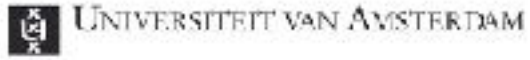
Simon Koolstra (25 years old)

June 2010 Graduated Dutch High School

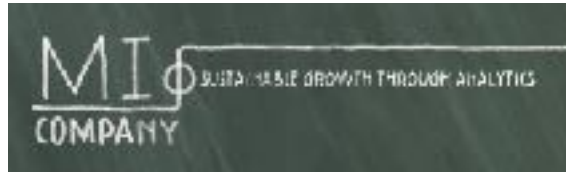
Sept. 2010 – Aug. 2013 Double Bachelor's in Mathematics and Physics



Sept. 2013 – April 2017 Double Master's in Mathematics and Theoretical Physics

- Feb – June 2016 Thesis research at Stanford University

Sept. 2017 – Future Data Scientist / Consultant at MIcompany



Today

- A (double) master's in Mathematics and Theoretical Physics
- A (double) master's thesis (in Mathematics and Theoretical Physcis)
- MIcompany - Where you can end up if you do not want to do a PhD (after studying Mathematics and Theoretical Physics)

A master's program in mathematics

- Courses that explore the frontiers of what we know
- Challenging problems and motivated and involved teachers and students
- Mastermath

Mastermath

- Combined program by all Dutch universities for offering master's courses in Mathematics
- Allows students broad access to all kinds of subjects
- Combined expertise from all universities in the Netherlands
- Meeting new teachers and new students

My master's program (190 ECTS)

	Year 1 first semester (30)	Year 1 second semester (31)	Year 2 first semester (29)	Year 2 second semester (34)	Year 3 (+ part of 4) Master's thesis (66)
Mathematics	Representation Theory (6) Seminar Mathematical Physics (6)	Lie Groups (8, Utrecht) Algebraic Geometry (8, Utrecht)) Mathematical Approaches to Quantum Field Theory (6)	Symplectic Geometry (8, Utrecht)	Commutative Algebras (8, Utrecht) Non-Commutative Geometry (6)	**Master's Thesis (66):** Mock Modular Tensor Categories
Ph5ysics	Statistical Physics and Condensed Matter Theory I (6) + Extension (3) Quantum Field Theory (6)	Statistical Physics and Condensed Matter Theory II (6) Gravitational Waves (3)	Bose Einstein Condensates (6) Particle Physics I (6) Advanced Topics in Theoretical Physics (6, Utrecht)	Particles and Fields (6) + Extension (2) General Relativity (6) String Theory (6)	
Other	Academic English (3)		Critical Thinking (3)		

A regular week as a master's student

	Monday	Tuesday	Wednesday	Thursday	Friday
08-09				Travel to Utrecht	
09-10		Studying / Homework	09-11 Gravitational waves NIKHEF, Amsterdam	09-12 Lie Groups Utrecht University	Studying / Homework
10-11					
11-12			Studying / Homework		
12-13		Travel to Utrecht		Travel to Amsterdam	
13-14	13-17 Statistical Physics and Condensed Matter Theory I UvA, Amsterdam	13-16 Algebraic geometry Utrecht University			
14-15					
15-16				15-17 Math. appr. to QFT UvA, Amsterdam	
16-17		Studying / Dinner / Drinks with fellow students			
17-18					

Master's project

Mock Modular Tensor Categories

Hunting for a generalized Verlinde formula

Simon Koolstra

Supervisor: dr. C. N. Cheng and prof. dr. E. Opdam

Second examiner: prof. dr. E. P. Verlinde

April 21, 2017

Rational 2D Conformal Field Theory
Mathematically described as the **representation theory** of **'rational vertex operator algebras'**, which has the structure of a **modular tensor category**

1. Finitely many different particles

2. Fusion rules for interactions are finite

3. Particle representations are completely reducible

4. Vacuum partition functions are modular forms

5. Some physically important numbers are rational

6. Tensor product theory exists

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Verlinde formula tells us which 3-point correlation functions can be non-zero!

$$\langle \phi_i \phi_j \phi_k \rangle = \begin{cases} \text{zero} & \text{if} \quad N_{ij}^k = 0, \\ \text{possibly non-zero} & \text{if} \quad N_{ij}^k \neq 0. \end{cases}$$

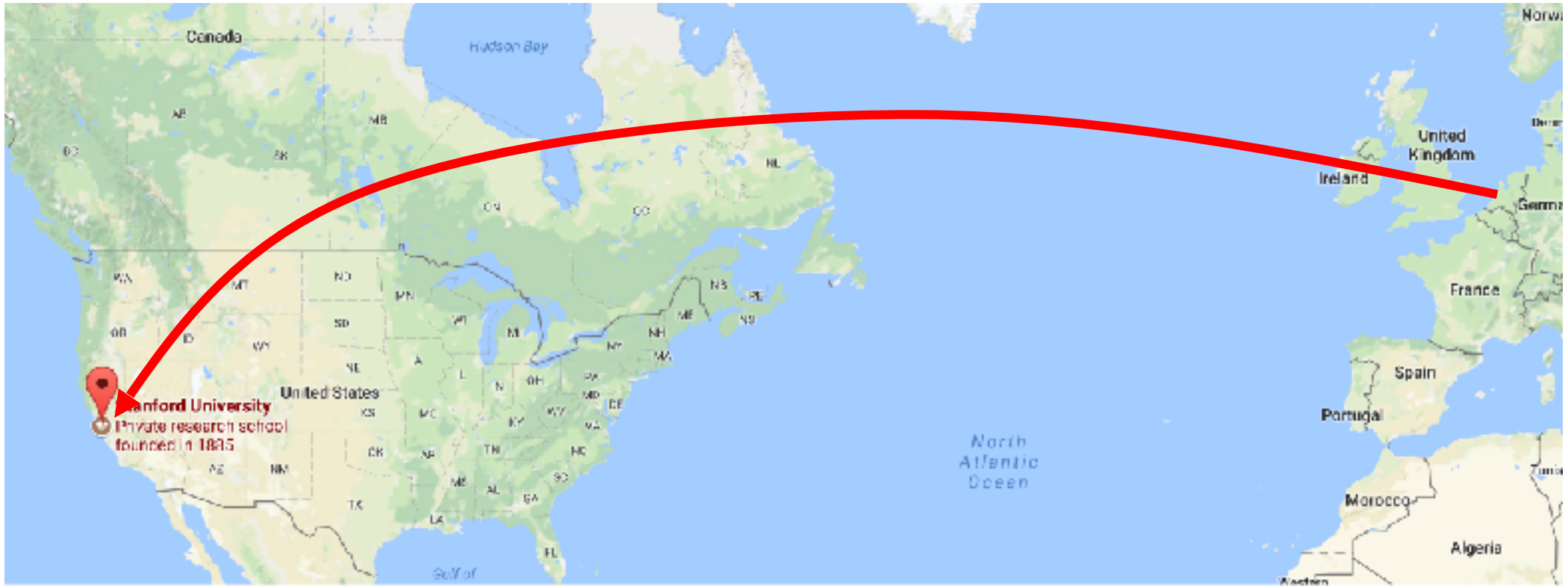
$$N_{ij}^k = \sum_{m=0}^{n-1} \frac{S_{im} S_{jm} \left(S^{-1}\right)_{mk}}{S_{0m}}$$

Mock modular

Rational 2D Conformal Field Theory

1. ~~Finitely many different particles~~
2. ??? Fusion rules for interactions are finite ????????
3. ~~Particle representations are completely reducible~~
4. Vacuum partition functions are mock modular forms
5. ~~Some physically important numbers are rational~~
6. ??? Tensor product theory exists ????????

Can we find a Verlinde (like) formula for mock modular 2DCFTs?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Hudson Bay
United States
Stanford University
Private research school
founded in 1885
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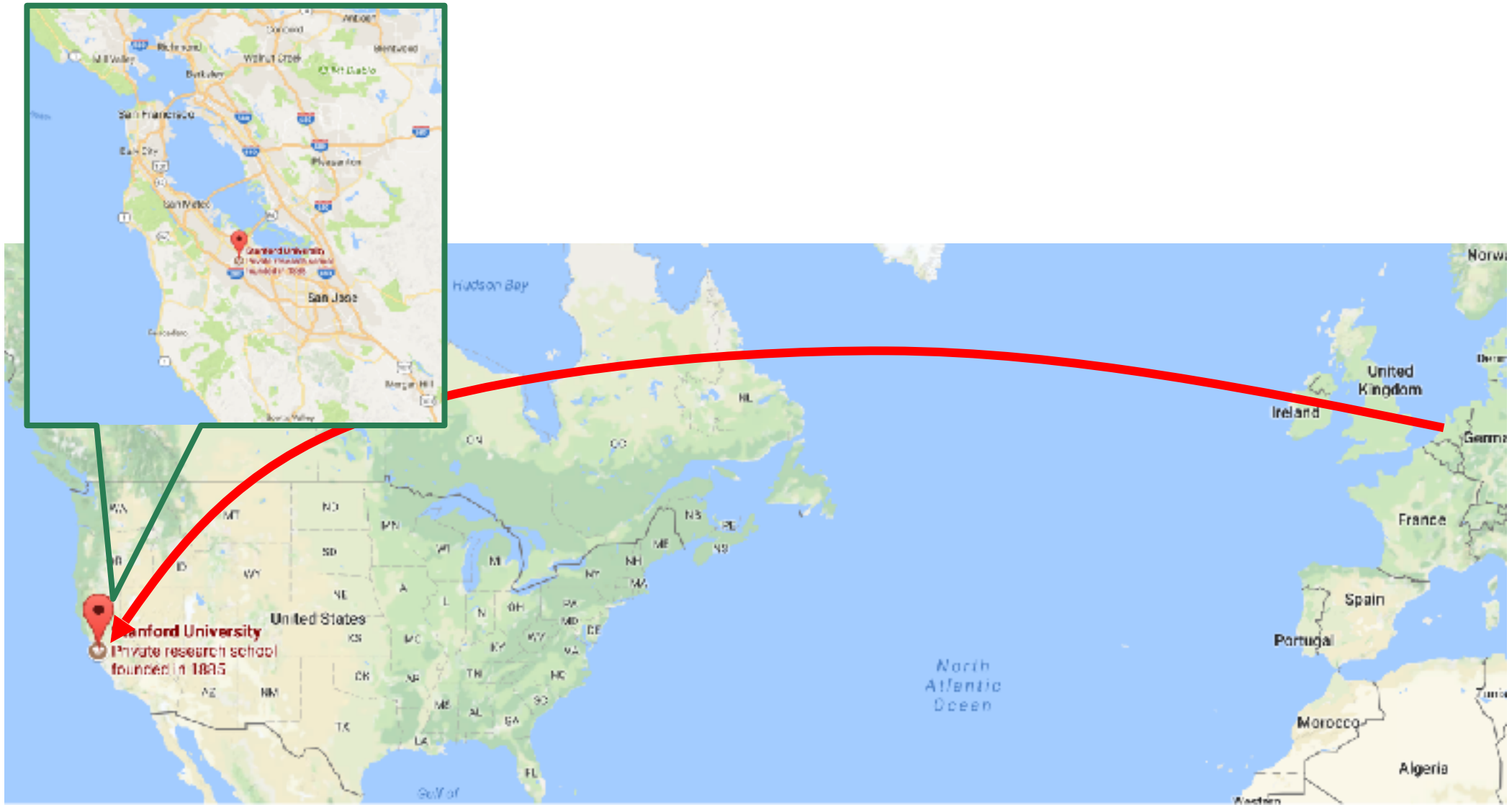
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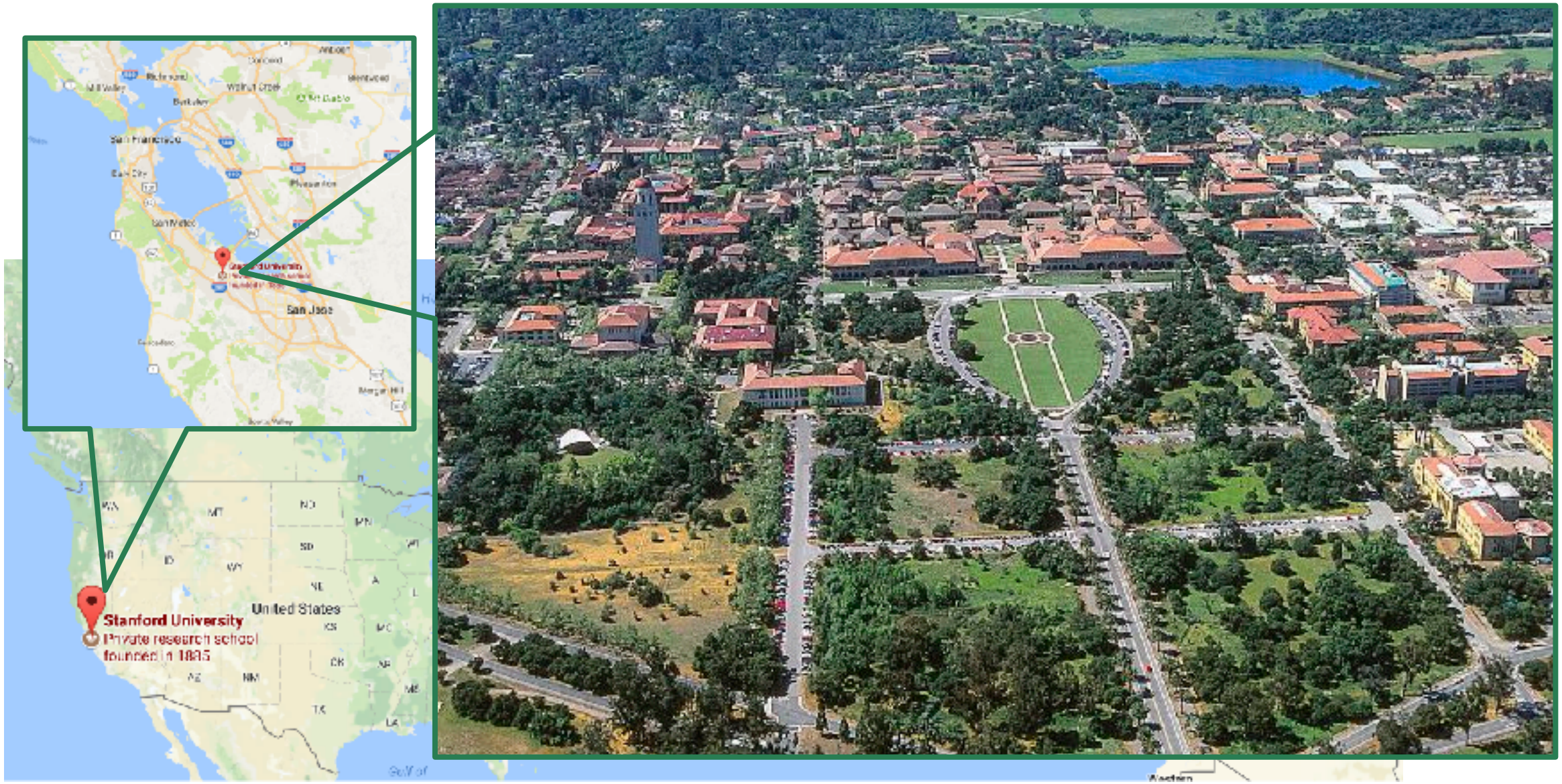
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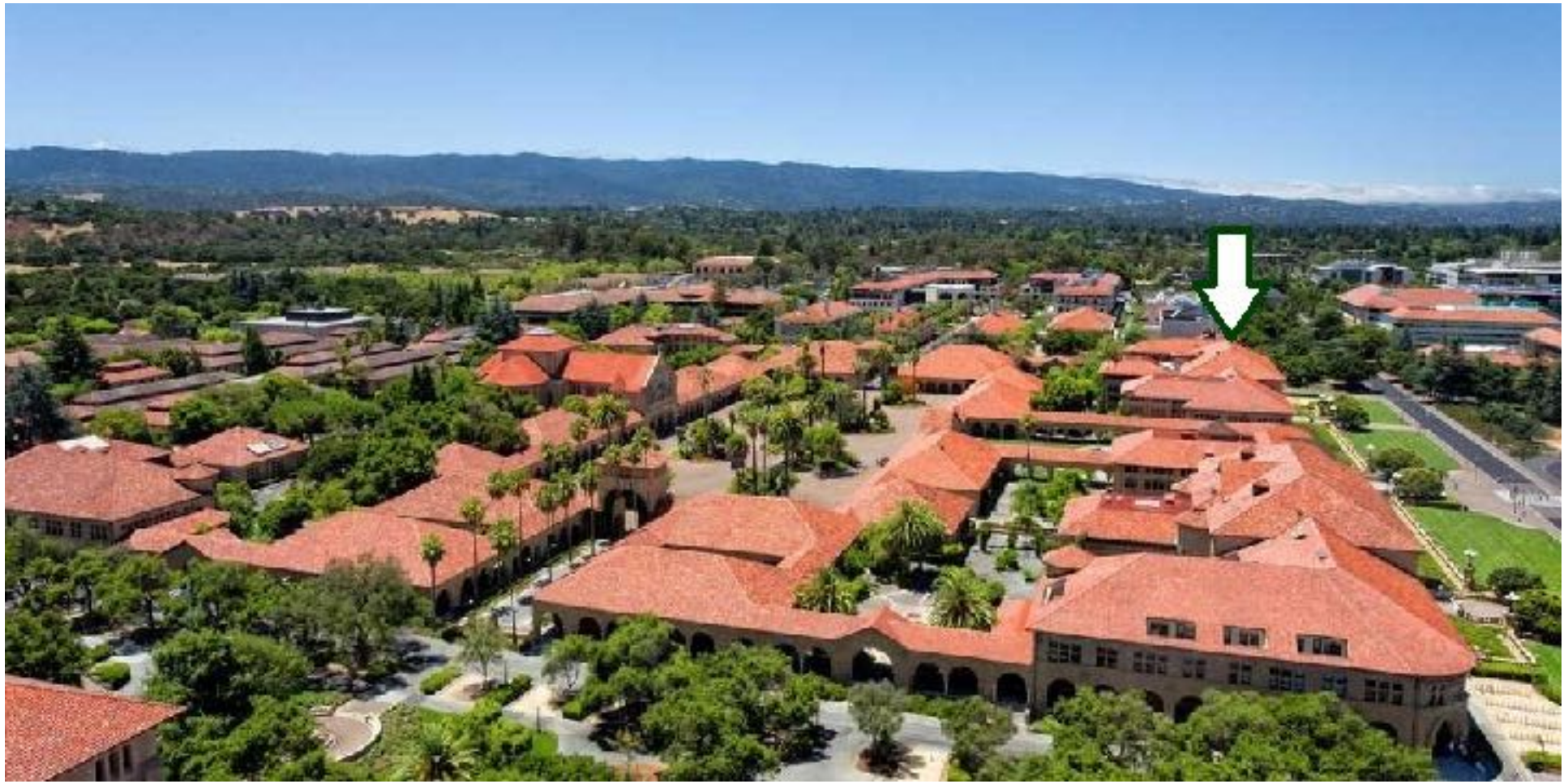
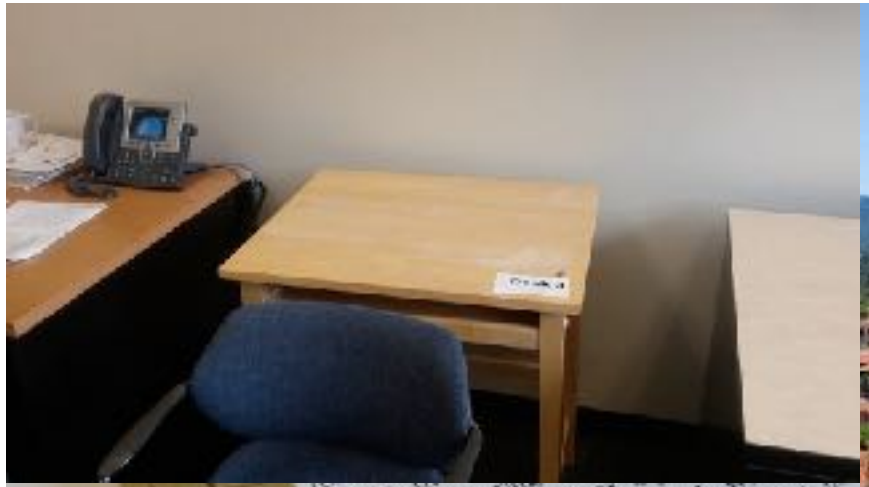
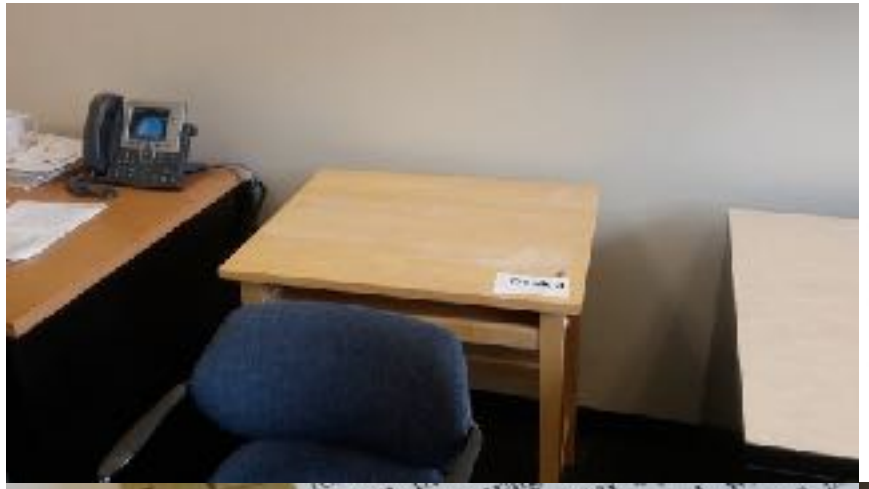
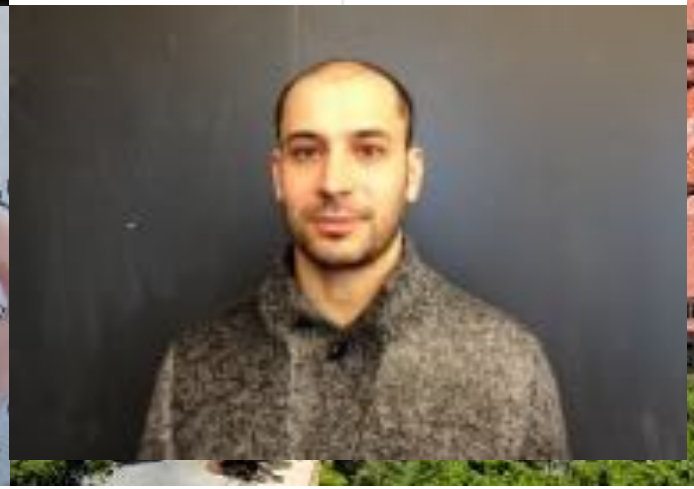


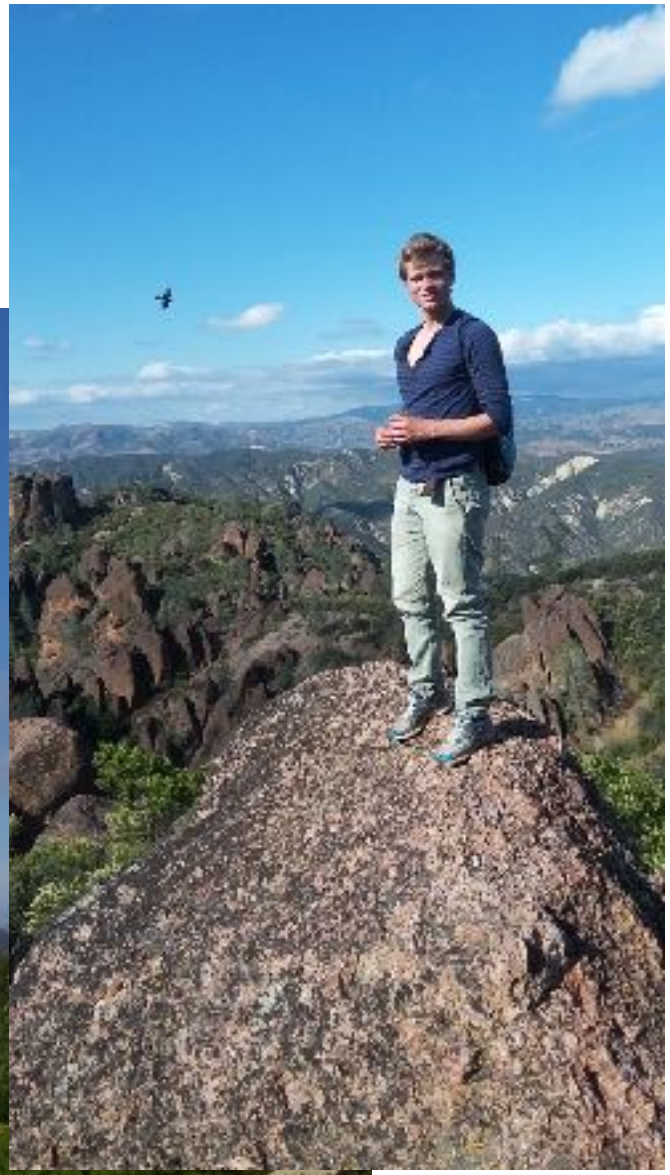


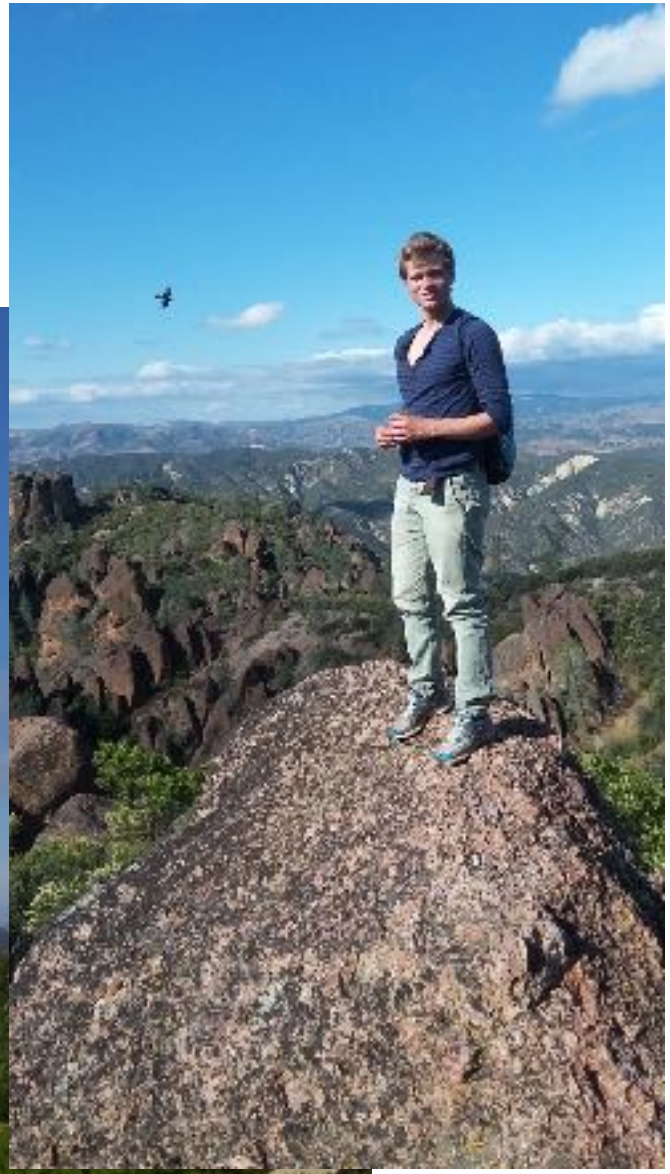

rimon kooistra
Desk #3
ROOM 3




hep-th/9807144)
simon koolstra
Desk #3
ROOM 3







But in the end…

So after your master's……

What do uber, amazon and netflix have in common?

•**Digital business models are powered by Analytics**

- Technology infrastructure is not differentiating in itself
- It's the intelligence that drives it which leads to competitive advantage

NETFLIX

- Predict the success of new series (House of Cards)
- Predict your preferences (content recommendation)
- Predict how movie cover design (graphics) influence view response

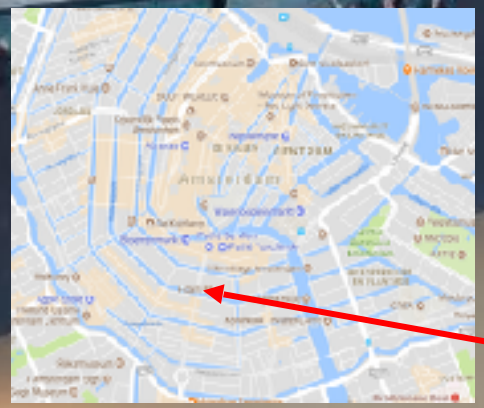
UBER

- Predict demand, provide advise to drivers of where to go
- Dynamic (surge) pricing
- Predict traffic

amazon

- Predict consumer needs and preferences; allegedly 30% of Amazon's revenue is driven by recommendation algorithm

Introducing Micompany



Micompany serves leading companies across industries

A day in MY life as MIcompany data scientist

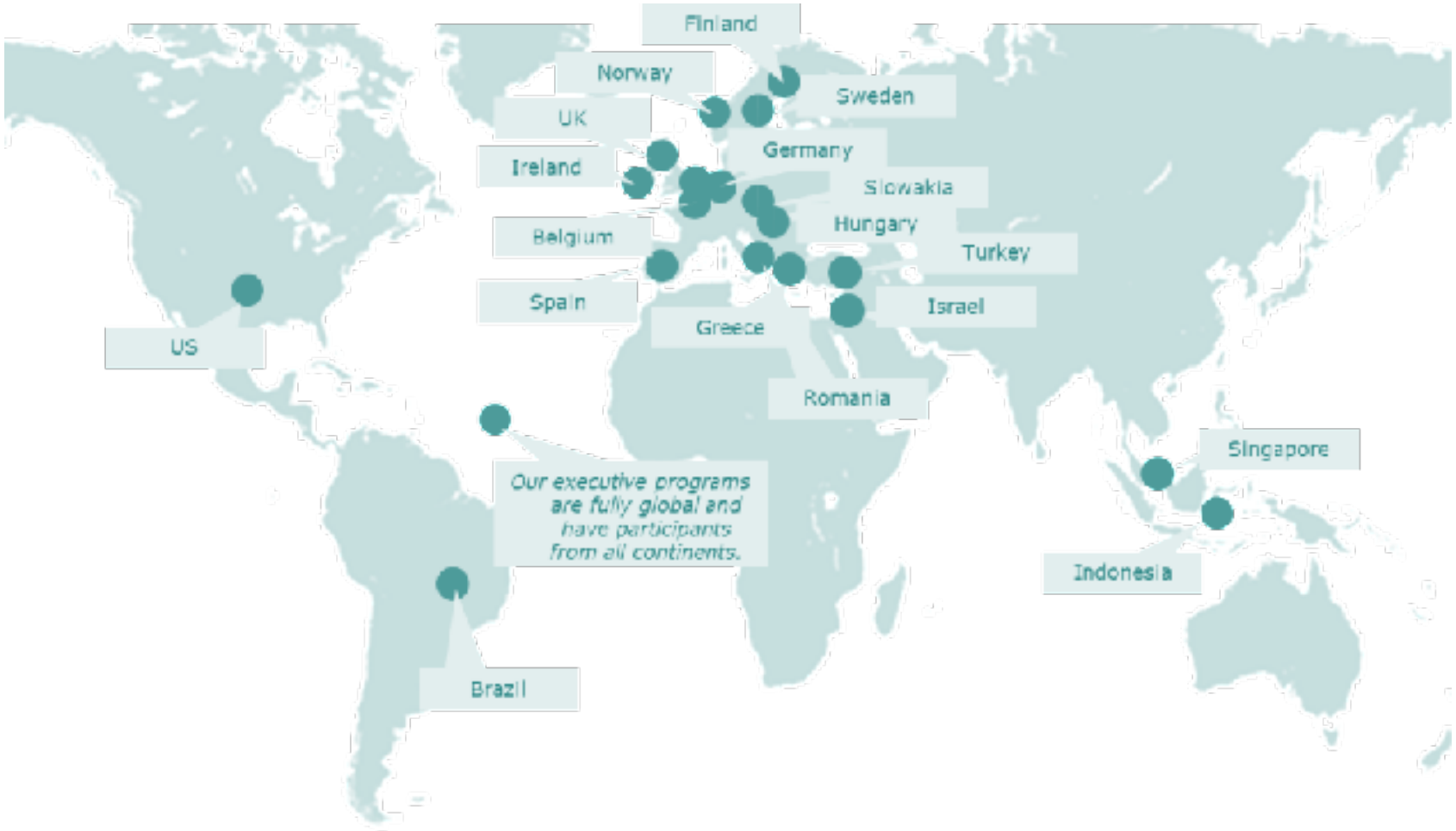
	Monday – Thursday @ Client Office	Friday @ MIcompany office
08-09	**08-09** Travel to Client office	**0830-09** Travel to MIcompany office
09-10	**09-11** Doing data collection and transformation work Tools: SQL, R, Python	**09-11** Doing some more work on case. Tools: SQL, R, Python, (really not that much Excel though, I promise)
10-11		
11-12	**11-12** Meeting client managers to discuss way of working and progress	**11-12** Meeting coach or project lead to discuss personal development
12-13	**12-1230** Lunch	**12-13** MIcompany Lunch Meeting
13-14	**1230-15** Analysing data, building statistical models Tools: R, Python (a bit of Excel sometimes, maybe)	**13-15** Project meeting with whole MIcompany project team
14-15		
15-16	**15-16** Meeting MIcompany project leader to get input on progress and results	**15-16** Some time to do case work and drink coffee with colleagues we haven't seen all week
16-17	**17-1730** Visualising results and creating a story Tools: Excel, PowerPoint, ThinkCell	**16-17** Probably some very important Friday afternoon meeting, in which we can all focus
17-18	**1730-1830** Go home	**17-whenever** Friday drinks

Why start your career with data and analytics?

MIcompany and the MIacademy are the best place to kick-start your career if you're interested in (big) data & analytics, but also aspire to making business impact

- Jump-starting career choice
  - Big Data: high-demand and exciting field
  - Build future-proof skill set
- Impact with Analytics
  - High-end consultancy for renowned corporations
  - Deep data and analytics expertise and technology
- Steep and continuous learning
  - 3-year flagship Academy program for analysts
  - On the job learning – apply theory in practice
  - Apprenticeship model – coaching & mentoring

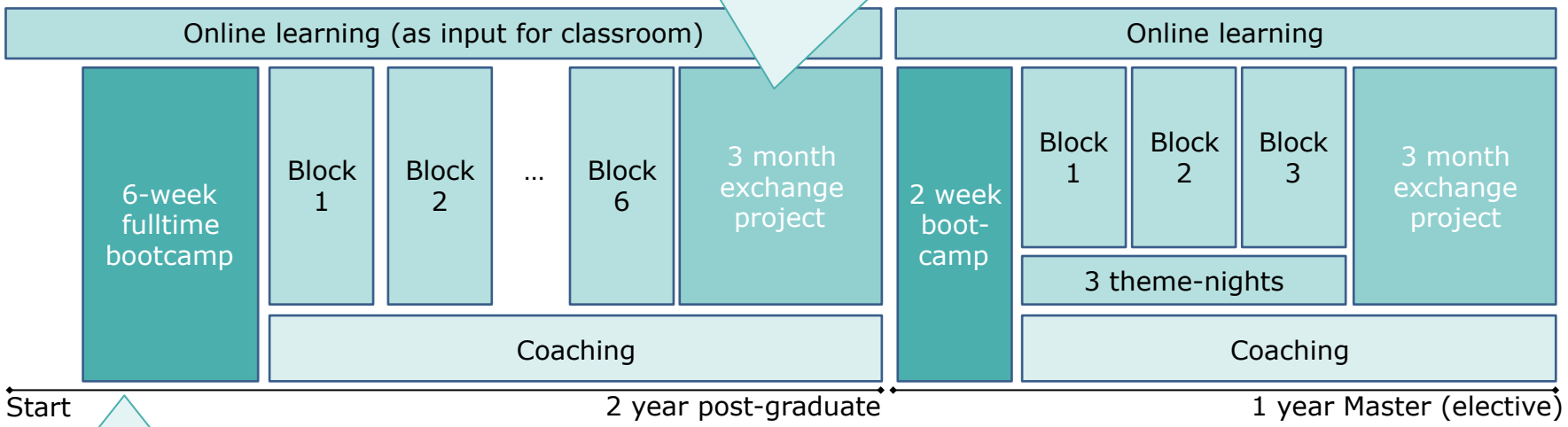
Micompany & miacademy going abroad



The miacademy data analytics Talent program is aimed at rapidly developing analytical OR technical talent

In 3 month exchanges, participants are responsible for their own analytical projects in another department, an international division, or another MIacademy partner

Example: Exchange of intelligence analyst to Singapore



In the bootcamp, participants learn through real cases with actual customer data how to:

Translate business question to analysis approach

Transform data to an analysis database

Perform several analysis methods and techniques

Translate results to an advice

There are different career tracks that guarantee broad learning

Simon Koolstra
Data Scientist @ MIcompany
SKoolstra@MIcompany.nl

MEET YOUR DATA ANALYTICS CAREER

Friday, DECEMBER 8, at 2PM

FIND OUT HOW YOU CAN BECOME A LEADER IN DATA ANALYTICS FOR AN AMBITIOUS ORGANIZATION WITH MIACADEMY:

Discover your data analytics talent

Find your perfect fit in industry or consulting

Get the job at a leading data analytics company

Deepen your knowledge and skills in a three year program

Kick-start your career with a data analytics bootcamp

Develop personally through coaching

Get ready to become a data analytics leader

APPLY: SEND YOUR CV TO talent@micompany.nl

FOR MORE INFORMATION www.micompany.nl/#career

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