

# *Approaching Sustainability and Industry: A Longest but not Last Mile*

*Michael Zentner, hubzero Platform Director*

*NSF SI2 PI Meeting  
Alexandria, VA April 2018*

*1994-2000 - Startup 1*

*2001 - Startup 2*

*2001-2005 - Startup 3*

*2003 - Startup 4*

*2005-2007 - Consultant*

*2007-2009 - Startup 5*

*2009 - Startup 6*

*2013 - 2018: Startup 7*

*1994-2000 - Startup 1*

*2001 - Startup 2*

*2001-2005 - Startup 3*

*2003 - Startup 4*

*2005-2007 - Consultant*

*2007-2009 - Startup 5*

*2009 - Startup 6*

*2010 - present: Senior Research Scientist*

*2012 - present: Entrepreneur in Residence*

*2013 - 2018: Startup 7*

*2015 - present: HUBzero Director*

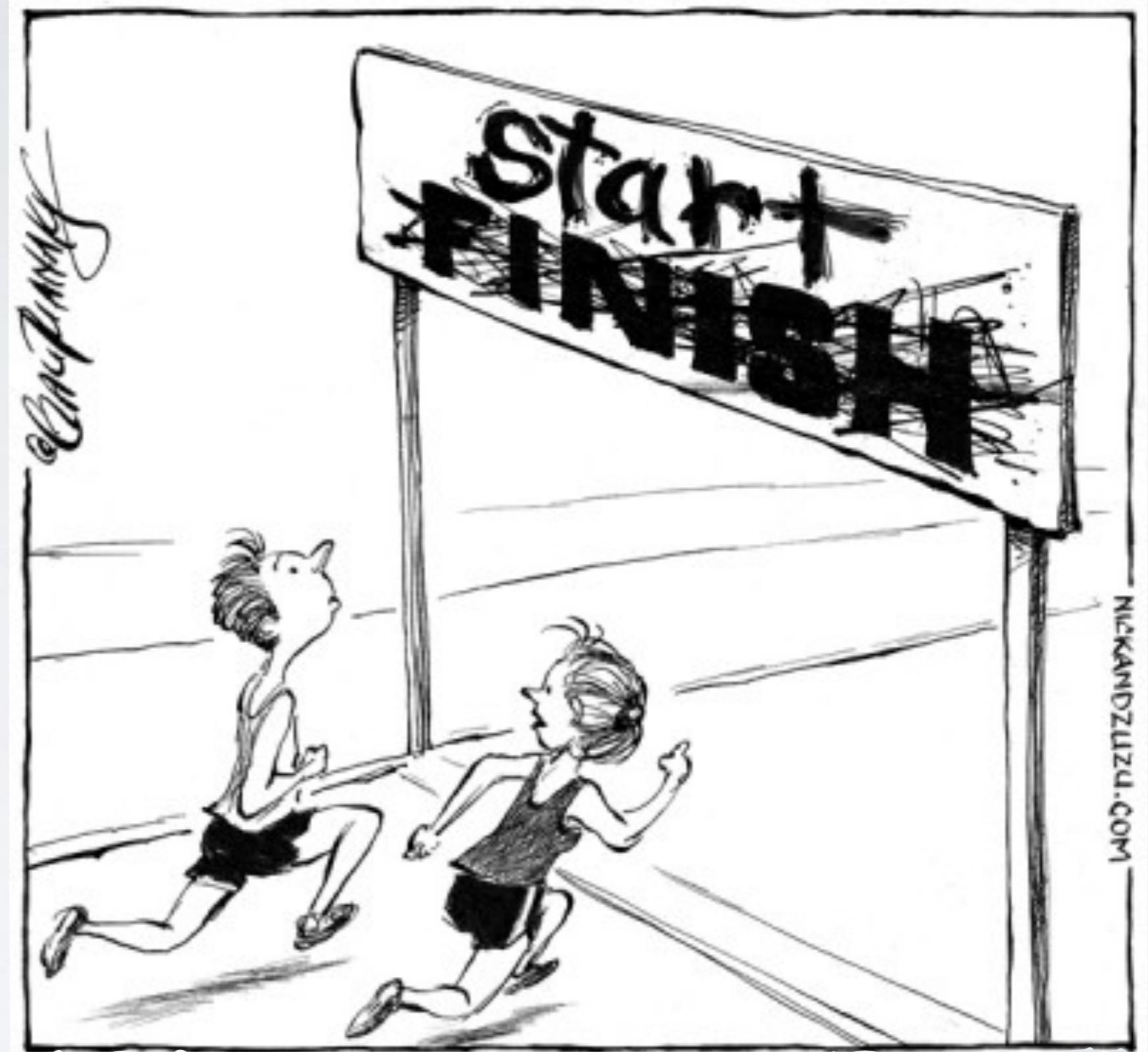


*Crossing the Finish Line  
of Sustainability!*

*No more proposals!  
No more months of reporting!  
Finally some breathing room!*

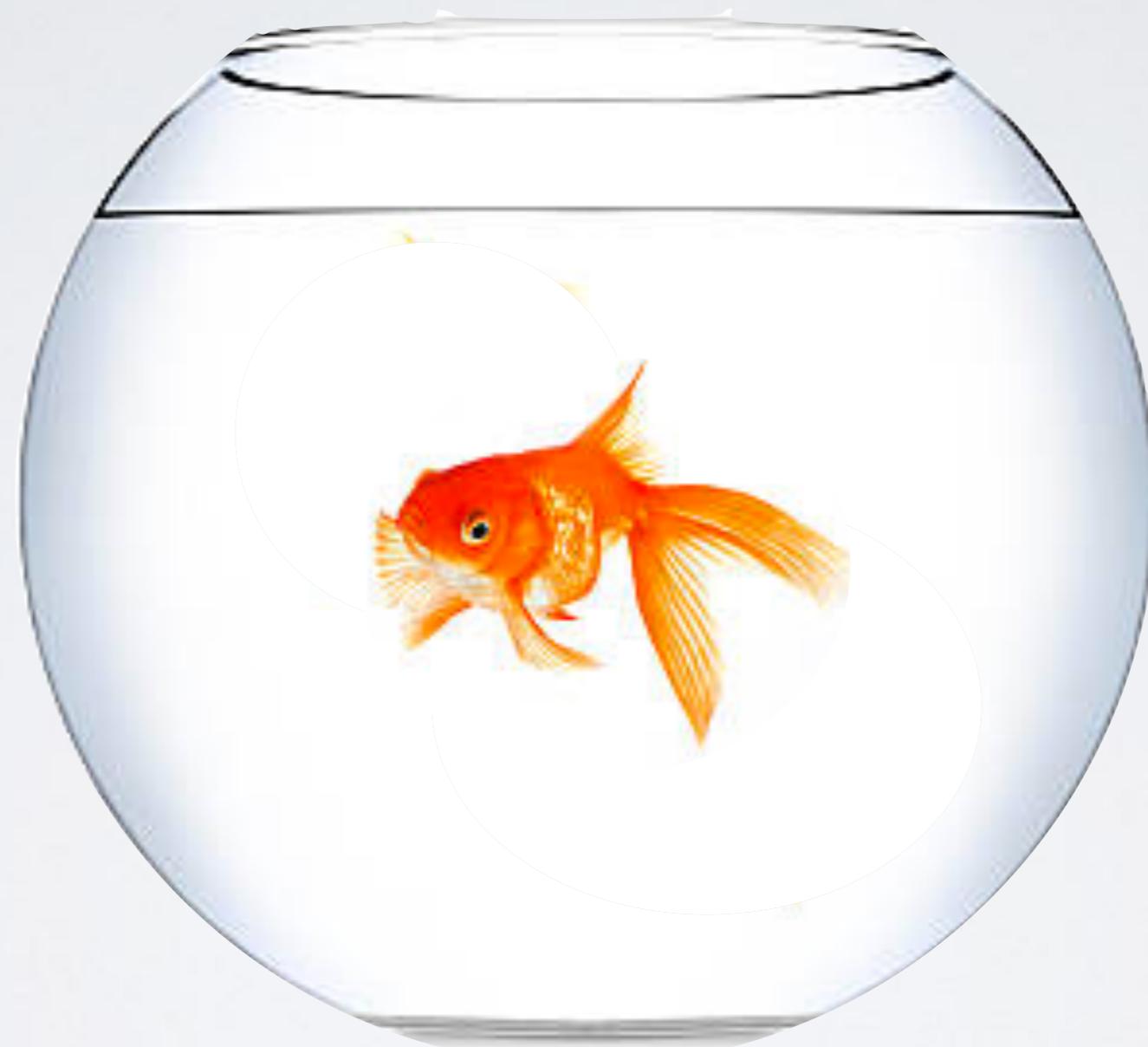
*But Wait,  
There's More!*

*Sustainability  
is a full time  
job.*



CAN THEY DO THAT?

# *The fishbowl of grant funding*



# *Dwindling grant funding*



# *Dwindling grant funding*



*"The next gig"*



# How far away is it?



*Does it look anything like the previous one?*



# *How do I need to look to survive there?*



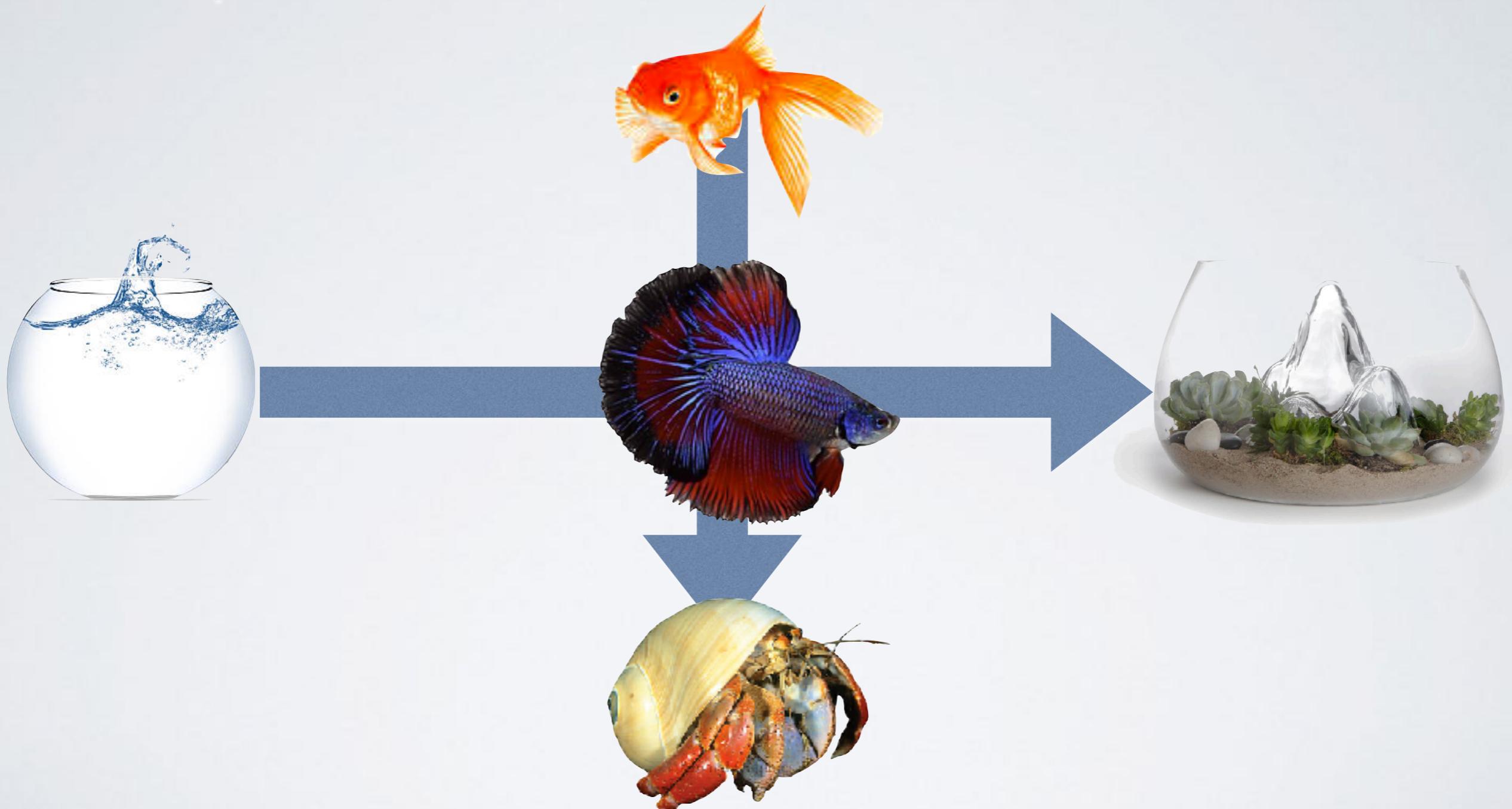
*How do I need to look to survive there?*



# *How do I need to look to survive there?*



*What is the gap between environments?  
What species do we have to be to survive?*



*What is the gap between environments?  
What species do we have to be to survive?*

*Team composition*

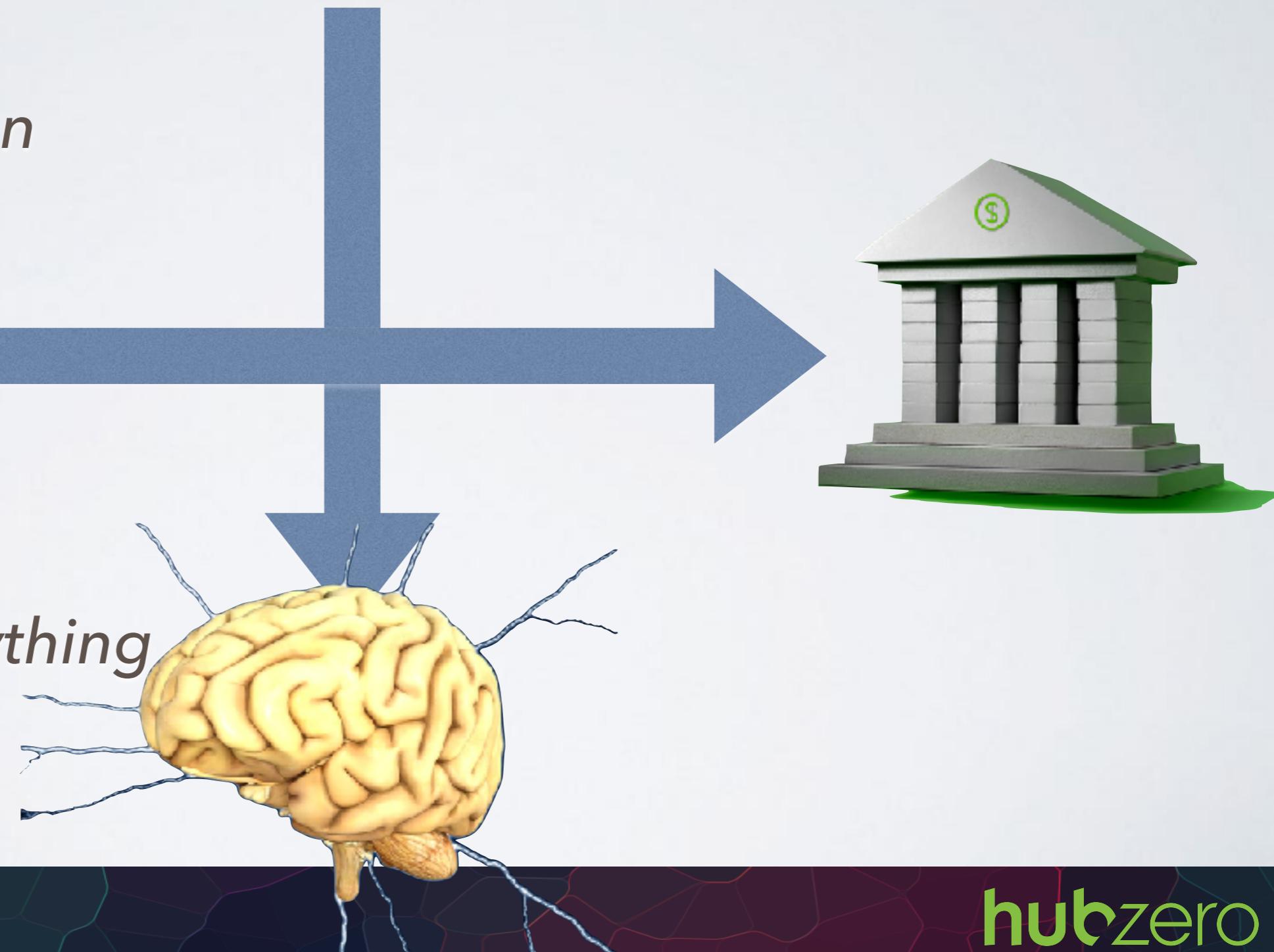
*Major activities*

*Funds allocation*

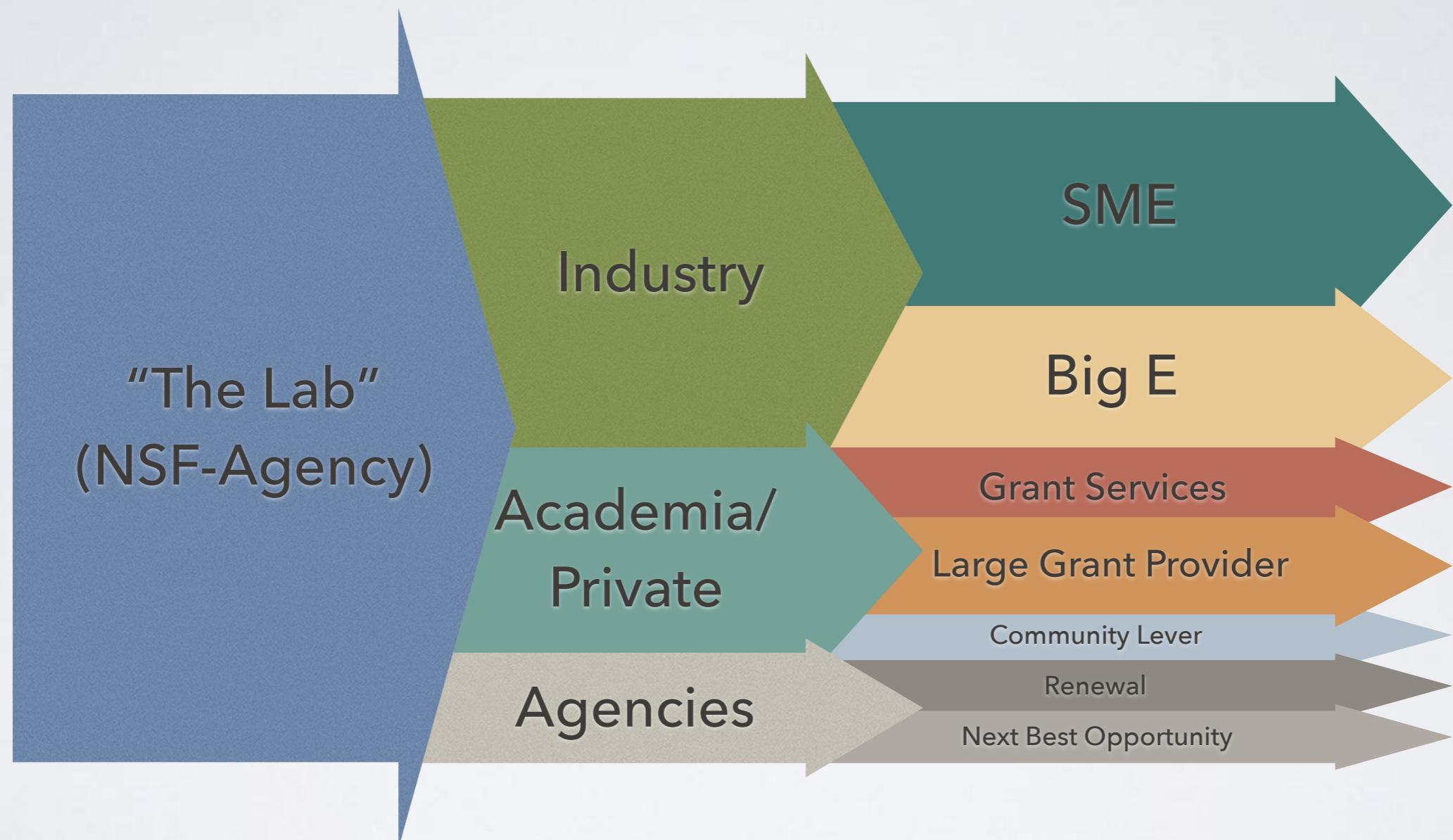
*Legal structure*

*Technology*

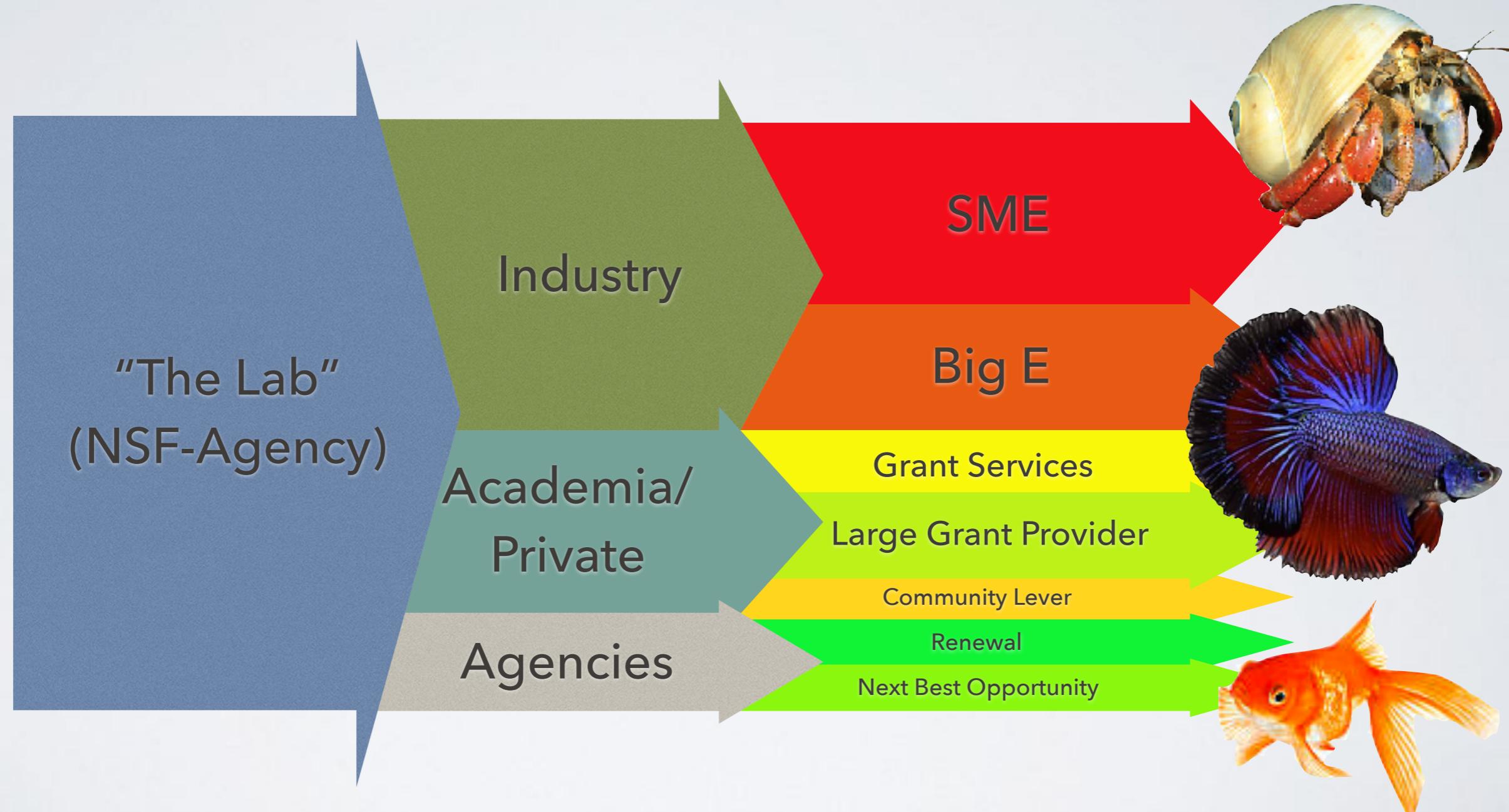
*...basically, everything*



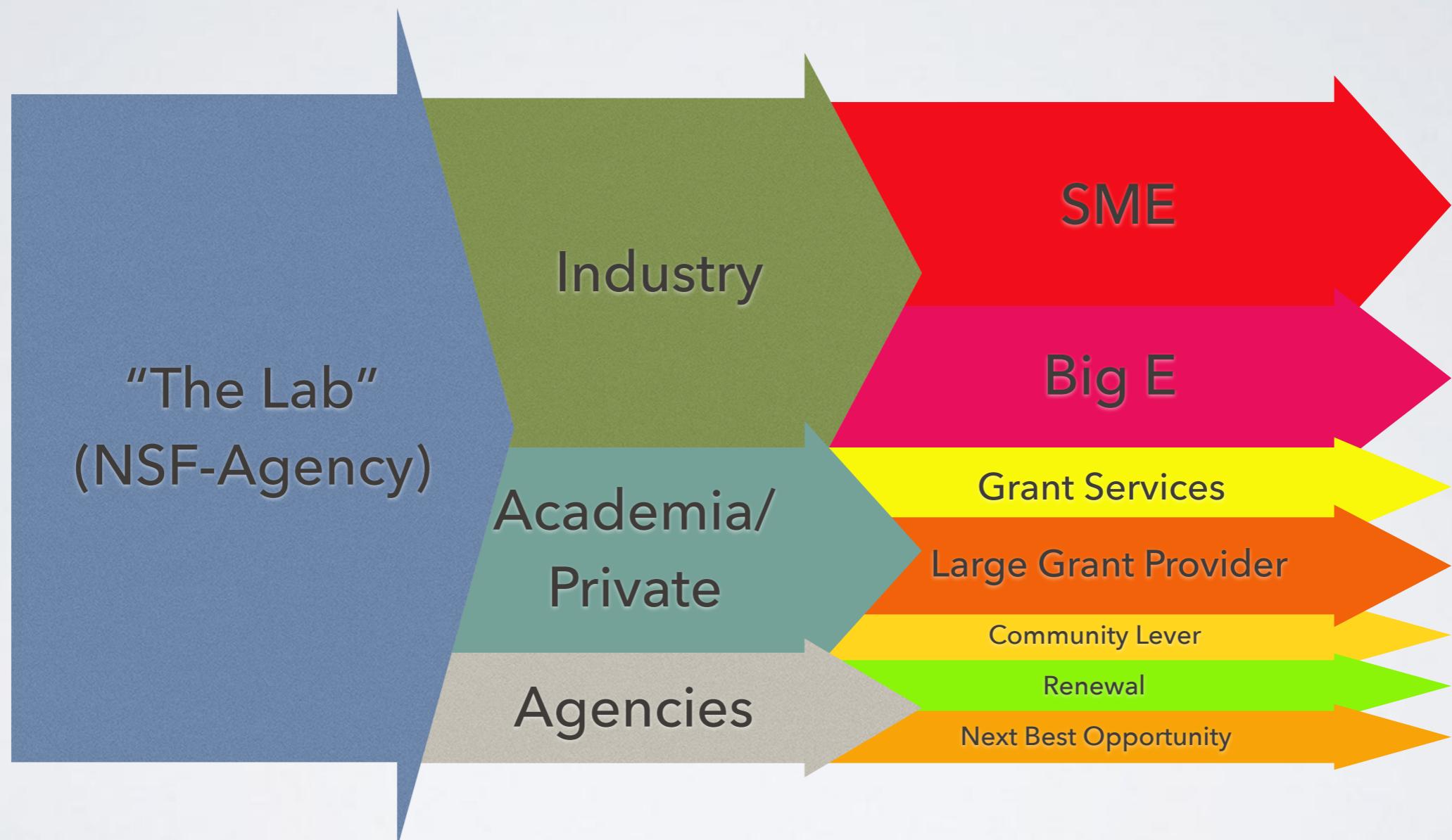
# *Path to who will pay the bills?*



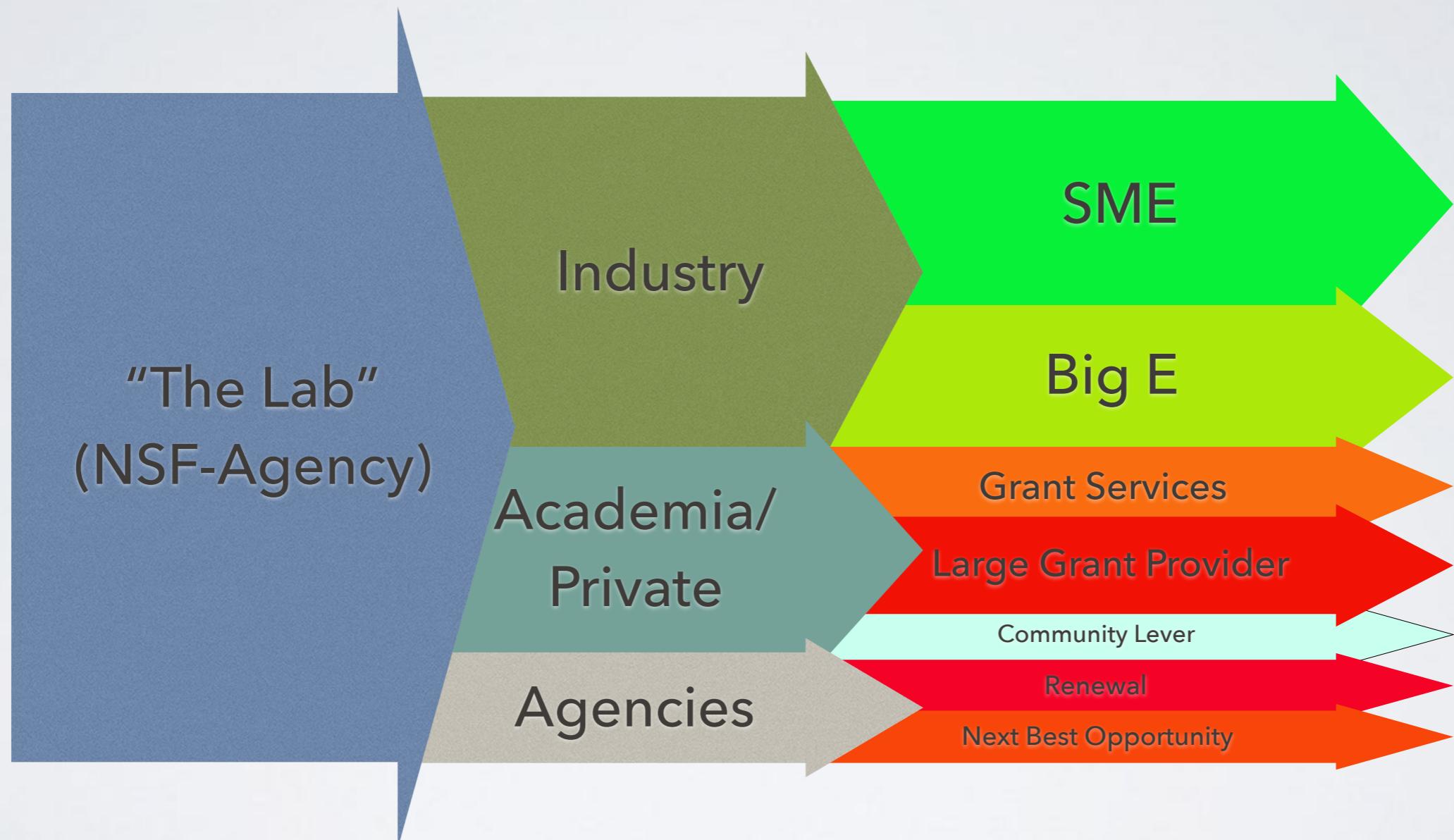
# *Size of the species gap*



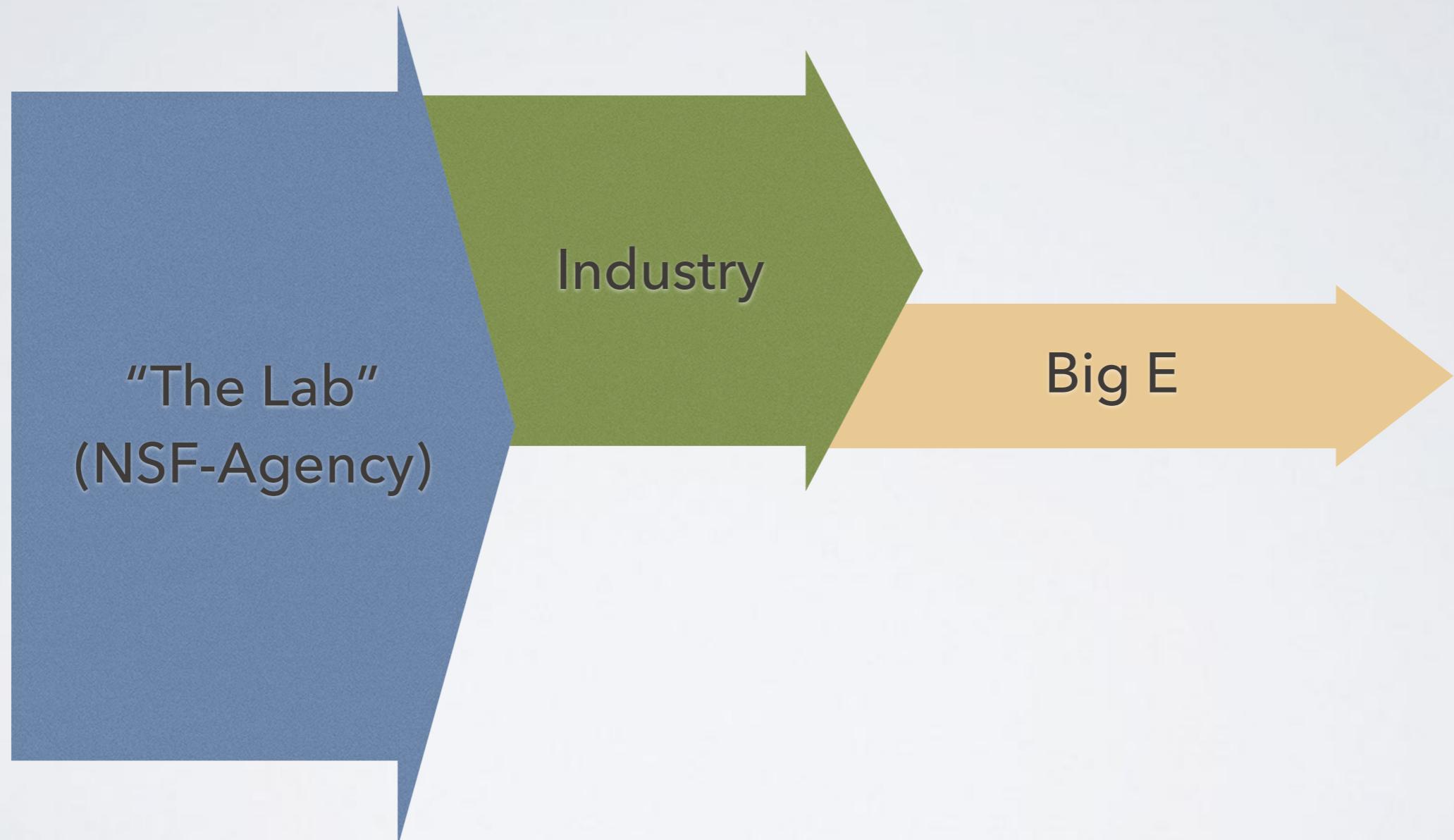
# *Size of the funding gap*



# *Size of the environment*



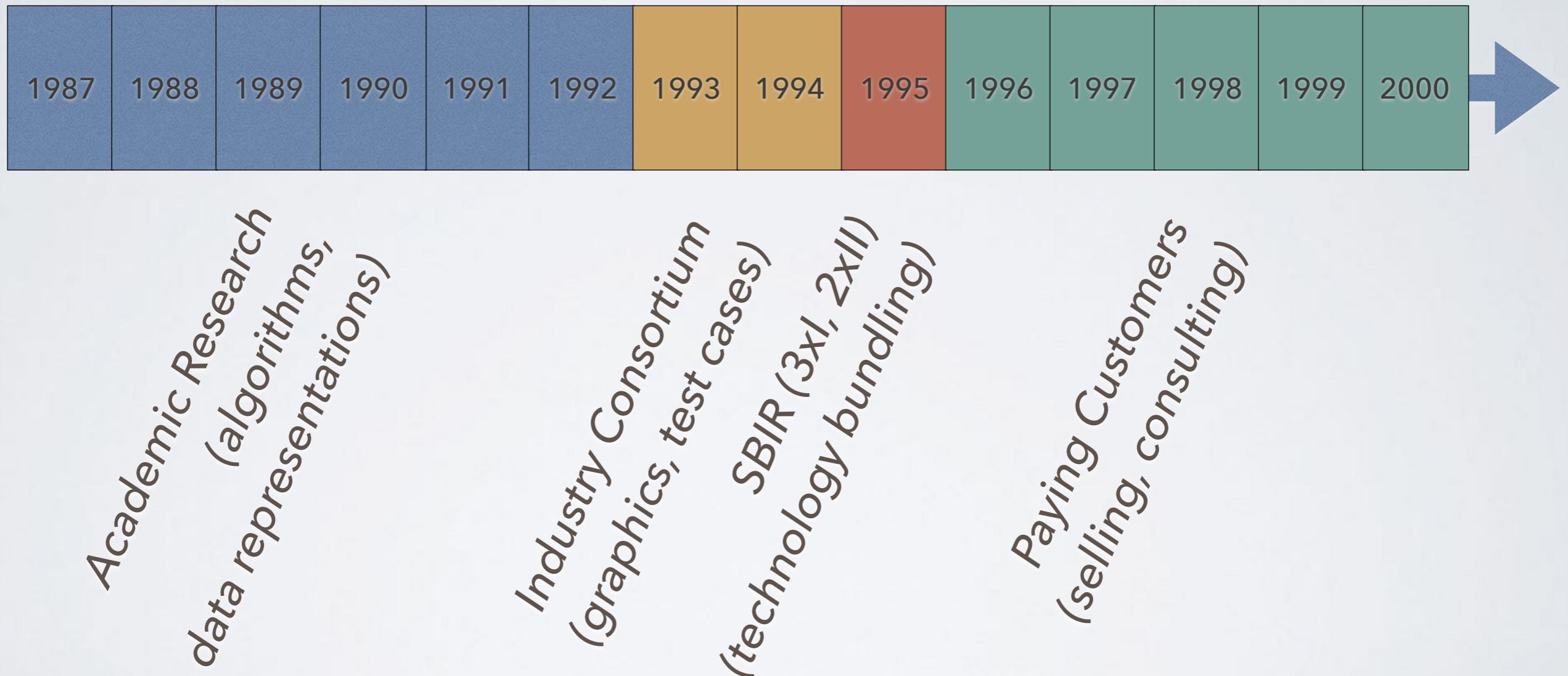
# An example: *Scheduling & supply chain optimization*



# An example: Scheduling & supply chain optimization



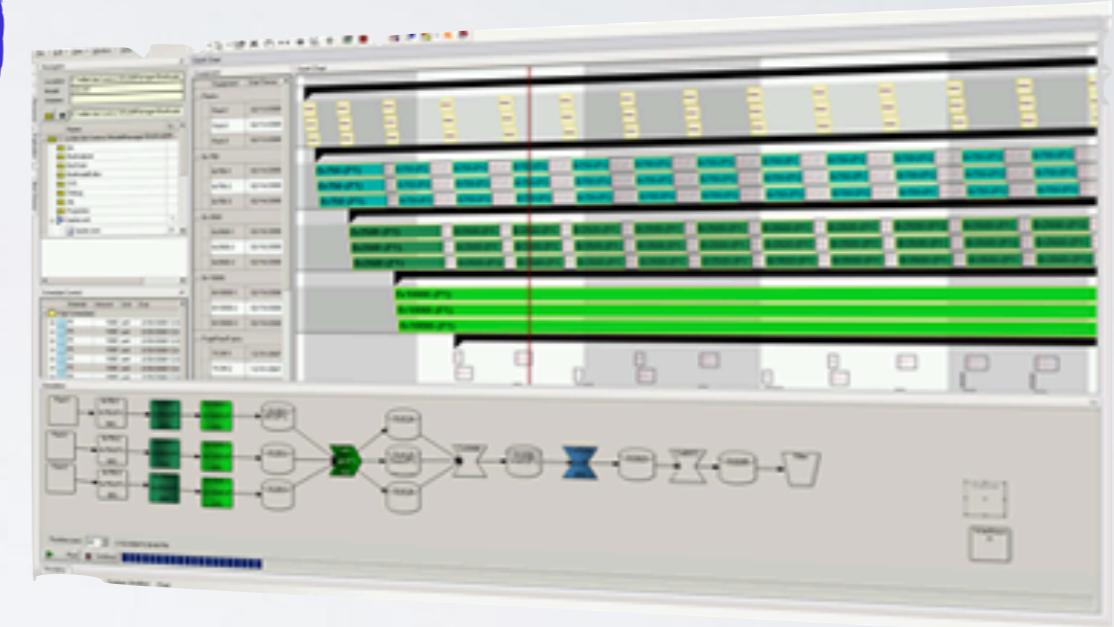
# *Early customer feedback is essential*



# An example: Scheduling & supply chain optimization

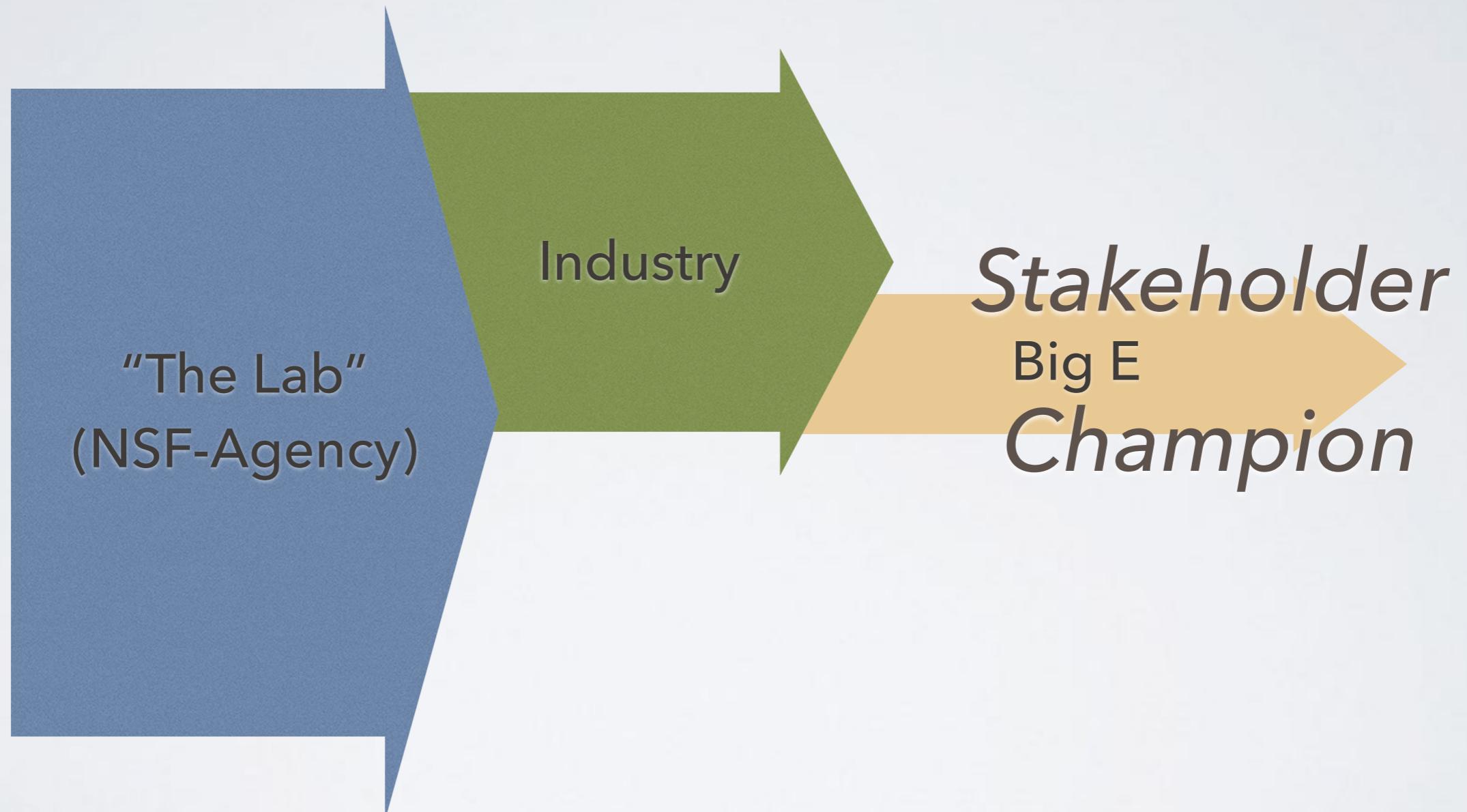


+\$500,000



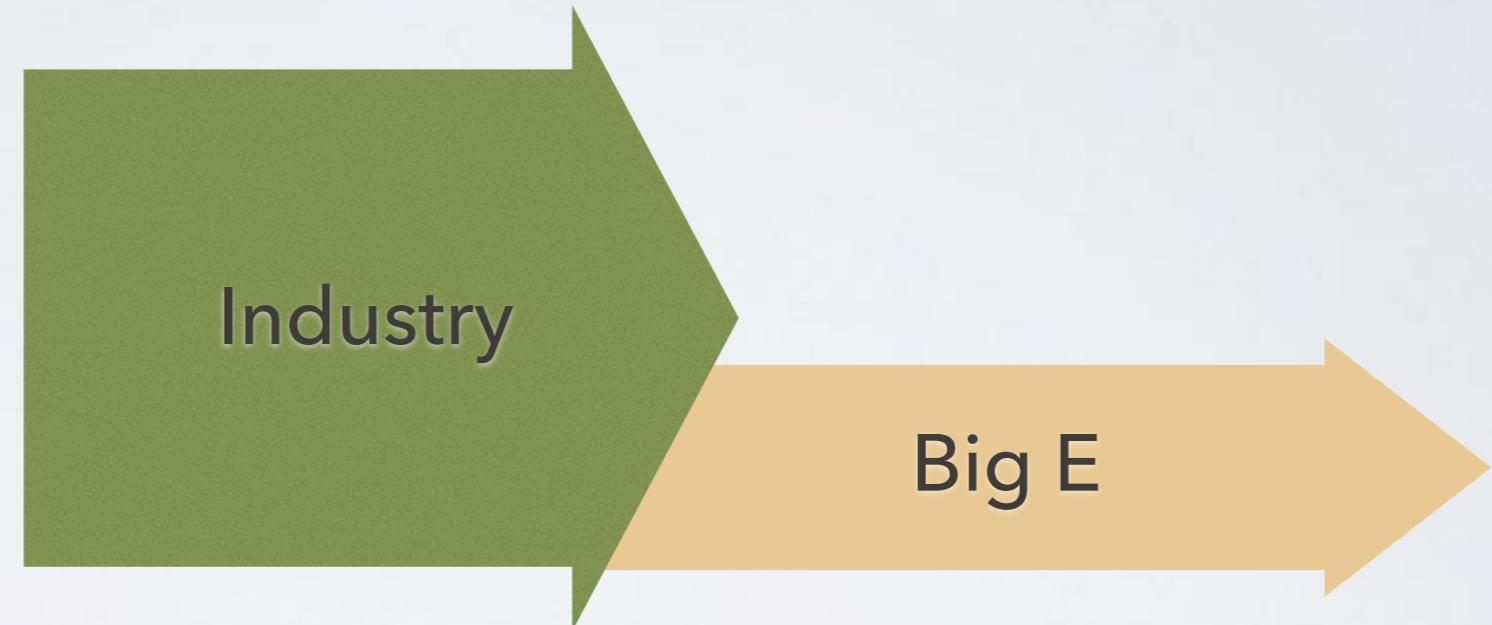
\$300,000

# An example: *Scheduling & supply chain optimization*

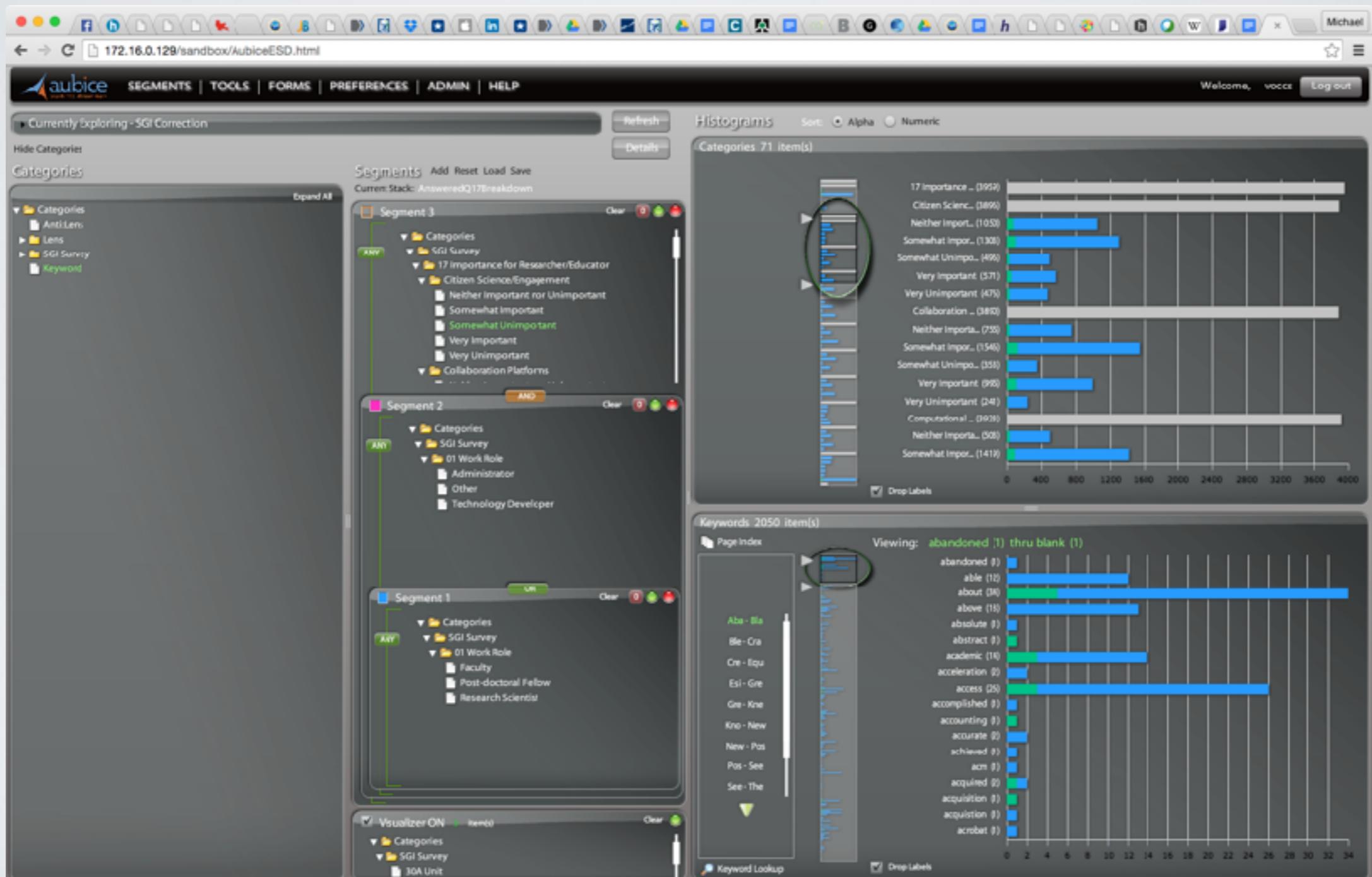


*An example:*

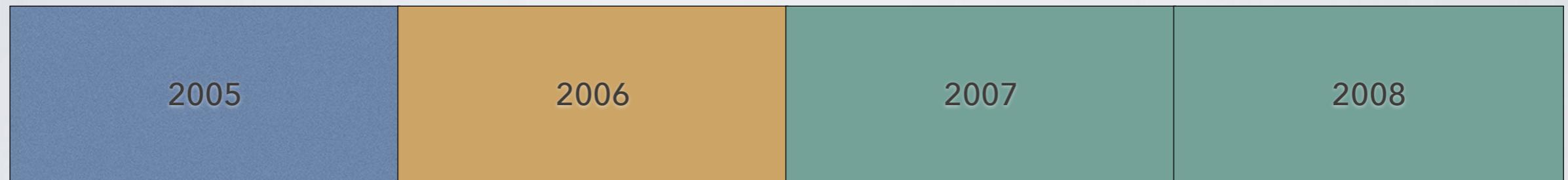
*Structured + unstructured data analytics*



# An example: Structured + unstructured data analytics



# An example: Structured + unstructured data analytics



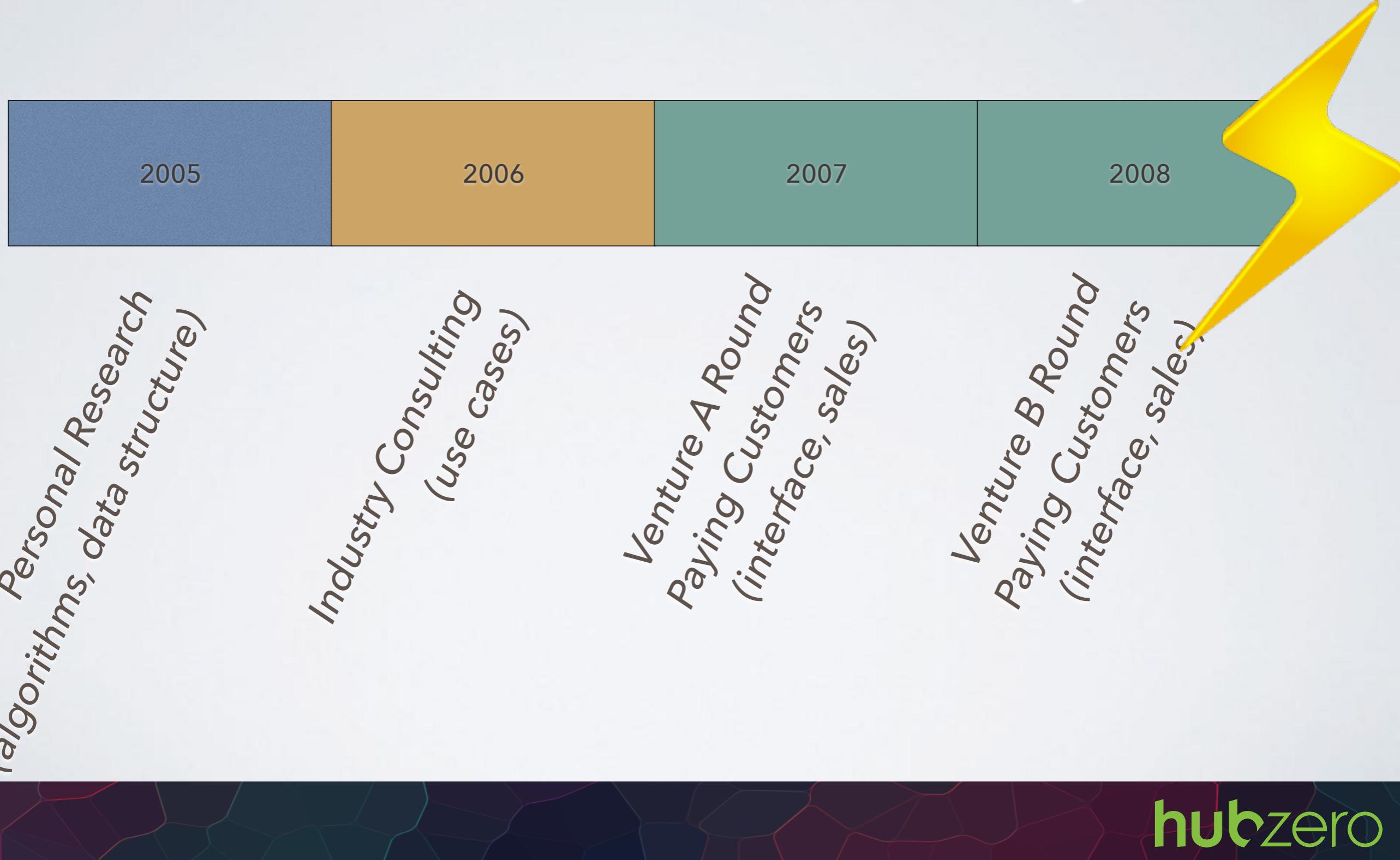
Personal Research  
(algorithms, data structure)

Industry Consulting  
(use cases)

Venture A Round  
Paying Customers  
(interface, sales)

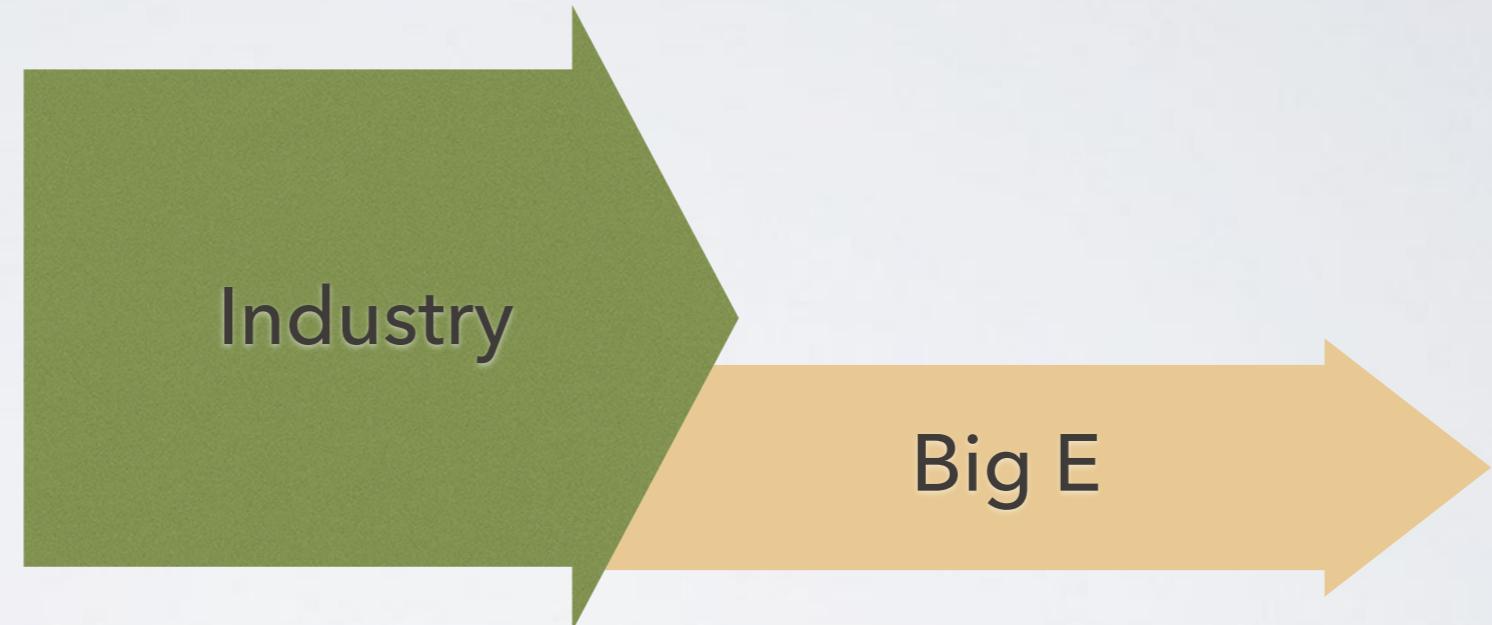
Venture B Round  
Paying Customers  
(interface, sales)

# An example: Structured + unstructured data analytics

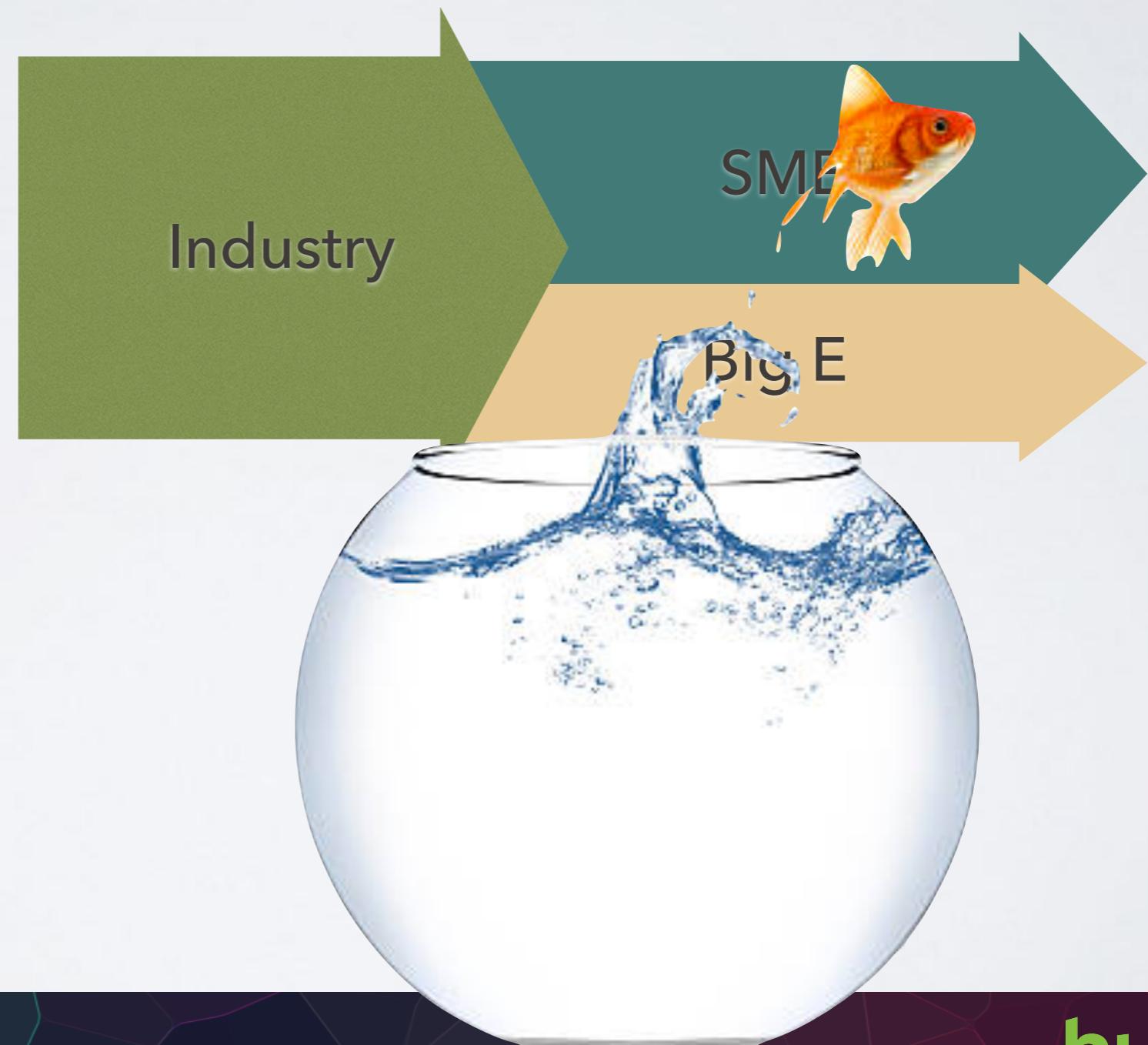


*An example:*

*Structured + unstructured data analytics*



# An example: Structured + unstructured data analytics



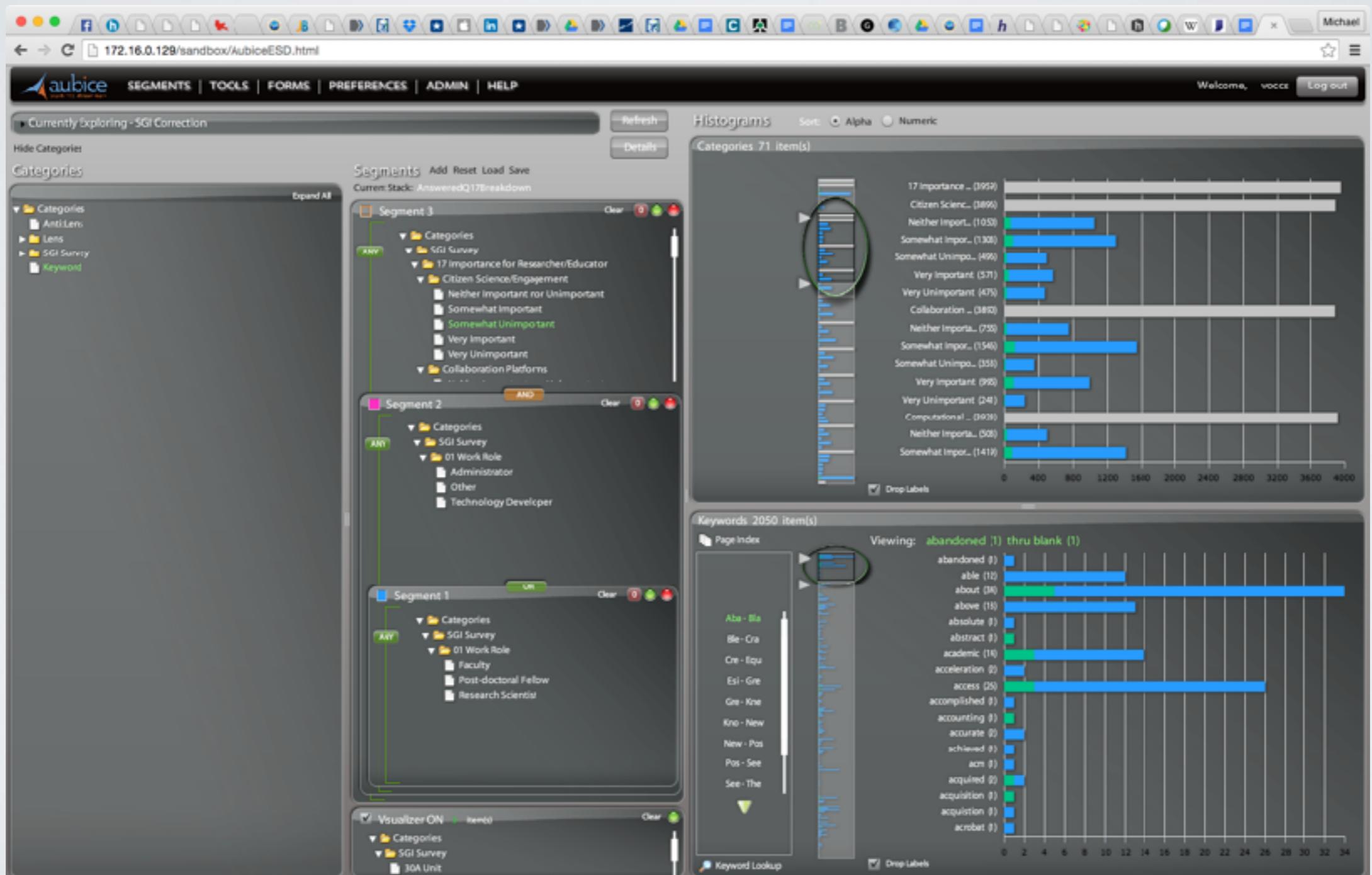
*An example:*

*Structured + unstructured data analytics*

- 25,000 new subscribers a month
- 25% of them paying \$10/month
- = \$62,500 in NEW revenue monthly

*How can we get more than 25% to pay?*

# An example: Structured + unstructured data analytics



# An example: Structured + unstructured data analytics



*An example:*

*Structured + unstructured data analytics*



*An example:*

*Structured + unstructured data analytics*



*An example:*

*Structured + unstructured data analytics*



# *What these customers want*

**Solutions, not capabilities**

"The Lab"  
(NSF-Agency)

Industry

SME

# *What these customers want*

*“With my tech, you can  
do almost anything”*

*“With my tech, you can  
do almost anything”*

# *What these customers want*

*“Look, my problem is X,  
just give me an answer”*

# *What these customers want*

*Our capabilities*

*"With my tech, you can do almost anything"*

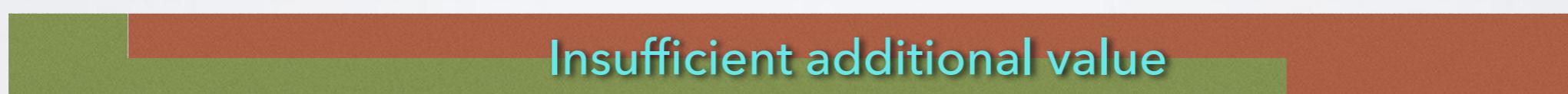
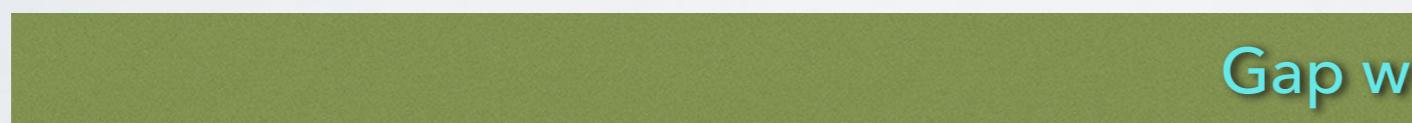
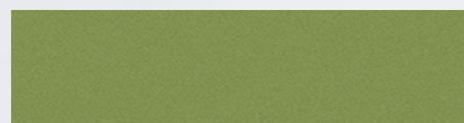
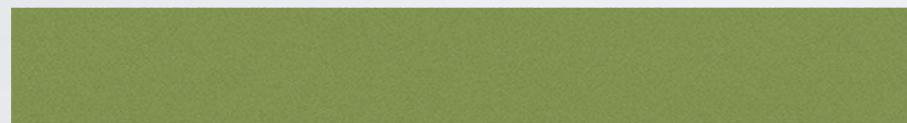
*Our "users'" capabilities*

*"Look, my problem is X, just give me an answer"*

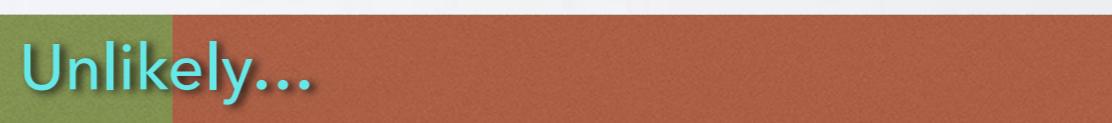
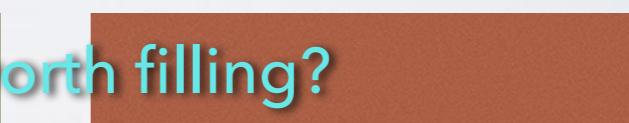
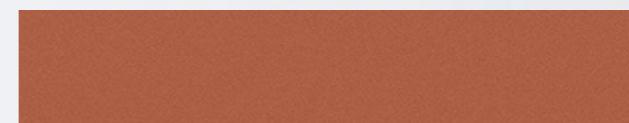
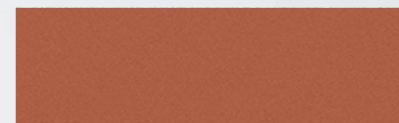
# *What these customers want*

*Our capabilities*

*"With my tech, you can do almost anything"*



*Our "users" capabilities*



Gap too large?

Gap worth filling?

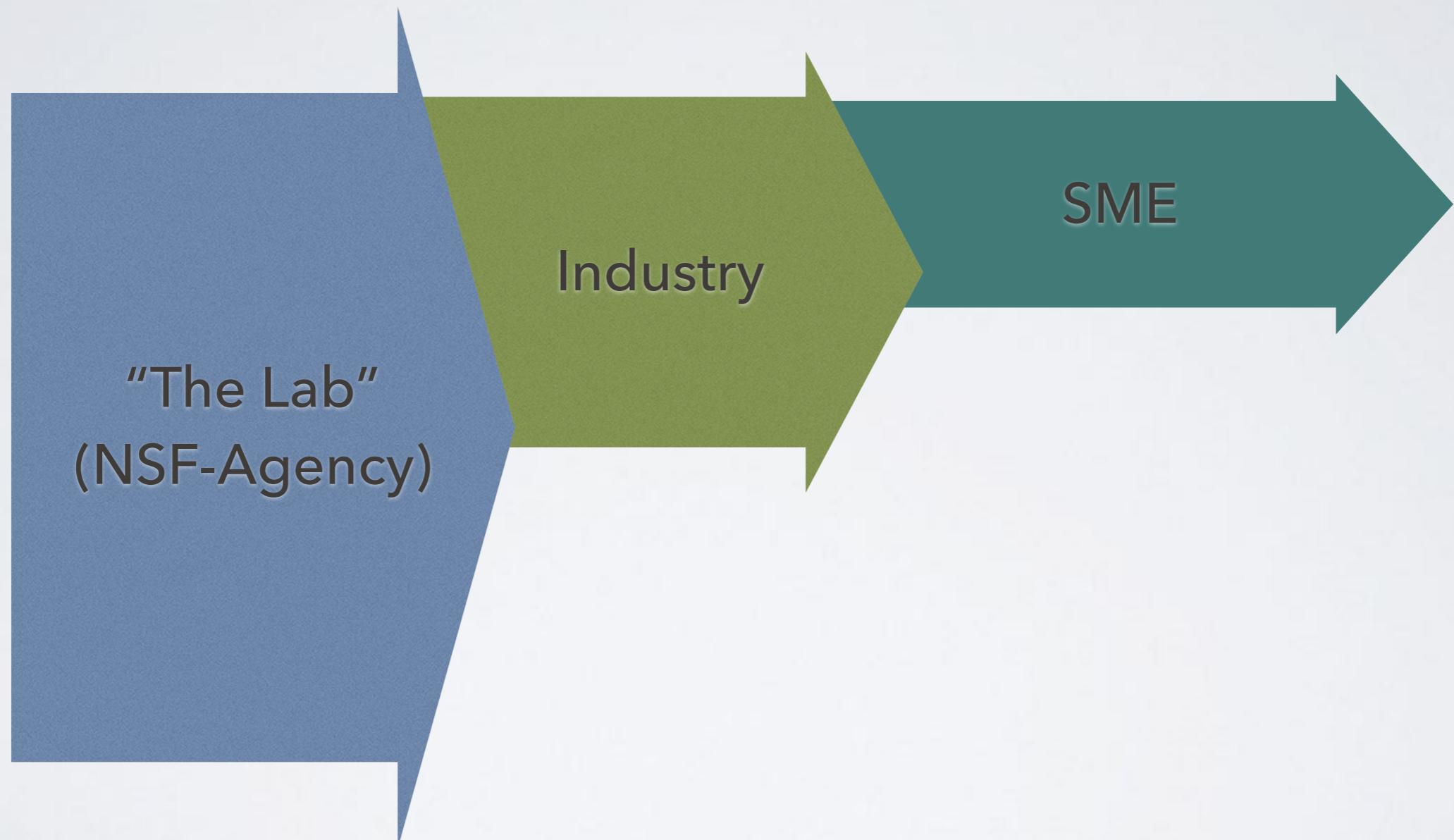
Unlikely...

Insufficient additional value

*"Look, my problem is X, just give me an answer!"*

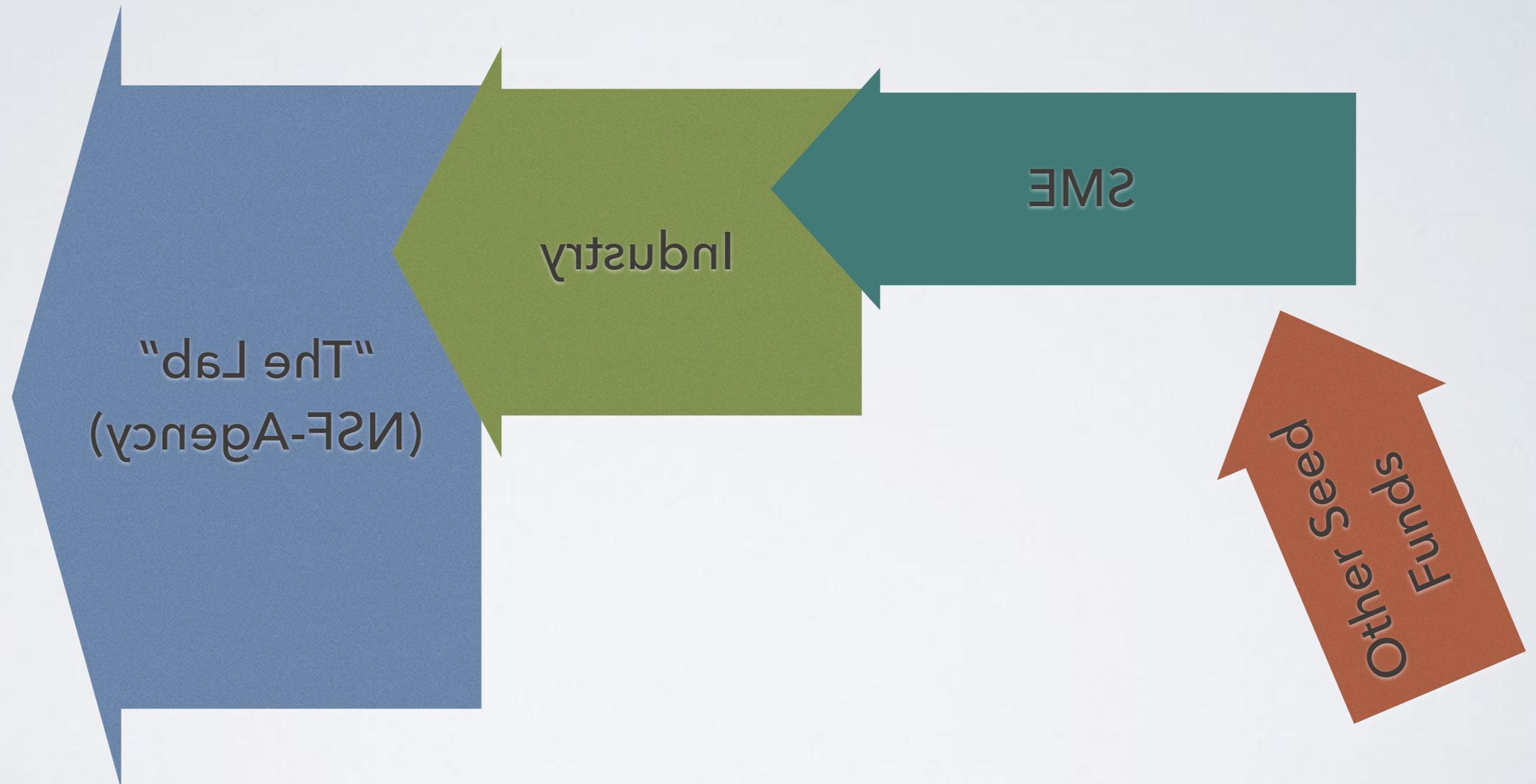
*An example:*

## *Medical device informatics*



*An example:*

## *Medical device informatics*



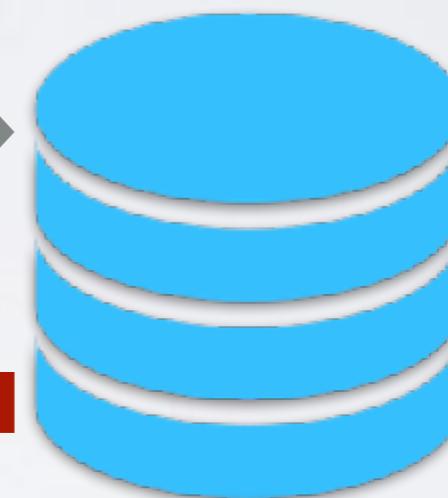
# REMEDI

C E N T R A L

# INFUSION PUMP ALERTS



Drug Limit Library  
Database



Setting

Alert

A photograph of three healthcare professionals, two women and one man, wearing blue scrubs and stethoscopes. They are standing close together, smiling, and have their arms crossed. The background is a soft-focus indoor setting.

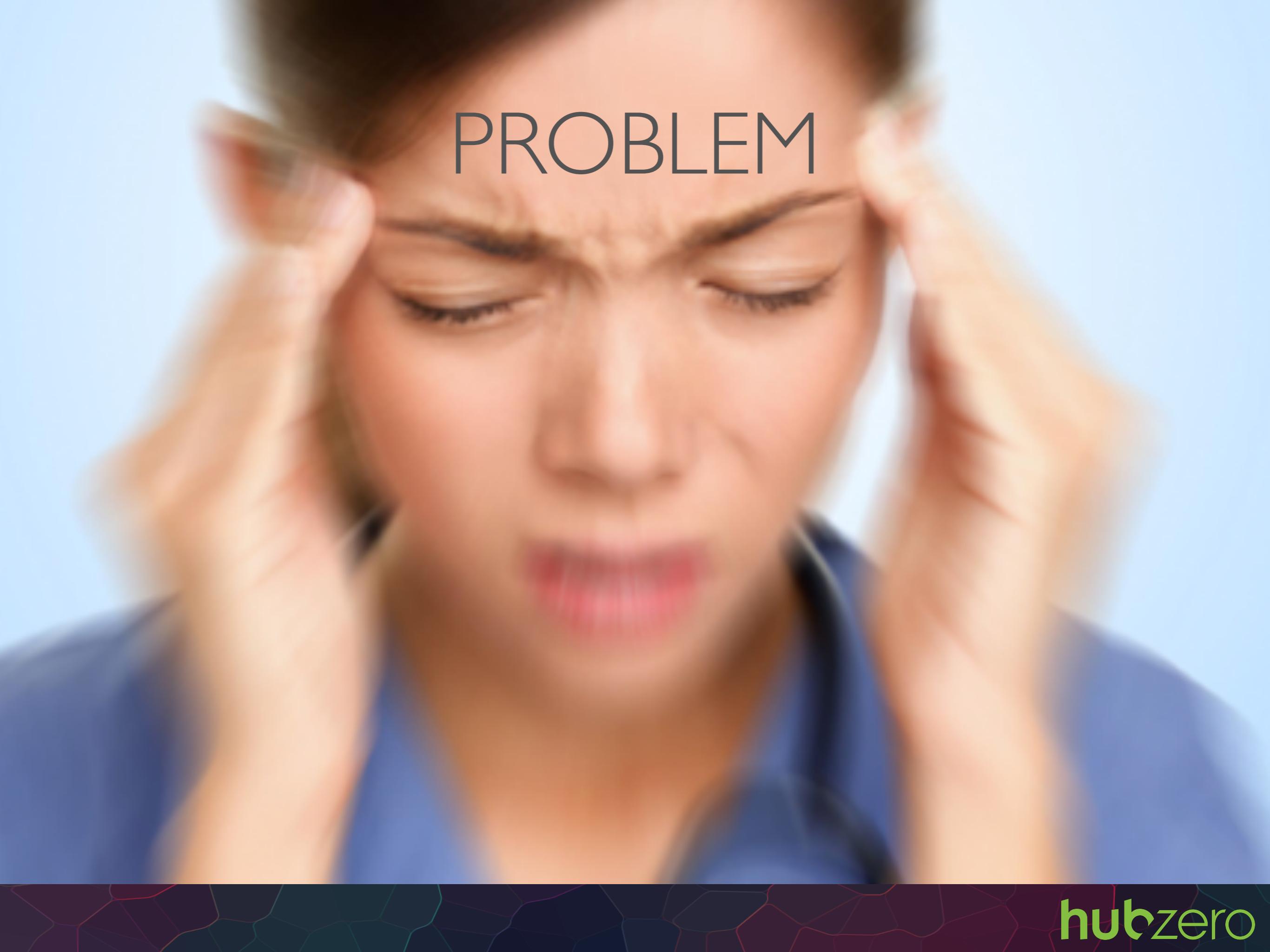
PROBLEM

# PROBLEM



# PROBLEM



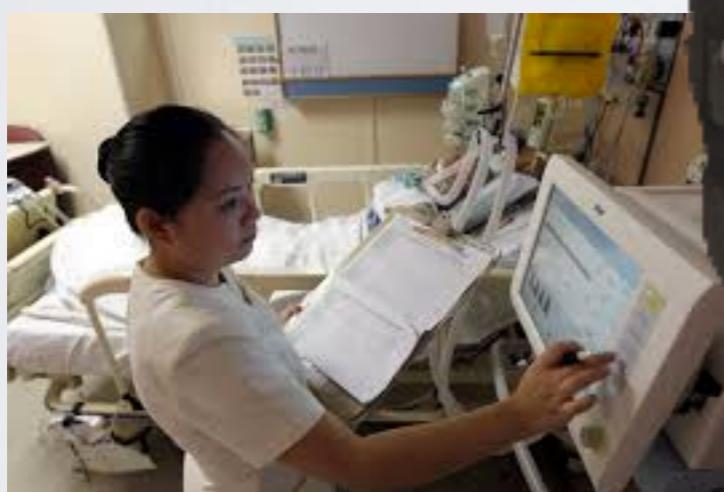


# PROBLEM



# BREAKING TRADITION

Practitioners

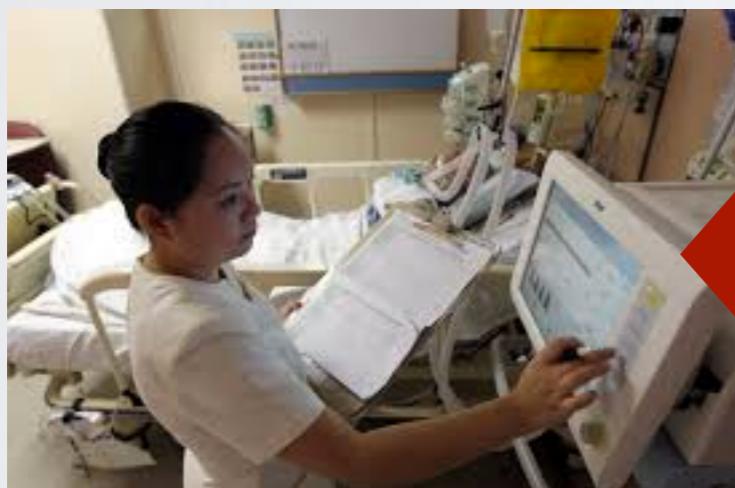


Researchers



# A 2-SIDED DATA MARKET

Practitioners



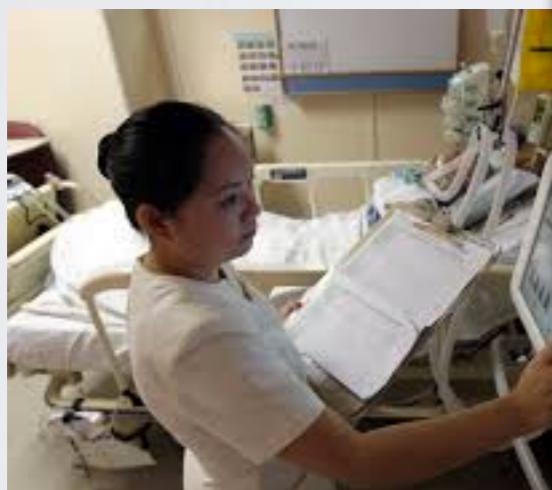
Researchers



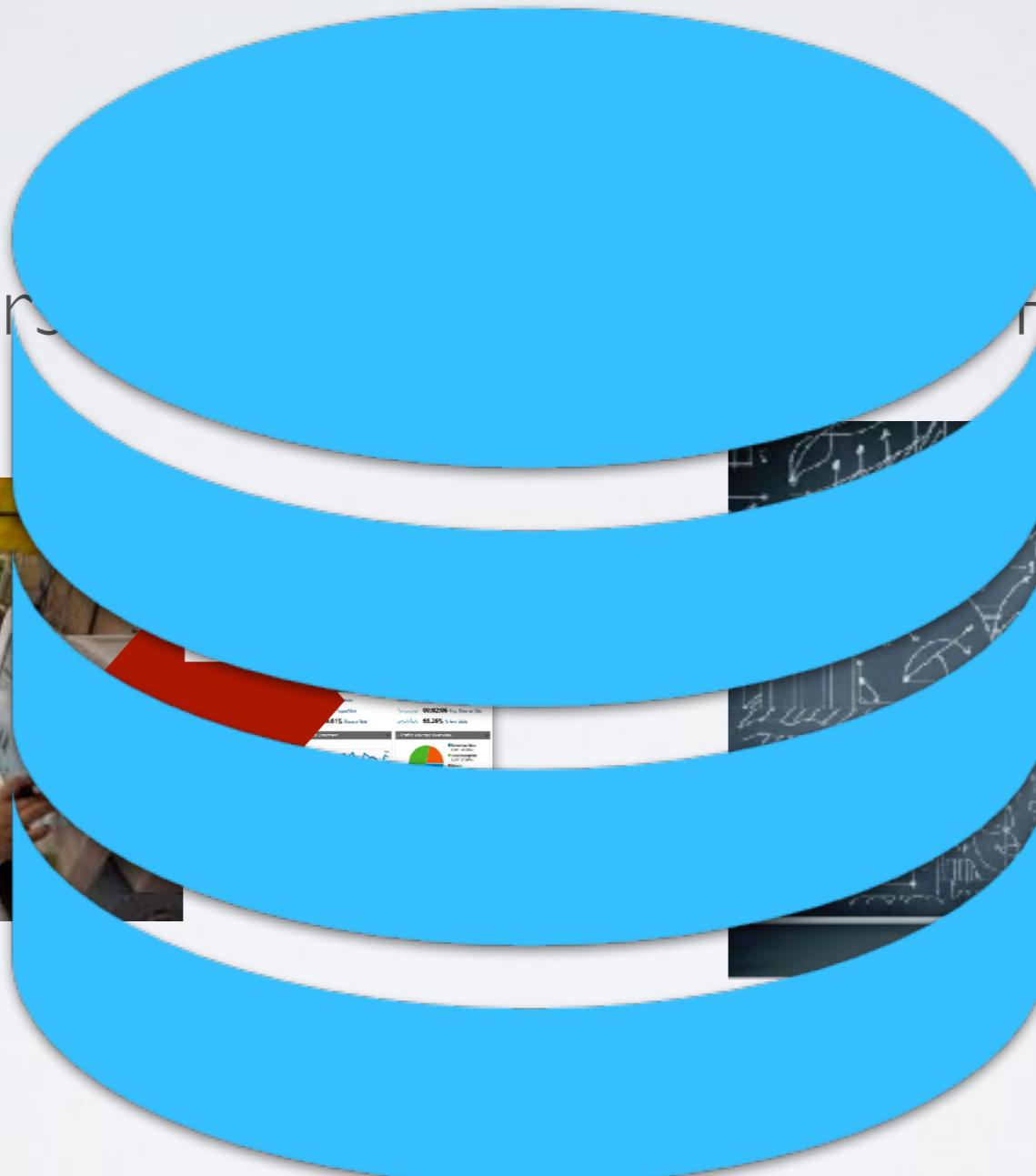
*Ann Christine Catlin, Purdue*

# A 2-SIDED DATA MARKET

Practitioners



Researchers



# A 2-SIDED DATA MARKET

Practitioners

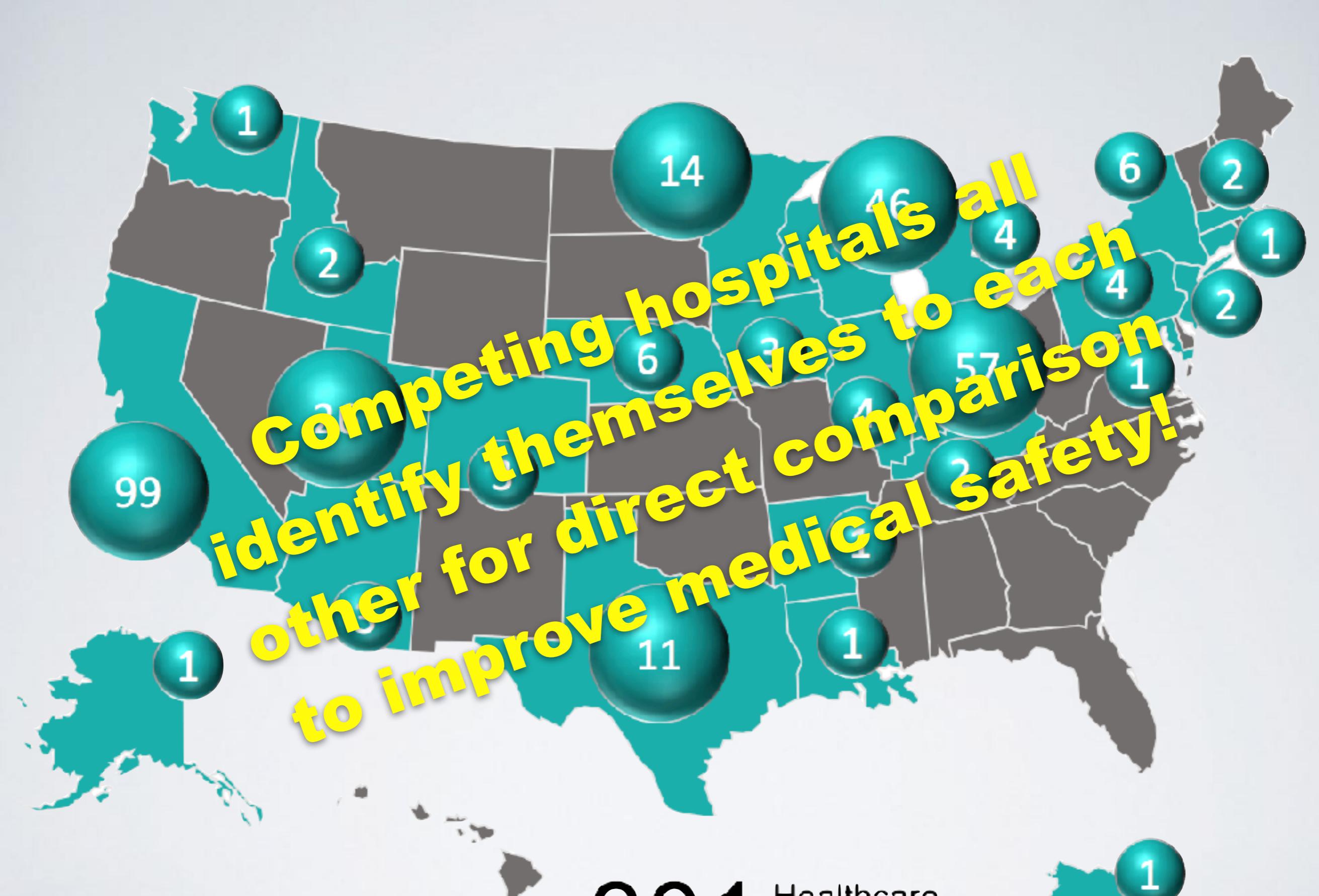


Researchers



Labs





301 Healthcare Providers





**301** Healthcare Providers



Costa Rica

*An example:*

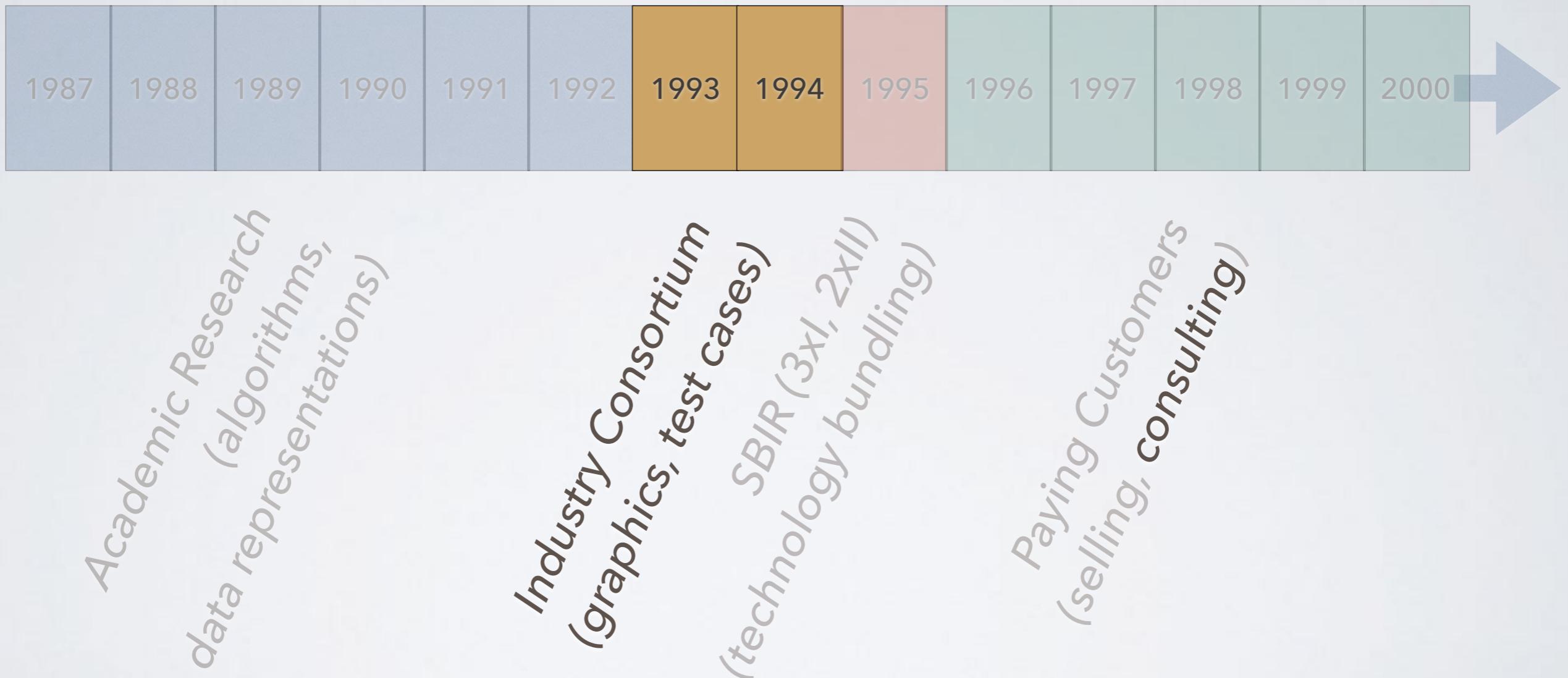
## *Medical device informatics*



# Vendors, nurses, pharmacists



# *Early customer feedback is essential*



# *Early customer feedback is essential*



Personal Research  
(algorithms, data structure)

Industry Consulting  
(use cases)

Venture A Round  
Paying Customers  
(interface, sales)

Venture B Round  
Paying Customers  
(interface, sales)

# *Early customer feedback is essential*



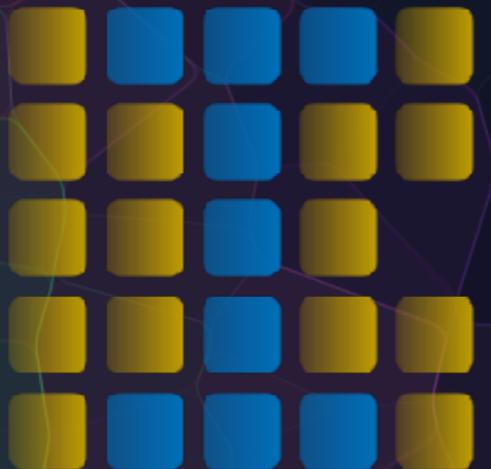
*Non-Paying Customers  
(technology building)*

*Industry Consortium  
(growing community)*

*Academic Research  
(interventions)*

*Paying Customers?  
(selling, consulting)*

BUT WAIT . . .  
THERE'S A PROGRAM  
FOR THAT!



.CORPS  
NSF Innovation Corps

# I-Corps solicitation

## Expectations from the I-Corps Teams Grant:

Successful completion of the I-Corps Teams grant is expected to contribute to one or more of the following:

- New for-profit, start-up business
- Licensing
- SBIR/STTR proposal
- A business model suitable for review by third-party investors
- Students prepared to be entrepreneurially competitive
- Enhancing the entrepreneurial mindset among NSF-funded researchers

NSF will seek to collect outcomes from the awardees along the lines listed above during post-award period.

# *I-Corps solicitation*

- New for-profit, start-up business
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- SBIR/STTR proposal
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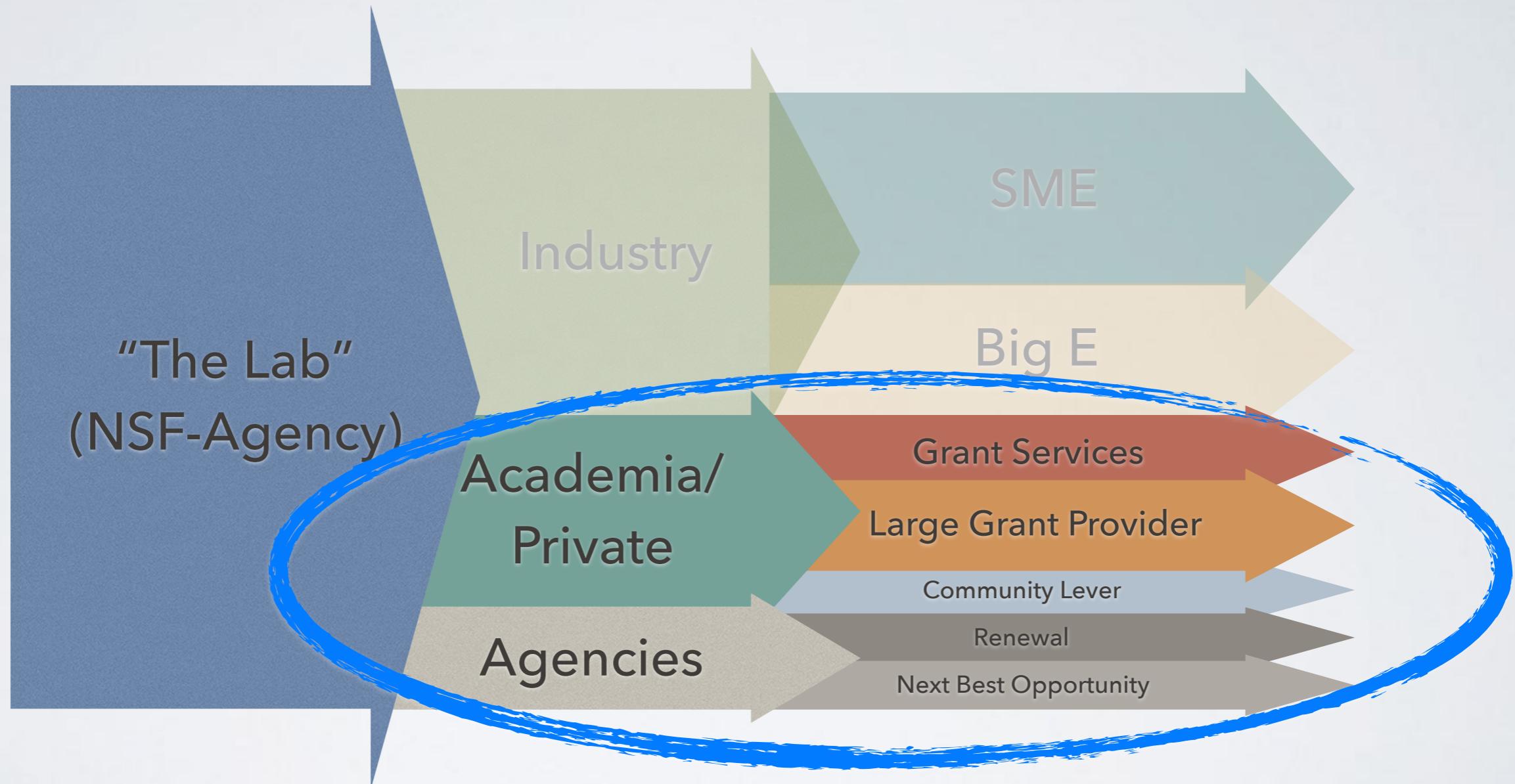
*Start a for profit business*

*Train to start some other for profit business*



- Students prepared to be entrepreneurially competitive
- Enhancing the entrepreneurial mindset among NSF-funded researchers

# What about us?



A close-up photograph of a baby with light blonde hair, wearing a white long-sleeved shirt. The baby is facing a mirror, looking directly at its own reflection. Its hands are positioned near the bottom of the frame, with fingers pointing towards the mirror. The background is a plain, light-colored wall.

**NO Talking To  
Yourselfs!**

*THE focus of I-Corps...*

**<some person>**

*will do*

**<some thing>**

*because*

**<that person will realize this value>**

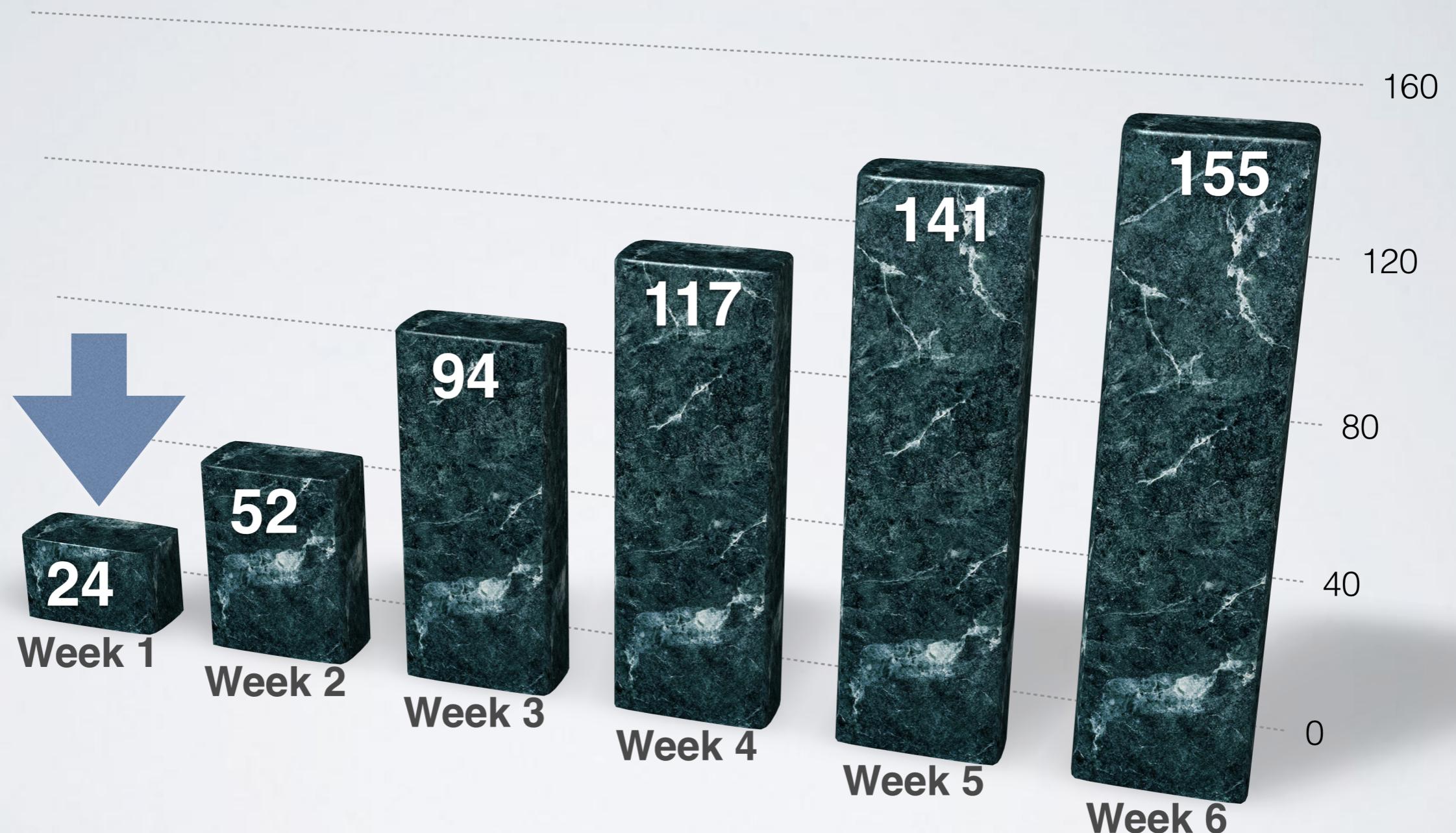
*THE focus of I-Corps...*

***Definitely NOT “buy my product”***

***<some thing>***

***Maybe not “use my technology”***

# *nanoHUB goes to I-Corps*



# *nanoHUB goes to I-Corps*

Dow

GM

United Airlines  
Ford NIST

GE Digital

Caterpillar

Trelleborg Sealing Solutions

Evonik

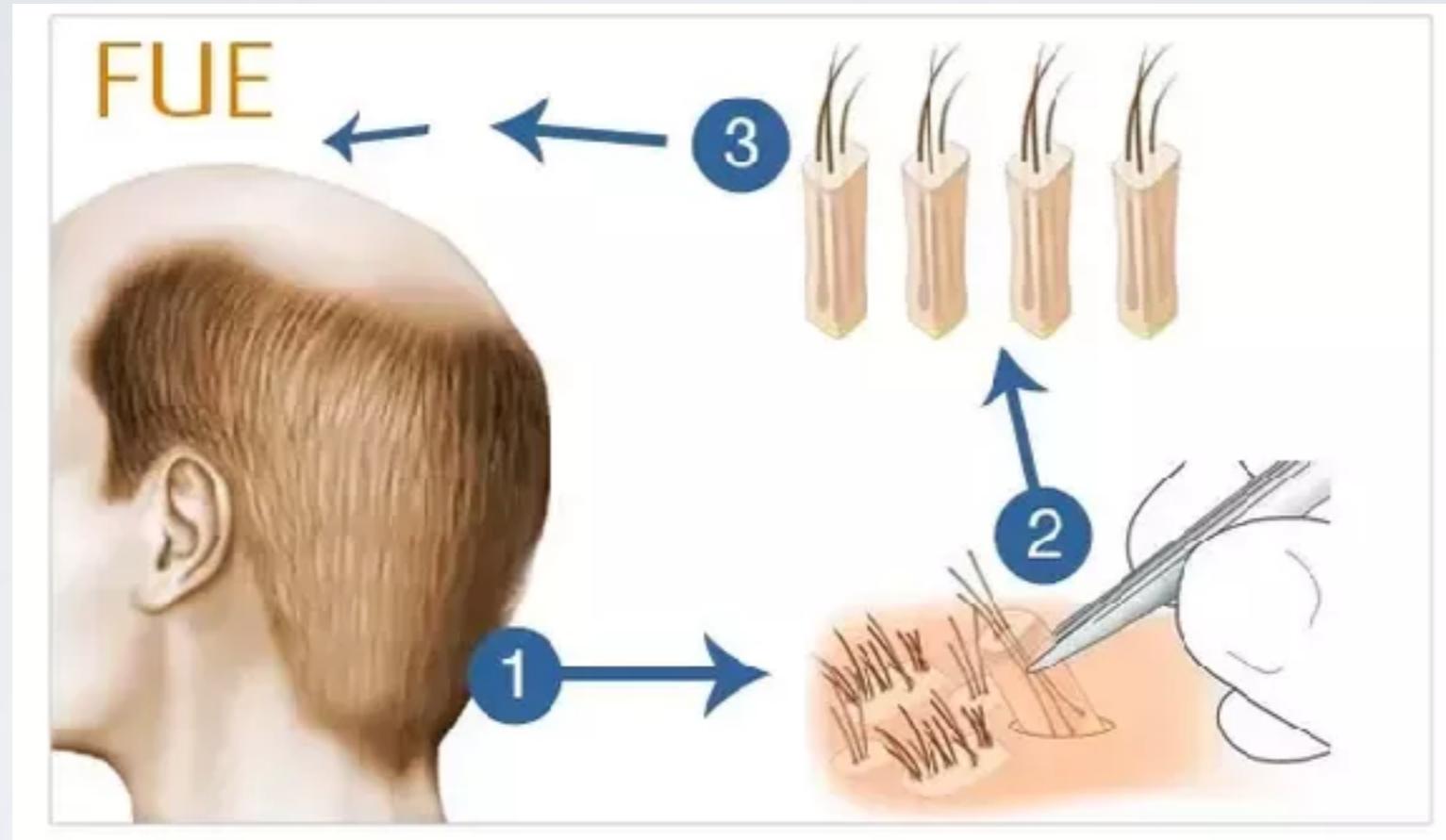
# *nanoHUB goes to I-Corps*

*These guys have lots of problems but they're not easily solved...more like grand challenges:*

*Provenance/Reproducibility  
Validation*

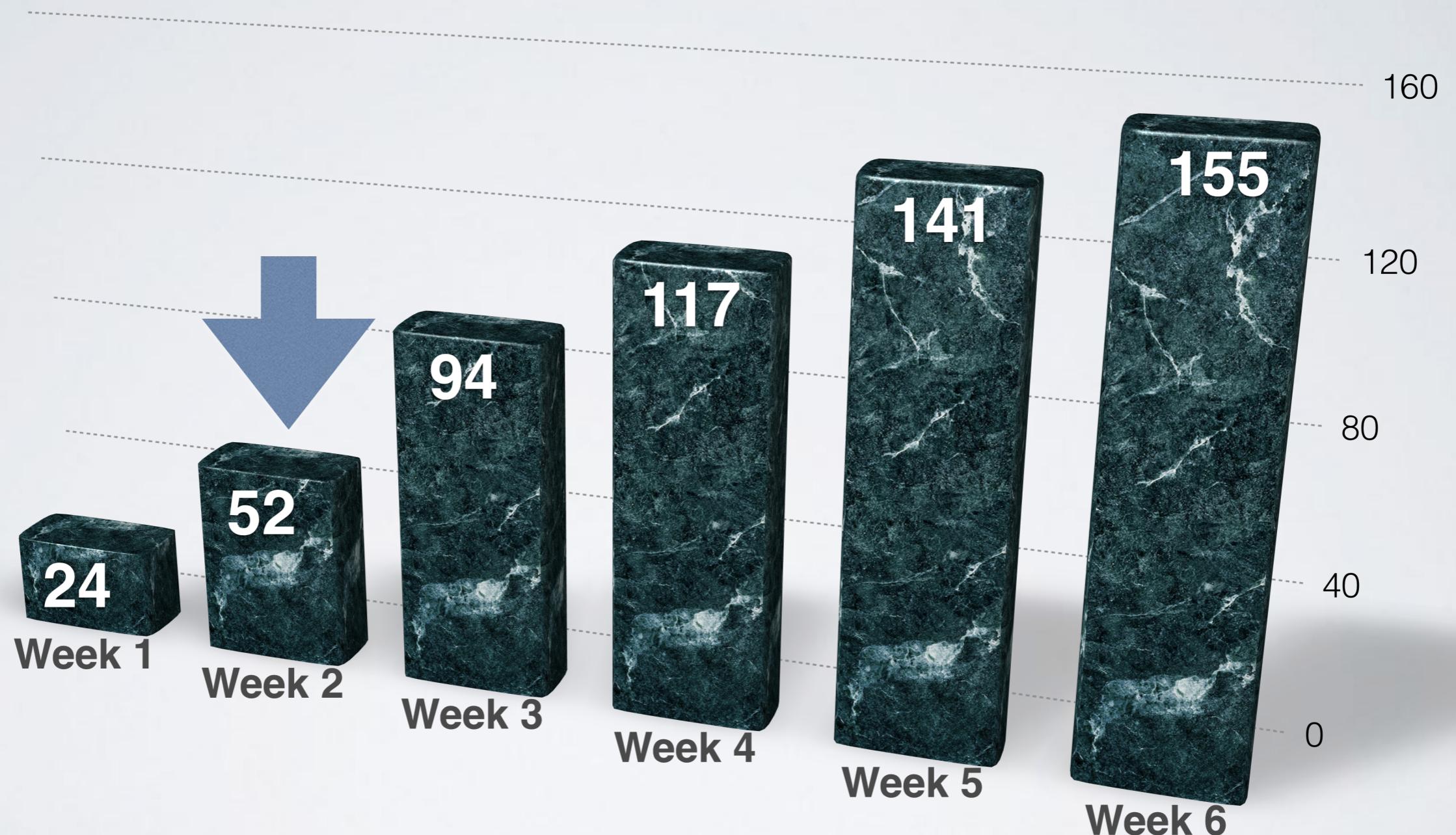
*Making Academic Research Practical*

# *nanoHUB goes to I-Corps*



*"Those class 3 medical device guys do simulation all the time, check with them.  
People will die if they are wrong."*

# *nanoHUB goes to I-Corps*



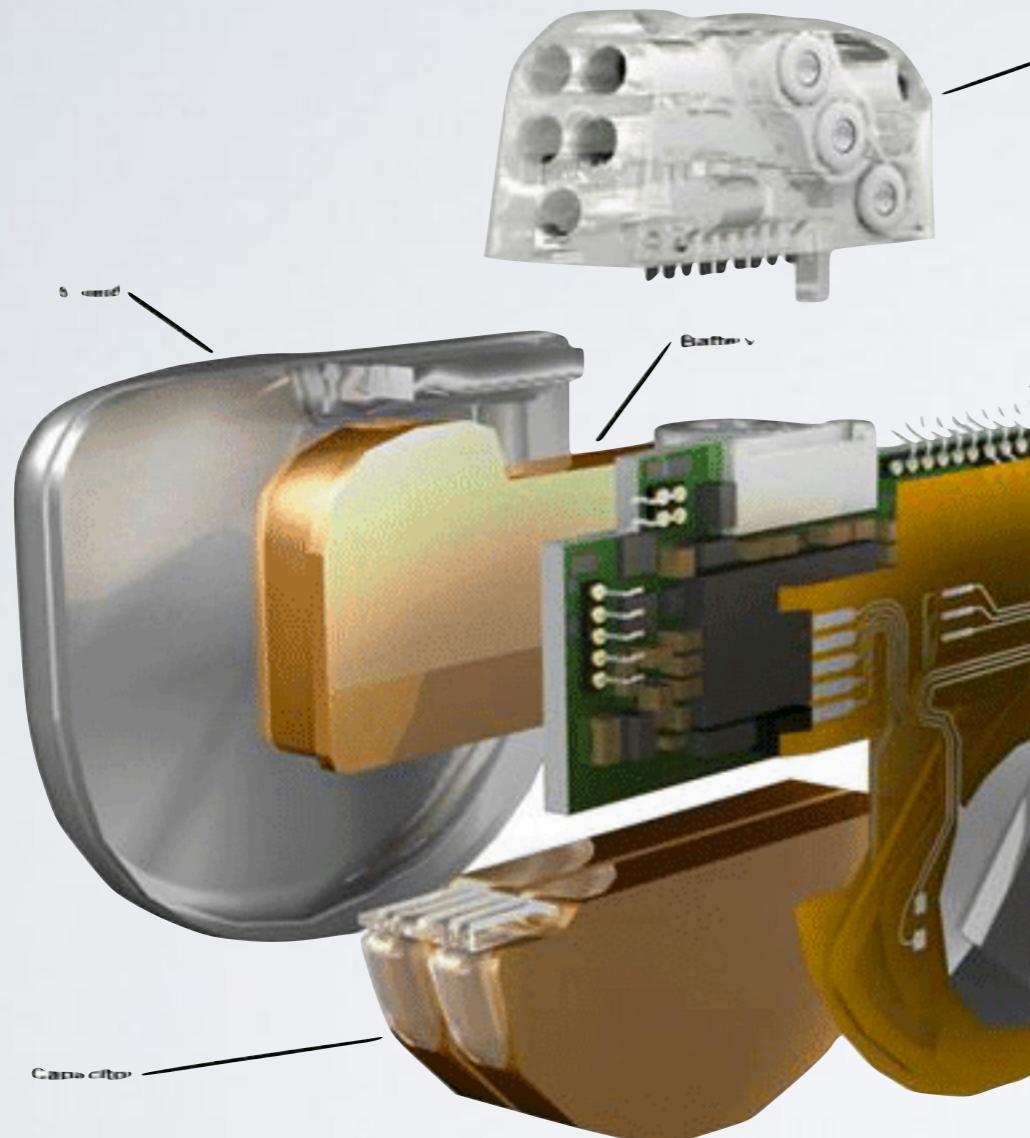
# *nanoHUB goes to I-Corps*

*"We don't simulate anything,  
we just generate specs and  
assemble parts. Talk to our  
suppliers."*

# *nanoHUB goes to I-Corps*



# nanoHUB goes to I-Corps



*“Sure, we simulate some, but we don’t really get measured on whether anyone lives or dies, we just meet the specs.”*

# *nanoHUB goes to I-Corps*



# *nanoHUB goes to I-Corps*



*"Simulation is  
indispensable for  
making competitive  
bids in sales."*

# *nanoHUB goes to I-Corps*



# *nanoHUB goes to I-Corps*



*"Medical devices is only 10% of what we do. We injection mold all kinds of parts."*

# *nanoHUB goes to I-Corps*



3KRF Lumerical Collin Lab Pilot Stadium Group  
TTR Trademarks Plastics Sanuwave Berliner Glas  
**nanoHUB goes to I-Corps**  
IPG Photonics Mega9 Dow PMC Tessy Plastics Cistec CGS  
Grintech DLC Precipitate Instrument Presco  
Moldex3D Photon Engineering Tucsen GM Amcor Flexibles  
CCC Argolight Andor Indepak Generation Orbit  
Techmer Sigmadyne GE Digital Bytec Medizintechnik  
United Airlines NIST EDrive Molded Pulp Engineering Axsun  
Dukane Ford LPMS CRI Devices Mosley Ventures  
NyproMold Izenda Primo Medical Group Quartus  
Access Optics Stepping Blocks Go Engineer Stable Kernel Wabash  
Femtoprint Performance Plastics Caterpillar Nortech  
Trelleborg Sealing Solutions Aspire Emrgy Jueke ASE Optics  
Class One Birk Engineering TecX Samtec  
CMD/Teamvantage Warbird Consulting Evonik  
Zantrex Quest Renewables Orchie Orthopedic Solutions Accumold  
Wasatch Photonics Modular Automation Norman Noble  
Materion Iris AO Midwestern Engineers Houghton International Rimnetics  
Luna Innovations Surgical Specialties

*nanoHUB goes to I-Corps*

**CEO's care about engineering.**

**CEO's Care about sales.**



*...thoughts on I-Corps...*

*The time commitment is  
not as advertised*

*It is too rushed to come to  
a valid business model*

*The instruction is  
unnecessarily brutal (or  
even rude?)*

*No real cohort is formed*

# S I N N E R S

In the Hands of an

## Angry G O D.

### A S E R M O N

Preached at *Enfield*, July 8th 1741.

At a Time of great Awakenings ; and attended with remarkable Impressions on many of the Hearers.

---

By *Jonathan Edwards, A.M.*

Pastor of the Church of CHRIST in *Northampton*.

---

*Amos ix. 2, 3. Though they dig into Hell, thence shall mine Hand take them ; though they climb up to Heaven, thence will I bring them down. And though they hide themselves in the Top of Carmel, I will search and take them out thence; and though they be hid from my Sight in the Bottom of the Sea, thence I will command the Serpent, and he shall bite them.*

---

BOSTON : Printed and Sold by S. KNEELAND  
and T. GREEN, in Queen-Street over against the  
Prison. 1741.



# *...thoughts on I-Corps...*

*The time commitment is not as advertised*

*It is too rushed to come to a valid business model*

*The instruction is unnecessarily brutal (or even rude?)*

*No real cohort is formed*

*The time spent equates with reality of business*

*Less urgency means lack of focus on results*

*This is exactly what some people need in order to learn*

*...thoughts on I-Corps...*

*The time commitment is  
not as advertised*

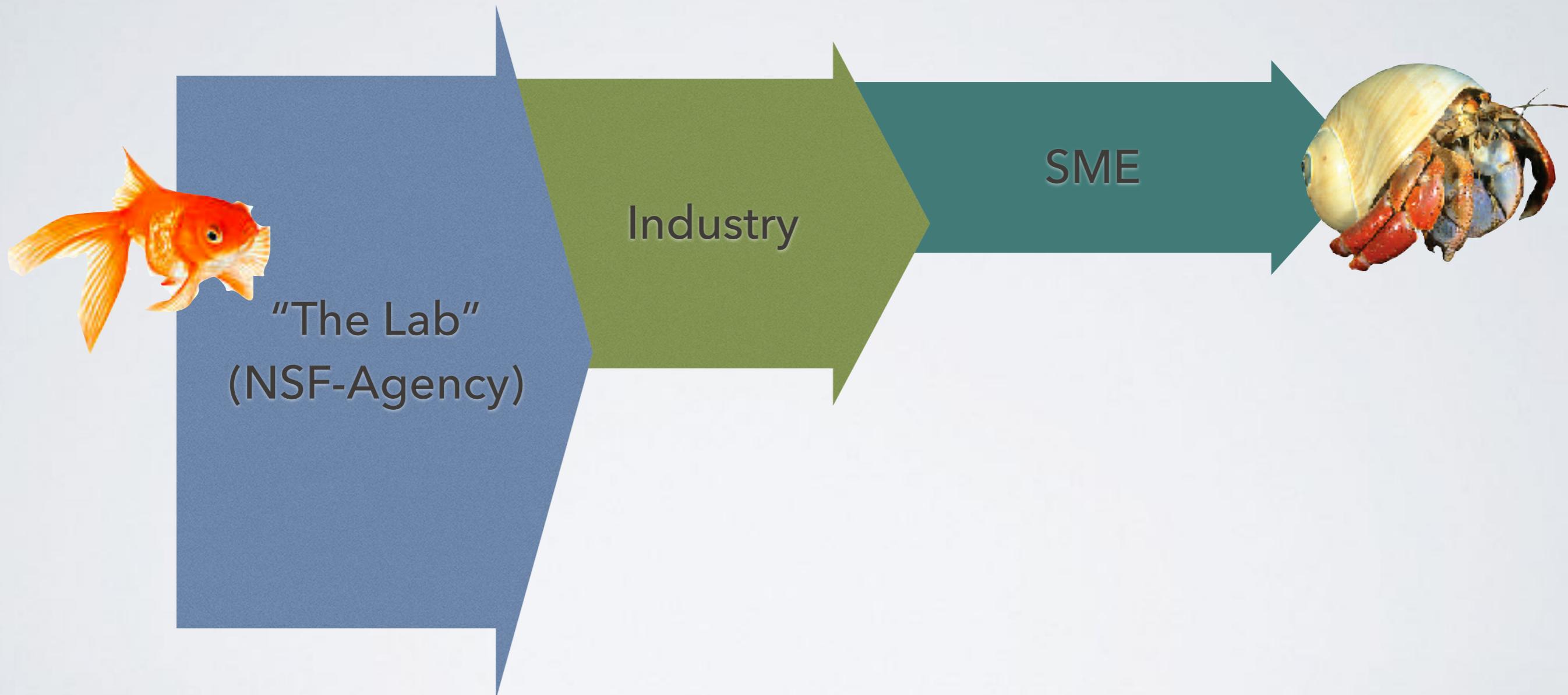
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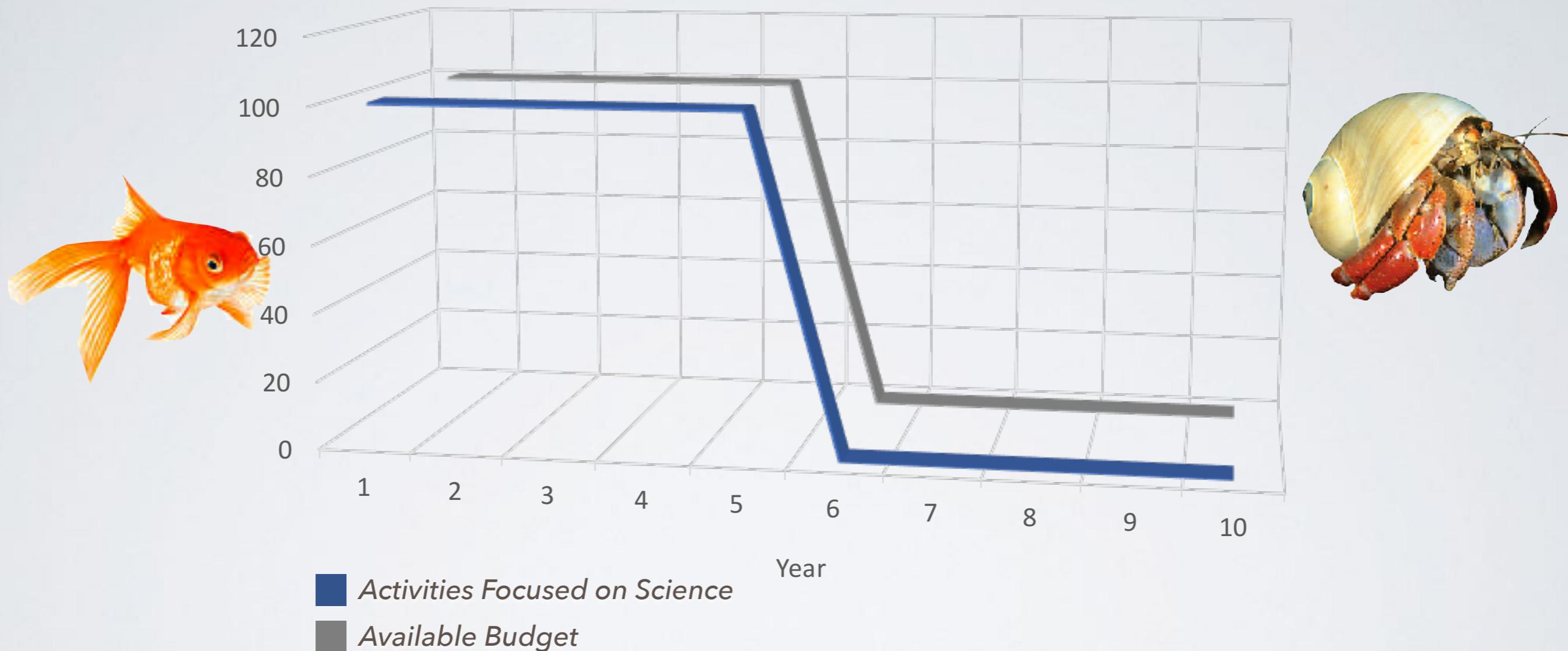
*No real cohort is formed*

*The time spent equates  
with quality of business  
**3rd best use**  
**of professional time in**  
**past 7 years**  
**This is exactly what some  
people need in order to  
learn***

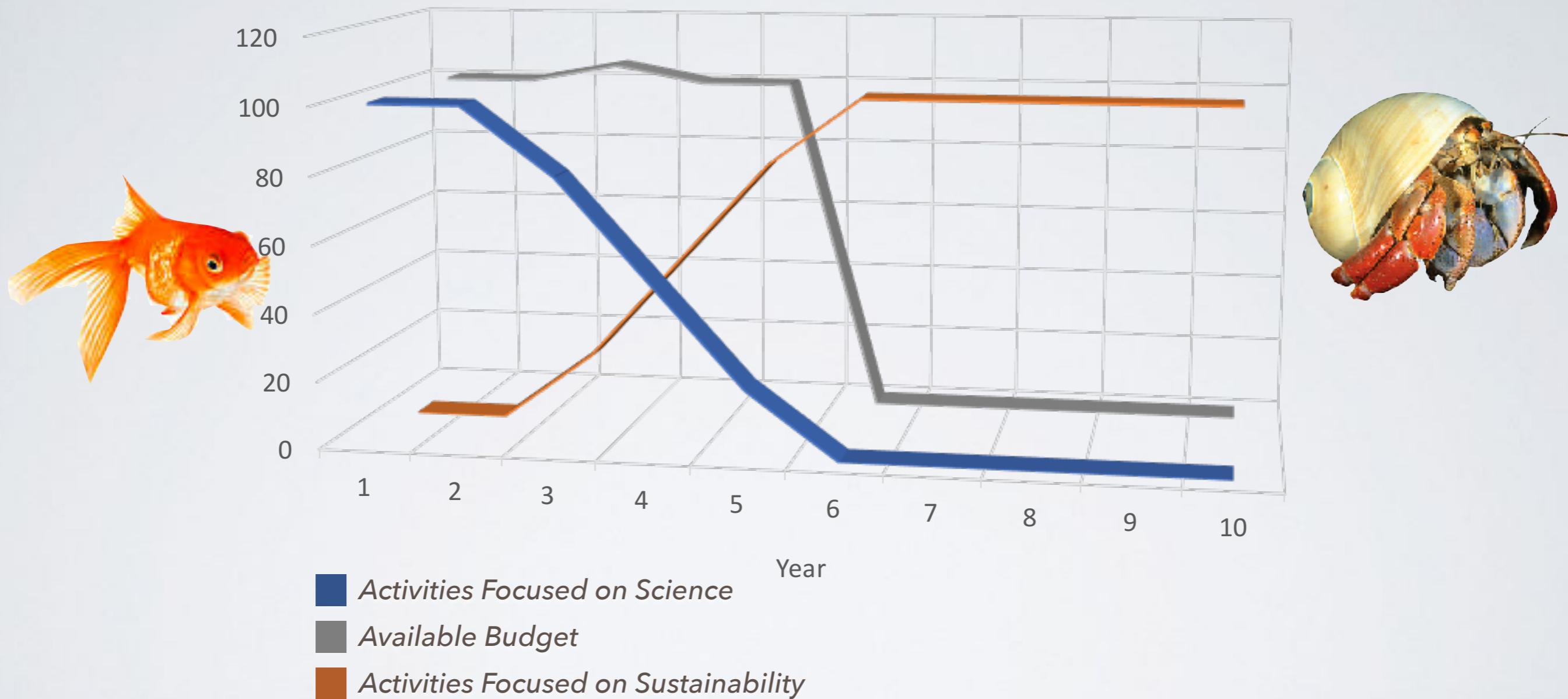
# *Definitely a metamorphosis*



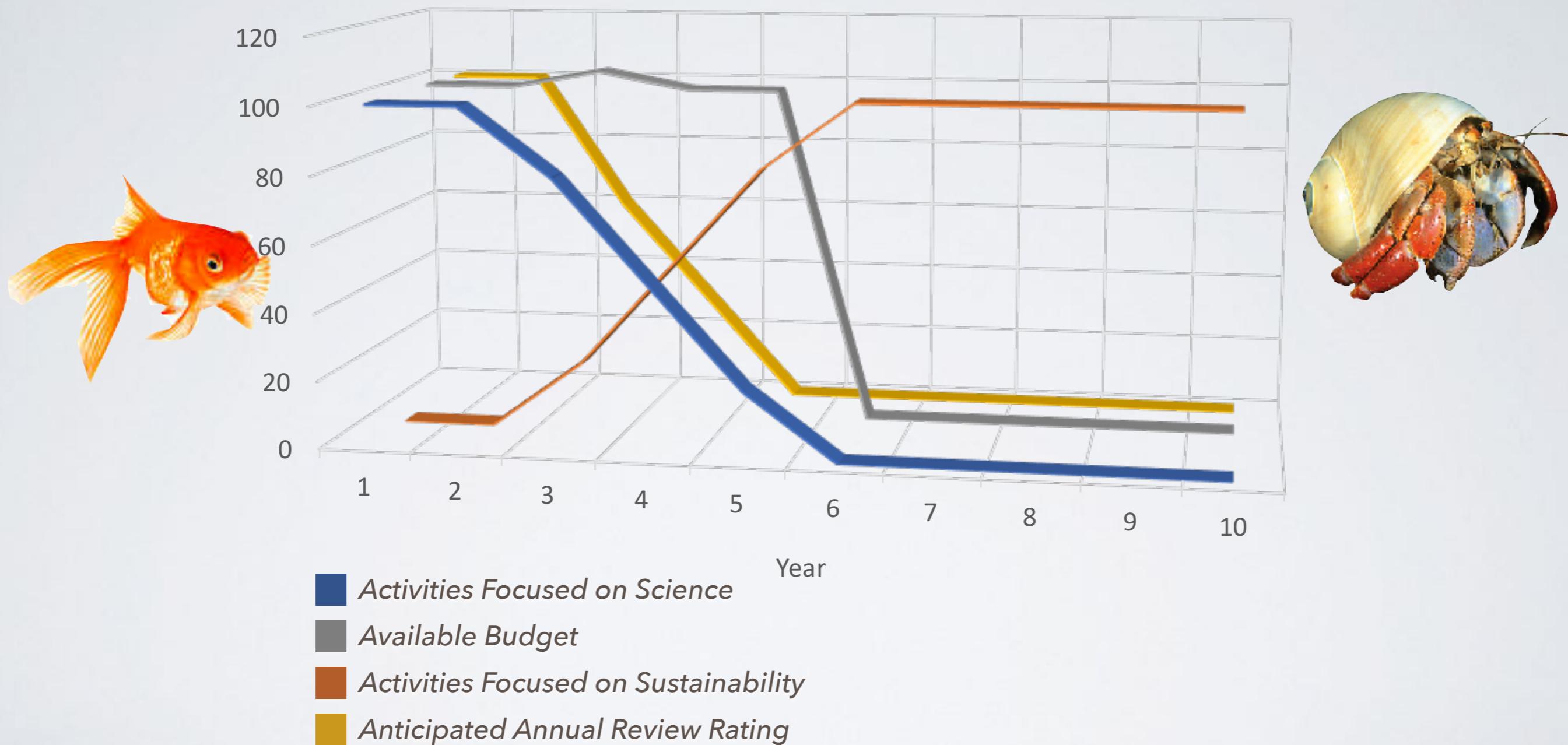
# *How this looks in terms of grant activities*



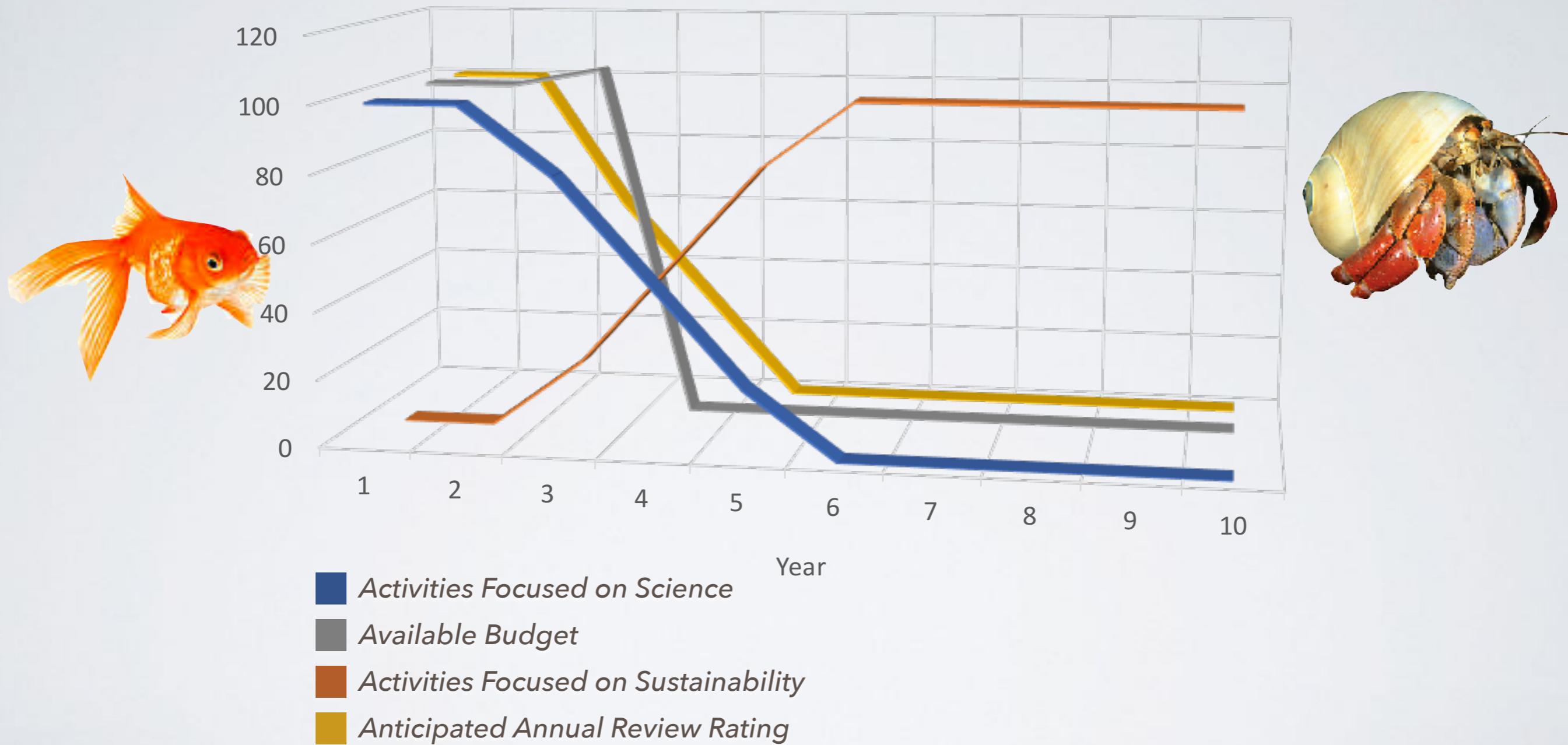
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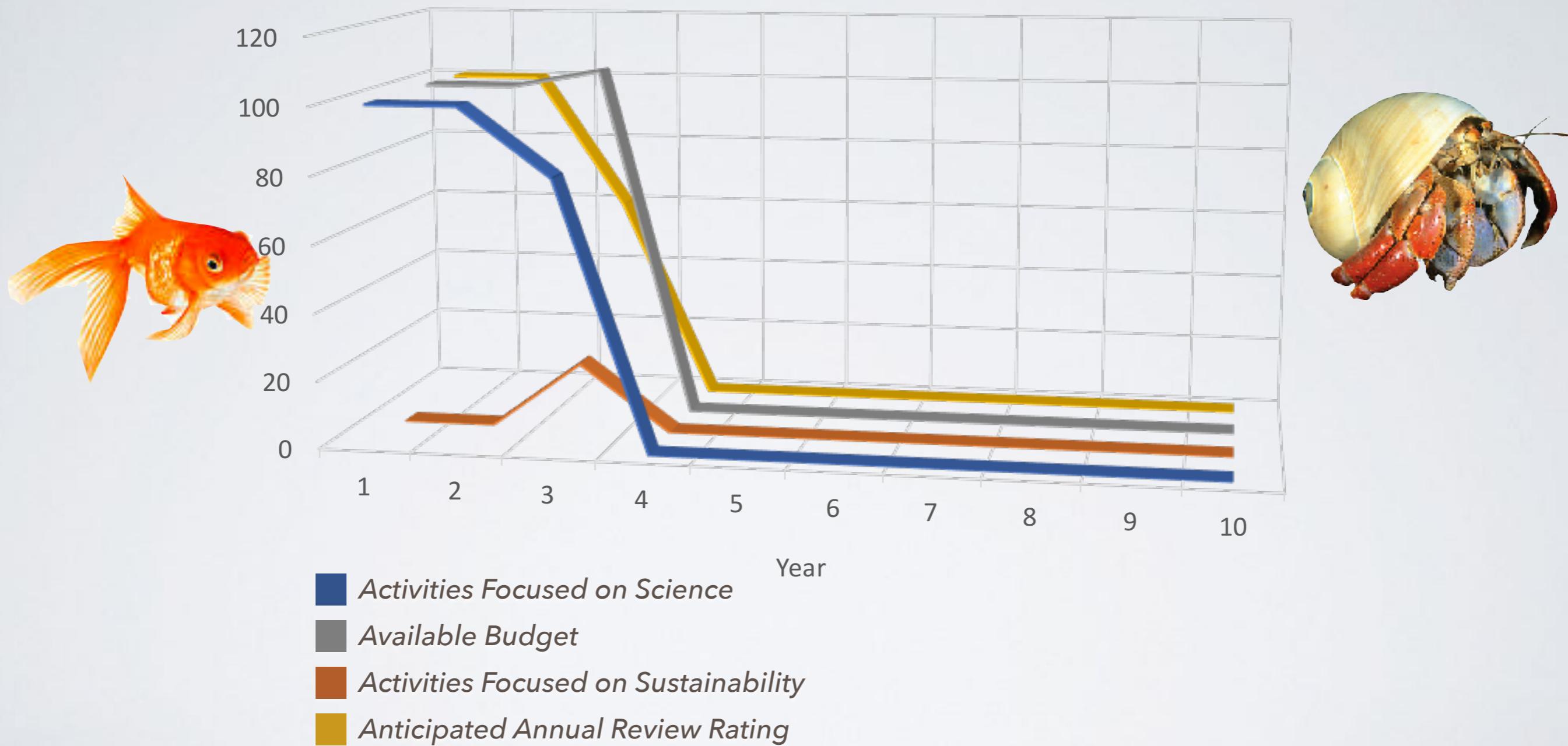
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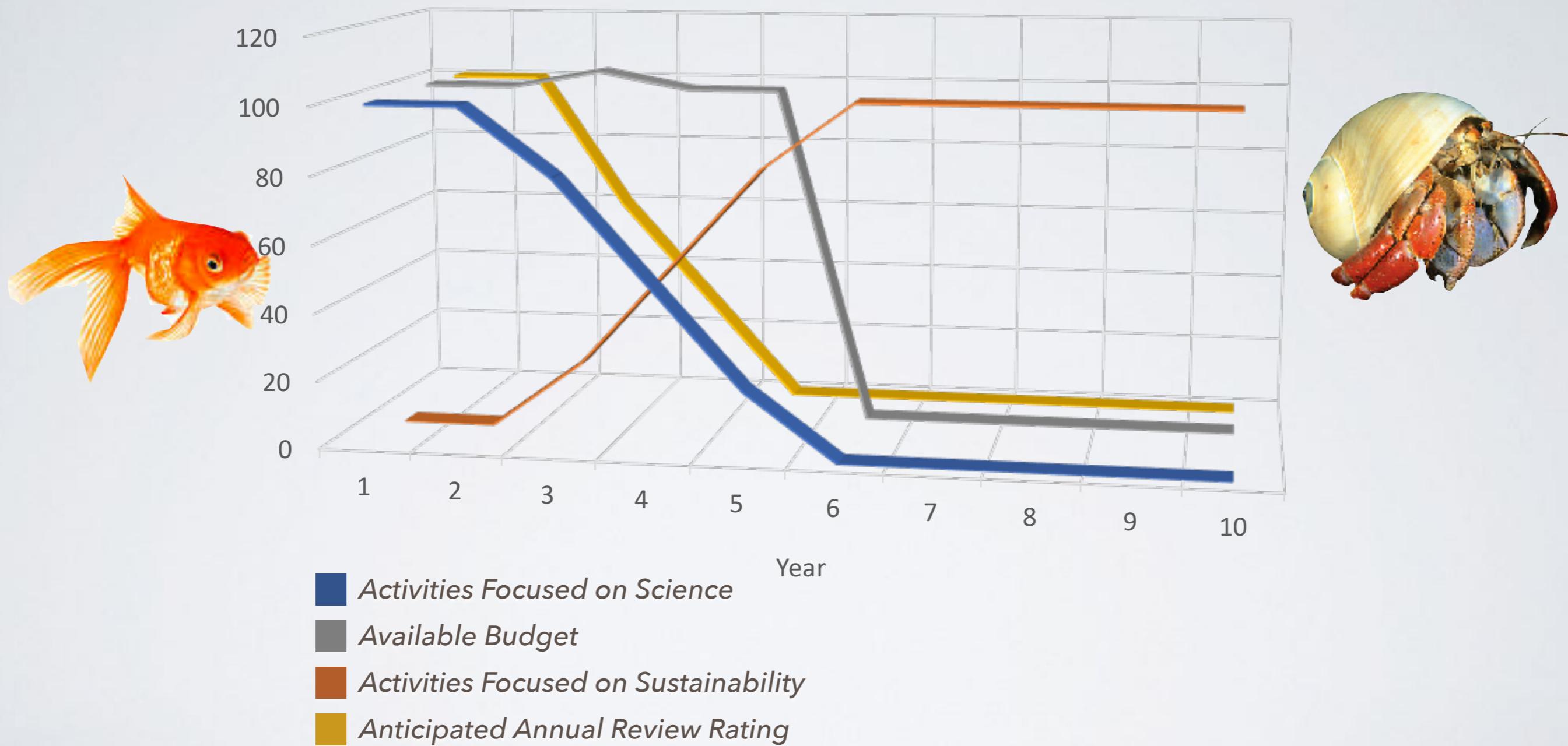
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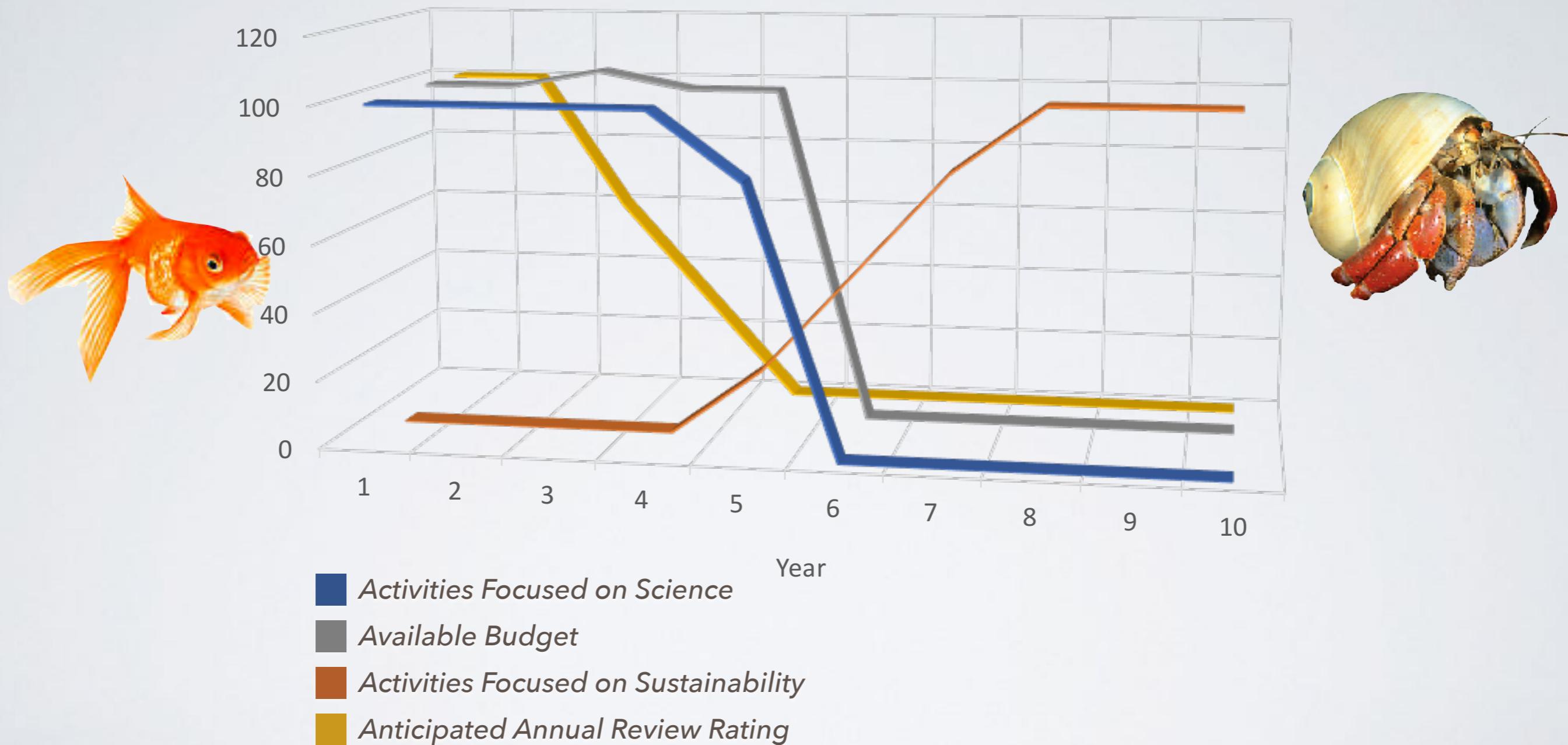
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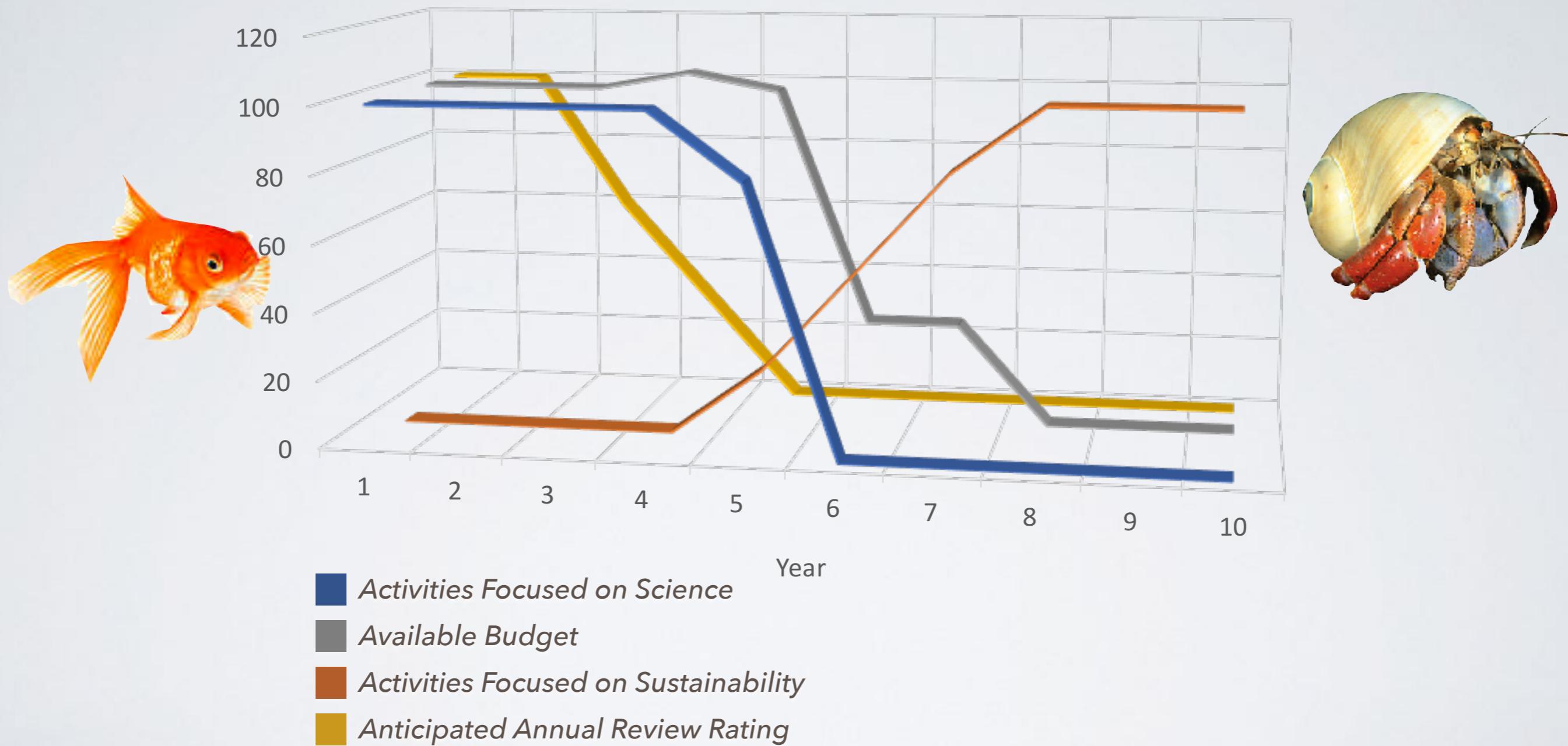
# *How this looks in terms of grant activities*



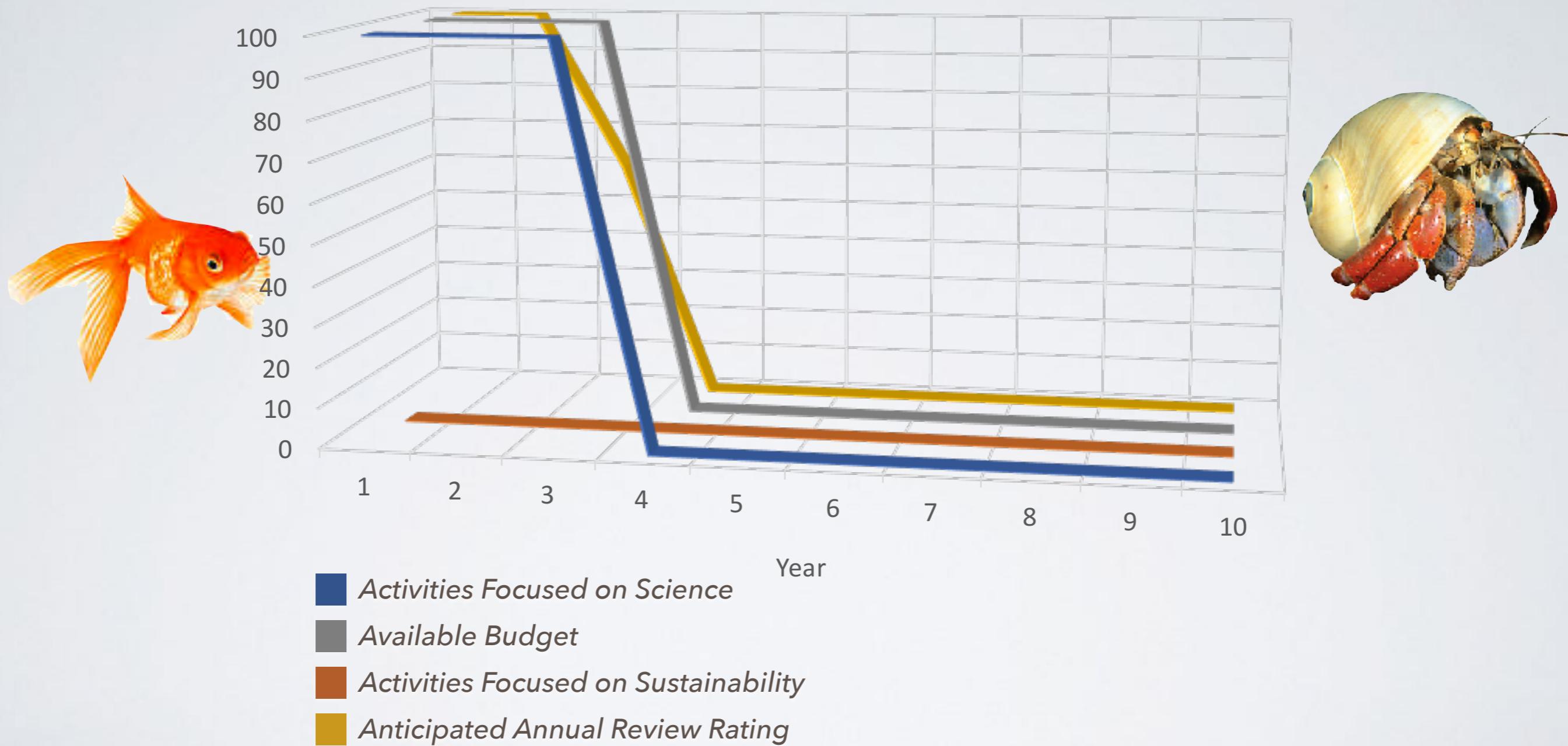
# *How this looks in terms of grant activities*



# *How this looks in terms of grant activities*



# *How this looks in terms of grant activities*

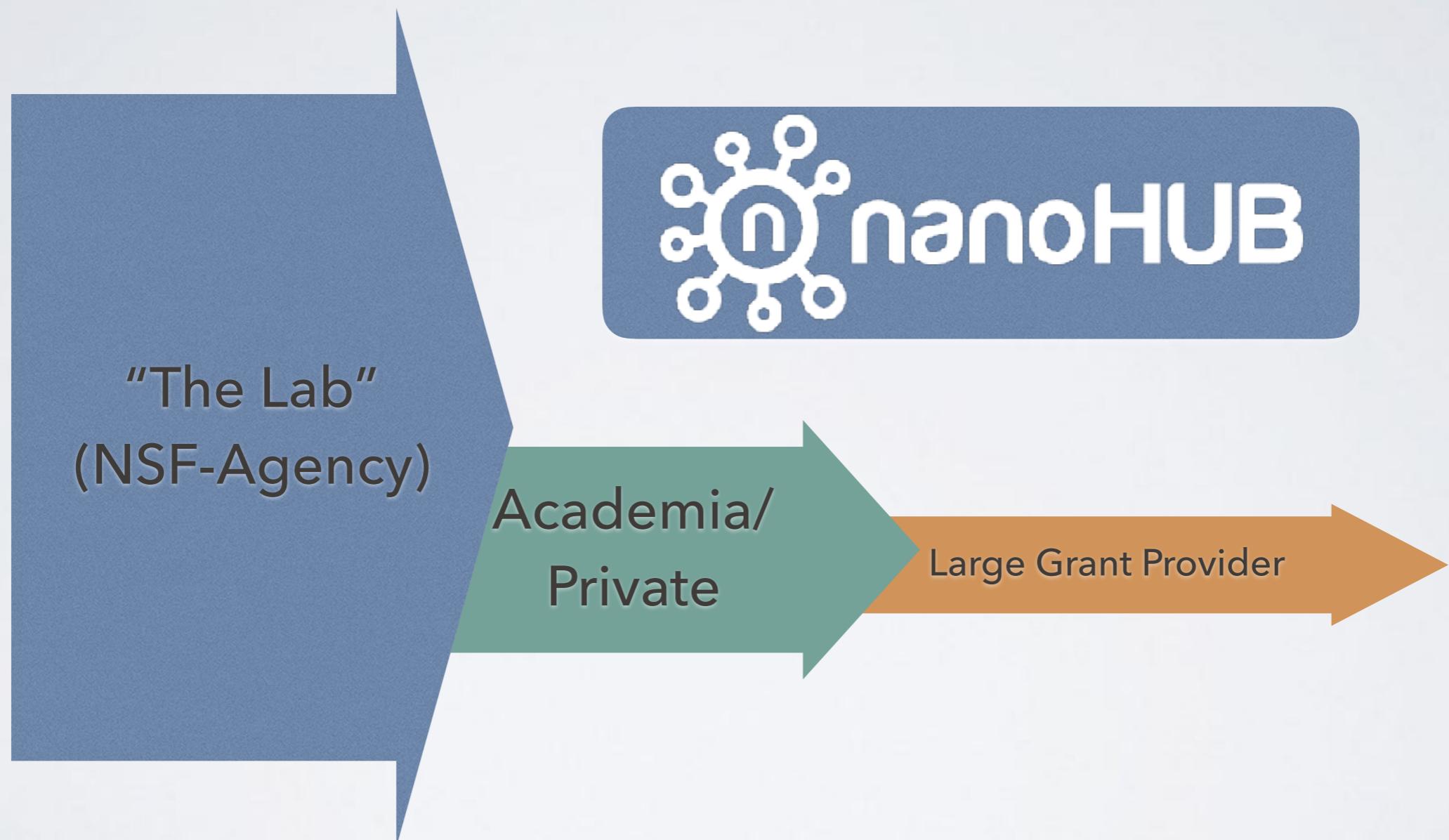


*What would help?*

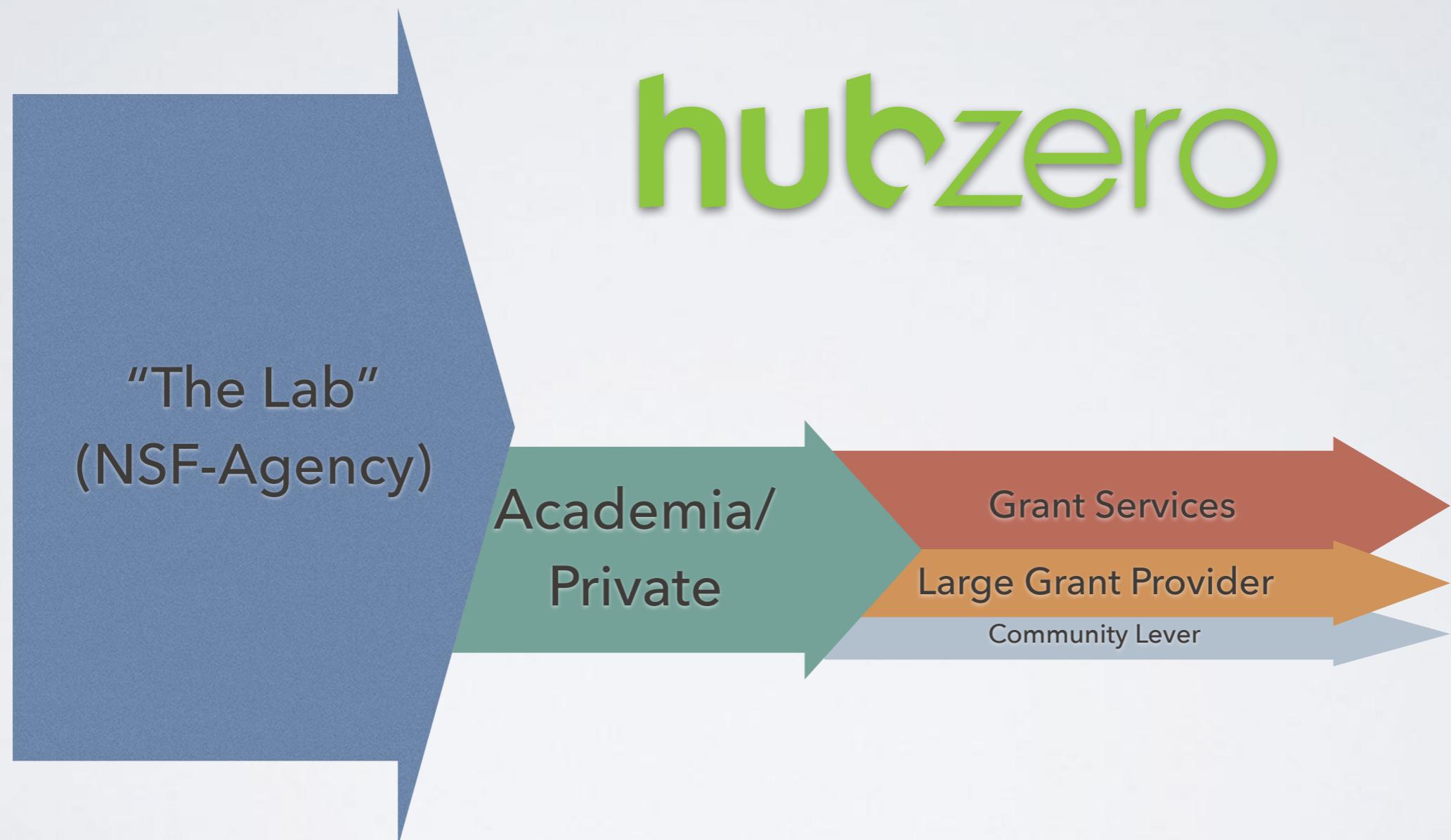


*Guidance to PI's  
Guidance to Review Teams*

# *One more case...*



# *One more case...*





## Bring your science to the web

### No Hassle Hosting

- Cost effective
- Continuous upgrades
- Continuous security monitoring
- Continuous patching
- Dedicated community manager representative

### Sponsored Research Projects

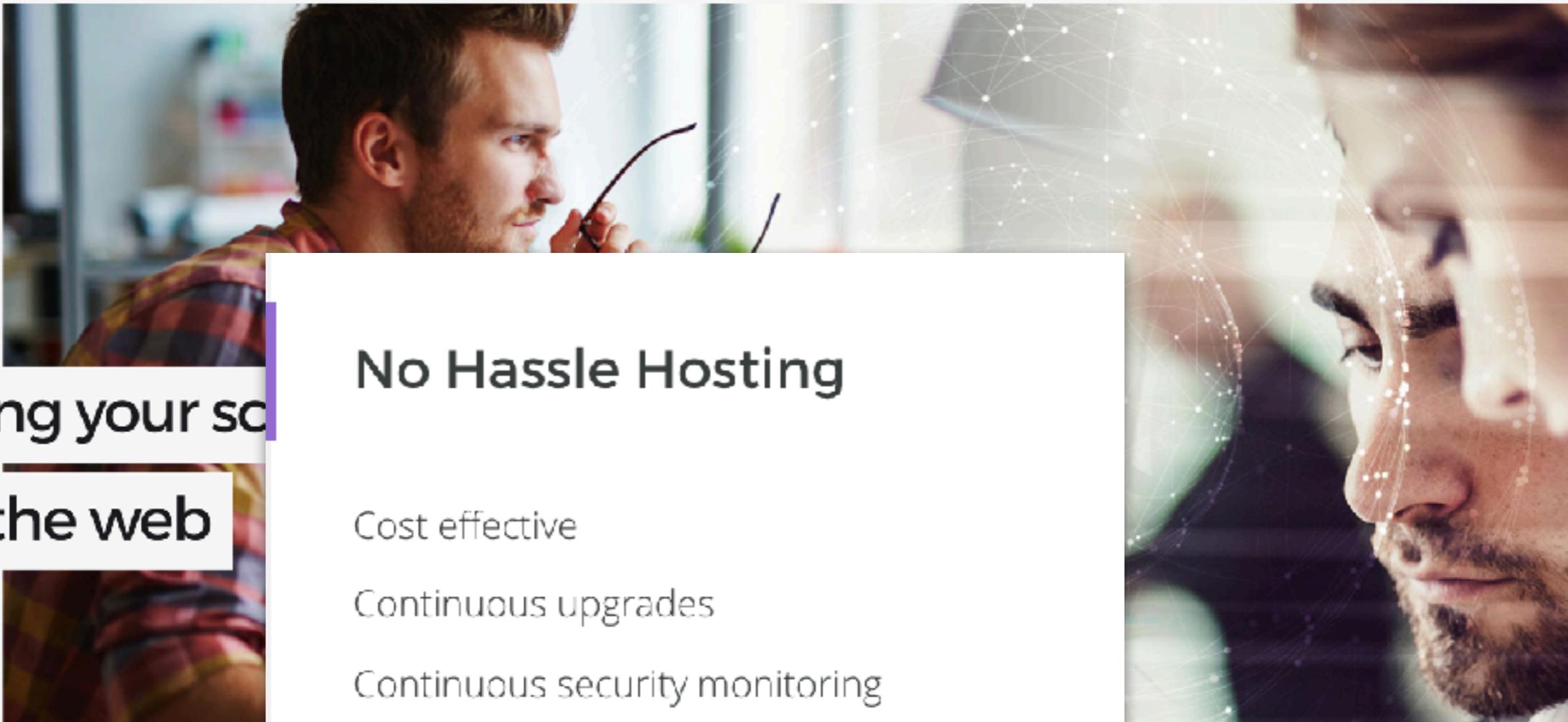
- Have HUBzero be part of your team
- New capability development
- Intellectual contribution
- Broader impact

### Foundation Membership

- Dedicated consulting for running your own hub
- Preferential handling of tickets/issues
- Customized development
- Input for future capabilities

### Open Source

- No cost
- Modify the code yourselves
- Host on your machine



Bring your science  
to the web

## No Hassle Hosting

- Cost effective
- Continuous upgrades
- Continuous security monitoring
- Continuous patching
- Dedicated community manager representative

### No Hassle Hosting

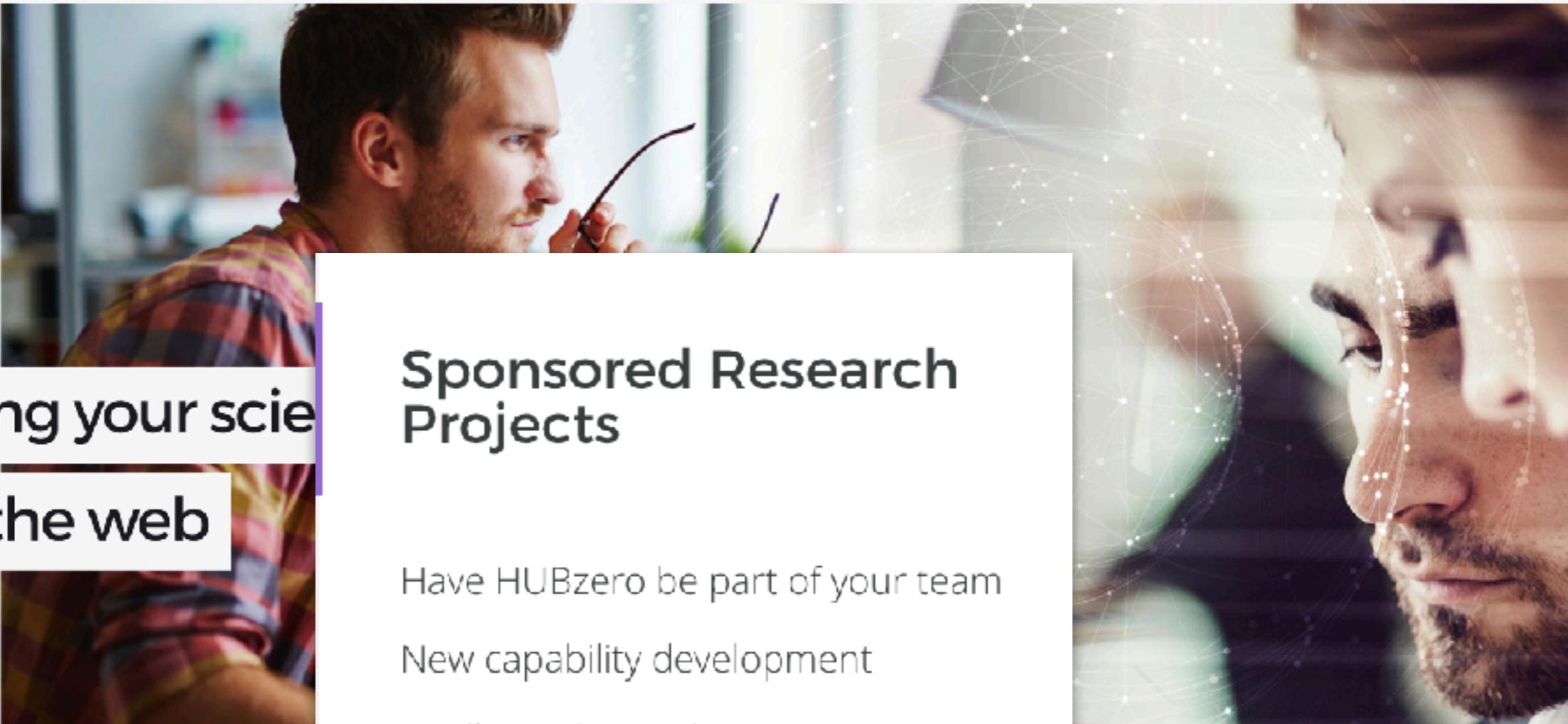
- Cost effective
- Continuous upgrades
- Continuous security monitoring
- Continuous patching

Dedicated community manager representative

## Open Source

- No cost
- Modify the code yourselves
- Host on your machine

**No hassles for less**  
*than 1/3 FTE*



## Bring your science to the web

### Sponsored Research Projects

Have HUBzero be part of your team

New capability development

Intellectual contribution

Broader impact

### No Hassle Hosting

- Cost effective
- Continuous upgrades
- Continuous security monitoring
- Continuous patching
- Dedicated community manager representative

### SPONSORED PROJECTS

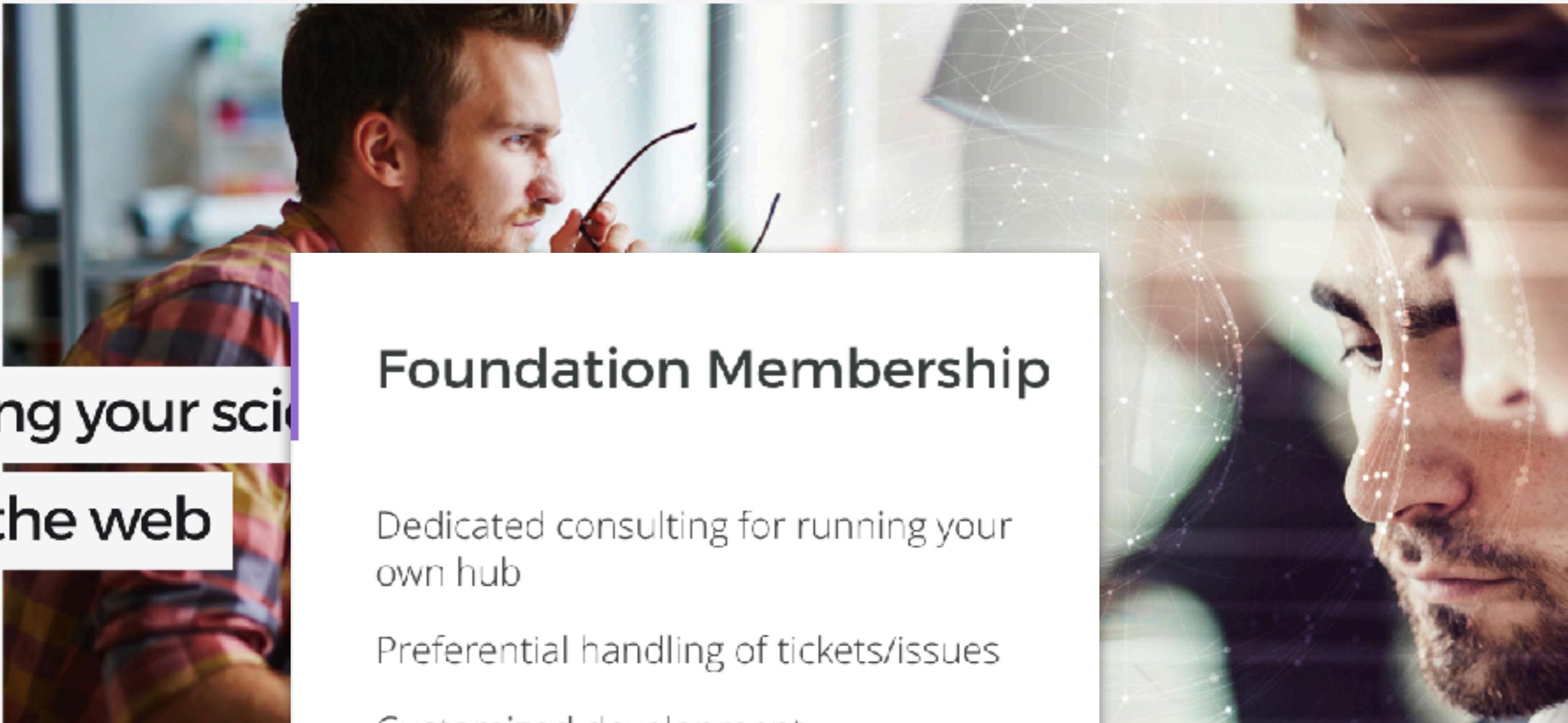
- Has
- New capability development
- Intellectual contribution
- Broader impact

### Open Source

- No cost
- Modify the code yourselves
- Host on your machine

# IP creation

- Customized development
- Input for future capabilities



## Bring your science to the web

### No Hassle Hosting

- Cost effective
- Continuous upgrades
- Continuous security monitoring
- Continuous patching
- Dedicated community manager representative

### Foundation Membership

- Dedicated consulting for running your own hub
- Preferential handling of tickets/issues
- Customized development
- Input for future capabilities

### Open Source

- No cost
- Modify the code yourself
- Host on your machine

*On the spot help*

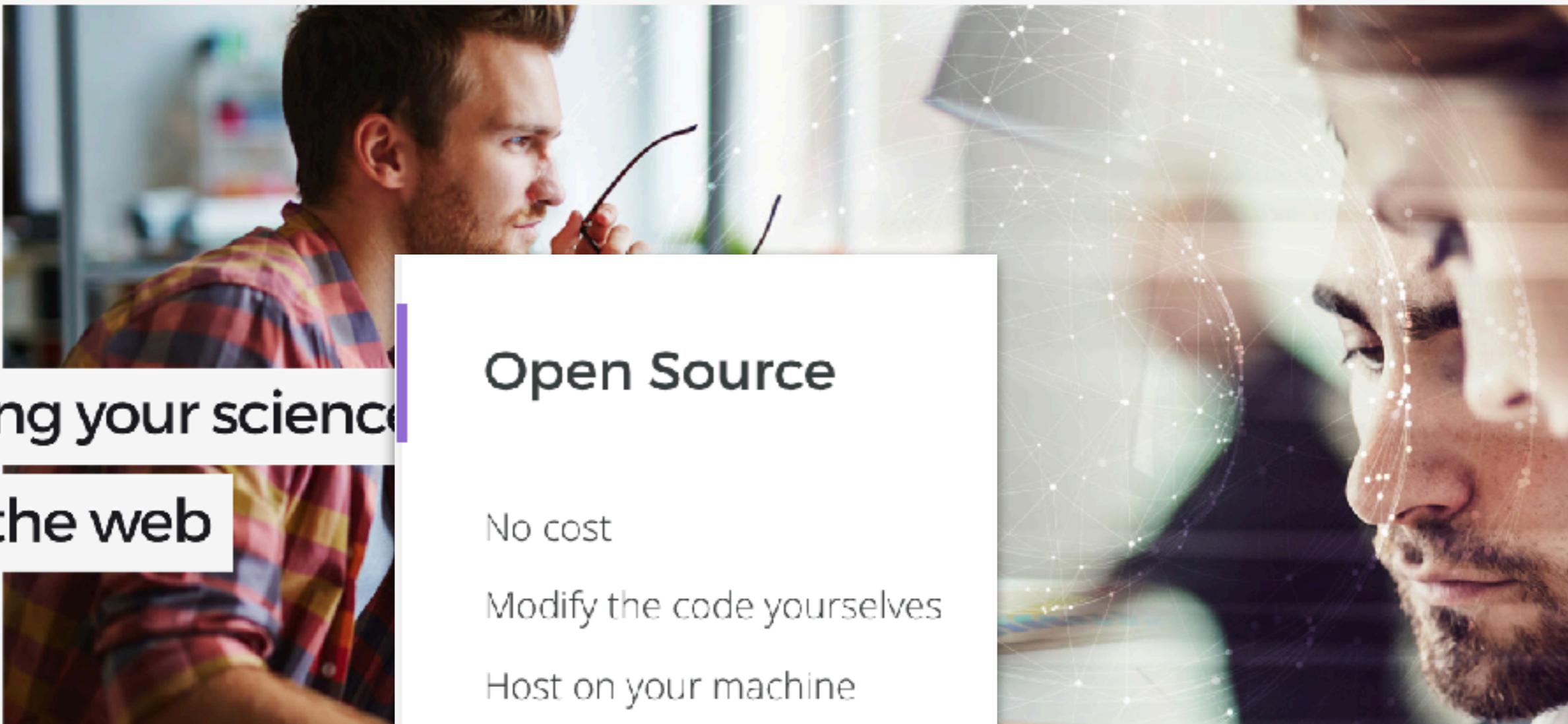
New capability development

Intellectual contribution

Broader impact

Customized development

Input for future capabilities



## Bring your science to the web

### Open Source

No cost

Modify the code yourselves

Host on your machine

### No Hassle Hosting

- Cost effective
- Continuous upgrades
- Continuous security monitoring
- Continuous patching
- Dedicated community manager representative

### Sponsor Project

- Have HUBzero
- New capability development
- Intellectual contribution
- Broader impact

### Partnership

- Bringing your
- Issues
- Customized development
- Input for future capabilities

### Open Source

- No cost
- Modify the code yourselves
- Host on your machine

**No cost**



Bring your science  
to the web

#### No Hassle Hosting

Cost effective  
Continuous upgrades

Continuous security monitoring

Continuous patching

Dedicated community manager  
representative

#### Sponsored Research Projects

Get Hubzero to be part of your team  
New capability development

Intellectual contribution

Broader impact

#### Foundation Membership

Dedicated consulting for running your  
community  
Differential handling of tickets/issues

Customized development

Input for future capabilities

#### Open Source

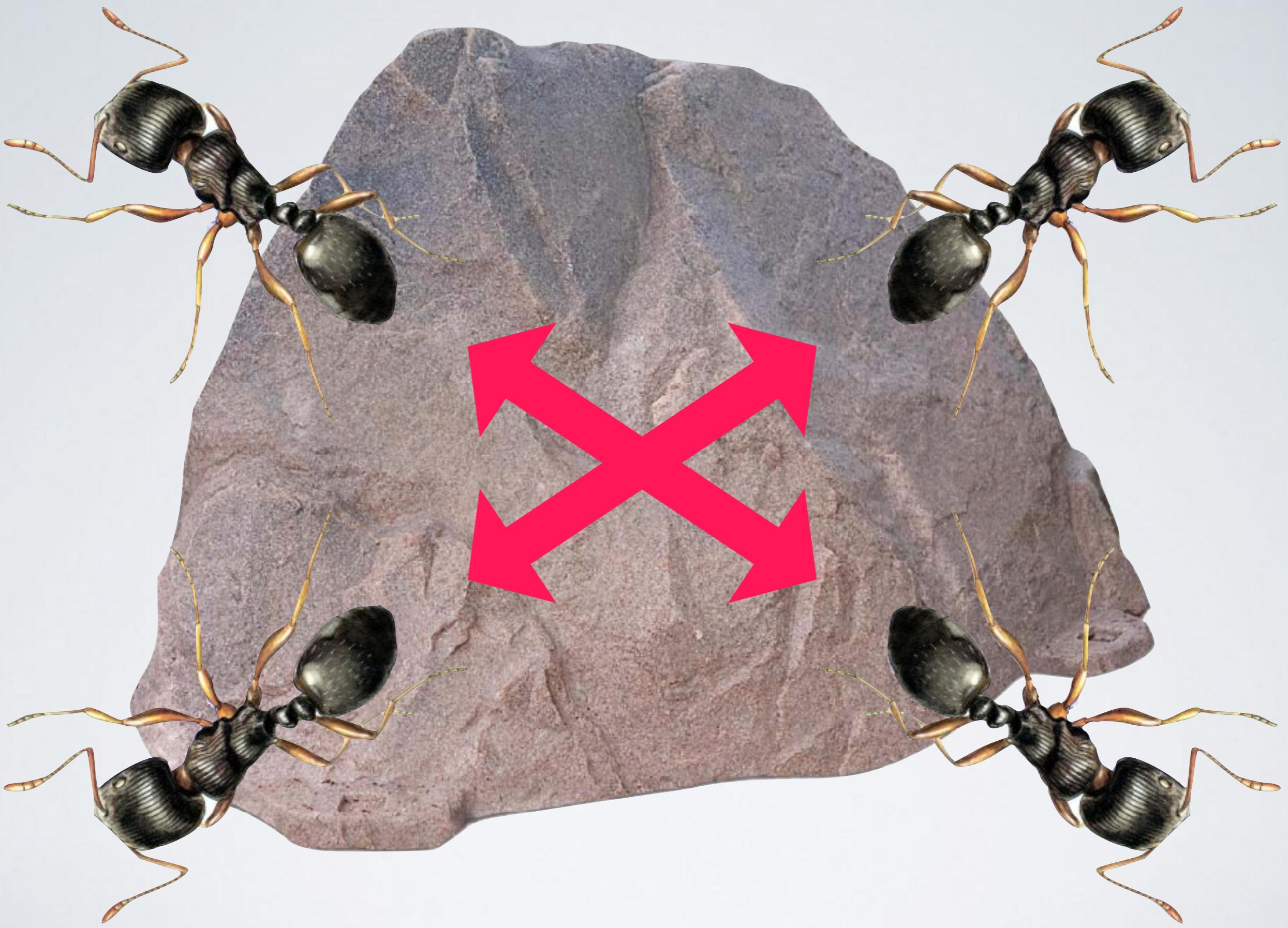
No cost  
Modify the code yourself  
Host on your machine

# + community management services

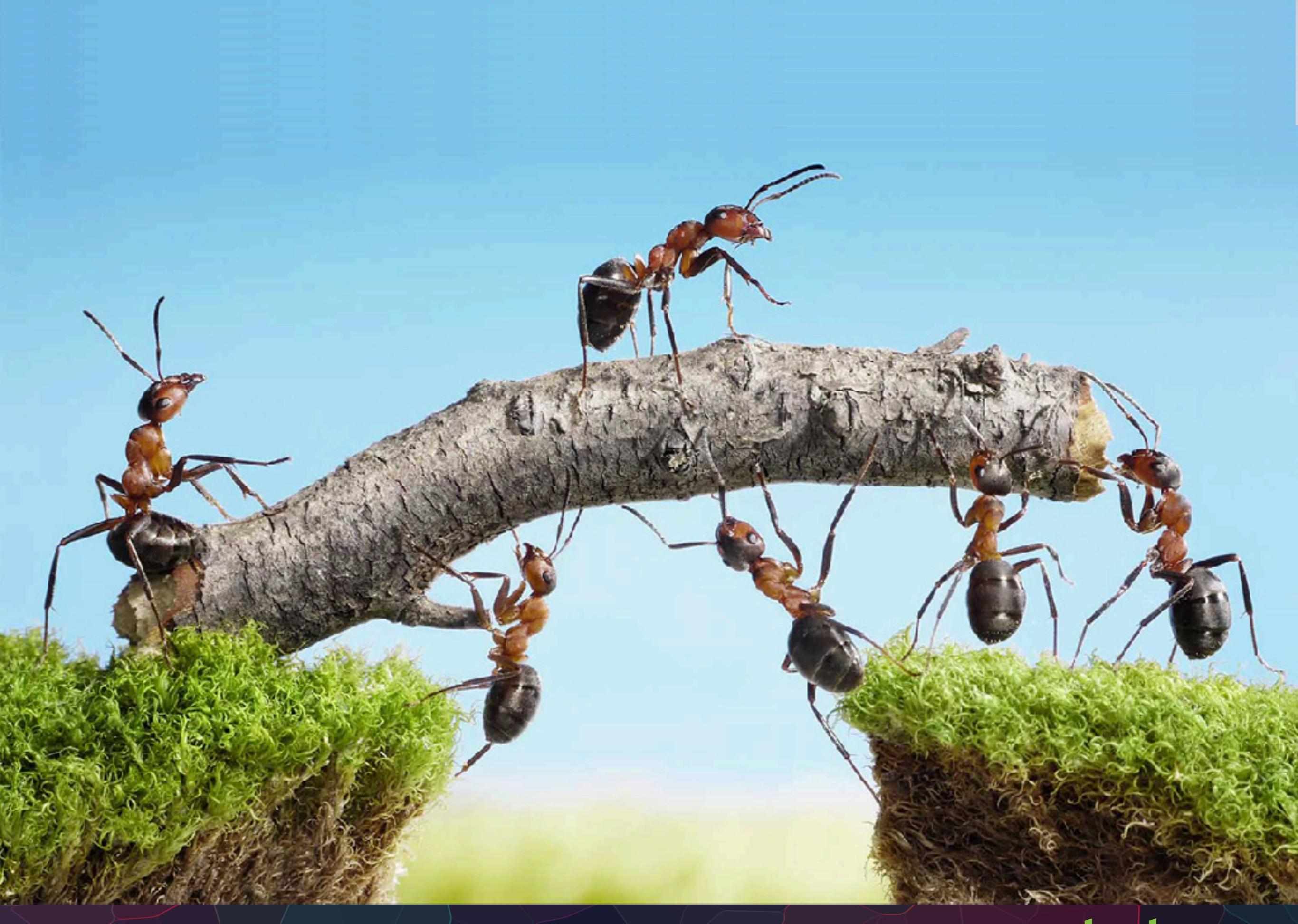
# *SI2: Software Infrastructure for Sustained Innovation*

*Who is concerned about sustainability?*











# OneSciencePlace

*A new address for sustainability  
from the HUBzero Foundation*



# One Science Place

## Foundation Membership



### No Hassle Hosting

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ow  
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Cu  
In

Cost effective

Continuous upgrades

Continuous security monitoring

Continuous patching

Dedicated community manager  
representative

*A community of science  
gateways living in **one**  
**big community, solving**  
**sustainability together.***

*Grant +7 years minimum  
for starter hubs.*

# Sustainability just got easier

Your address to sustain your HUBzero hosted science community

