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Plan B

Group assignment



Plan A





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Education projects

⇒ Develop new education tools (high school)

⇒ Implementation

⇒ Evaluation



Inquiry-2-Insight



STANFORD
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Wallenberg global learning network

Inquiry to insight

A 3 step curriculum

Step 1: What is OA and its impact on marine ecosystems? Virtual lab on OA

Step 2: How does OA impact us? Interactive discussion on OA

Step 3: What can we do? Carbon footprint calculator

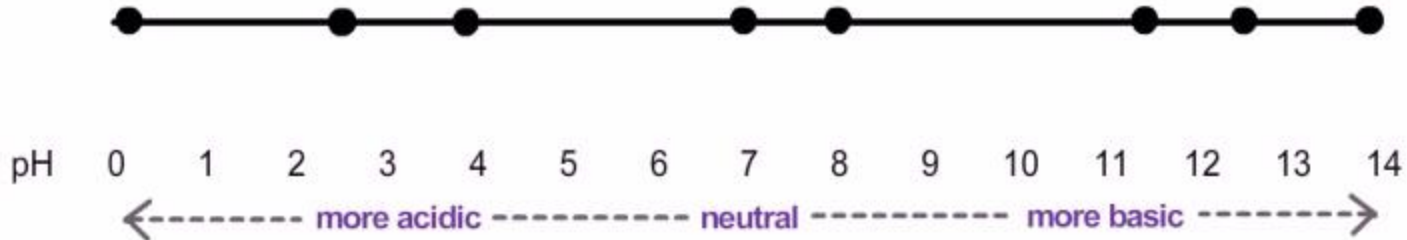


Step 1 – virtual lab

pH of liquids

The acidity of liquids can be measured by pH, on a logarithmic scale from 0 to 14. Where do common liquids fall on this scale?

Drag the liquids below to their proper relative position in the pH scale at the bottom. The eight dots on the scale indicate the drop positions. Good luck!





Step 2 – voicethread

Sea urchin larvae are smaller in low pH water

SO WHAT???

- ✓ Students can browse at their own pace
- ✓ Students can leave comment and question



Step 2 – voicethread

Public: Ocean acidification and animal early ...



Impact of CO₂-driven ocean acidification on early life-history – what we know and what we need to know



Sam Dupont & Mike Thorndyke
[sam.dupont@marecol.gu.se]

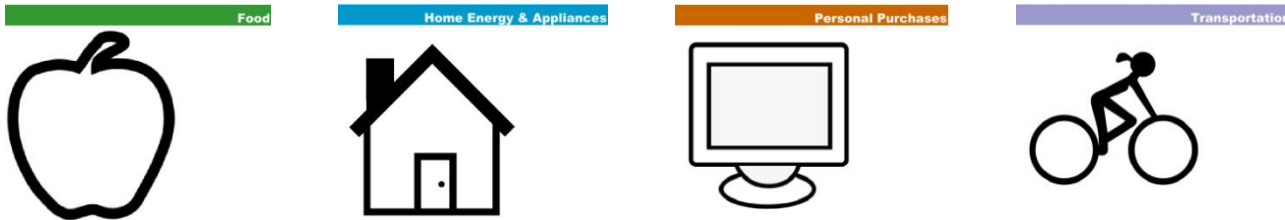


 The Sven Lovén Ocean Acidification Facilities
Kristineberg

comment



Step 3 – Carbon footprint



- ✓ students' life style
- ✓ Takes into account user's location
- ✓ Synchronization behavior - emission



Step 3 – Carbon footprint

Introduction

Where do you live?



-- choose your country --

Enter Your Name:

Please note that this carbon footprint calculator is currently under development
If you encounter any problems or mistakes, we apologize, but would love your feedback!
Please email us at seastar@stanford.edu ... thanks for trying it out!





Step 3 – Carbon footprint

Conclusion

Your average carbon footprint is 10312 pounds of CO₂ per year, compared to an average of 15286 for Sweden.

	You:	Your region:
Transportation:	1317	4176
Home:	2120	2882
Food:	4574	6595
Purchases:	2301	1633

Convert pounds to kilograms (kg)

pounds = kilograms

*Values in this chart are in pounds CO₂ equivalents;
use the converter at right to convert these values to kg*

Now go back and adjust values to try to lower your footprint to a Brasil level.
(approx. 1800 kg, or 4000 lbs CO₂ equivalents)

Print

Email

Average:



15286 pounds CO₂ per year

Your total:



10311 pounds CO₂ per year



click above to change between pounds and kg



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International carbon footprint challenge



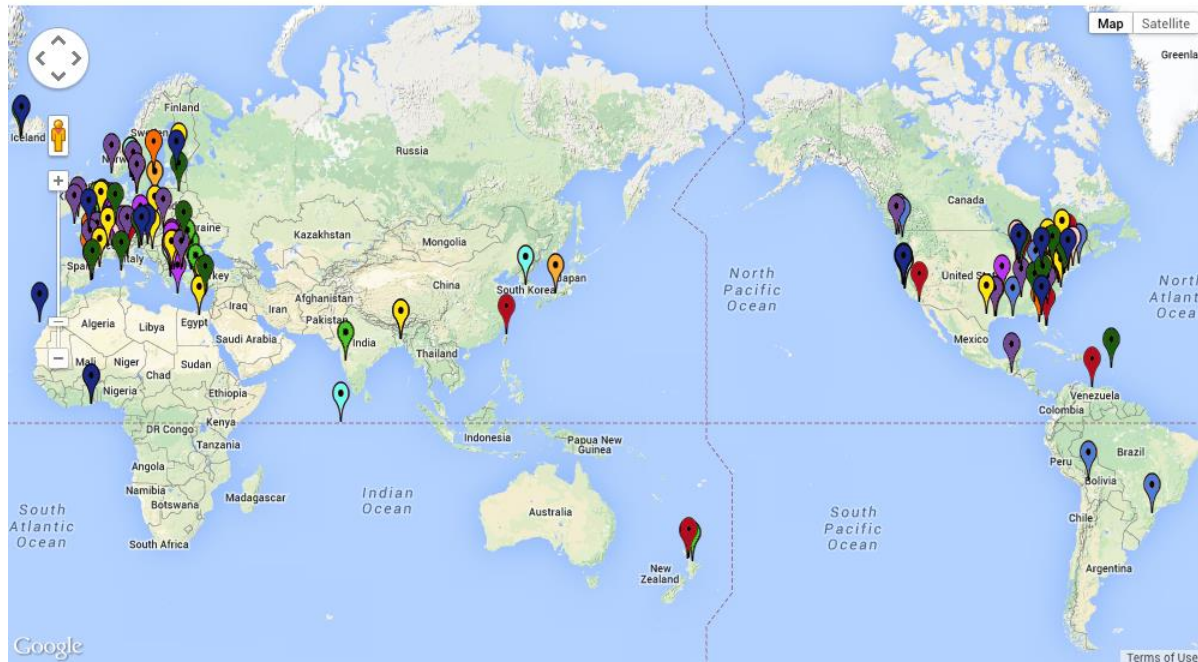
Get an international view on CO₂ footprint

Learn from each other

Envision solution together

ISCFC participants from: Apr 2011; Sept 2011; Nov 2011; Feb 2012; Apr 2012; Sept 2012; Nov 2012; Feb 2013;
 Apr/May 2013; Sep/Oct 2013; Feb 2014; Sep/Oct 2014;

To submit your class data, see the [Participate](#) page at this site for instructions and contact information.



>20000
participant
40 countries



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International carbon footprint challenge

Einztein BETA
The Social Learning Network

Einztein is the social learning network for higher education and lifelong learners.

Learning Group 603 [Join Now](#) [Share](#) [Embed](#)

The International Student Carbon Footprint Challenge (ISCFC)

Curated by Jason Hodin

Welcome to your International Student Carbon Footprint Challenge (ISCFC) Learning Group!

ISCFC students and teachers should click the "Join Now" button at the top to join this group; this is the page where all of the student conversations are ... [\[expand \]](#)

[carbon emissions](#) [carbon footprint](#) [environmental sustainability](#) [iscfc](#)

Discussions (16) [Post to Discussions](#) [Join Discussions](#)

Is climate change real? Is it mostly human? Jason Hodin 30	Off the table? I2I Admin 196
Student footprints I2I Admin 302	Wants or needs? I2I Admin 228
ISCFC schools in the news! Pam Miller 16	Home grown Jason Hodin 100
Deforestation SOS Bert Breton 150	DISCUSS: Green products Marita Batsiou 102
Clean development I2I Admin 98	Family footprint I2I Admin 191
Food & hunger I2I Admin 160	Reuse & repurpose I2I Admin 142



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VIRTUALMARINESCIENTIST

STIFTELSEN
MARCUS OCH AMALIA
WALLENBERGS
MINNESFOND



UNIVERSITY OF GOTHENBURG
BIOLOGICAL & ENVIRONMENTAL SCIENCES



UNIVERSITY OF GOTHENBURG
DEPT OF EDUCATION, COMMUNICATION AND LEARNING

CHALMERS



UNIVERSITY OF GOTHENBURG

Department of Applied Information Technology

http://www.ipkl.gu.se/english/Research/research_projects/vms/



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Perform virtual experiments



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VIRTUALMARINESCIENTIST

Step 1: Learn about the field

Climate change

Ocean acidification

Mussel life cycle

Mussel ecosystem

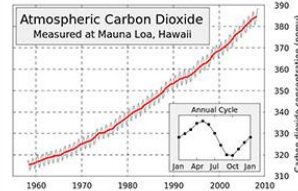
How to apply for funding

Glossary

Climate change

Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions (i.e., more or fewer extreme weather events). Climate change is caused by factors that include oceanic processes (such as oceanic circulation), variations in solar radiation received by Earth, plate tectonics and volcanic eruptions, and human-induced alterations of the natural world; these latter effects are currently causing [global warming](#), and "climate change" is often used to describe human-specific impacts.

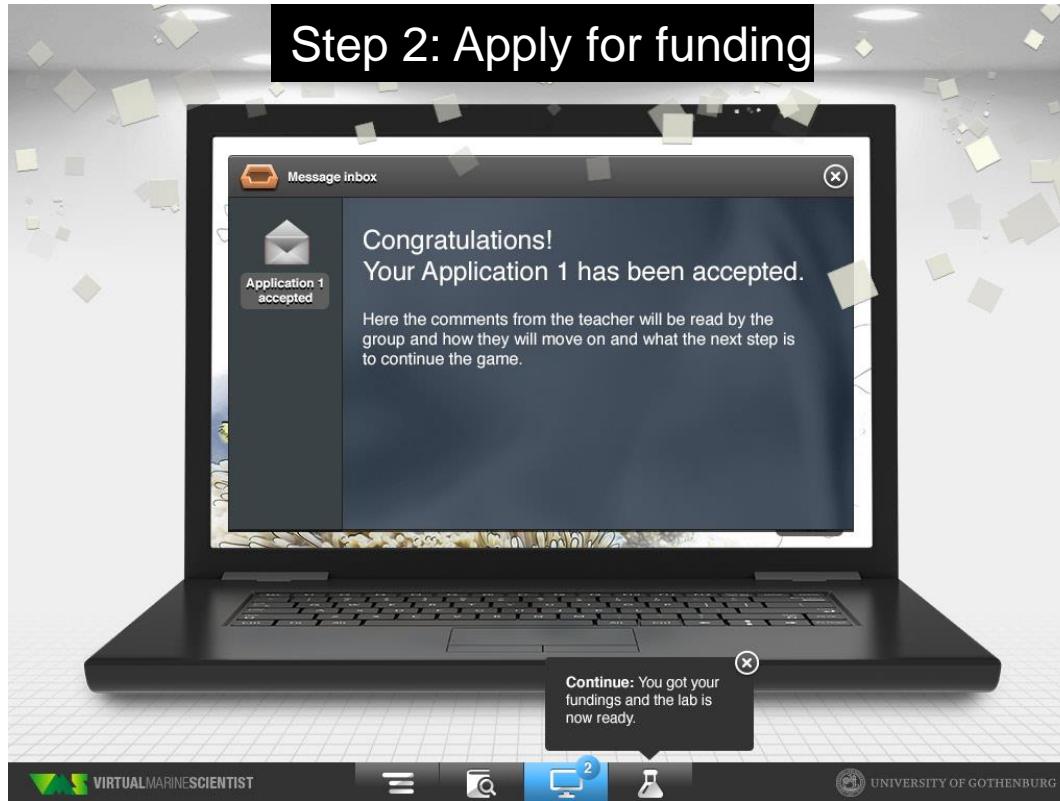
Scary global warming propaganda vid





Learn
about new
field

Step 2: Apply for funding



Message inbox

Application 1 accepted

Congratulations!
Your Application 1 has been accepted.

Here the comments from the teacher will be read by the group and how they will move on and what the next step is to continue the game.

Continue: You got your fundings and the lab is now ready.

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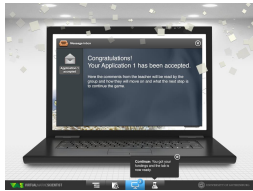
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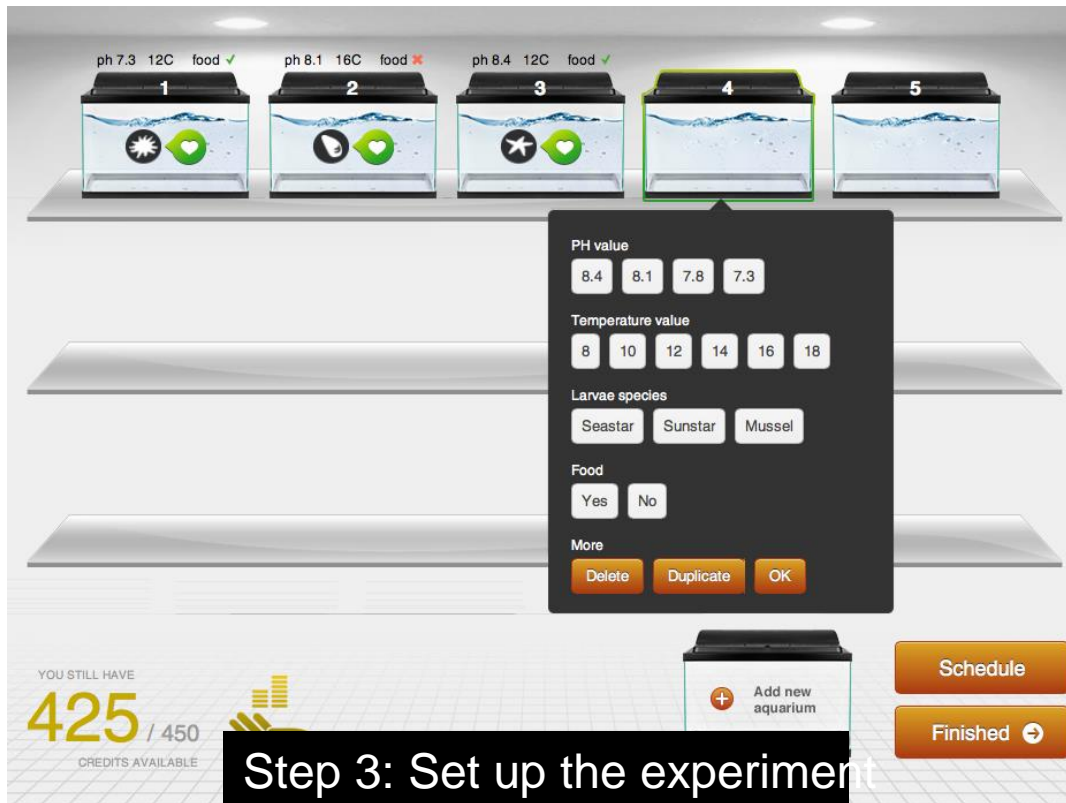
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Learn
about new
field



Apply for funding



ph 7.3 12C food ✓ ph 8.1 16C food ✗ ph 8.4 12C food ✓

1 2 3 4 5

PH value
8.4 8.1 7.8 7.3

Temperature value
8 10 12 14 16 18

Larvae species
Seastar Sunstar Mussel

Food
Yes No

More
Delete Duplicate OK

YOU STILL HAVE
425 / 450
CREDITS AVAILABLE

+ Add new aquarium

Schedule

Finished →

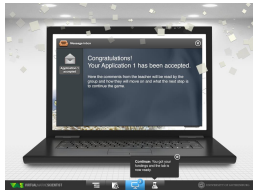
Step 3: Set up the experiment



VIRTUALMARINESCIENTIST



Learn about new field



Apply for funding






Set up experiment

Step 4: Parameters to measure & frequency

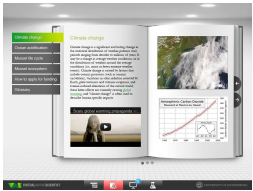
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Density 1 credit	✓			✓	✓		✓																							
Feeding 3 credits	✓			✓	✓		✓																							
Average size 3 credits	✓			✓	✓		✓																							
Respiration 3 credits	✓			✓	✓		✓																							

14 / 30
CREDITS

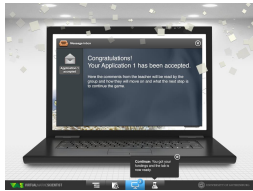






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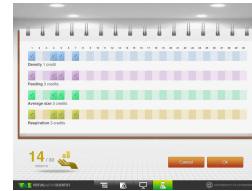
Learn about new field



Apply for funding



Set up experiment



Decide parameters to measure

Step 5: See evolution of the experiment

ph 8.4 18°C food ✓

01 02 03 04 05

ph 8.4 18°C food ✓ ph 8.4 18°C food ✓ ph 8.4 18°C food ✓ ph 8.4 18°C food ✓ ph 8.4 18°C food ✓

06 07 08 09 10

ph 8.4 18°C food ✓

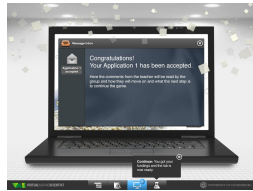
11

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

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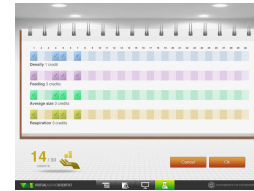
Learn
about new
field



Apply for funding



Set up experiment



Decide
parameters to
measure



Experiment
through time

Step 5: Collect data



ID	Image	Star	Heart	ph	Temp	Food	Status
01		★	♥	8.4	18°C	food	✓
02		★	♥	8.4	18°C	food	✓
03		★	♥	8.4	18°C	food	✓
04		★	♥	8.4	18°C	food	✓

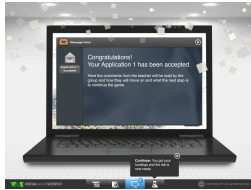
To create database:
Huge literature review
extrapolation



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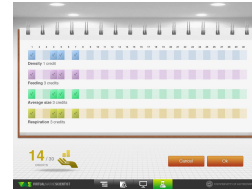
Learn about new field



Apply for funding



Set up experiment



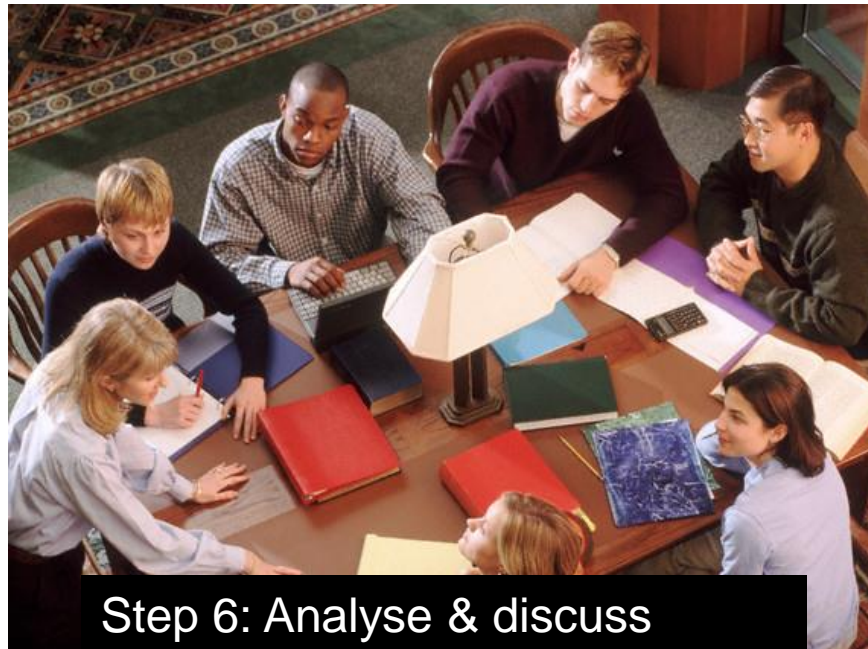
Decide parameters to measure



Experiment through time



Collect data



Step 6: Analyse & discuss

Inquiry to Sea

Wallenberg global learning network



The screenshot shows the I2SEA website. At the top, there is a banner with the I2SEA logo and the text "Inquiry to Student Environmental Action" and "promoting student environmental understanding and international collaborations". Below the banner is a navigation menu with links for HOME, ACTIVITIES, RESOURCES, ABOUT, and CONTACT. The main content area contains a paragraph about the project's purpose and a list of digital learning tools. Three tool thumbnails are visible: "Carbon Footprint Calculator", "Our Acidifying Ocean", and "Ocean Acidification: So What?".

I₂Sea Inquiry to Student Environmental Action
promoting student environmental understanding and international collaborations

HOME ACTIVITIES RESOURCES ABOUT CONTACT

The "Inquiry to Student Environmental Action" (I2SEA) project promotes international collaboration among high school and secondary school students as they learn about, discuss, and envision solutions to shared environmental challenges.

In particular, we offer the following free, interactive digital learning tools relating to climate change and ocean acidification:

- Carbon Footprint Calculator
- Our Acidifying Ocean
- Ocean Acidification: So What?

All open access: <http://i2sea.stanford.edu/>



Plan B: write a research proposal

Rules:

- *Ocean acidification*
- *Include biological experiment*
- *Realistic (e.g. manpower, infrastructure/species available at your institutions, budget, time)*
- *Use what you've learned (e.g. optimize resources, no "waste")*



Time table

Thursday

2:30-... – Group assignment (discussion, plan) + Technical forum

Friday

8:45-10:30 – Group assignment (prepare presentation)

10:30-10:45 – Break

10:45-12:15 – Presentation Groups 1 to 3

12:15-1:30 – Lunch (meal boxes)

1:30-3:00 – Presentation Groups 4 to 6



Groups

Rules:

- *6 groups (4-5 persons)*
- *No rules...*

But:

- *Maximize expertise*
- *Be strategic (e.g. geography)*



Presentation

Rules:

- *Any support*
- *15 minutes max*
- *Everyone contributes*
- *Detailed information on what, why and how (e.g. design, statistics, endpoints)*

Evaluation criterias

1/ originality / novelty / hypothesis

2/ Scientific strategy / methodology

3/ Feasibility (including budget)

4/ Societal relevance & Communication plan



How to design your experiment

1. What is your question? Your hypothesis?
2. How can I test this?
 - What are my limitations?
 - What is the best model?
 - What are the best endpoints?
 - What are the best design/stats?
 - What are my controls?
 - etc.

Can I REALLY answer my question with the collected data?