



Idea<sup>s</sup>

Challenge  
Based  
Innovation



# Multidisciplinary team

Solving power - different points of view

## NGOs

Problems worth solving – driving the solution if successful

## CERN

Technological feasibility support - inspiration

3-6 months  
Global teams  
Kick-off and Gala at CERN



Needfinding → Solution generation → Proof of concept

# CBI @ Mediterranean 2016

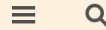
- *36 students from 4 universities: ESADE, IED and UPC (Barcelona, Spain) and Unimore (Reggio Emilia, Italy)*
- *Main coordination responsibility with ESADE*
- *3 months, 5.9. – 2.12.2016*
- *Time at IdeaSquare: 1 + 1 + 2 weeks (20/88 days)*
- *6 student teams, 6 external challenges through the universities*

*Results available online at [www.cbi-course.com](http://www.cbi-course.com) (final reports + videos)*

# Visibility

Several major news outlets wrote about the latest CBI, for example:

- El Pais
- Playground Magazine
- Financial Times



# FINANCIAL TIMES

HOME WORLD US COMPANIES MARKETS OPINION WORK & CAREERS LIFE & ARTS

MBA + Add to myFT

## MBA project at Cern develops device to bring electricity to refugees

Students worked with scientists at particle physics facility to help displaced people



# How did we get here

## – history of Challenge Based Innovation

- *First iteration of CBI was at the old IdeaLab building – the students carried the furniture in to the old assembly hall.*
- *17 students from 3 universities: Aalto (Finland), NTUA (Greece) and Unimore (Italy)*
- *4,5 months, 28.10.2013 – 7.3.2014*
- *2 student teams, connected with research groups TALENT and EDUSAFE*

*Results available online at [www.cbi-course.com](http://www.cbi-course.com) (final reports + videos)*

# CBI 2

- 2014 – 2015 (5 months)
  - 8 universities, 46 students
  - Main coordination: IdeaSquare (Joonas & Tuuli)
  - Our input ~100%, including the CERN visits and some of the global teaching material & testing our online platform
- - - Really heavy format to our small team (one year of work from 2 people)
- + + + CERN-connection easier to maintain (still lot to develop)
- / + More control to the content & focus of the teaching
- - - Less ownership for the participating universities

Next “full” CBI-iteration would need significant additional resources, e.g. a full-time coordinating professor working at CERN to coordinate & run the course



# CBI @ Mediterranean

- Late 2015 & late 2016
- Main coordination: ESADE
- Our input ~20%, mainly during the CERN visits

+++ More resource-efficient to our small team  
- - - CERN-connection is more difficult to maintain  
- / + Less control to the content & focus of the teaching

All the involved parties are interested in developing the format, next meeting in Barcelona in February

# CBI in the future:

We want to fully encouraging parallel CBI @ X –projects with other groups building on previous projects!

Participating schools take care of their own expenses, we help with the CERN connection & offer the use of IdeaSquare.

Several universities would like to join in, less interest in resource-heavy global coordination

# Format attracts attention:

## OSU BA program

### Innovation for Change

### with Torino 2016

- 50 MBA + PhD
- 8 Teams
- 20 weeks of work
- 20 months of planning
- 20 years vision



Dr. Francesco Profumo – President of SAFM

Mr. John Elkann – Vice President of Fondazione Agnelli

Dr. Fabiola Gianotti – Director General of CERN

Dr. Marco Gilli – Rector of Politecnico di Torino

+ WINNING  
TEAM

# 52 students coming in next Wednesday

1. Enabling **seafood security** by smart sensing
2. Future of **cold chain**
3. Helping people sense the effects of **nutrition** has on their mind and body
4. Prevention of diseases utilizing **pattern detection in medical data**
5. Future of **screen work** - improving the mind and body complex
6. Future of tracking healing in **skin wound care**
7. Rethinking the use of **offshore rigs**
8. Effective **data backed interventions** in third world communities

CBI@Asia 2017

= Melbourne + Yonsei + X?

# Research

We are an experiment,  
crucial to test hypothesis

# Research

## Data

7 long student projects

250+ students

2-4 surveys from each

Interviews

Final reports

Videos

Most of the intermediate submissions



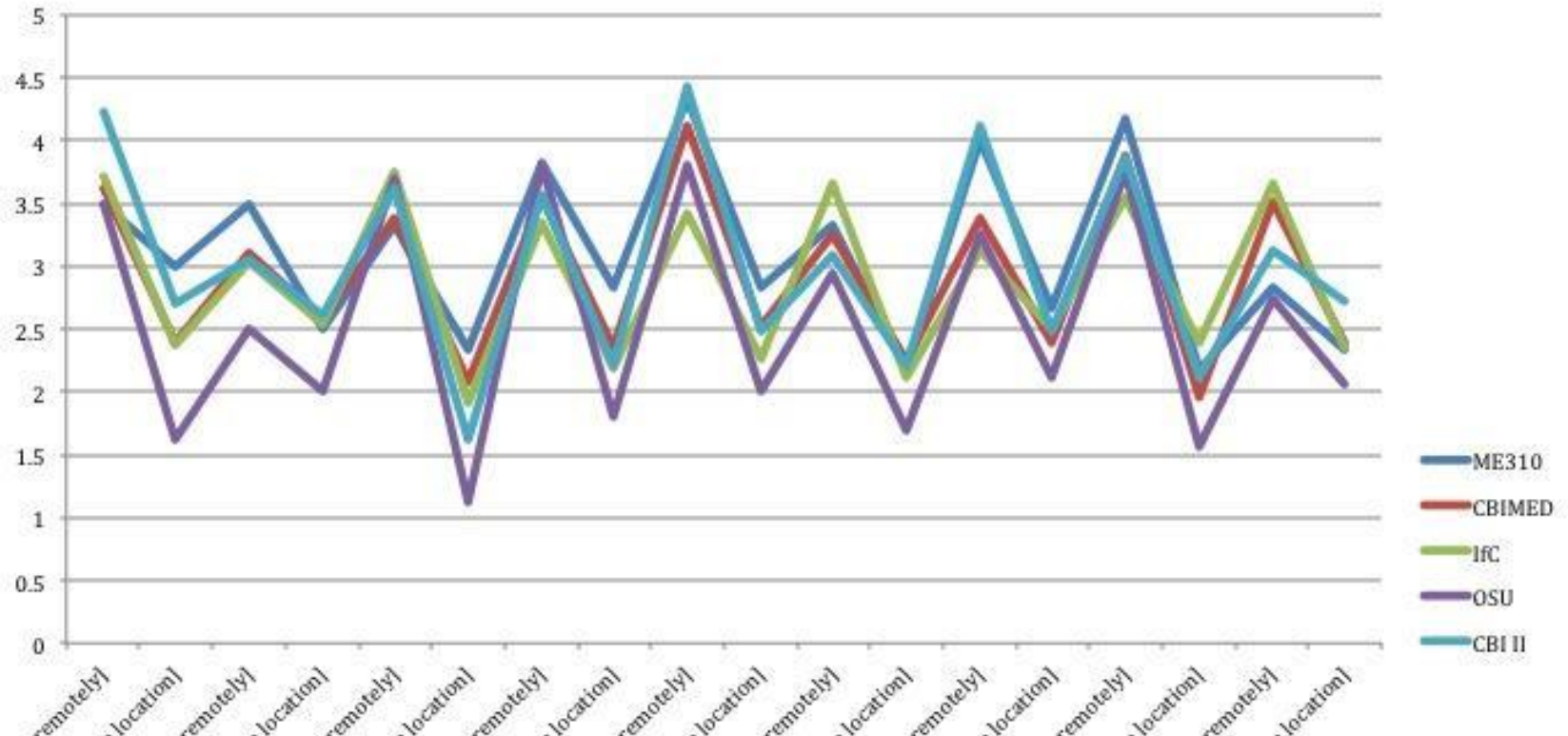
# Research Data example 1

Results from CBI II retrospective student survey

<b>Design activity</b>	<b>Co-located rank</b>
Testing and user feedback	1
(Re)defining the problem	2
Grasping external knowledge	3
Making decisions	4
Concept specifying	5
Synthesis	6
Ideation	7
Making it tangible	8
Knowledge pooling	9

<b>Design activity</b>	<b>Remote rank</b>
Making decisions	1
(Re)defining the problem	2
Concept specifying	3
Making it tangible	4
Knowledge pooling	5
Synthesis	6
Testing and user feedback	7
Ideation	8
Grasping external knowledge	9

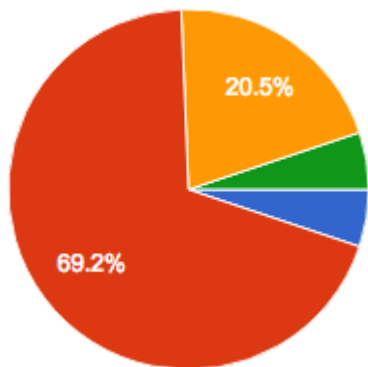
# Research Data example 1



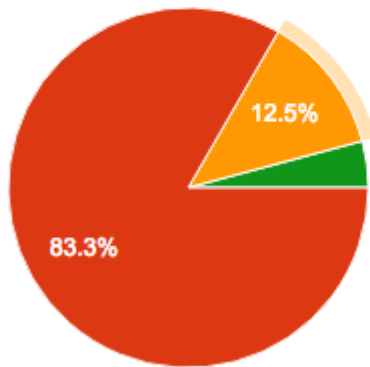
# Research Data example 2

Which of the following you think would be a starting point for a project with a maximum societal impact?

(24 responses)



Before

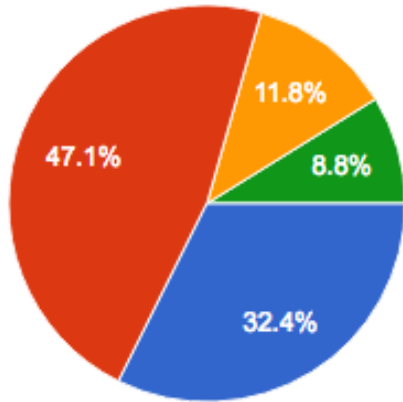


After

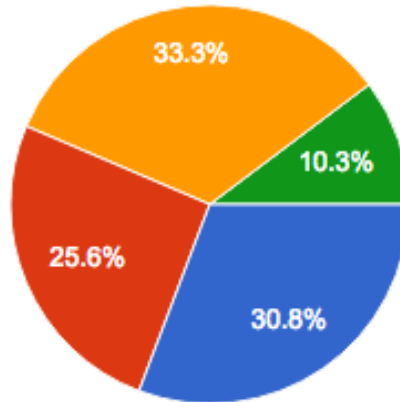
- A challenge based on a new business opportunity?
- A challenge based on a new user need opportunity?
- A challenge based on a new technology opportunity?
- Other

# Research Data example 3

Given that the goals of the project, would you have rather chosen...  
(39 responses)



Before

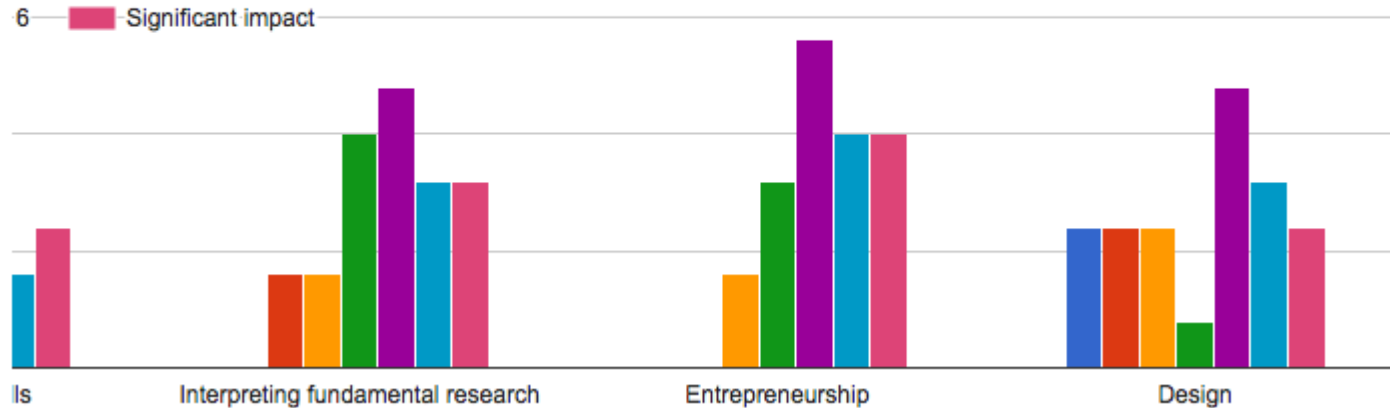


After

- your own challenge, ideated and put together in your team?
- the challenge framed by an organization as happened now? (need pull)
- challenge formed starting from the technologies by CERN KT/ Polito TT groups? (tech push)
- Other

# Research Data example 4

How big impact you think CBI had on your following skill areas:



+ Entrepreneurial attitudes tracking

*Kurikka J., Utriainen T. And Repokari L. (2016). Challenge based innovation: translating fundamental research into societal applications. In Int. J. Learning and Change, Vol. 8, Nos. 3/4, 2016*

*KURIKKA, J. and UTRIAINEN, T., Container challenge – prototyping distributed collaboration. In Proceedings of the International Conference on Engineering and Product Design Education 2014, University of Twente, The Netherlands*

*Kriesi, C., Steinert, M., Aalto-Setaelae, L., Anvik, A., Balters, S., Baracchi, A., ... & Onghia, F. (2015). DISTRIBUTED EXPERIMENTS IN DESIGN SCIENCES, A NEXT STEP IN DESIGN OBSERVATION STUDIES?. In DS 80-2 Proceedings of the 20th International Conference on Engineering Design (ICED 15) Vol 2: Design Theory and Research Methodology Design Processes, Milan, Italy, 27-30.07. 15.*

*Kriesi, C., Balters, S., & Steinert, M. (2016). Experimental Studies in Design Science and Engineering Design Science—A Repository for Experiment Setups. DS 85-1: Proceedings of NordDesign 2016, Volume 1, Trondheim, Norway, 10th-12th August 2016.*

*Gerstenberg, A., Sjöman, H., Reime, T., Abrahamsson, P., & Steinert, M. (2015, September). A Simultaneous, Multidisciplinary Development and Design Journey—Reflections on Prototyping. In International Conference on Entertainment Computing (pp. 409-416). Springer International Publishing.*

*Jensen, M., Utriainen, T. and Steinert, M. (2017). Mapping Remote and Multidisciplinary Learning Barriers – Lessons from Challenge Based Innovation at CERN. European Journal of Engineering Edition (accepted for publication in upcoming issue)*

**+ Several master's thesis works and papers currently in works**

# Future thinking

## VR tool development

Based on data

CBI for R&D

ATLAS as a test bed - 3000 collaborators

## Expert-led long projects

To get to impactful results, a longer time (6 months +) is needed with people who do not start from 0.

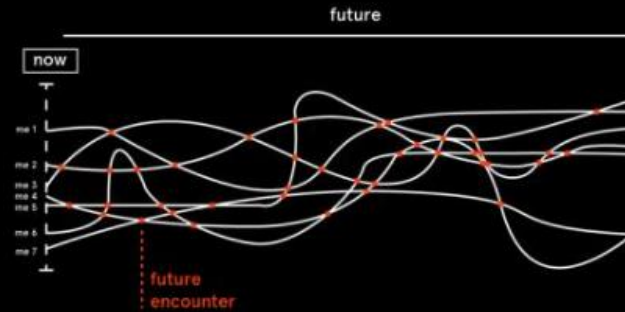
# Future thinking

## Experimenting with methodologies

Yuri Tanaka in residence, design speculation projects with HEAD Geneva & young researchers

idea

communicate with your different selves that exist  
in parallel universes





# MOOP – Online Based Innovation

“How to run a CBI project for 400 000 people with a strong CERN connection & interesting, new project results?”

# **Online Based Innovation (OBI) - Idea Sharing Platform for Online Collaboration and Distributed Student Projects**

OBI is a development project to create and test a scalable online platform to support globally distributed learning, collaboration and concept development.

Some of the platform elements have already been tested with the CBI students in previous projects (e.g. the online platform for CBI 2).

# OBI-1 - First steps for testing the concept & refining requirements for future development:

Technical setup hosted by CERN (for up to ~400 students in the first pilots)

- Open edX for hosting lectures, teaching material & team submissions (running on CERN OpenStack)
- VIDYO meeting rooms for project team
- Cernbox for data archiving, e.g. videos & 3D models (Owncloud 1TB instances)

Open(source) collaboration tools to extend the work from Open edX to smaller subteams; in the beginning each project subteam can tailor and coordinate their custom solution from available alternatives:

- Slack / Mattermost
- Riot
- Git(hub)
- Google Drive
- Gaaana
- etc...

# **Online Based Innovation (OBI) - Idea Sharing Platform for Online Collaboration and Distributed Student Projects**

As the next step in OBI development, IdeaSquare is participating in two engineering-driven concept development student projects; one on high speed aviation, and another on nanosatellite development.

IdeaSquare's contribution to these projects will be the development of an online platform to match the needs of these pilot projects, and incorporate the learnings for further development of OBI.

# **Online Based Innovation (OBI) - Idea Sharing Platform for Online Collaboration and Distributed Student Projects**

Applying EU funding to speed up development (Pablo Tello)