

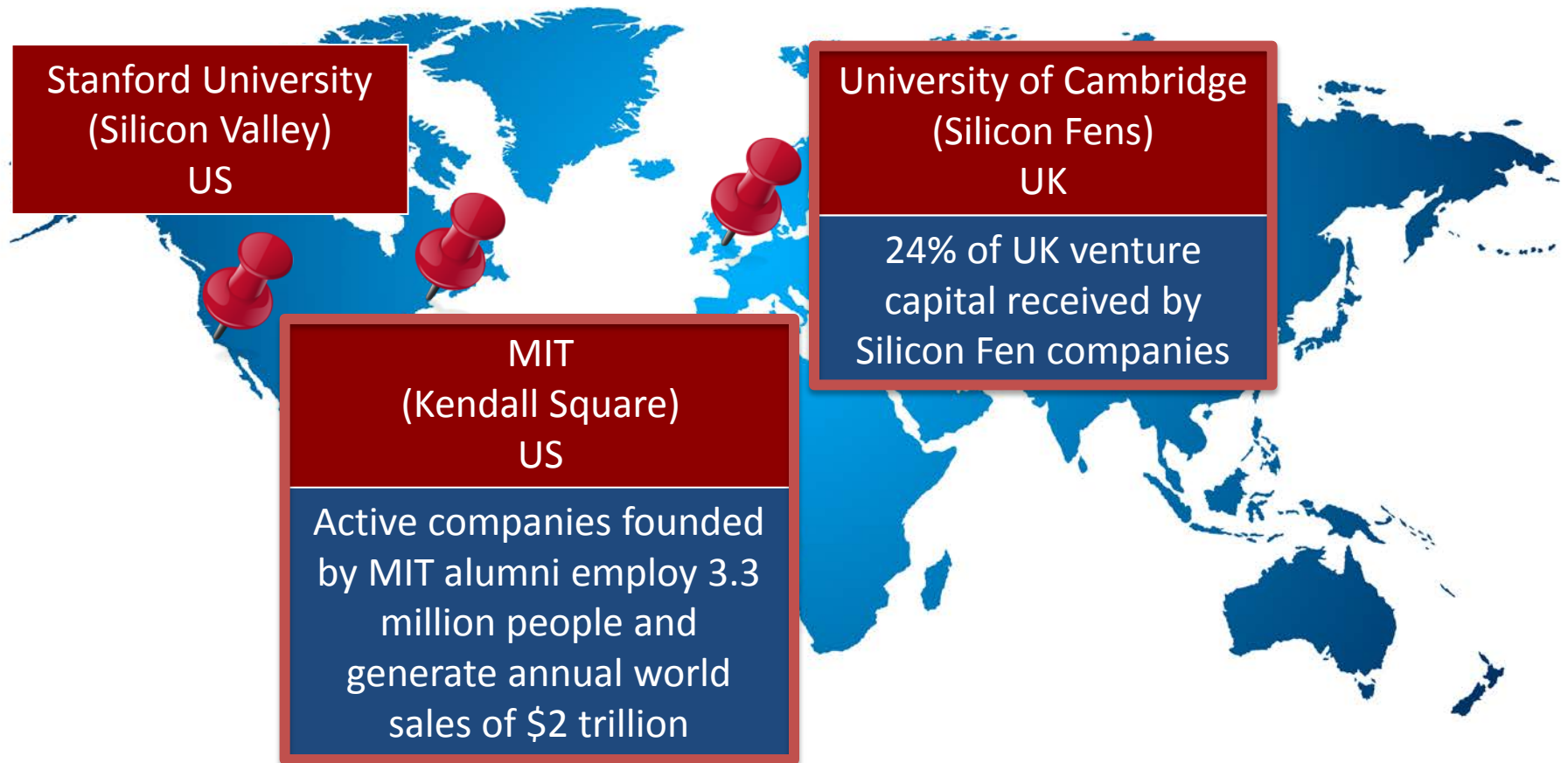
# Towards the entrepreneurial university

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# The world's most highly-regarded university-based technology innovation ecosystems...



But, drawing inspiration from these institutions, in their current form, does not provide insight in two important domains:

- How to drive and manage a process of institutional transformation towards a more entrepreneurial model
- How university-based ecosystems can be nurtured in cultural, economic and socio-political environments that might not be naturally conducive to E&I

An increasing number of universities in more challenging conditions are establishing strong reputations in entrepreneurship and innovation...

...universities that will undoubtedly be future leaders

...developing models that others across the world are likely to follow

# Questions framing the study

- Who are these emerging leaders?
- What can the wider academic community learn from their experiences?

# Study approach

# Three-phase process

- **Phase 1** sought to identify the world's most highly-regarded university-based E&I ecosystems, as well as 'emerging leaders', and characterise the approach taken by these institutions
- **Phase 2** focused on four selected universities identified as emerging leaders, and looked in depth at the drivers, conditions, change strategies and barriers associated with their E&I transformations

# Phase 2: case study universities



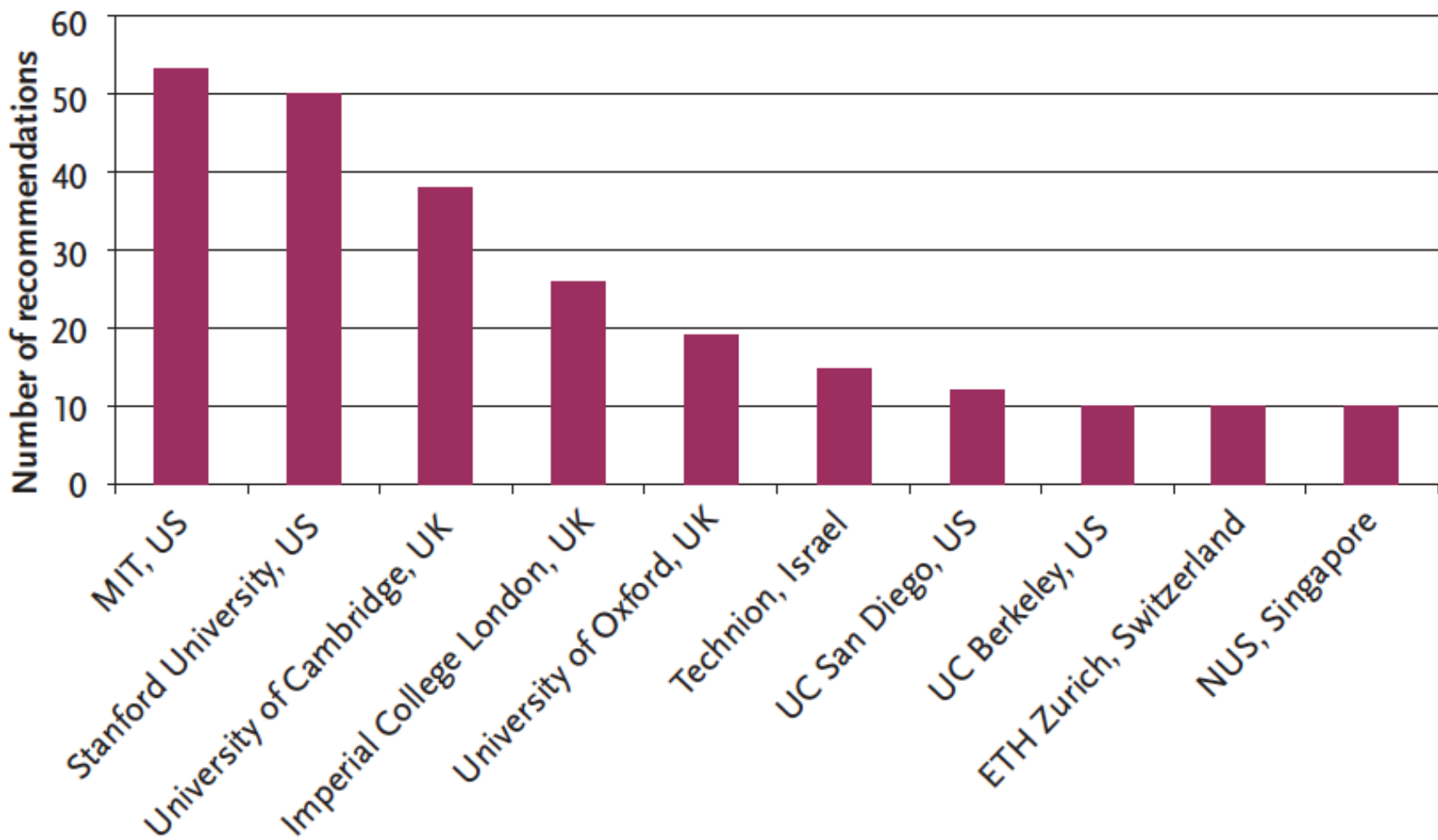


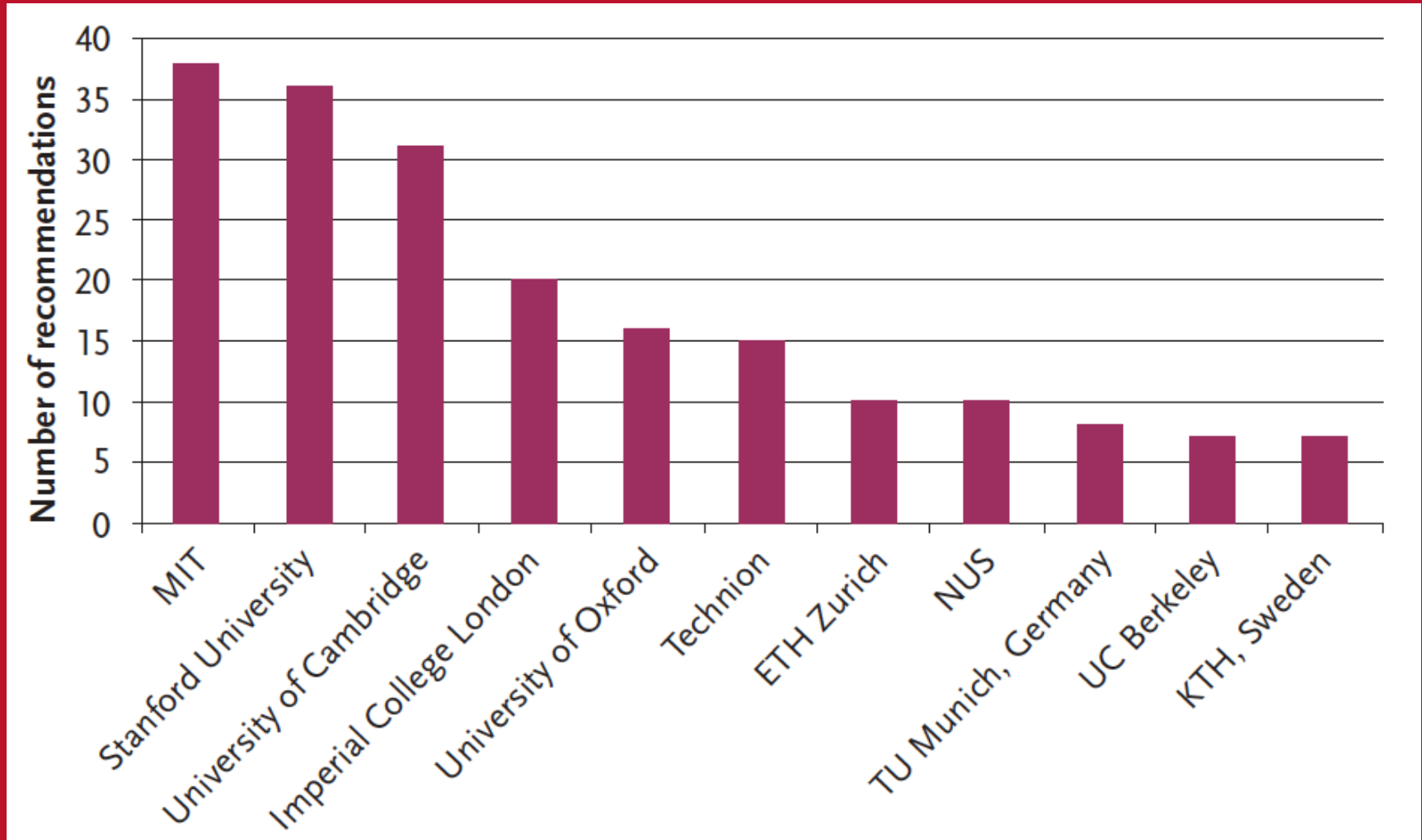
# Three-phase process

- **Phase 1** sought to identify the world's most highly-regarded university-based E&I ecosystems, as well as 'emerging leaders', and characterise the approach taken by these institutions
- **Phase 2** focused on four selected universities identified as emerging leaders, and looked in depth at the drivers, conditions, change strategies and barriers associated with their E&I transformations
- **Phase 3** drew together this evidence to identify (i) common success strategies and barriers association with the establishment of university E&I capability, and (ii) the implications for the wider community

Study outcomes

# The most highly-regarded university-based technology innovation ecosystems



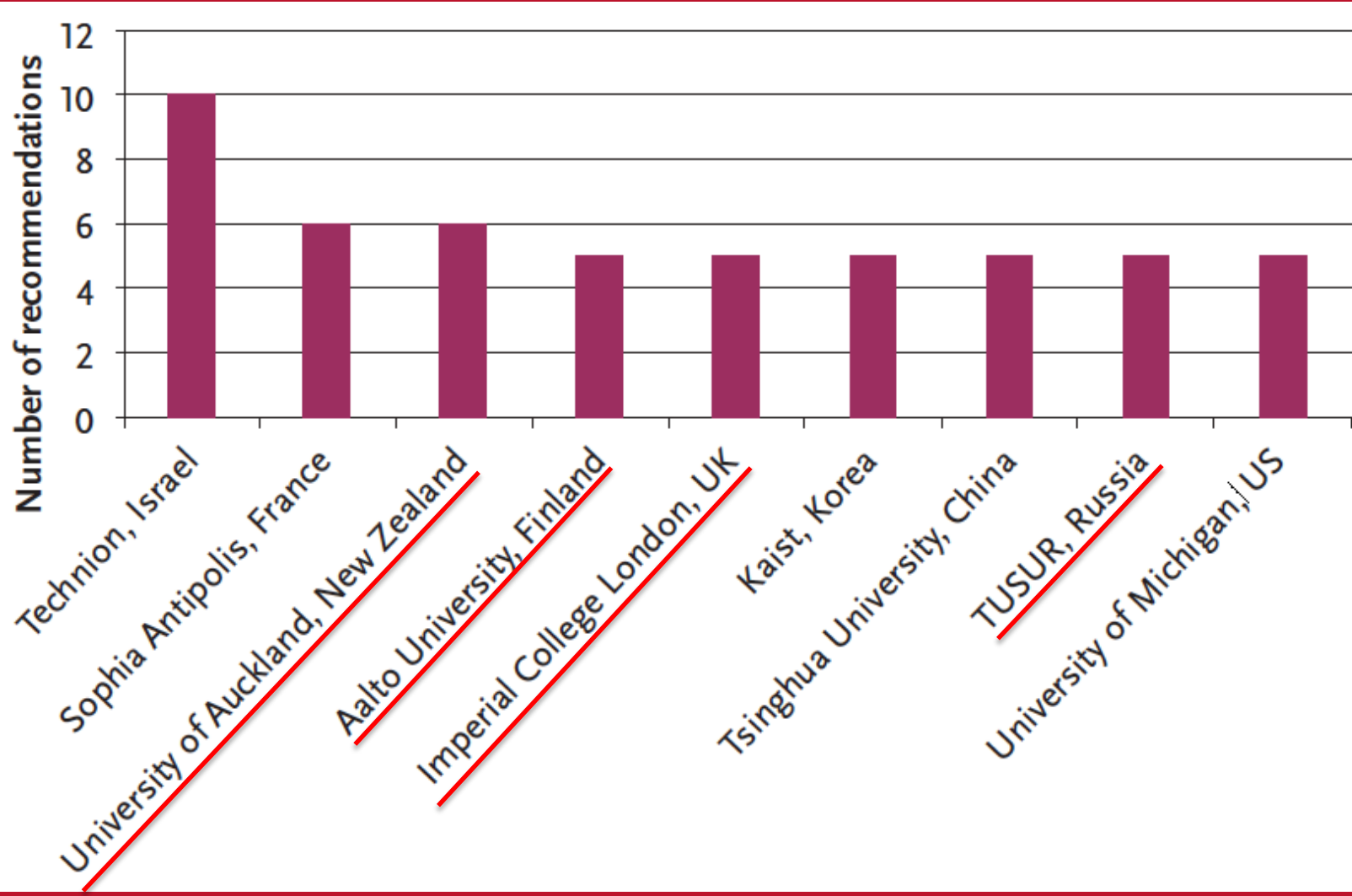


Adjusted for interviewee country of residence

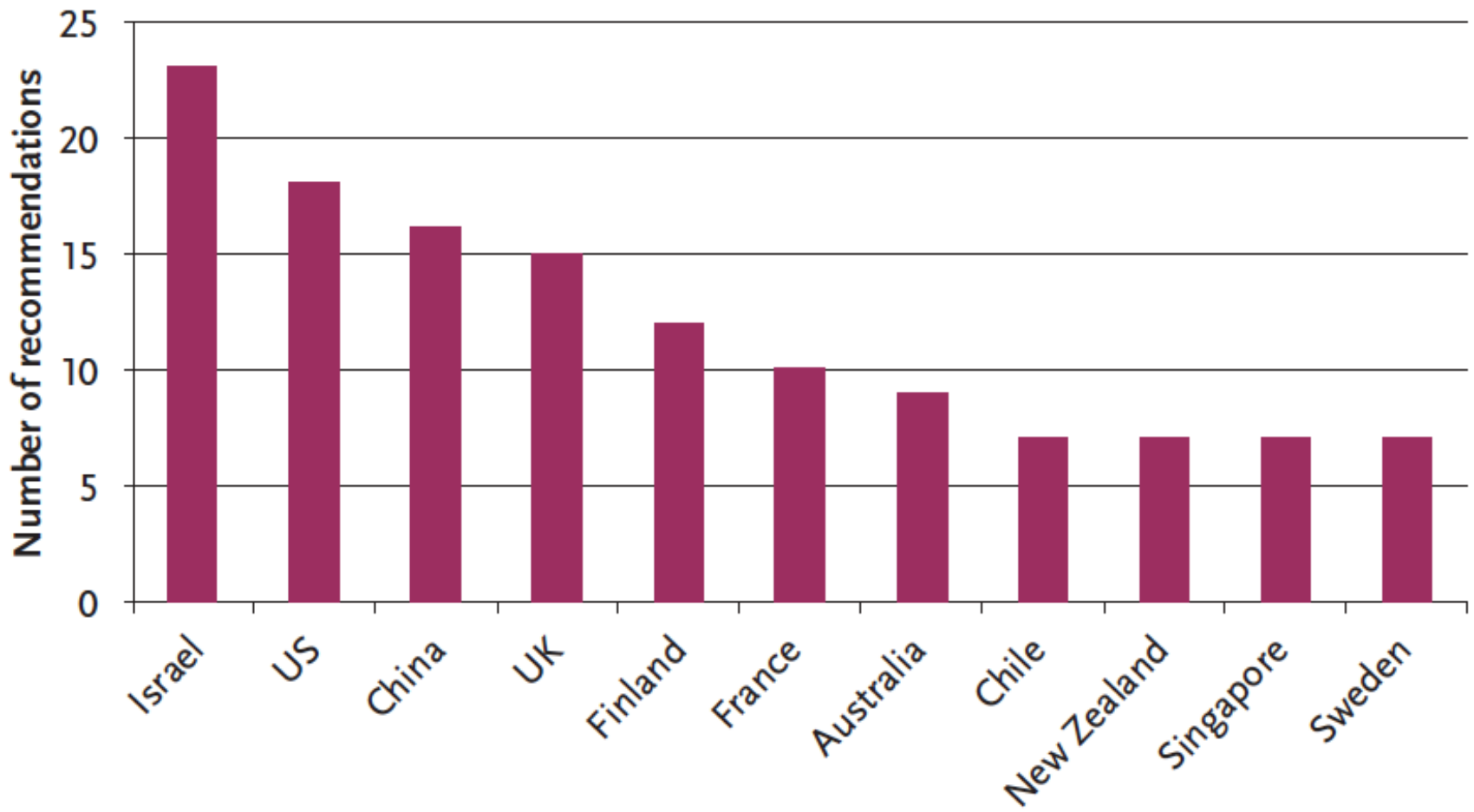
# The 'emerging leaders' operating in more challenging environments

# A challenging environment?

- A culture/country with a limited history of risk-taking and entrepreneurship
- Geographic isolation/poor transport links
- Very limited local venture capital
- Poor international research ranking of university
- Few or no multi-national companies in region/country
- Unattractive or hostile environment







# Study outcomes

2. What can be learnt from the group of 'emerging leaders'?

# Models of E&I development amongst the emerging leaders

# Model A: 'top-down' with 'tight IP control'

- Typically triggered by a desire to realise income from university research
- The E&I agenda is often driven by a strong and ambitious TTO with a clear preference for licences over startups
- Often building on established research strengths, the model offers a robust and fully institutionalised approach
- Potential for a lack of distinction between the university E&I strategy and that of the technology transfer office
- The primary focus on university-owned IP often leaves student and alumni communities marginalised with relationships with global R&D partners prioritised over the those with the regional E&I community

# Model B: 'bottom-up' with 'loose IP control'

- Often triggered by regional/national economic constraints, leading to a desire to position the university at the centre of a programme of capacity development, job creation and, ultimately, economic growth
- A grassroots movement, often 'bubbling-up' from students and alumni, to very quickly develop a vibrant inclusive ecosystem that is rooted into the regional entrepreneurial community
- Investment is focused on regional rather than institutional capacity; universities often downplay the importance of IP ownership
- Often attracts strong championship from university leadership and external funding
- With many activities operating outside formal structures, universities may struggle to regulate and institutionalise their E&I approach

# Shared features amongst the emerging leaders

# Shared features

- Well connected champions
- Public endorsement of E&I by senior management
- Responsive and flexible external support
- Mobilisation and drive of the student community
- Relationships of trust with the regional E&I community
- Creating a market for the university's innovative output

# Success factors apparent at TUSUR

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# Shared barriers to E&I development

## Barrier 1

# Barrier 1

The disconnect between the two key mechanisms that appear to be driving entrepreneurial growth...

## Component 1

Inclusive grassroots community of E&I engagement across university populations and regional community

## Component 2

Strength in industry-funded research and licensing of university-owned technology

# Barrier 1

- Emerging leaders often establish their E&I focus through one of two routes, leaving it imbalanced during the early stages
- There is often considerable tension at their interface and the two domains often operate in relative independence

## Component 1

Inclusive grassroots community of E&I engagement across university populations and regional community

## Component 2

Strength in industry-funded research and licensing of university-owned technology

# Barrier 1

- A faculty member interested in the commercial potential of their field of research is rarely encouraged to interact informally with experts from the regional ecosystem
- Participants in grass-roots E&I activities rarely have opportunities to learn from university research commercialisation or benefit from the national or international networks access by the TTO

## Component 1

Inclusive grassroots community of E&I engagement across university populations and regional community

## Component 2

Strength in industry-funded research and licensing of university-owned technology

# Barrier 1

The division between university-owned IP and non-university owned IP casts a long shadow...

## Component 1

Inclusive grassroots community of E&I engagement across university populations and regional community

## Component 2

Strength in industry-funded research and licensing of university-owned technology

# Shared barriers to E&I development

## Barrier 2

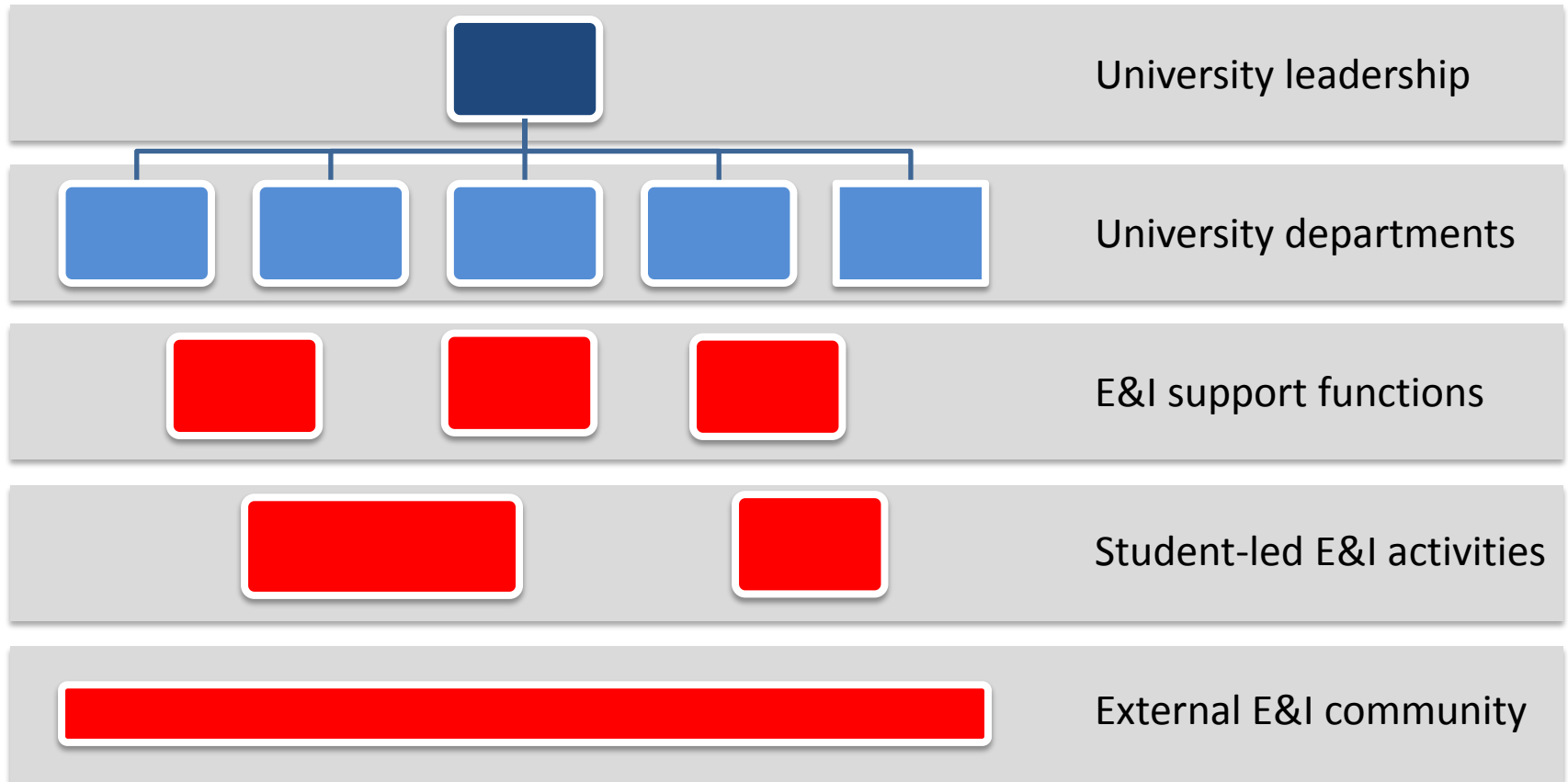
# Barrier 2

Entrepreneurship is rarely aligned with the core university functions of teaching and research...

...despite vocal commitment by senior management and a suite of high-profile E&I activities by support functions....

*“entrepreneurship is virtually invisible”* from university departments

# Barrier 2





# Barrier 2

For example:

- A university's entrepreneurial ambitions and profile are rarely reflected in the curriculum; in large part, the content and delivery remain fairly traditional
- There is little explicit encouragement to consider and harness commercialisation opportunities at an early stage of research; commercialisation is seen as a beneficial bi-product for a very small proportion of research rather than a mainstream driver for it

# Barrier 2

## Component 3

University E&I agenda reflected in its policies, mission, budget allocations, incentives and curriculum

## Component 1

Inclusive grassroots community of E&I engagement across university populations and regional community

## Component 2

Strength in industry-funded research and licensing of university-owned technology

# Recommended metrics

## 1. Input indicators: institutional approach

University policies and activities

Education/development opportunities offered

## 2. Process indicators: entrepreneurial culture and innovation capacity within the university

Individual staff/student attitudes and aspirations

Connectivity and university/industry engagement

Relevance and quality of research output

## 3. Output indicators: ecosystem impact

Technology transfer office throughput

The creation of sustainable companies

The impact of university graduates

Broader ecosystem development

Many of the 'emerging leaders' are well positioned to overcome these challenges, and universities such as ...

Aalto, TUSUR, KAIST, Michigan

...are considered by many to be pioneers in the field and will undoubtedly be sources of inspiration for universities across the world

# The emergence of engineering entrepreneurship education

... must change always been driven by a crisis?



# Drivers for establishing EEE programs:

- Discrete EEE courses driven by individual faculty members
- University-driven commitment to the entrepreneurship and innovation (E&I) agenda
- Government-driven strategic investment in technology-driven entrepreneurship education
- Student-driven entrepreneurship movement

# Discrete engineering entrepreneurship courses



## Imperial College London and the Royal College of Art

Design-led innovation and new venture creation: 10-week elective course catering to around 150 3<sup>rd</sup> and 4<sup>th</sup> year engineers that takes students on “*an entrepreneurial journey that mirrors the design process*”. Incorporates formal teaching sessions and a team project to “take a novel product to market”



# Discrete engineering entrepreneurship courses



- One-semester elective
- First half of courses focuses of case studies of successful and failed social ventures from across the world
- Second half of semester focuses on “developing an appropriate business model and implementation strategy for a “sustainable” social venture”
- Research program looking at retention of women in engineering through social entrepreneurship education



Social Entrepreneurship  
Penn State University

# Drivers for establishing EEE programs:

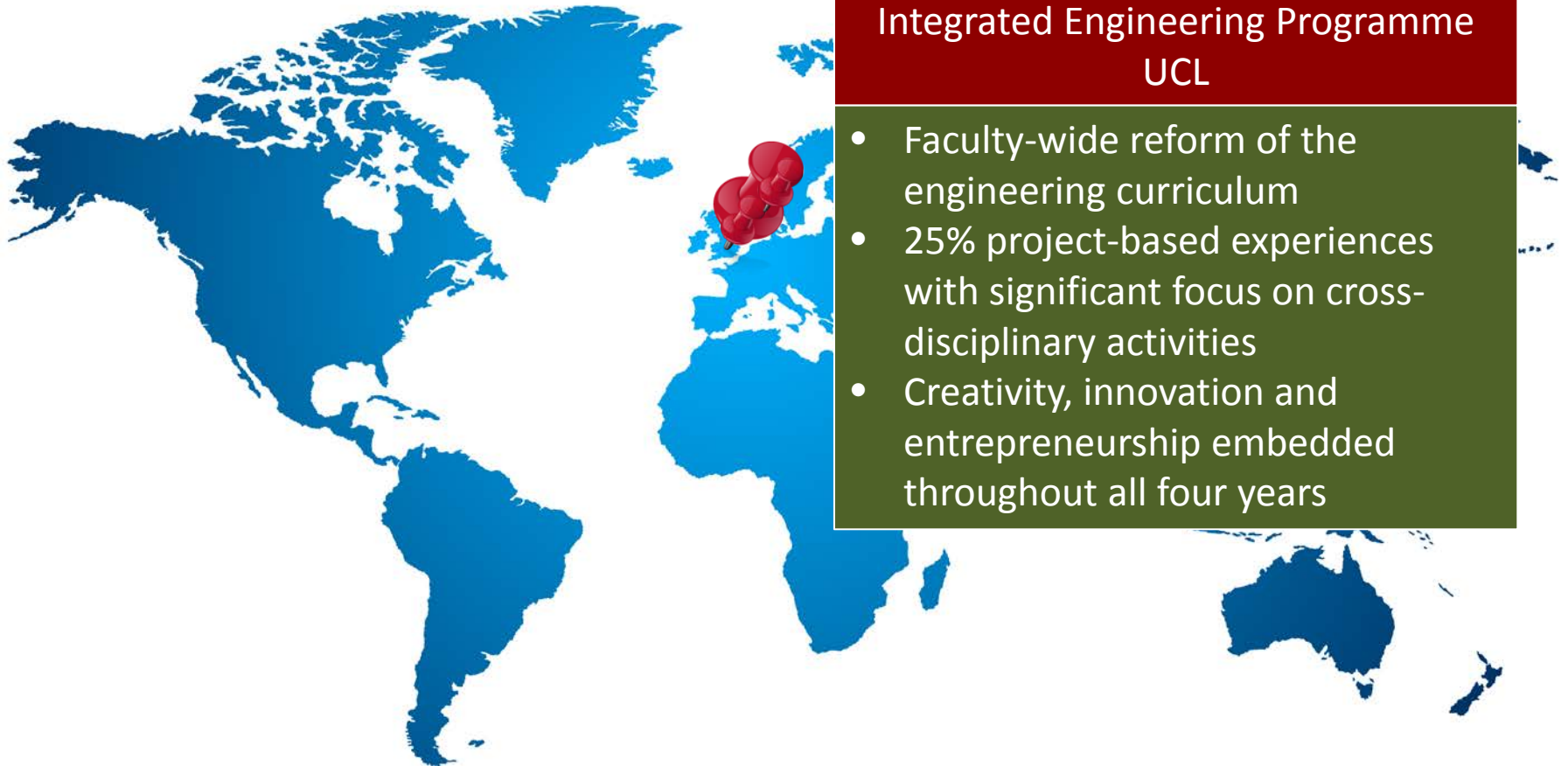
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# Institutional commitment to EEE

Skylab (est. 2013)  
Denmark Technical University  
Denmark



# Institutional commitment to EEE



## Integrated Engineering Programme UCL

- Faculty-wide reform of the engineering curriculum
- 25% project-based experiences with significant focus on cross-disciplinary activities
- Creativity, innovation and entrepreneurship embedded throughout all four years



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- **Government-led strategic investment in technology-driven entrepreneurship education**
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# Government-led investment in engineering entrepreneurship education

Engineering 2030 (est. 2014)  
PUC, Chile



Skolkovo Institute of Science and  
Technology (est. 2012)  
Russia



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- **Student-driven entrepreneurship movement**

# Student-driven entrepreneurship movement

Startup Sauna and AaltoES (est. 2010)  
Aalto University  
Finland





# Student-driven entrepreneurship movement



University Innovation Fellows  
Epicenter  
Stanford University, US



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Thank you