Workshop on Challenge Driven Innovation

Steve Domeck, InnoCentive
Homer Swei, Johnson and Johnson

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GREEN CHEMISTRY & COMMERCE COUNCIL
Business Mainstreaming Green Chemistry

9th Annual
GC3 GREEN CHEMISTRY & COMMERCE COUNCIL
Innovators Roundtable
MAY 28–30 2014
St. Paul, Minnesota
Hosted by 3M

GC3 Green Chemistry Innovation Webinar Series

Professor Kaichang Li: Successes and Lessons from a Serial Green Chemistry Innovator
Kaichang Li, Professor, Oregon State University
September 17, 2013

Kaichang Li, Professor of Wood Science & Engineering at Oregon State University, observed mussels tenaciously gripping rocks on the Oregon coast, which led to the development and commercialization of a bio-based,

InnoCentive: Using Crowdsourcing to Solve Green Chemistry Challenges & Create New Market Opportunities
Alph Bingham, Founder & Board Member, InnoCentive
Wednesday, October 23, 2013

As companies seek to develop safer chemicals and materials for use in products and production processes, some are turning to crowdsource innovation "challenges" to create new markets and solve problems mor and cost effectively. Challenge driven innovation (CDI) enables organiz

Workshop Goals:

To learn about green chemistry challenge driven innovation (CDI)

To illustrate CDI through a real example

To explore the idea of collaborative green chemistry challenges and a possible role for the GC3 to facilitate these collaborations

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Workshop Overview:

Part 1: CDI -- What is it and the What is the Process that InnoCentive Uses?

Part 2: The Green Chemistry Challenge

Part 3: Applying the CDI Process to the Challenge

Part 4: Collaborative Challenges

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Part 1

CDI: What is it and the What is the Process that InnoCentive Uses?

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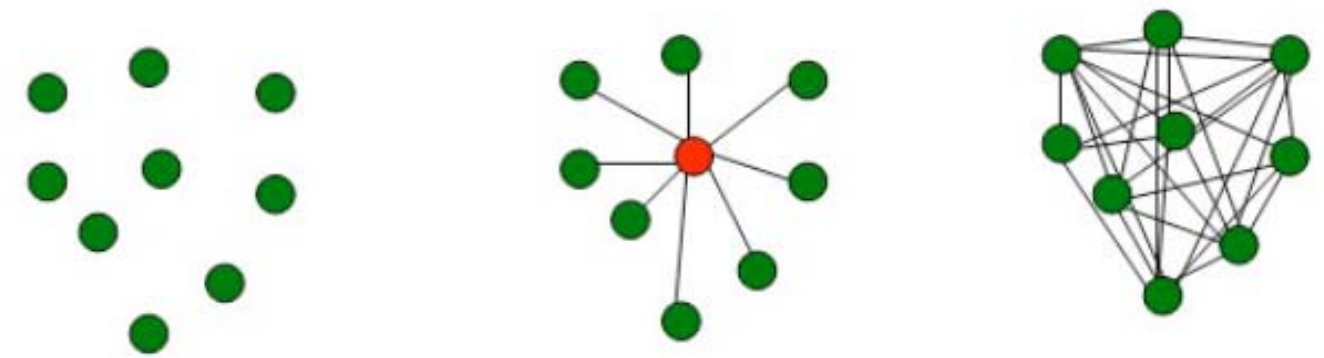
Work has Changed

Artisans - Hierarchies - Networks



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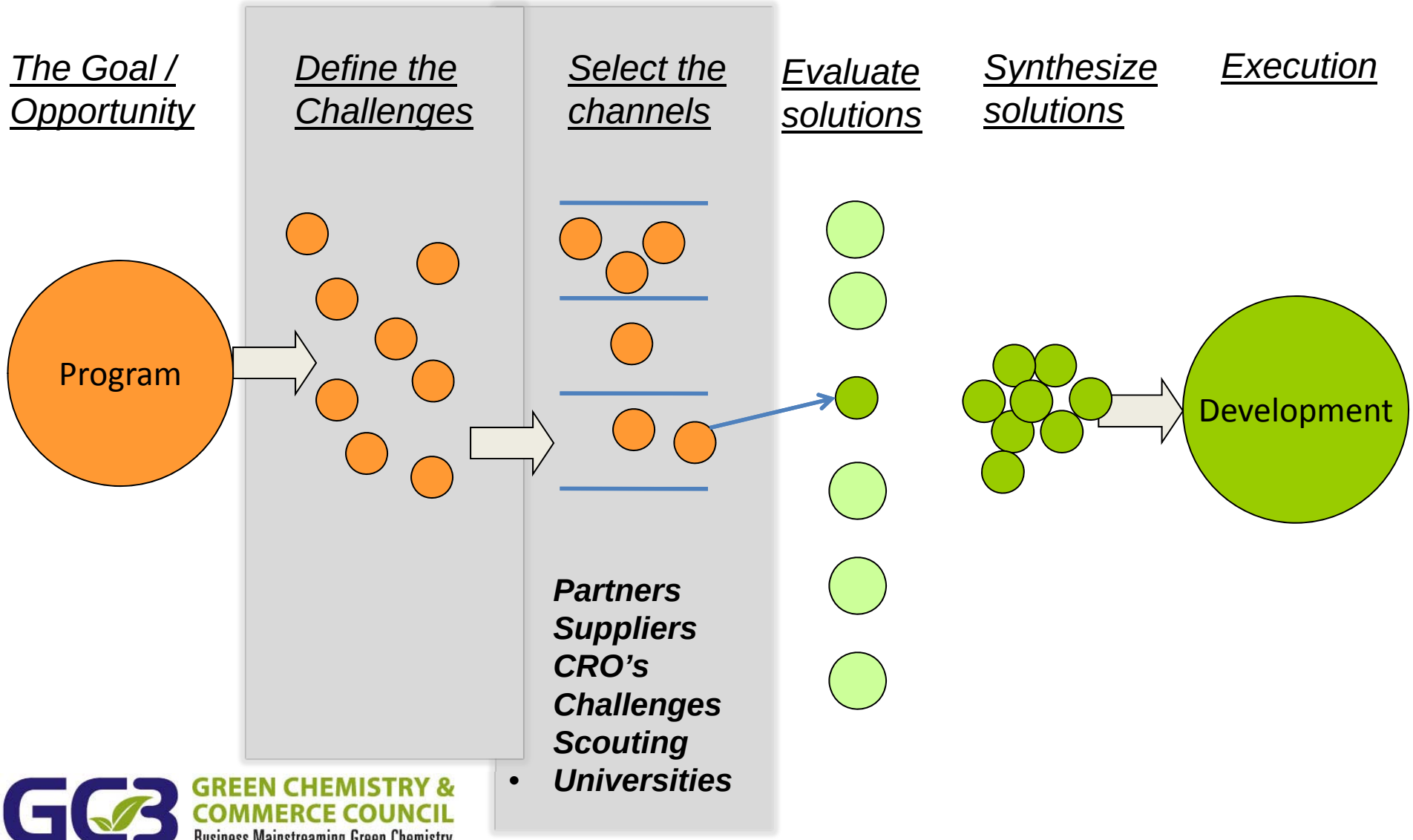
Challenge Driven Innovation™



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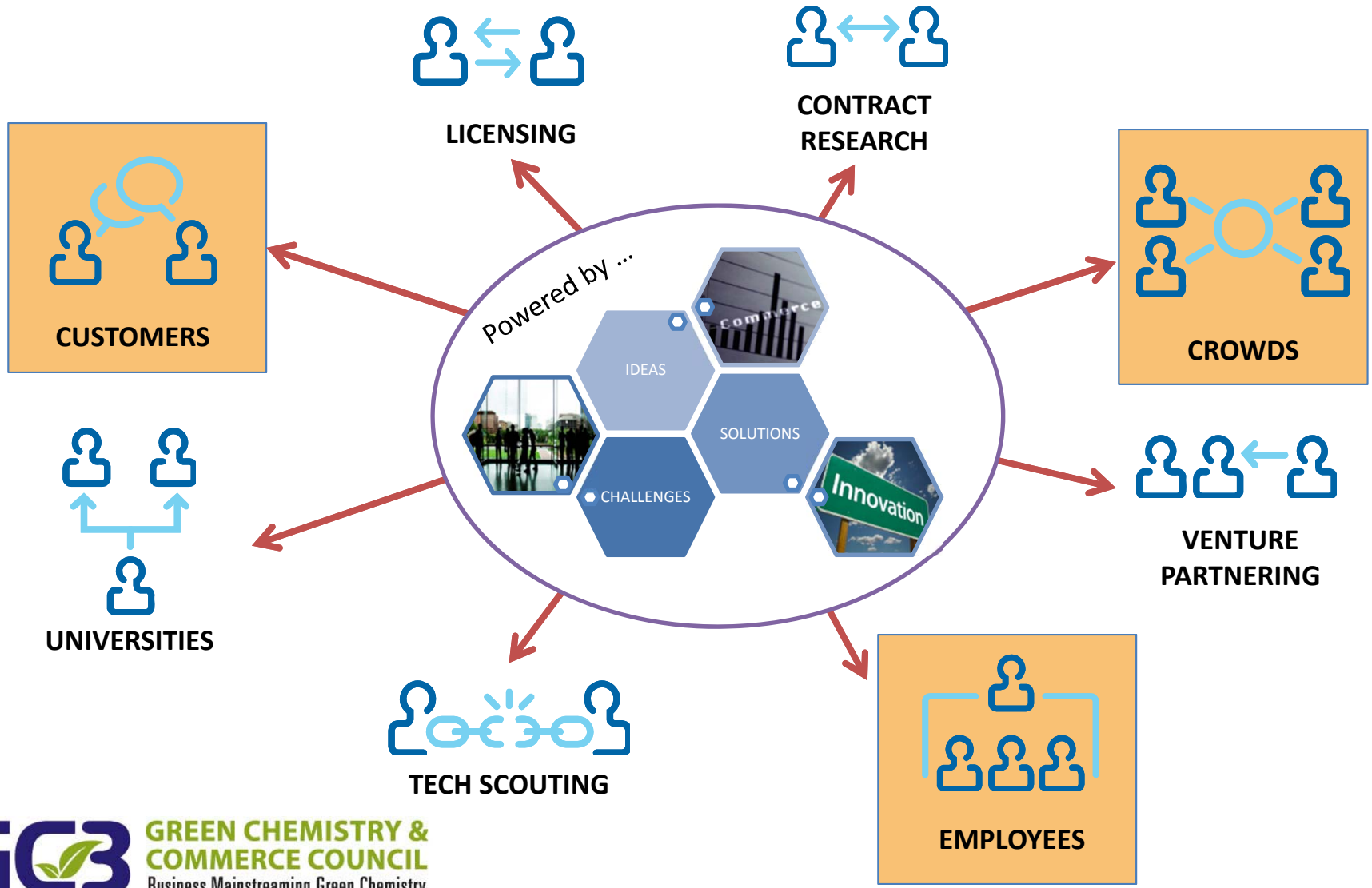
Channels of Challenge Driven Innovation™



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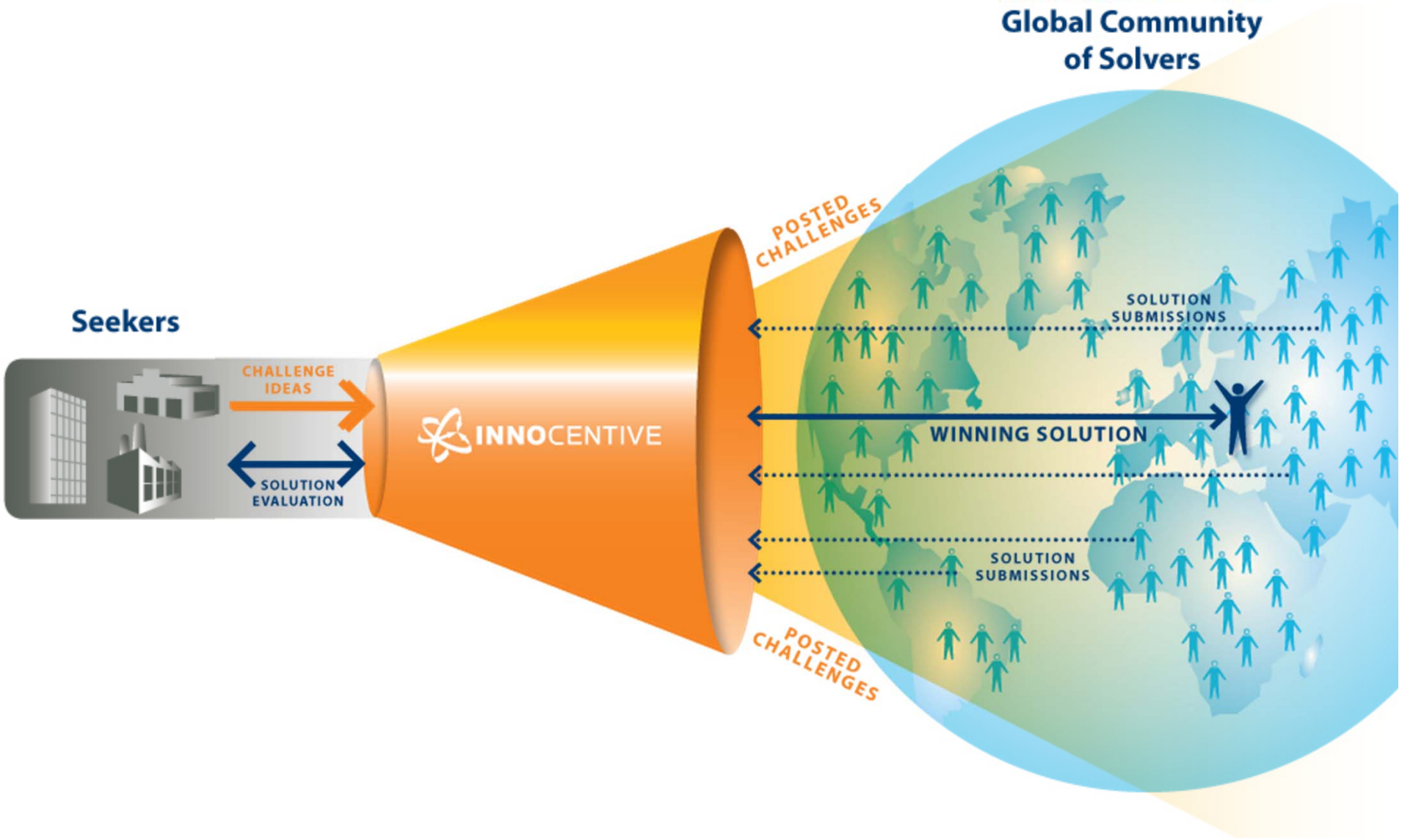
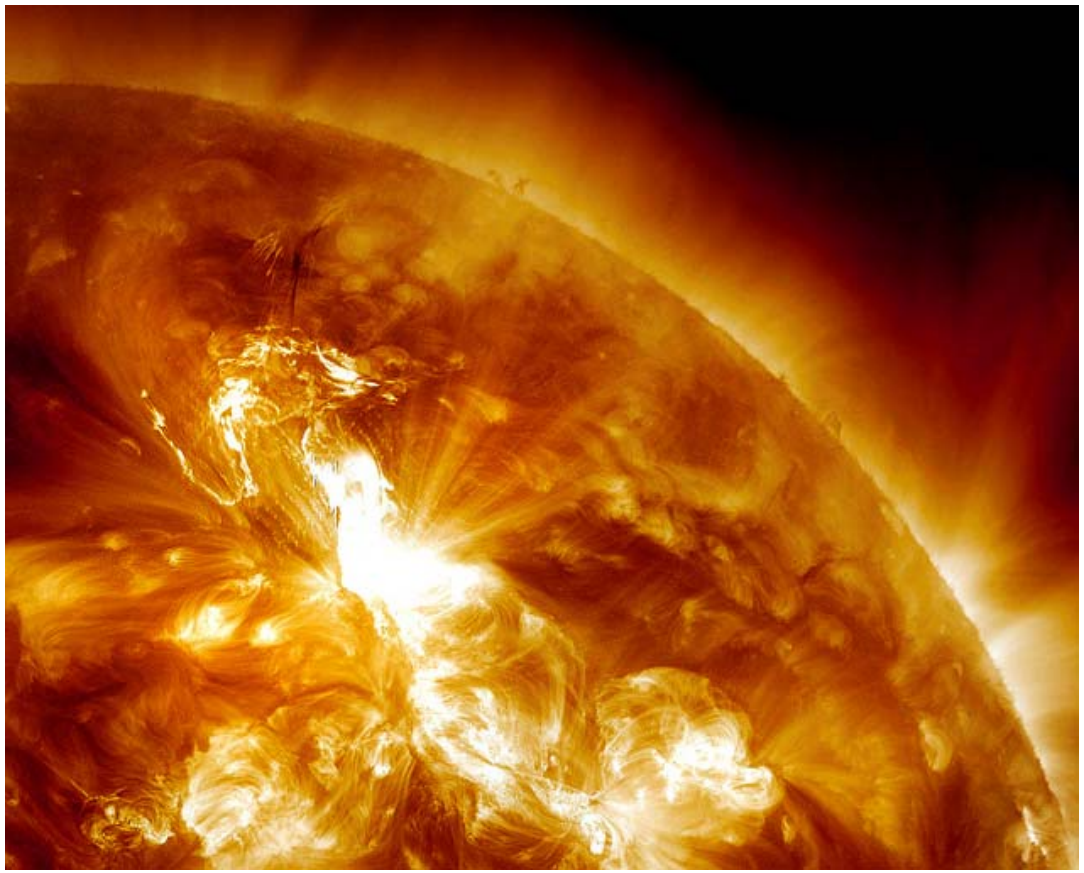
The InnoCentive Challenge Process



InnoCentive in Action



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Data-Driven Forecasting of Solar Events

- **Challenge**: NASA provided 40 years worth of event data. They invited solvers worldwide to develop algorithms to better forecast the occurrence of a Solar Particle Event (SPE) within a select time window.
- **Solution:** Winner improved predictability of SPEs from *4 hours to 8 hours*.
- **Result:** A $30,000 award was made to retired Ph.D. from New Hampshire for his SPE prediction algorithm. NASA continues working with the Solver on implementation into an operational framework.

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Data-Driven Forecasting of Solar Events

>1,000 Solvers

>200 Proposed Solutions

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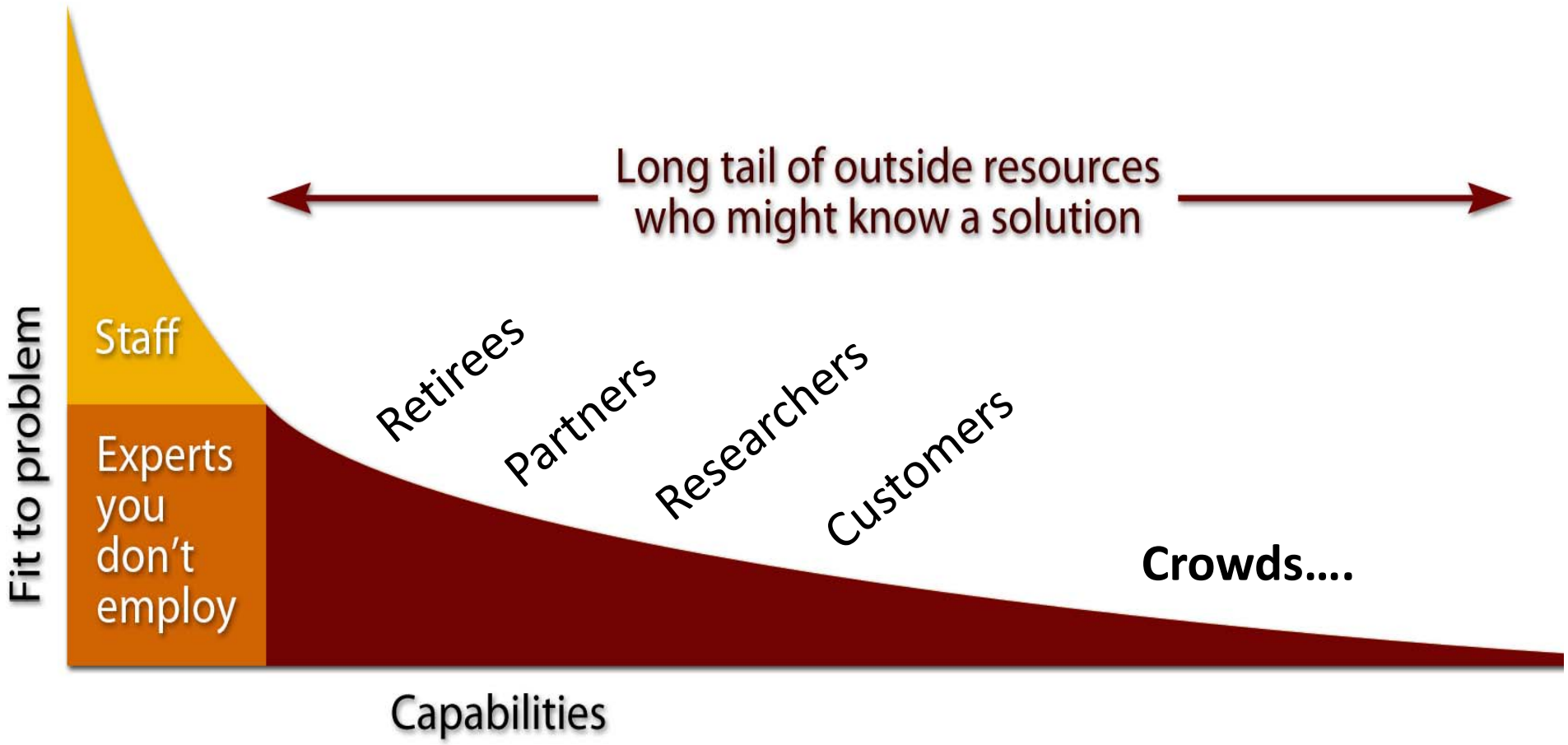
NASA

Harnesses the “Long Tail”



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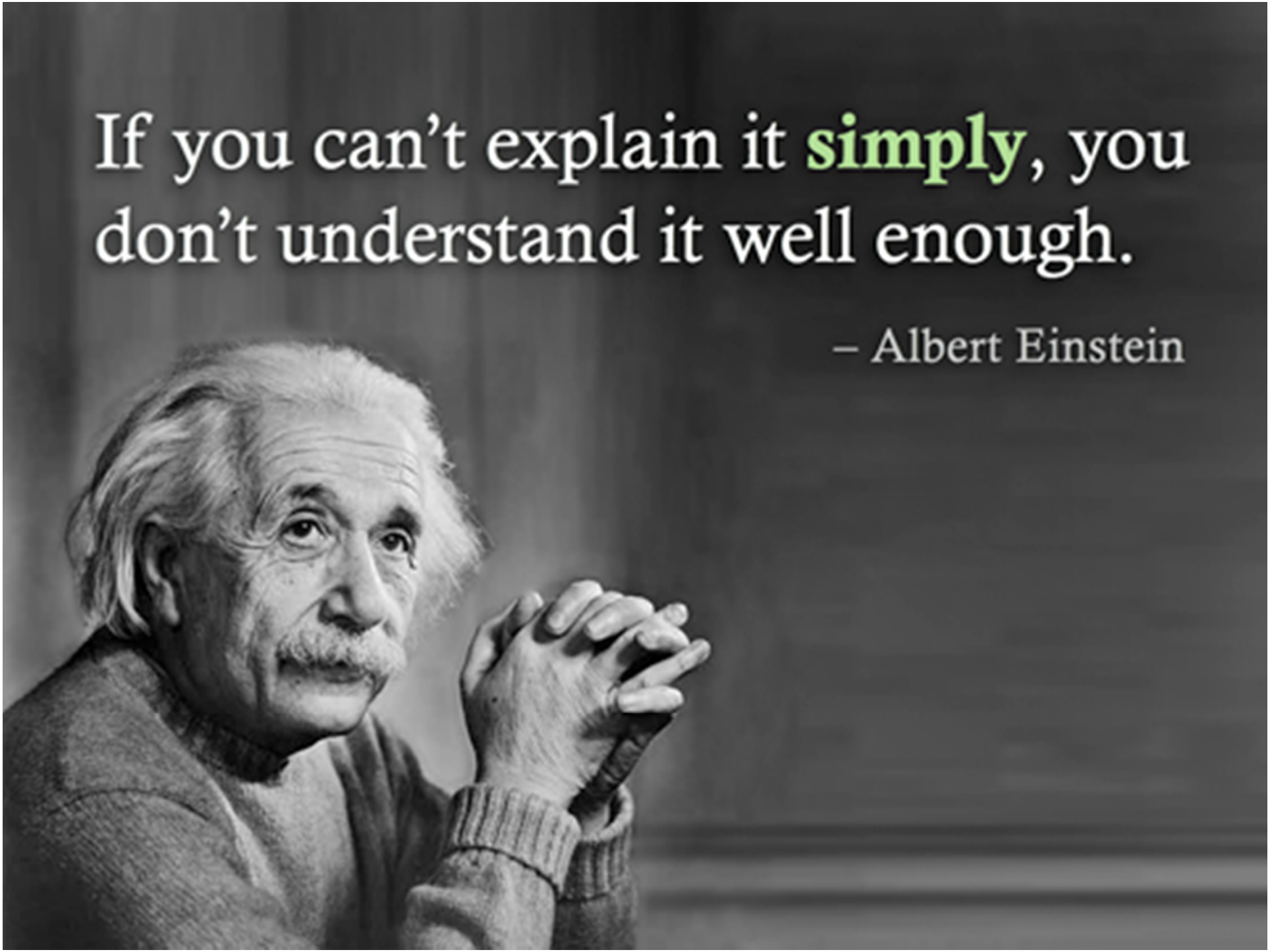
If you can't explain it simply, you don't understand it well enough.
– Albert Einstein

Five Guidelines of Good Challenges

***L**imited Scope*

***A**ctionable*

***S**pecific*

***S**upported*

***O**wned*

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Why use Challenges?

- Find novel solutions to difficult problems
- Maximize the ‘Long Tail’ and reduce risk
- Draw attention to a problem / promote cause

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Sure, it worked for NASA, but will it work for green chemistry?

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"Green Chemistry" Replacement for Traditional Polar Aprotic Solvents

AWARD: **$8,000 USD** | STATUS: **Awarded** | ACTIVE SOLVERS: 244 | POSTED: 12/15/11

Source: InnoCentive **Challenge ID:** 9932717 **Type:** Ideation

Team Share Referral: $800 USD

The Challenge was looking for Green Chemistry replacements for solvents such as dimethylformamide and dimethyl sulfoxide.

Results / Data

- 7,874 Challenge Views
- 244 Participating Solvers & Teams from 29 Countries
- 36 Submissions from 11 Countries
- 2 Awarded Solvers
  - A professor from a University in Russia
  - A solver from India

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Part 2: The Green Chemistry Challenge

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Microbial Safety

"… microbial contamination of food and cosmetic products was the leading cause for recalls, accounting for a total of 1,370 recalls (36% of all products recalled)."

"Recalls of foods and cosmetics due to microbial contamination reported to the U.S. Food and Drug Administration", Wong et al, J Food Prot. 2000 Aug; 63(8):1113-6.

"… 11 babies in the neonatal intensive care (NICU) and three babies in the nursery were infected with *Serratia marcescens at King Abdulaziz University* Hospital …"

"*Serratia marcescens-contaminated baby shampoo causing an outbreak among* newborns at King Abdulaziz University Hospital, Jeddah, Saudi Arabia", Madani et al, Journal of Hospital Infection 78 (2011) 16-19.

"The reality today is there are very few effective preservative materials available for formulators to use."

"Conventional vs. Natural Preservatives", Brown et al, May 2014, Happi.

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Diminishing Palette of Preservatives

“Understanding science really takes the capacity for critical thinking and openness to reason and openness to understanding the basis for safe use of an ingredient,” she explained. “But public perception and emotional arguments and criticism of ingredients – they’ve driven policies at a state level, at a retailer level or at a public perception level that makes fewer ingredients available.”

The most glaring example is in the area of preservatives, the science chief said.

She noted that in **recent years, regulatory bans and restrictions have significantly reduced the palette of preservatives that manufacturers can use in personal-care products.**

“I think we’re at the point where this is going to start to have an adverse impact on public health, and that’s scary,” Breslawec said.

> “Science Matters”: Council’s Breslawec Upholds Role Of Science In Cosmetics Safety Debate" — "The Rose Sheet," Feb. 20, 2012

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Part 3

Applying the CDI Process to the Challenge

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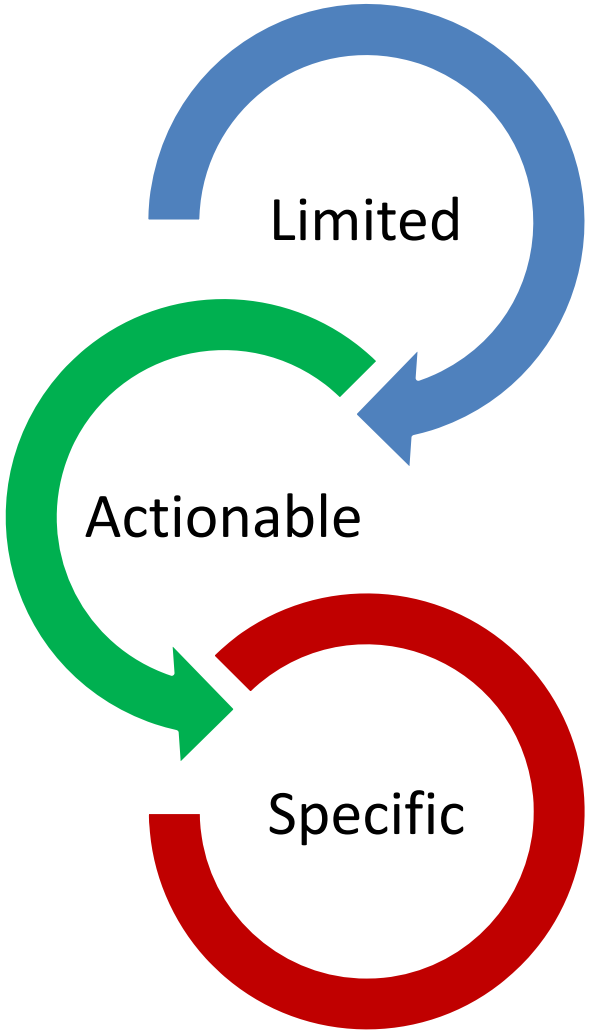

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Dr. Naeem Yusuff - InnoCentive

- Associate Principal, Challenge Design & Development
- PhD, Chemistry (University of California, Berkeley)
- Prior Experience:
  - Over 10 years as a lead Investigator for Global Discovery Chemistry at Novartis
  - Post-doctoral Fellow at Yale University

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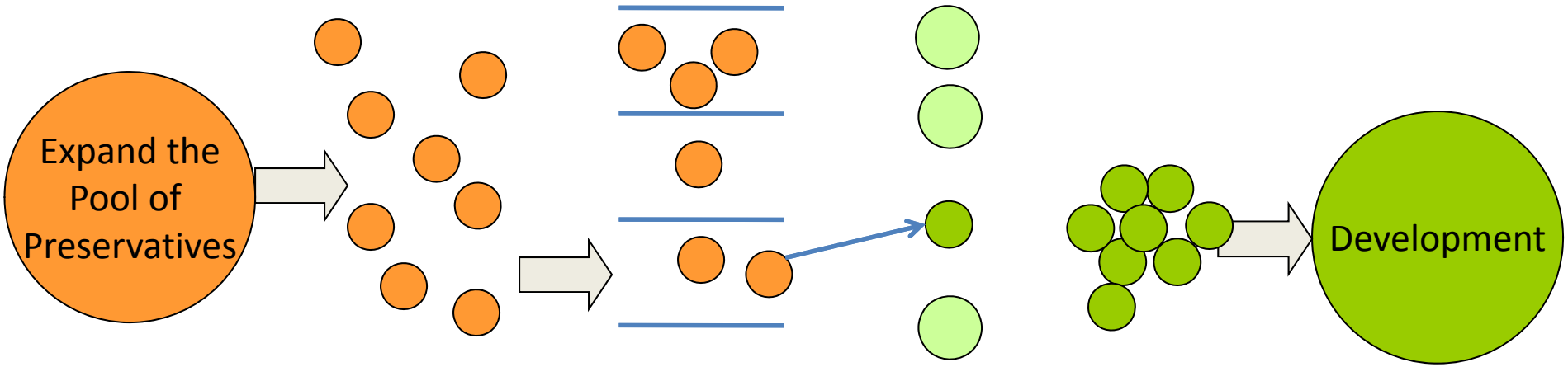
Challenge Driven Innovation

The Goal / Opportunity | *Define the Challenges* | *Select the channels* | *Evaluate solutions* | *Synthesize solutions* | *Execution*



- ***New targets / new mechanisms***
- ***Labeling confusion***
- ***Regulatory burden / risk***

- ***Partner / Suppliers***
- ***CRO's***
- ***Crowdsourcing***
- ***Others***

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New Preservatives for Personal Care Products

Award Recommendation: **$15,000 USD**

Summary / Brief

The challenge draft would seek new chemicals or mechanisms which can be used as a preservative or preservative booster in personal care products.

- Solvers encouraged to provide available safety test data / ensure the safety and shelf stability of cosmetic products.
- Should exclude commonly used and well known preservatives.
- Challenge draft should present well known preservatives and describe the known mechanisms of action as a template for Solvers.
- Preferred new chemical preservatives should be safe for human use.

Risks / Concerns

Complicated regulatory system governing allowable and non-allowable ingredients for personal care products, low level of risk tolerance for companies using “new” preservatives. Preference of consumers/Solvers to gravitate towards “natural” ingredients.

Labelling of Personal Care Products to Enable Customers to Make Informed Decisions

Award Recommendation: **$10,000 USD**

Summary / Brief

Customers are not able to make informed decisions about personal care products due to complicated labelling and multisyllabic unpronounceable ingredients. How can labelling be redesigned to more effectively inform the consumer?

- Identifying the key information (safety, origin of ingredient, “green’ ingredient, etc.) that consumers are interested in

Risks / Concerns

Need to make specific efforts to avoid greenwashing. Should be an open solicitation from Solvers to identify most pertinent information to present, and a visual display challenge to most effectively present information.

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Part 4

Collaborative Challenges

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Consumer Electronics Association:

The Problem / Why

Limited leaded glass recycling options presents an industry wide challenge for its member companies

CEA has made a commitment on behalf of all its member companies to responsibly deal with the problem of e-waste. Their e-cycling program is an industry-wide effort, with a goal of collecting one billion pounds of electronics annually by the year 2016.

The Opportunity / Need

- Incentivize new ways to recycle leaded glass from TV sets
- Discover new end uses for the Recycled Glass

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Consumer Electronics Association:

The InnoCentive Cathode Ray Tube *Challenges*

- Challenge 1 – CRT Challenge: New Uses for Recycled Glass
  - Wide Scope Ideation for new uses of the recycled glass
  - Conceptual Solutions Sought for:
    - End uses for the Recycled Glass

- Challenge 2 – CRT Challenge #2: Ways to Recycle Glass
  - Theoretical designs or developed concepts for processing
  - Conceptual Solutions Sought for:
    - Methods & Process solutions to Recycle the Glass

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Challenges Widely Publicized for Diversity of Thought…

- **Challenge Marketed Through Social Media, Blogs, Innocentive.com**
- **931 Solvers Engaged in 41 Countries**

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Challenge 1 – New Uses for Recycled Glass

- 3 Solutions Awarded
  - A solution for using *recycled material as glass in tile or brick with proposal for piloting the project*
  - Detailed *industrial application of the CRT glass*
  - A proposed solution for *combination with Cement for nuclear waste disposal*

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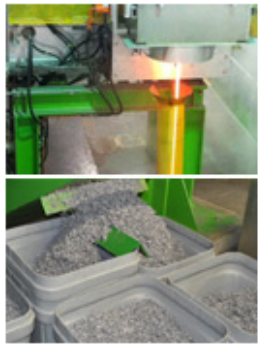
Challenge 2 – Ways to Recycle the Glass

- 3 Solutions Awarded
  - Environmental Engineer from Spain – *New lead Separation process*
  - UK based Glass Processing Company – *Operates world's first leaded glass furnace, environmentally friendly*
  - Mechanical Engineer from North Carolina – *Process for glass frit for the vitrification of nuclear waste*

nulifenews



'World's first' leaded glass furnace operational in UK

WEEE recycler SWEEEP Kuusaksoki has installed the 'world's first' glass furnace capable of recovering pure glass and lead from leaded cathode ray tube (CRT) glass, at its facility in Sittingbourne, Kent. The furnace, which has been installed ..., has been developed by Manchester-based CRT recycling specialists Nulife Glass, and is capable of processing around 10 tonnes of television glass per day.

Click here for more details...

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Part 4 Breakout Discussions

Objective: To explore the idea of collaborative green chemistry innovation challenges and possible role for the GC3

Questions for Discussion:

1. What are some challenge topics/goals that would be relevant to your organization?

2. Based on what you heard, do you see potential rewards for your organization to participate in a collaborative challenge? (Rewards)

3. What might prevent your organization from participating in a collaborative challenge? (Risks)

4. What do you think the role of the GC3 could be in catalyzing these collaborative challenges?

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