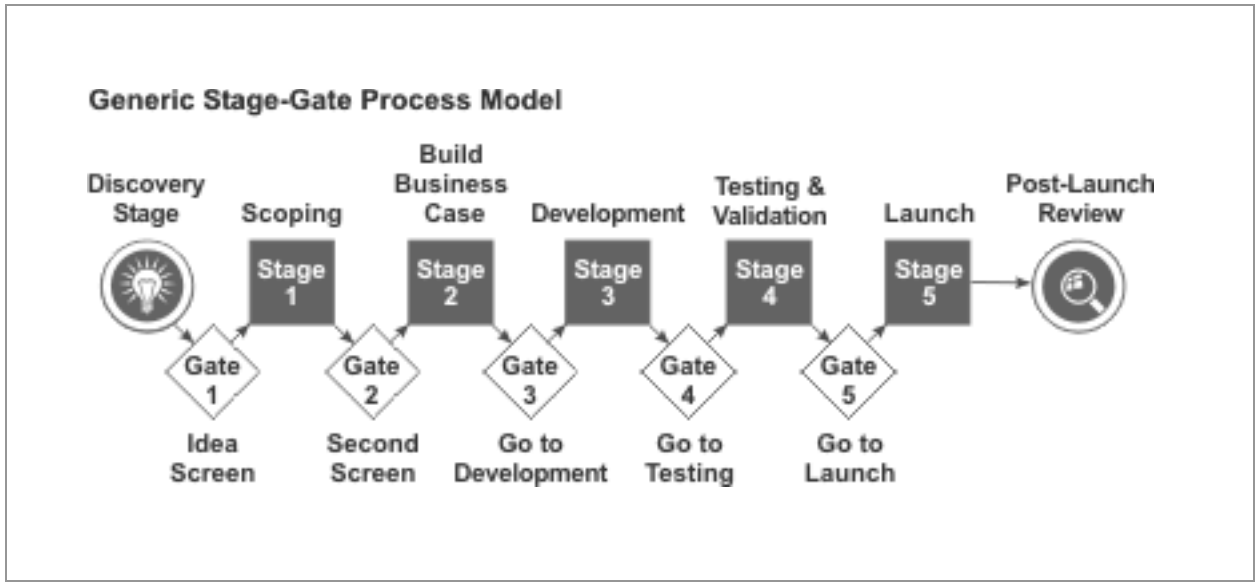
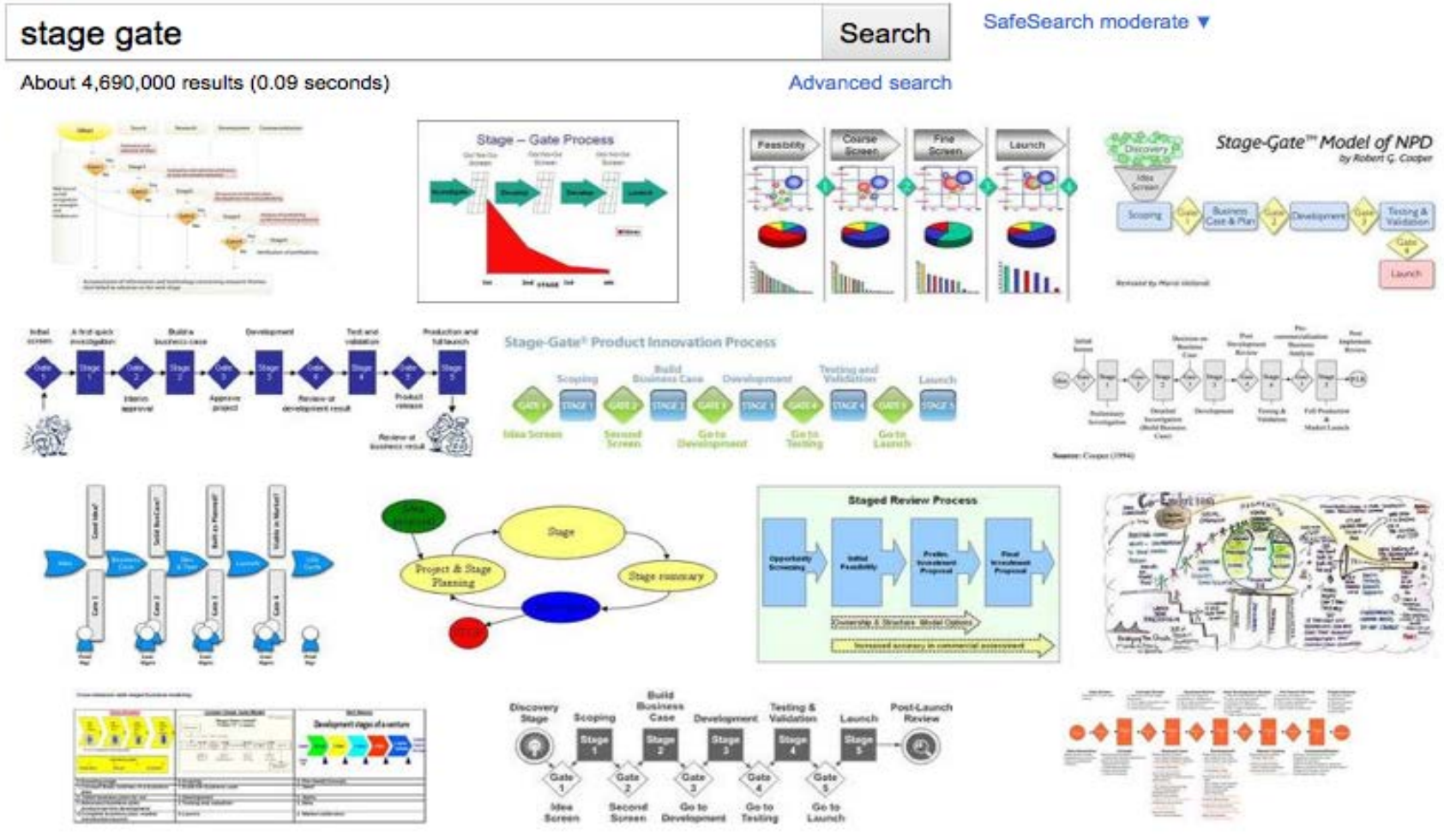
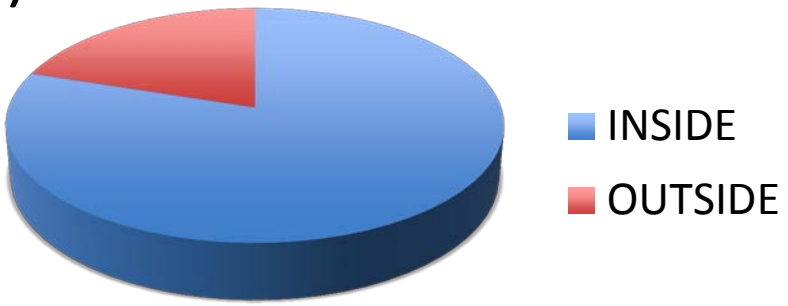

Generic Stage-Gate Process Model
Discovery Stage
Scoping
Build Business Case
Development
Testing & Validation
Launch
Post-Launch Review
Stage 1
Stage 2
Stage 3
Stage 4
Stage 5
Gate 1
Gate 2
Gate 3
Gate 4
Gate 5
Idea Screen
Second Screen
Go to Development
Go to Testing
Go to Launch

Google Image Search: Stage gate



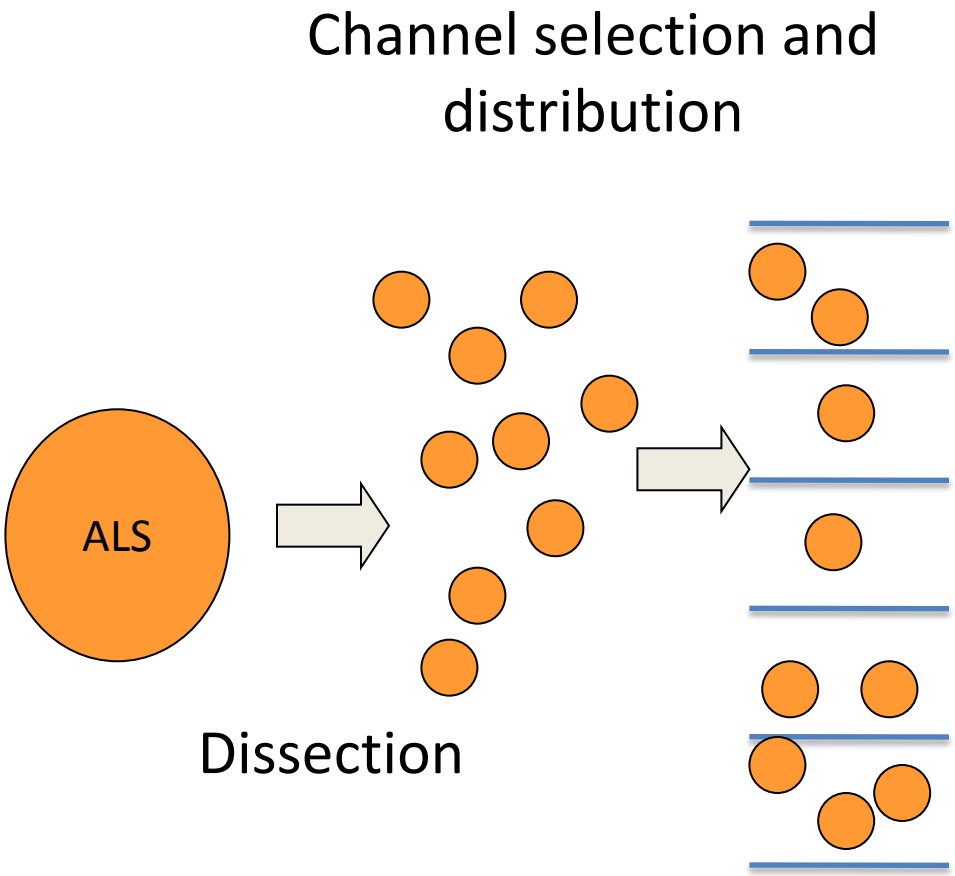
Innovation and Development Skills stage/gate systems

- Inside (80%)
  - Hypothesis generators (10%)
  - Data/proto generators (60%)
  - Designers (5%)
  - Project coordinators (5%)



- Outside (20%)
  - Scaling data generators (20%)

CHALLENGE DRIVEN INNOVATION



The Challenge as a Modular and Portable Unit of Work

Please note that the details of this Challenge are no longer open. This challenge is awarded and is no longer accepting new submissions. You can:

- **Browse for a new Challenge in the Challenge Browser**

"Green Chemistry" Replacement for Traditional Polar Aprotic Solvents

TAGS: Clean Tech, Life Sciences, Chemistry, Ideation

STATUS: **Awarded** | ACTIVE SOLVERS: 244 | POSTED: 12/15/11

This Challenge is looking for environmentally-friendly ("green chemistry") replacements for traditional polar aprotic solvents.

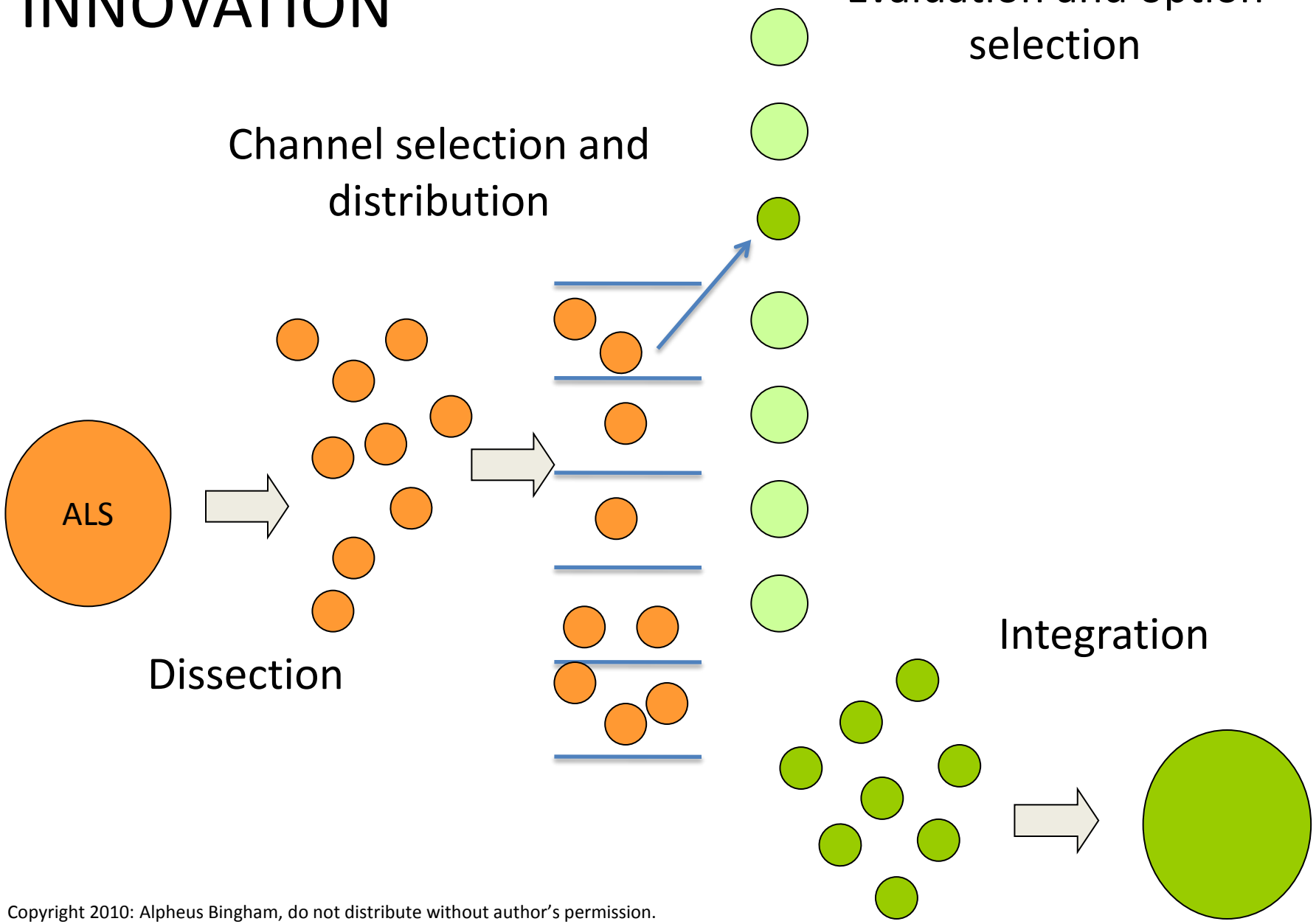
This is an Ideation Challenge with a guaranteed award for at least one submitted solution.

Source: InnoCentive **Challenge ID:** 9932717

Challenge Overview

This Challenge is looking for environmentally-friendly ("green chemistry") replacements for traditional polar aprotic solvents, such as dimethylformamide (DMF), dimethyl sulfoxide (*DMSO*), dimethylacetamide (DMAc), and N-methylpyrrolidone (NMP).

CHALLENGE DRIVEN INNOVATION



One Challenge Many Solutions

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EDF - Nitrate Capture System

TAGS: Physical Sciences, Life Sciences, Food/Agriculture, Engineering/Design, Nature, Environment, Clean Tech, Ideation

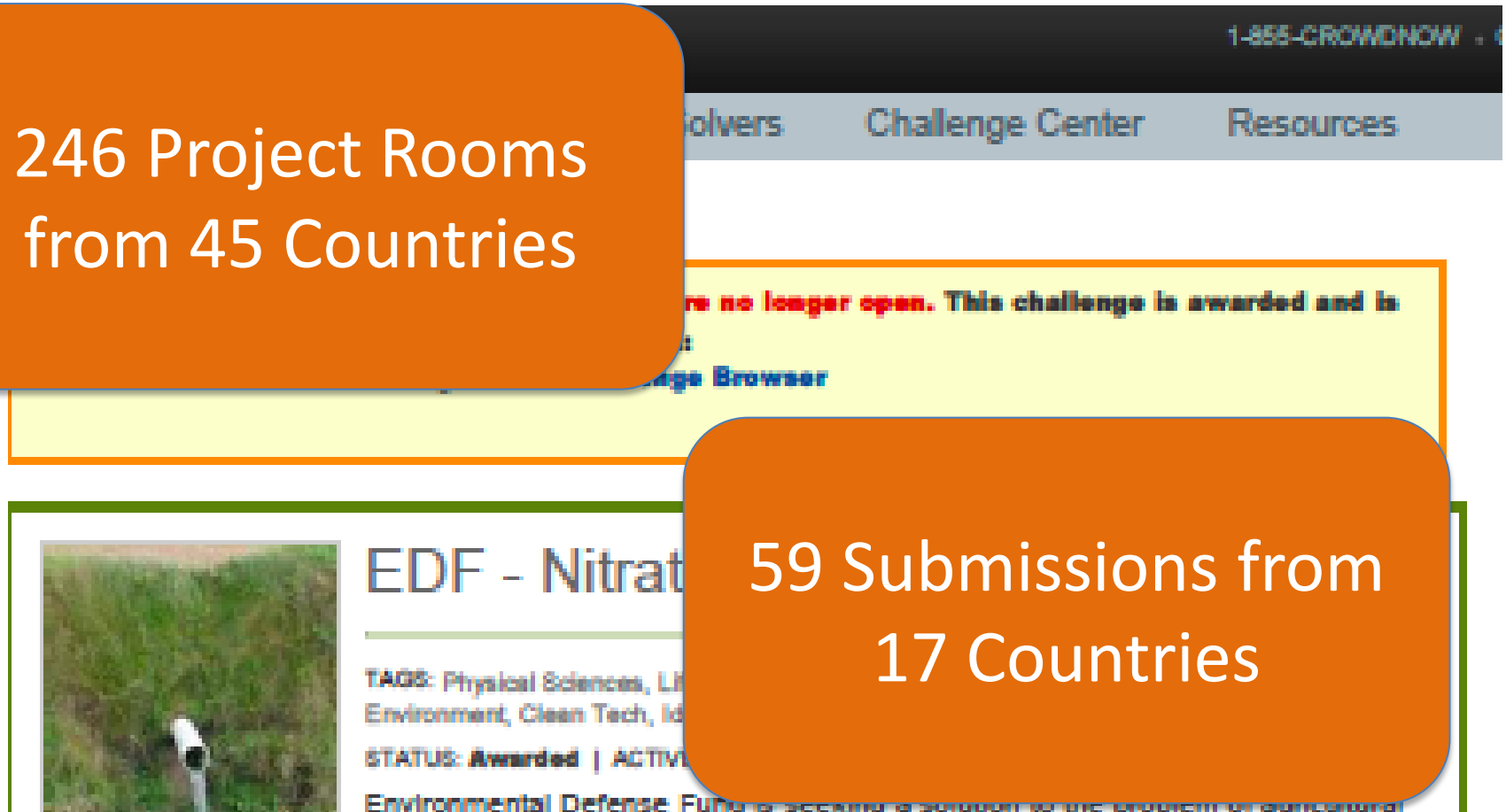
STATUS: **Awarded** | ACTIVE SOLVERS: 245 | POSTED: 5/26/11

Environmental Defense Fund is seeking a solution to the problem of agricultural nitrate pollution. Concepts for systems to capture or concentrate nitrates from agricultural field drainage are required.

Currently between 50% and 80% of fertilizer applied to commercial crops in the U.S. is not absorbed by the plants and is instead lost to water and air, causing dangerous environmental and health impacts in a growing number of watersheds

One Challenge Many Solutions

246 Project Rooms from 45 Countries



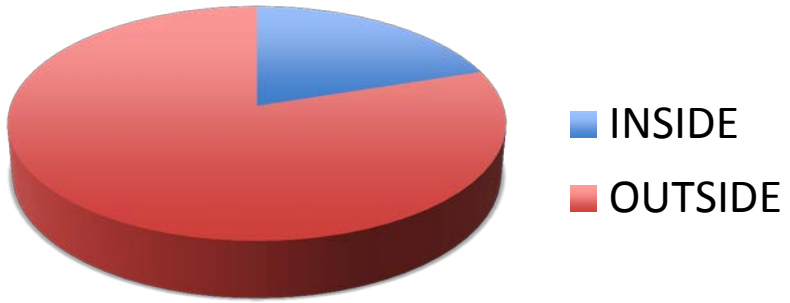
59 Submissions from 17 Countries

NASA Challenges Posted at InnoCentive.com

						Challenge Type		
Challenges Posted	Dates Posted	Awarded	Total Awards Paid	Project Rooms	Solutions	RTP	Theoretical/ IP	Theoretical/ License
7	2009, 2010	7	$145,000	2,928	407	1	5	1

Innovation and Development Skills
Channel orchestration systems

- Inside (20%)
  - Project dissectors (3%)
  - Orchestrators (3%)
  - Assemblers (4%)
  - Evaluators (10%)
- Outside (80%)
  - Hypothesis generators (10%)
  - Data/proto generators (70%)
  - Designers (5%)



Innovation Channel Selection

Module Archetypes/ Innovation Channels	Archetype A **Under the Radar** Secrecy	Archetype B **The Regulated Recipe** Recipe/Regulated	Archetype C **Follow the Directions** Recipe/ Not Regulated	Archetype D **Directed Stumbling** Judgment/Fuzzy	Archetype E **A New Way To... Judgment/** Precise/ Low Risk	Archetype F **Explore Problem-Solving Space** Judgment/Precise/ Risky	Archetype G **Fix MY House** Precise/Risky/ Local
1. Internal	●			◑	●		●
2. Contract research organization		◑			◑		
3. Electronic request for proposal		●	◑		◔		
4. Offshoring			●				
5. Crowdsourcing/ ideation				●			●
6. Crowdsourcing/ reduction to practice					◑	●	
7. University contracts				◑	◑		
8. Consulting	◑				●		●
9. Right of first refusal						◔	
10. Joint venture						◑	

Why Challenge-driven Innovation Works

Communities collaborate around well-defined **“boundary objects”**

- Boundary objects create a common reference point and language
- Enable “constructive arguments” (collaboration)
- Example: a clay model or prototype of an automobile
  - Designers look at aesthetics, engineers consider aerodynamics

Well-formed Challenges are uniquely effective as boundary objects

- Rich in information, but abstracted to engage diverse thinking…”just-right” challenges
- Must be actionable, sponsored, owned
- In contrast, “ideas” are loosely defined, not clearly owned, and create less impact
- Challenges help to transform organization, process, and culture

Challenge-driven Innovation unlocks your innovation potential

The Challenge as a Boundary Object

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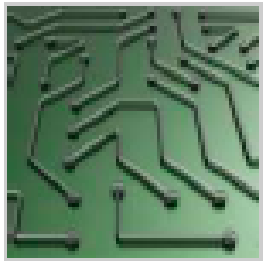

Robust Electrical Contact to Glass without Lead (Pb)

TAGS: Business/Entrepreneurship, Engineering/Design, Physical Sciences, Chemistry, Clean Tech, Theoretical-IP Transfer

STATUS: **Awarded** | ACTIVE SOLVERS: 329 | POSTED: 9/13/12

The Seeker requires a method of making a physically robust electrical connection between a conductive material and tempered glass. The core specification is that lead (Pb) must not be used.

This Challenge requires only a written proposal.

Source: InnoCentive **Challenge ID:** 9932969

Challenge Overview

Functional glass very often requires electrical inputs or outputs. Securing electrical contacts to silver surfaces (bus bar) on glass have traditionally been done using lead solder. The Seeker

Share This Challenge

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- Well-defined Challenges are **Boundary Objects**.

  Challenges are the fundamental basis for:
  - Problem Solving; and
  - Distributing creative and inventive work.

- Organizations package their needs, problems and opportunities into Challenges which are coupled with inducements and made available for audiences to solve on a secure platform.

- In fact, “challenge” types are all around us and supporting outsourced software development, manufacturing, and services contracts in addition to competitions and prizes.

Commercial Case Study

The challenge was posted on the InnoCentive network and had almost 1,000 readers in two months. The result was 113 proposals from around the world. Their quantity and quality took Bedilion and his team by surprise. "The proposals were incredible," he says. "In contrast to the internal network, rather than being one or two lines, many were multiple pages. Some people had done experiments. There were diagrams. There were drawings that filled an entire notebook. We would have been delighted if we could have got much of the work out of our own research organisation."

The pay-off was apparent. As Tod Bedilion noted: "I couldn't put ten people in a room and have a brainstorming session or a seminar for two days for the same cost with all the travel involved. And I would have got a few hundred sticky notes rather than an entire notebook with 113 separate detailed proposals."

And, most important of all, there was a result. Basically, in 60 days, Roche was able to solve a problem that it and its partner have been tinkering with and optimizing for the last 15 years. The solutions provided actually mirrored the entire history of Roche's R&D programme. All of the solutions Roche had tried came in.

Green Chemistry
Advanced Through Challenges

- Capture and re-use of Nitrates in Agricultural Run-off
- New, better chemical routes
- Removal of contaminants in recycled products
- Replacement solvents for specialty applications, i.e., art restoration
- New reagents and solvents in commercial processes
- Removal of unwanted contaminants in conmsumer products form Natural Gas to Food items
- New polymers for food, medicine, construction, etc
- Commercial processes, i.e., electrical bonding to glass.

The audio recording and slides shown during this presentation will be available to GC3 Members on the GC3 Website:
http://www.greenchemistryandcommerce.org

Non- GC3 Member Attendees who would like to view these slides please contact Sarah Shields at sarah_shields@uml.edu

Upcoming GC3 Webinars

Advancing Green Chemistry Innovation in the Pharmaceutical Industry: The GCI Pharmaceutical Roundtable's Research Grant Program
Julie Manley, ACS Green Chemistry Institute
Others/Date/Time TBA

LAUNCH: How Nike, USAID and the State Department are Using Challenge Driven Innovation to Advance Sustainable Materials
Nike
Others/Date/Time TBA

Crowdsourcing in Action at Harvard

- **Challenge**: What Do We Not Know to Cure Type 1 Diabetes?
- **Goal:** Identify new research topics or open questions related to Type I diabetes whose answers would significantly advance the ability to treat, cure, or manage the disease
- **Result:** A diverse group of 12 Solvers – some new to diabetes research – were rewarded for offering up novel questions
- **Key Lesson Learned:** The InnoCentive model can be used in a very flexible way to ask broad questions to try to identify novel approaches, novel open questions, or areas for further investigation on a topic

Broad Participation

- 800 Project Rooms
- 195 Submissions (91 Harvard, 104 InnoCentive Solvers)

Extensive Review Process

- ~240 reviewers
- Each submission rated by ~22 reviewers
- Included core topic experts, biotech execs, and others

12 Winners Chosen

- Diverse range of backgrounds
- Further development to be funded by grants from the Helmsley Trust

The Prize4Life–InnoCentive Grand Challenge

- **Challenge**: Find a biomarker that allows tracking of the progression of ALS. The discovery of a biomarker clears the way forward for pharma and biotech companies to develop cost effective treatments.
- **Solutions & Results:**
  - **A $1MM Grand Challenge was posted in 2006 to InnoCentive.com**
    - Two stages with partial awards totaling $175,000 going to six groups for their progress, including a dermatologist with no prior ALS background for his non-invasive test for skin elasticity
  - **The $1MM Grand Challenge was re-posted in 2009**
    - Full $1MM awarded to Dr. Seward Rutkove in 2011 for his biomarker discovery, a non-invasive test that measures the flow of a small electrical current through muscle tissue
- **Key Statistics:** Nearly 3,000 project rooms and over 100 solutions from dozens of countries were proposed over a five-year period

PRIZE4LIFE

Non-profit focused on ALS (Lou Gehrig's Disease), founded in 2004 by Avi Kremer, a Harvard Business School student diagnosed at 29 with ALS