design thinking
theory from practice

dancing with ambiguity
the case for human-centered systems engineering

Swiss Chapter of the International
Council on Systems Engineering
Zurich, CH, 8 September 2015

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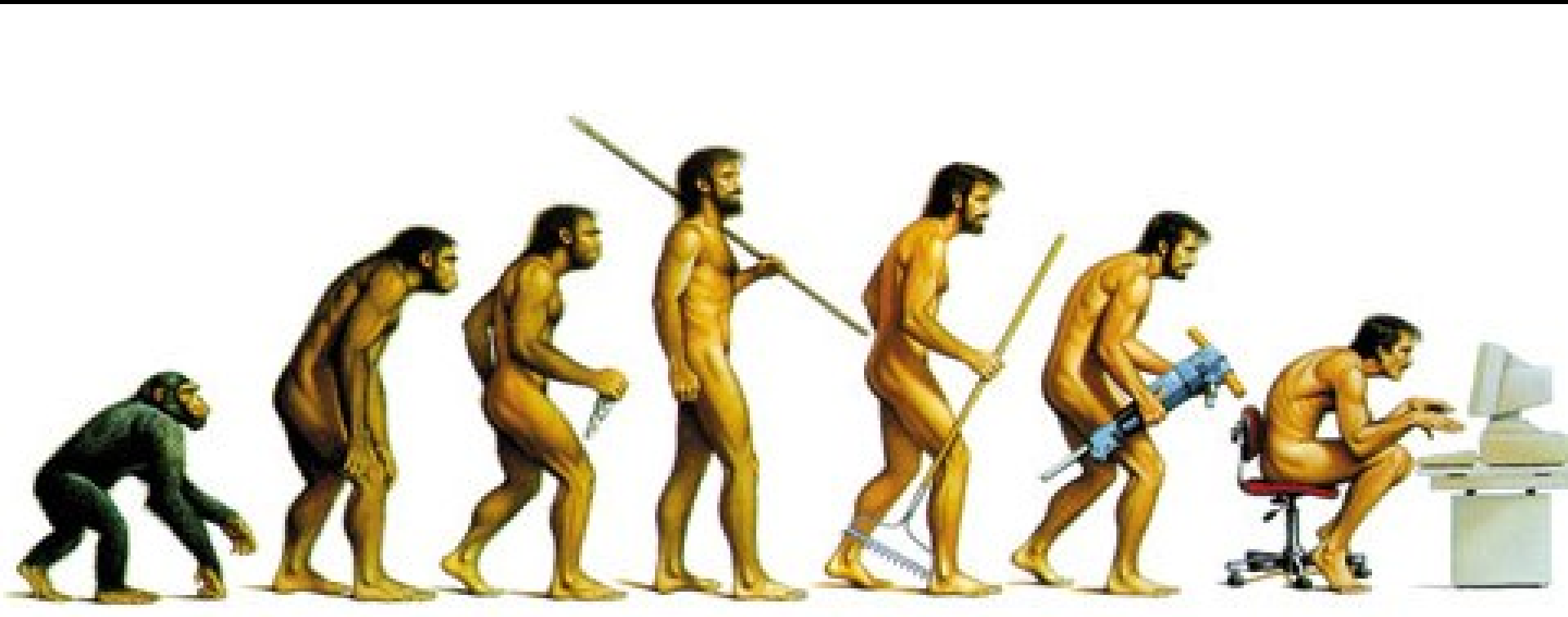
Professor, Dr., Director, Center for Design Research at Stanford
Director, Hasso Plattner Design Thinking Research Program at Stanford
http://cdr.stanford.edu

context is always knowledge worth having.
my context



your context

INCOSE
International Council on Systems Engineering

The Swiss Chapter of the International Council on Systems Engineering

SYSTEMS ENGINEERING IN THE REAL WORLD

SSSE

September, 8th Kongresshaus Zurich

SWISSED15

our context

1,035,968BCE

60 years in the making

Creative Design

John Arnold and GSB

Product Design Program with Fine Arts Department

Robotic Systems Design with Computer Science and Aero

Team-Based Systems Design (310) with Industry Partners

Smart Product Design (218) with EE and CS

Center for Design Research (CDR) with Industry Partners

Manufacturing Systems Design with GSB and MS&E

Micro Electro Mechanical ystems Design (MEMS) with EE

Human Computer Interaction Design with CS

Learning Design & Technology with Education

Learning Lab with Wallenbergs of Sweden

ME310-global & SUGAR across the world

BioDesign wit Biology & Medicine

Foresight Engineering with Industry Partners

Hasso Plattner Institute of Design with HPI Pottsdam

Venture Design in India, Nigeria

1960 1970 1980 1990 2000 2014

validated best practices

30 years of design research

… now including the

Hasso Plattner Design Thinking Research Program

and “Understanding Innovation”

Design Thinking Research series, vol.1-6

INSTAGRAM INSTA-HIT

rst available, in October
ded the app. In the year
ed 11 million and the app
the top-10 free apps on

one owners snap pictures
select among 15 filters
enly, boring, run-of-the-
y different—better than

Instagram still has fewer than ten employees, but CEO Kevin Systrom and co-founder Mike Krieger are

[illegible] million in funding and Instagram was on its way. **S**

Stanford Engineering

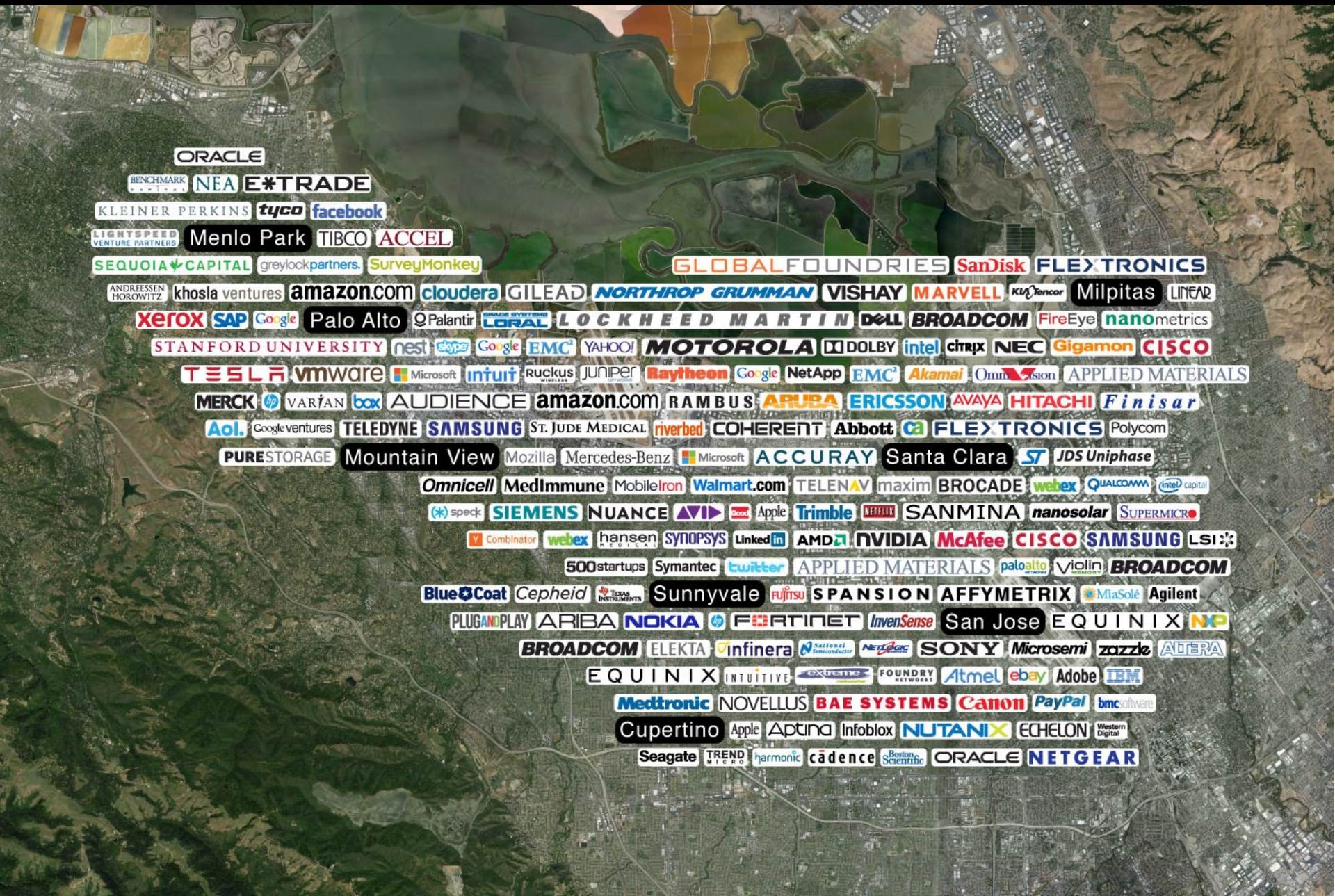
Stanford Engineering alumni have generated

2.2
million new jobs
and
$1.6
trillion annual revenues worldwide.

As of November 2011, the application has been downloaded over 11 million times.

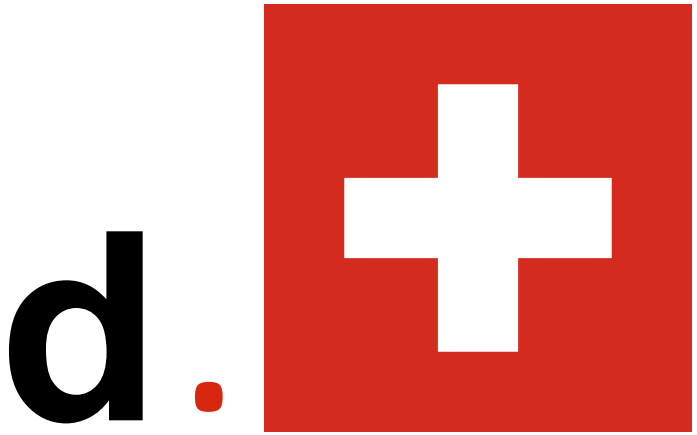
10,900
companies created by Stanford Engineering alumni over the decades

silicon valley eco-system



today we go

opportunity hunting



mission

build talent
to create break-through
new product, service,
and business

relationships

hypothesis

the shortest path to better products, services & relationships is through better

teams of teams and their dynamics

value-proposition

create a place where
design research shapes practice
& practice shapes research

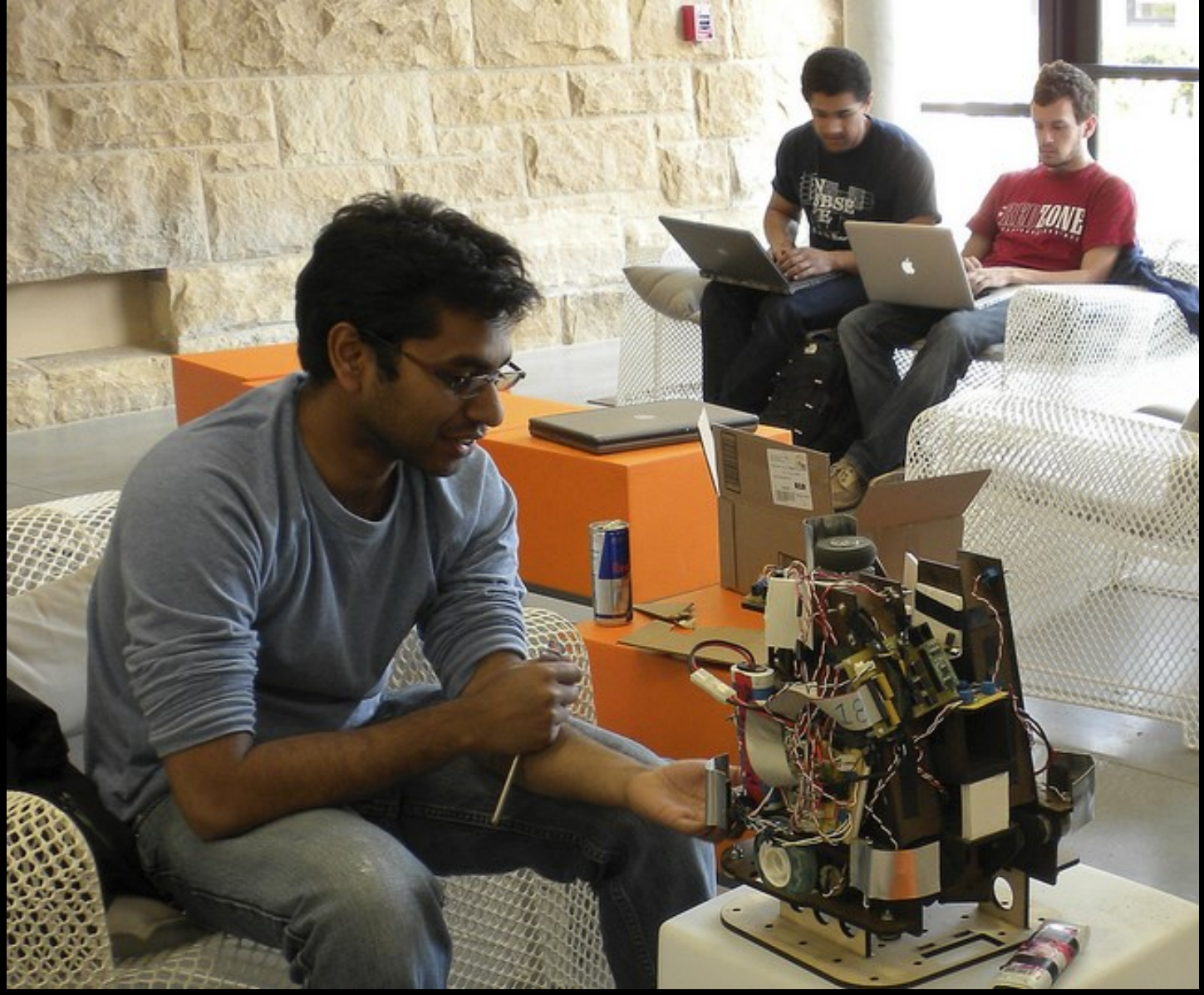
d.innovation

while most engineering education is about
the facts, figures, and physics of

what we know

design innovation is about
the intentions, actions, and values that guide

how we use
what we know



smart systems

software systems

free online classes enrolled **335,000** world wide in 2013

executive boot-camp

addressed by **IDEO** co-founder, Prof. David Kelley


hunting is all about people


tangible communication

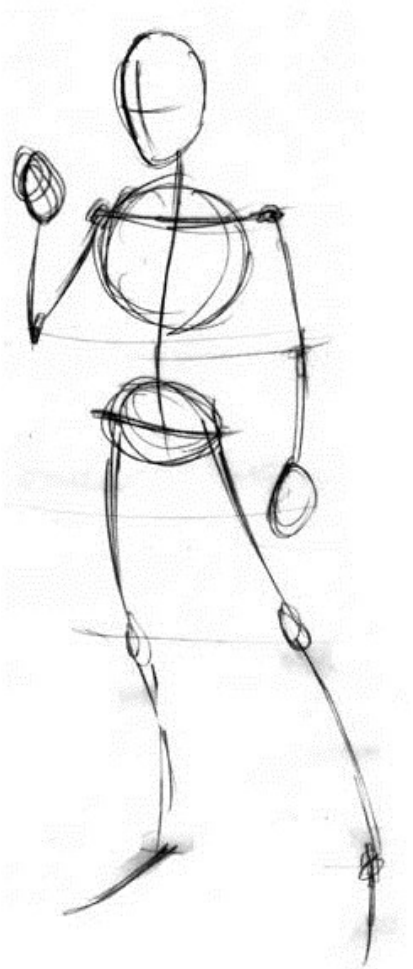

prototype storming


accelerated learning


defying gravity

creating ambiguity

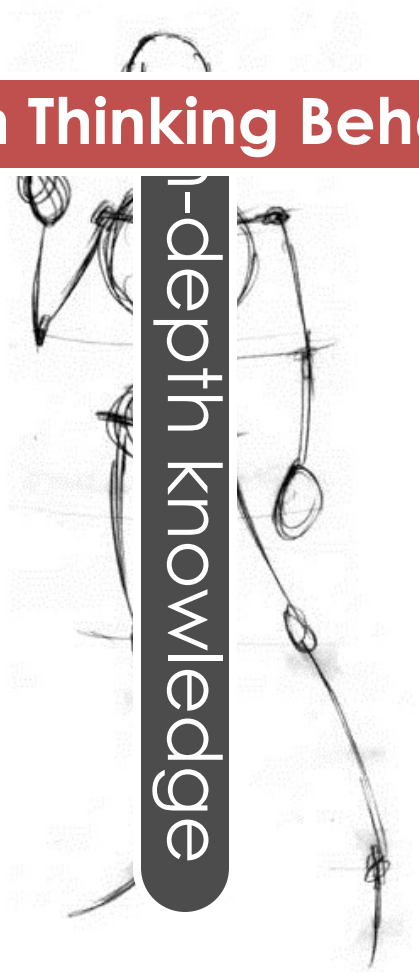
building “T” people & “T” teams



in the moment,
should i be an
“I” shaped or
“T” shaped
person

(Suzuki’2011)

Design Thinking Behavior



“I”

shaped by

knowledge

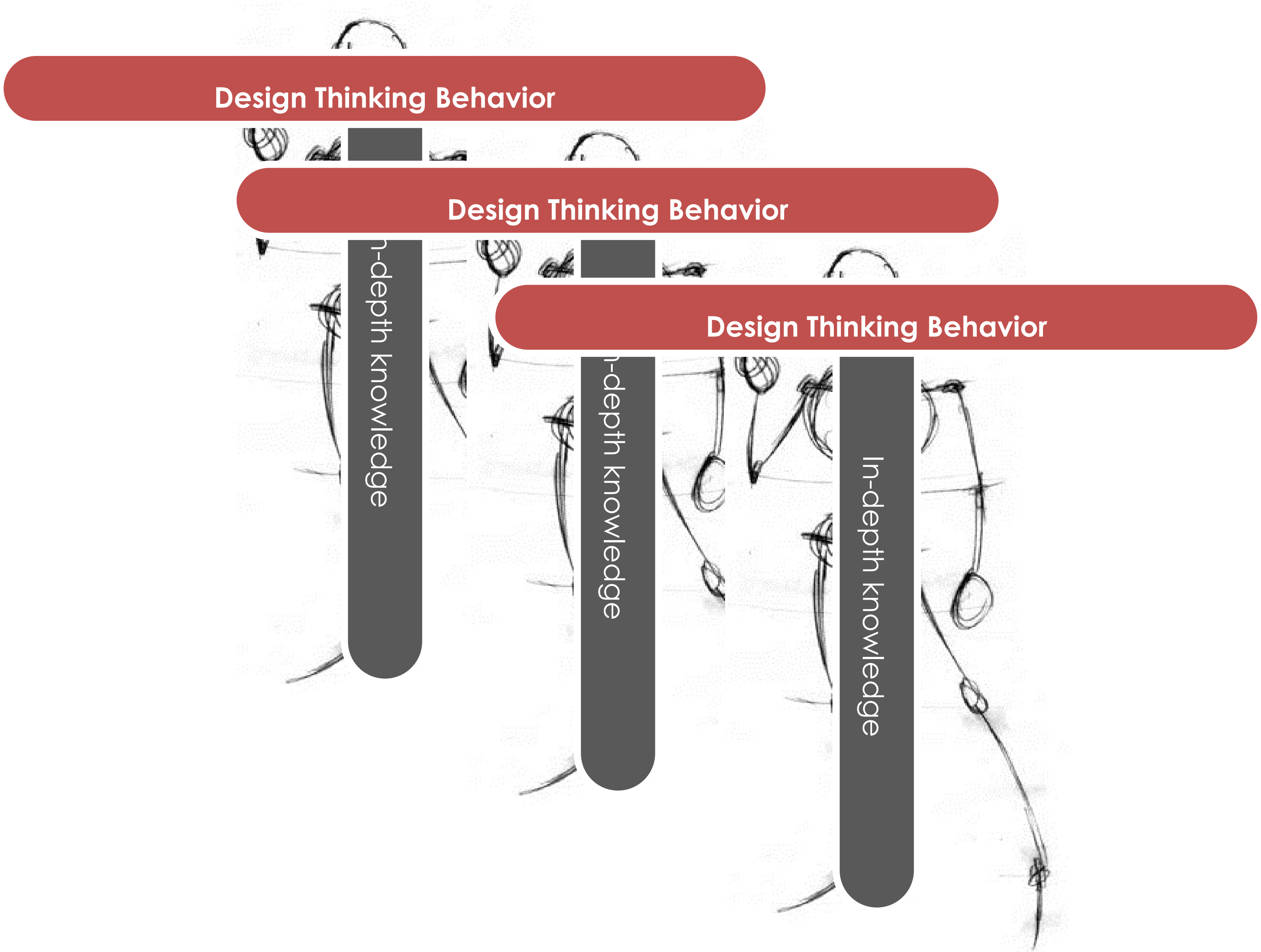
in depth

“T”

shaped by

breadth

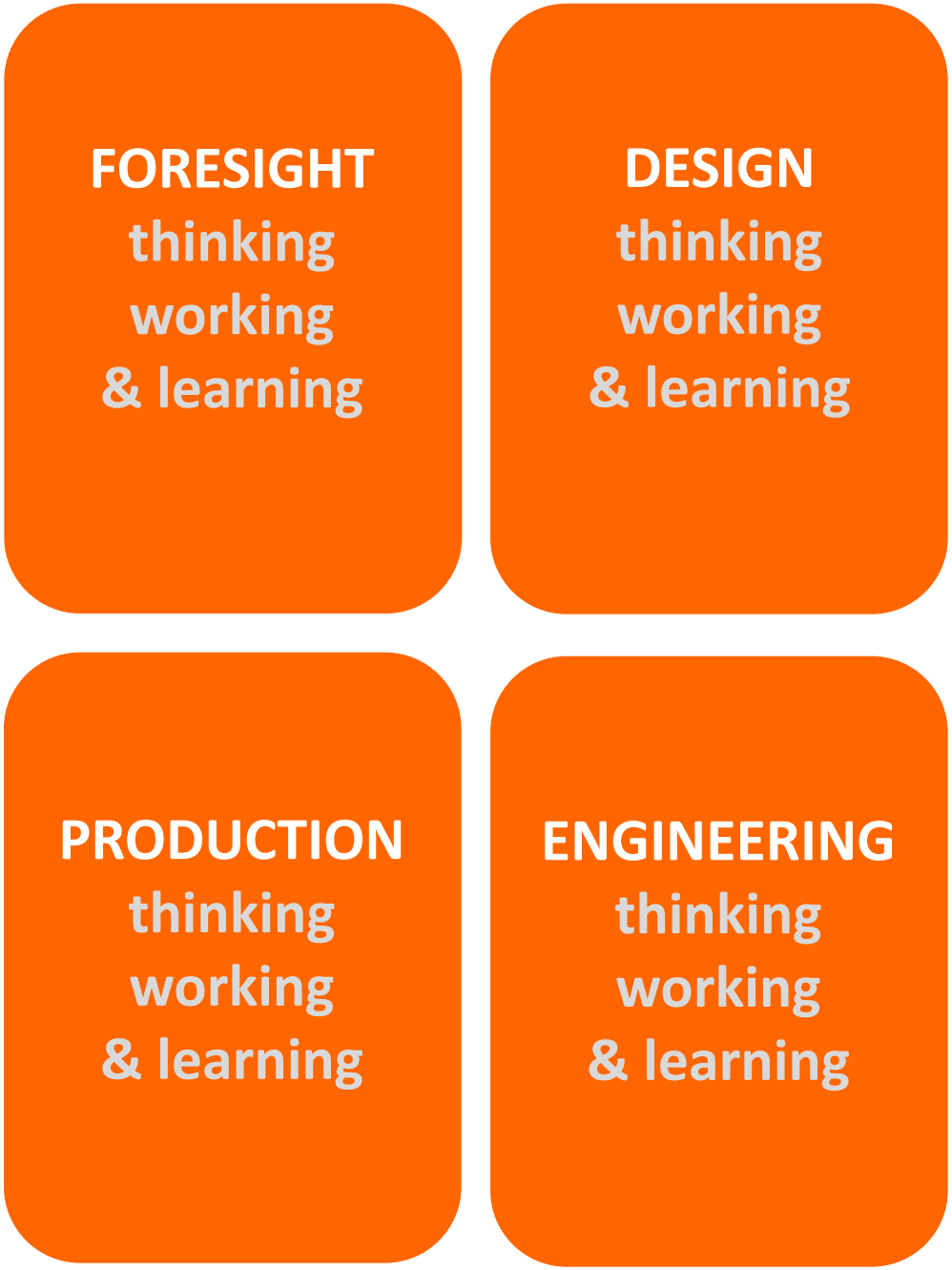
in behavior



“T” people teams

why is it so hard

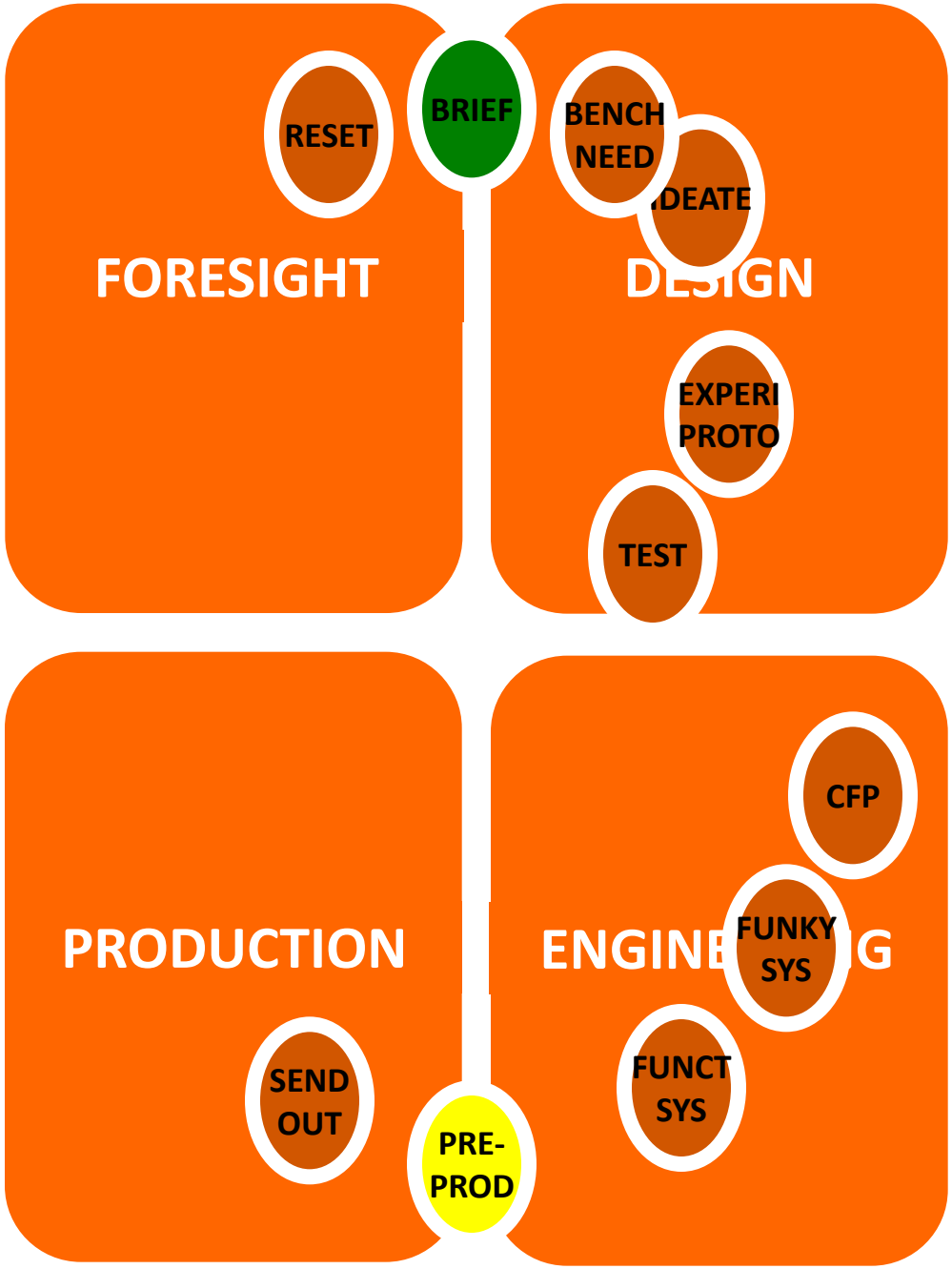
to be an adaptive “T” person



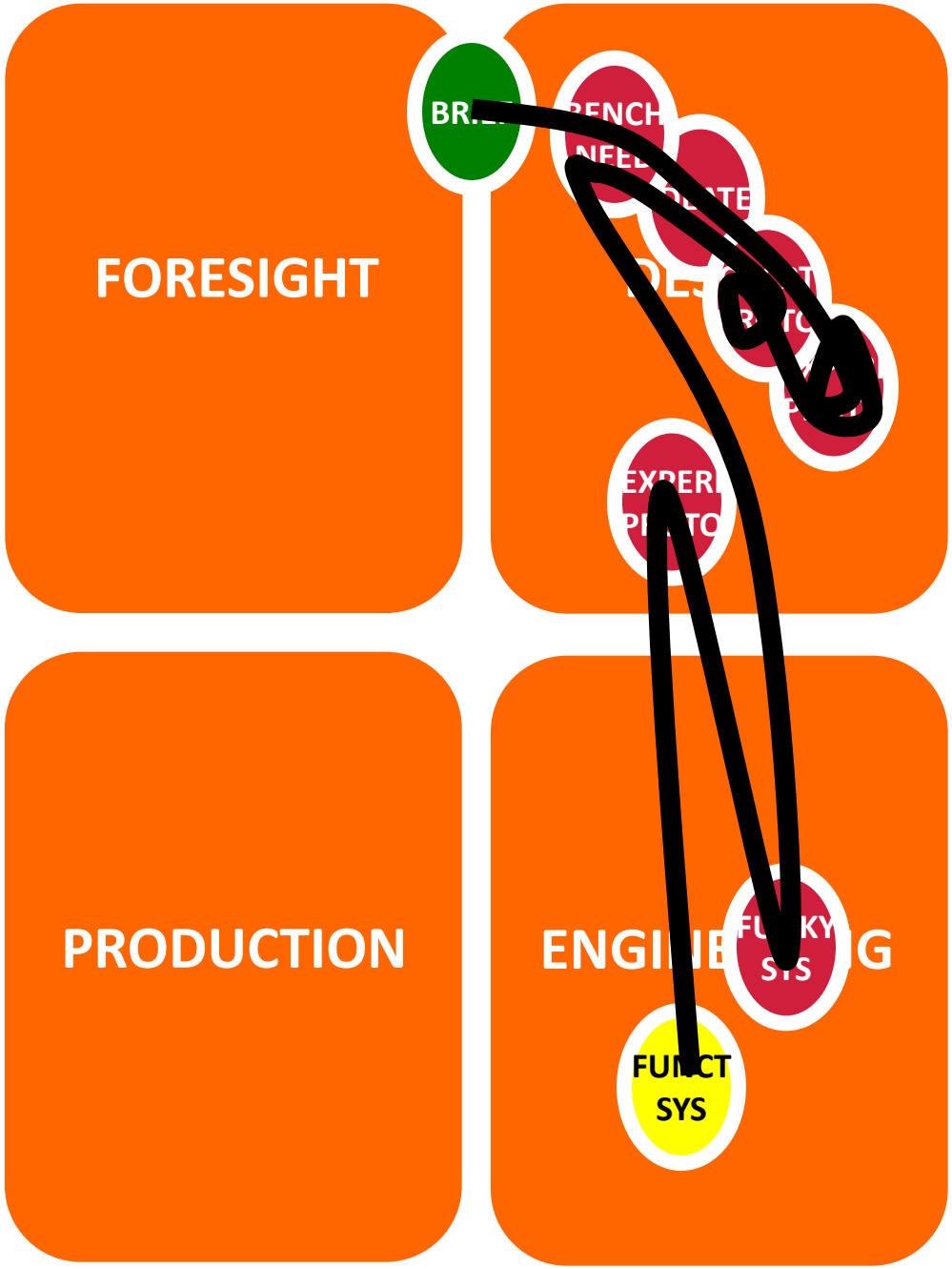
people

have different ways of thinking, working, and learning

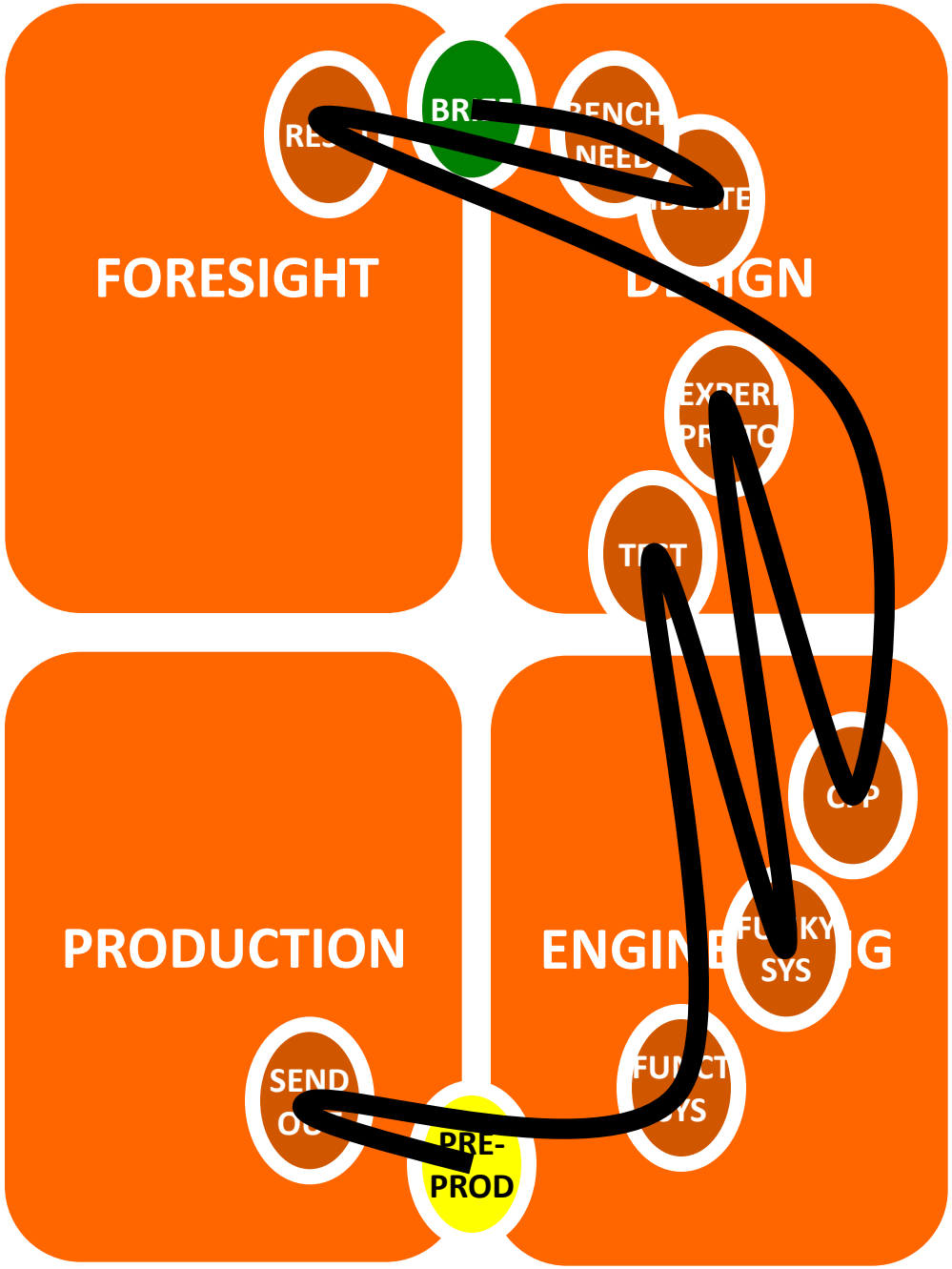
Lande 2009



way points along the passage from a concept to functional proof-of-concept hardware, software, and experience …



team-B's
8 month passage
through the
thinking and doing
space



team-A's
8 month
passage
through the
thinking and doing
space

A earned a WOW

B earned a thank you

precision innovation

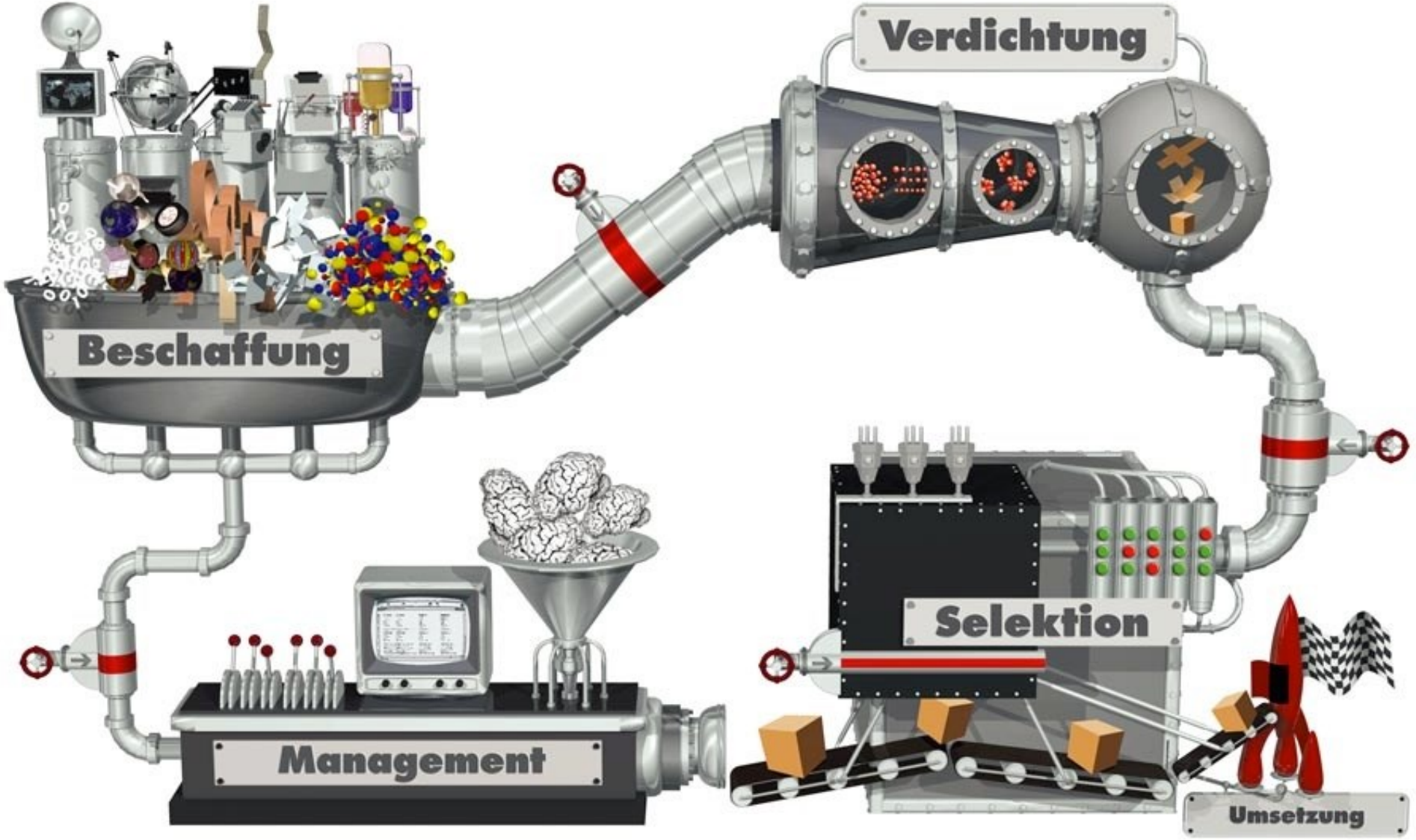
the 1st law

never go hunting alone

respect an ancient dictum

this is not hunting

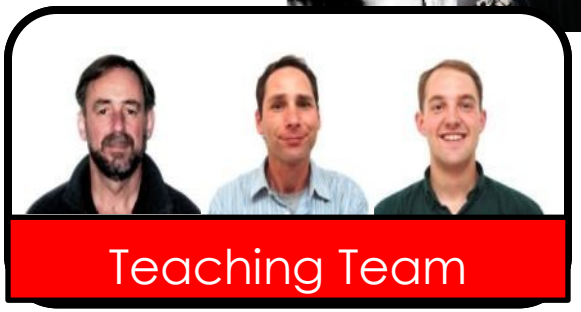
image via Malte Jung, PhD 2012



introducing Stanford's
formula-1 simulator for
for extreme design innovation
…
it is our laboratory
so **who** is in the lab

graduate design teams

teaching team coaches



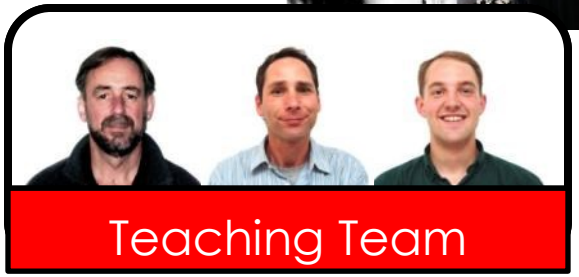
professional coaches

Project Coach

Project Coach

Munich Team

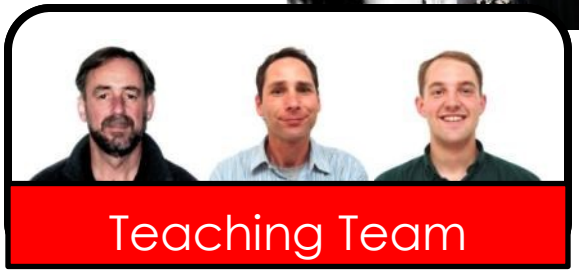
Stanford Team



Teaching Team

Teaching Team

culture coaches



corporate sponsors


Project Coach


Project Coach

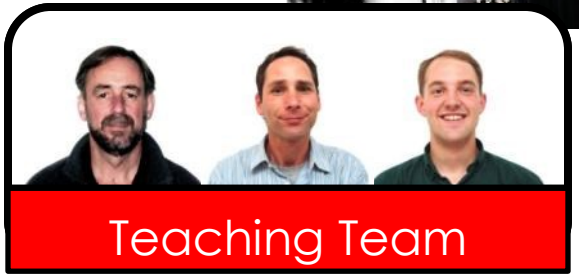

Class Coach


Munich Team

Audi
Corporate Partner

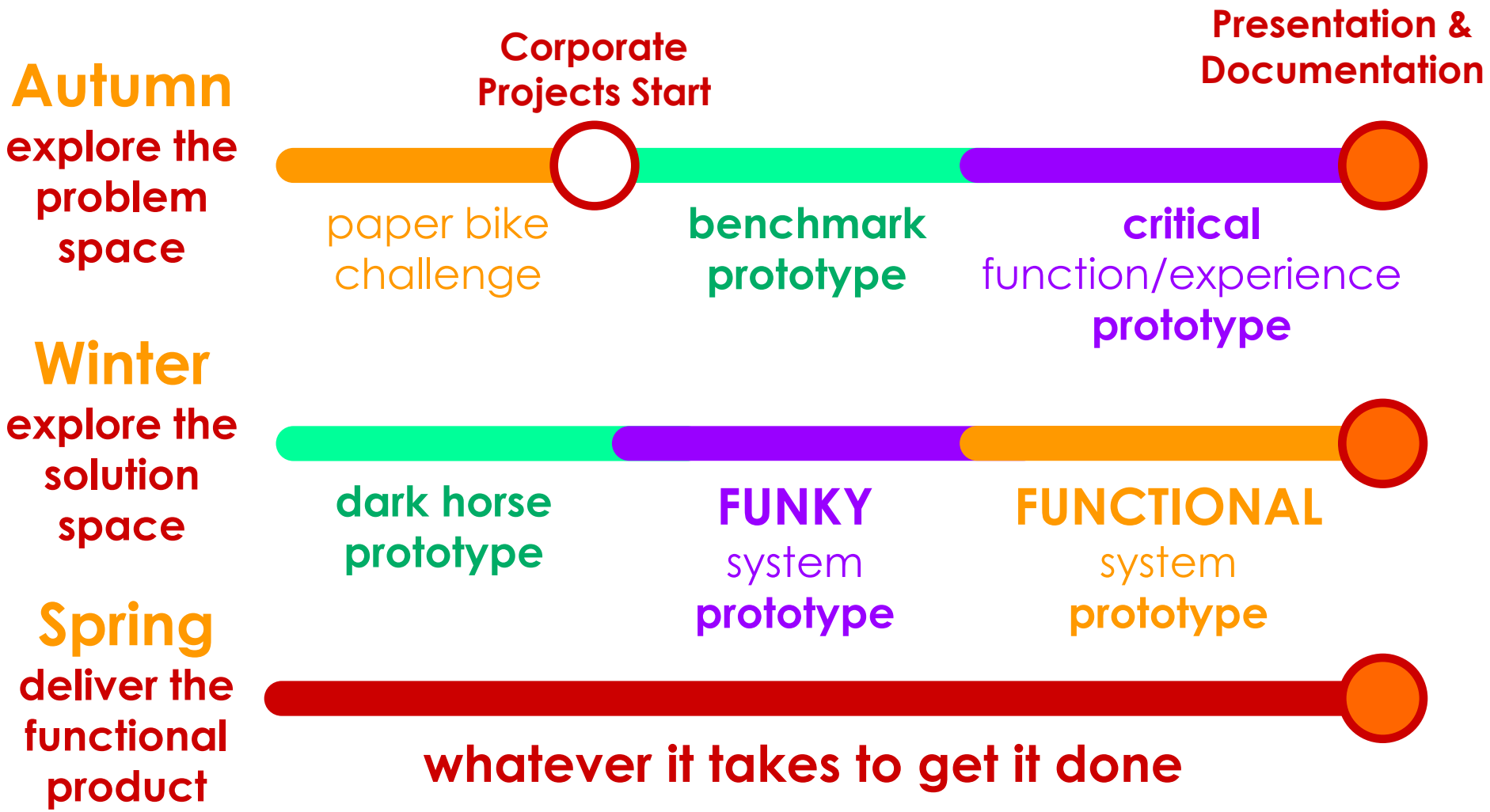

Stanford Team


Class Coach


Teaching Team

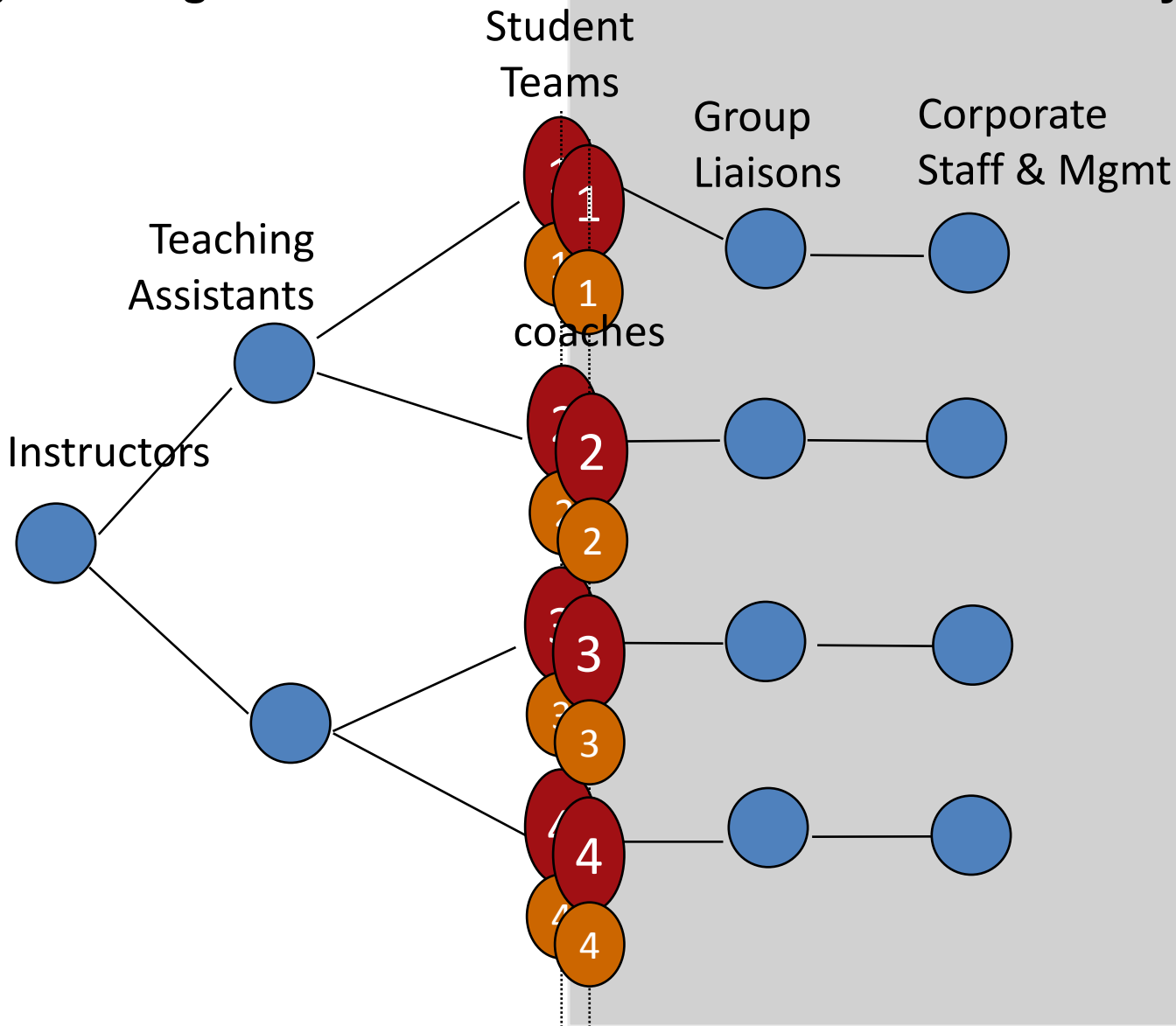

Teaching Team

re-inventing the future every 30 weeks

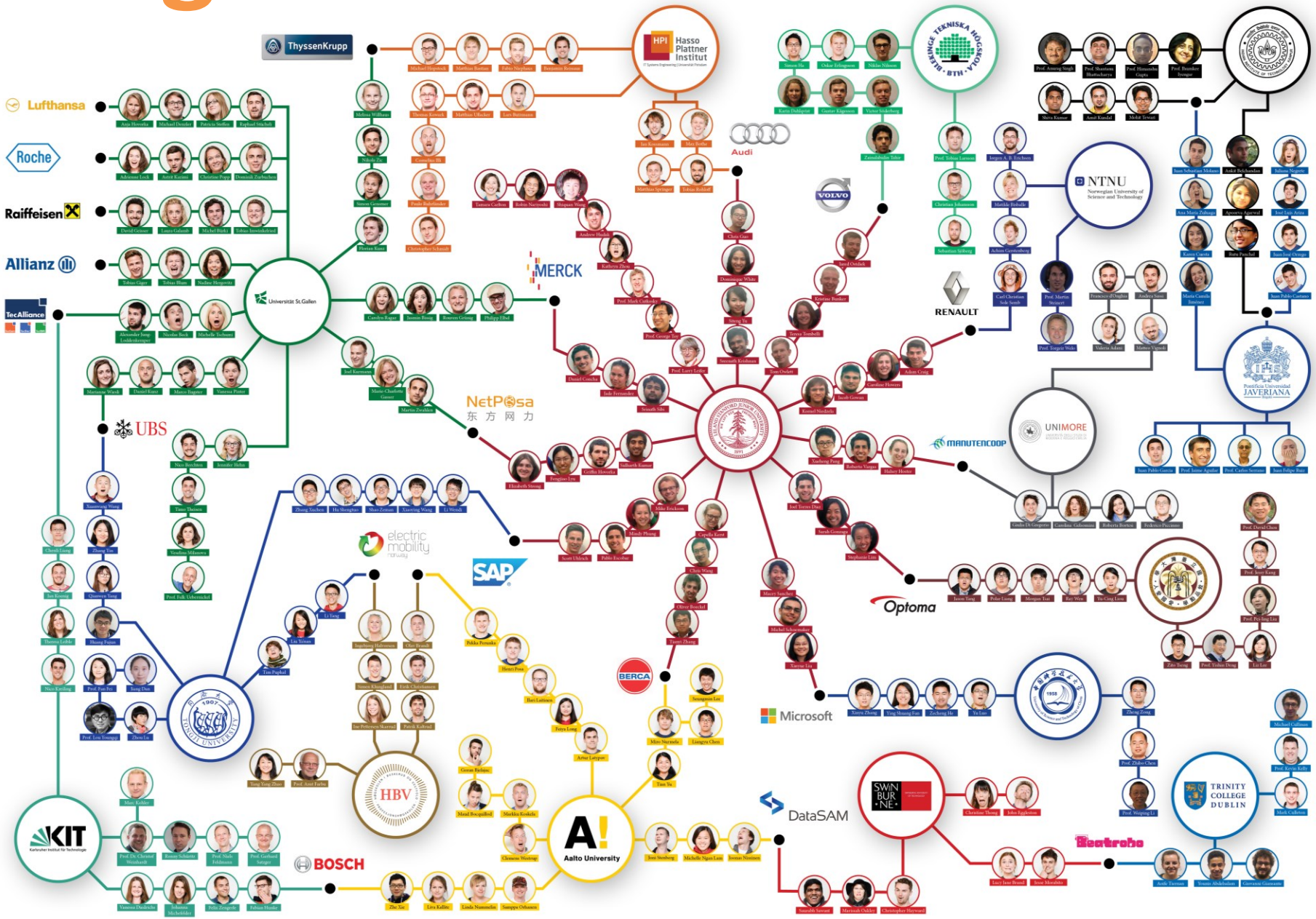


310-global teamwork

university learning PROCESS CONTENT delivered by industry



global team of teams



UNIMORE
UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

NTNU
Kunnskap for en bedre verden

Paris

A?

HPI Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

SWINBURNE UNIVERSITY OF TECHNOLOGY

Technische Universität München

BLEKINGE TEKNISKA HÖGSKOLA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EL PAÍS
SIEMENS
ACTIVISION.
Schick
DB BAHN
SEIKO
swisscom
DAIKIN
DELPHI
Microsoft
TOSHIBA
Leading Innovation
electric mobility
PHILIPS
VISY
FOR A BETTER WORLD
MERCK
KEMPPI
The Joy of Welding
LINCOLN ELECTRIC
EDEKA
TOTTO
UPM
THALES
Banco de Occidente
sue2
environnement
FIFA
NASA
HUGHES
BOEING
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WD
Western
Digital
Medtronic
Luidia
VTT
BELCORP
3M
ROVIO
CLARIANT
immerseglobal.
SPECIALIZED.
yle

d.space

…

where you work defines

- how you work
- who you work with
- what you do, and
- what you create


tangible access


stand-up action


video conference
improvisation


keep them creative


past learning
experiences at hand


prototyping tools
accelerate learning