Electrification in Sweden

Exploring socio-technical barriers from key stakeholders via Q method

Nhu Anh Phan, Filip Johnsson, Lisa Göransson & Hans Hellsmark
Chalmers University of Technology
22.5.2023

Electrification – Onwards and Upwards

Social acceptance?

Permitting?

Grid capacity?

Import dependency?

Future economic and political system?

2021

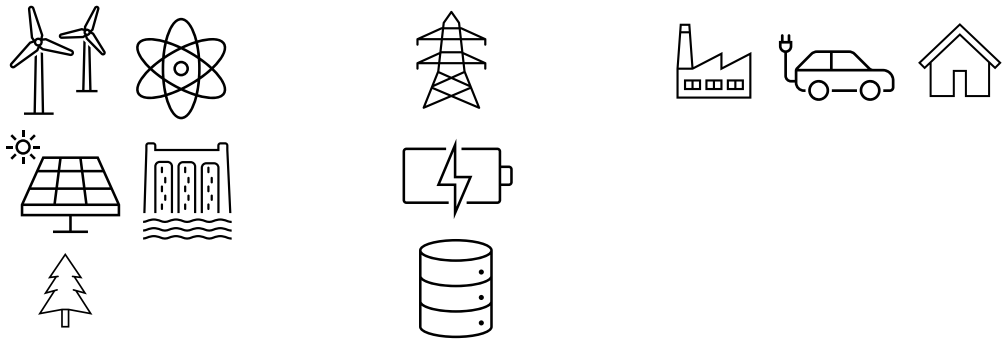
Electrification

2050

- Cost optimal
- 9GW Nuclear
- 22GW Offshore wind

48.7 million tons CO2 eq.

134 TWh of energy use



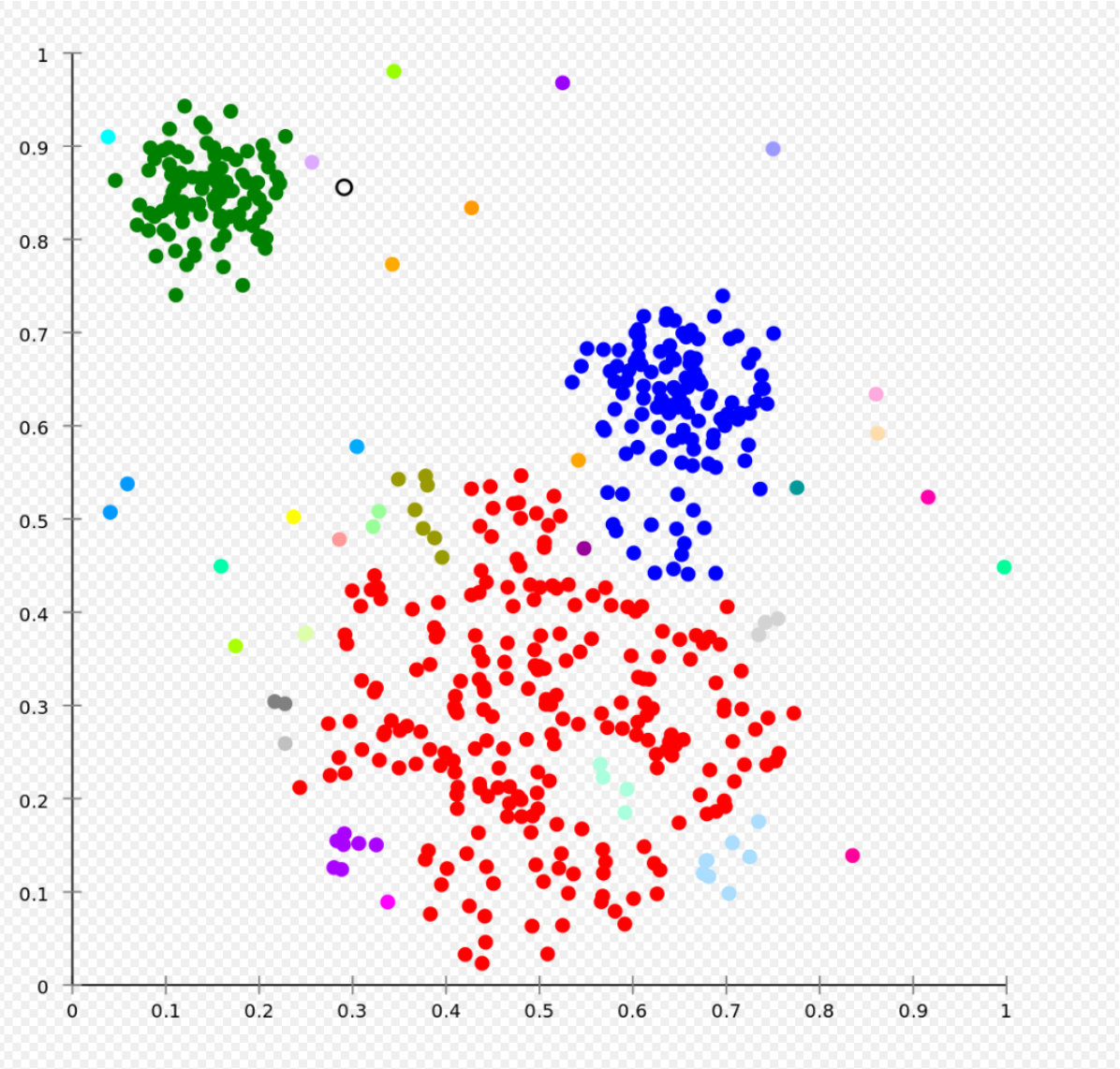
Carbon neutral

228 – 349 TWh

Source: SCB & Energimyndigheten

Aims

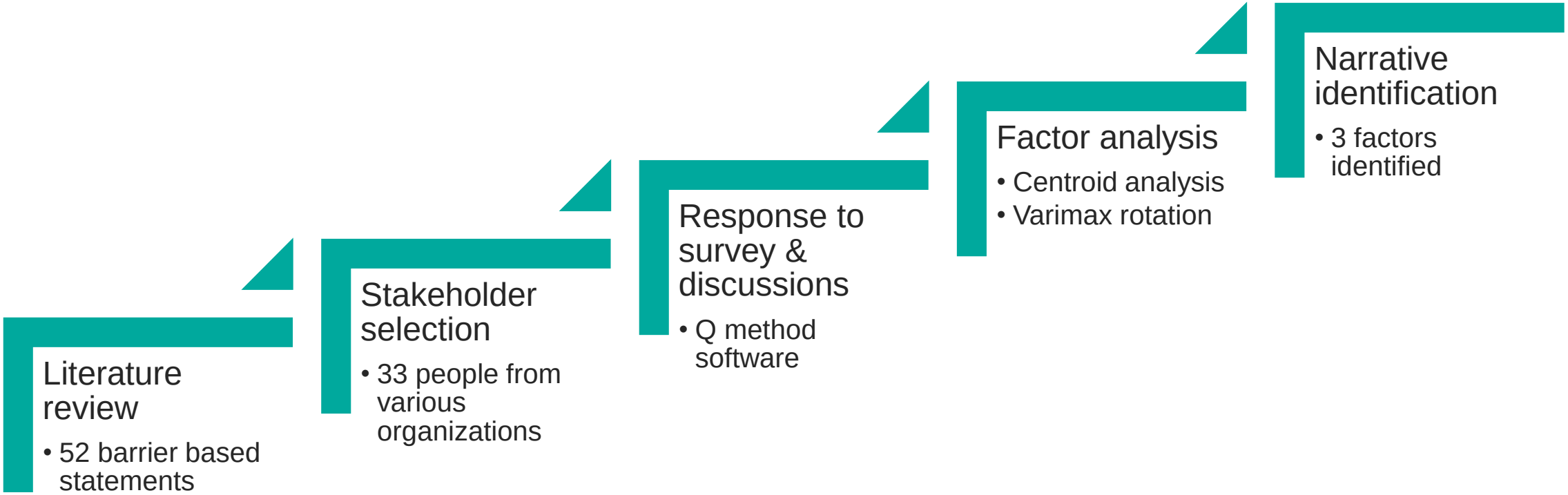
- Identify main **narratives** on **socio-technical barriers** to **electrification** from **stakeholders in the energy sector**
- Map out which barrier **overlaps** or **diverges** with each narrative



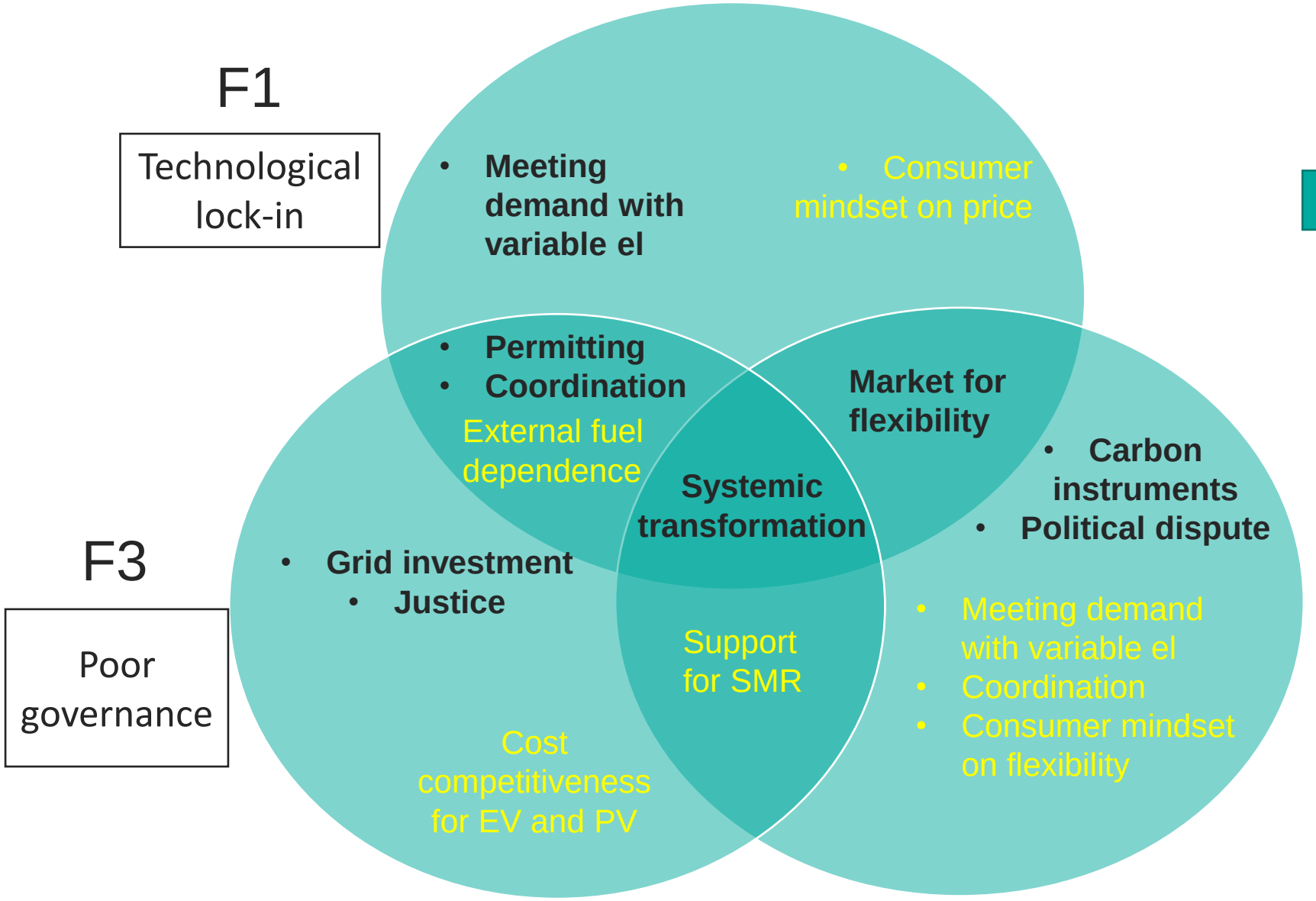
Q methodology

- Mixed method
- Small sample size
- Complex & ambiguous issues

Research steps



Extracted narratives on barriers



Important, unimportant

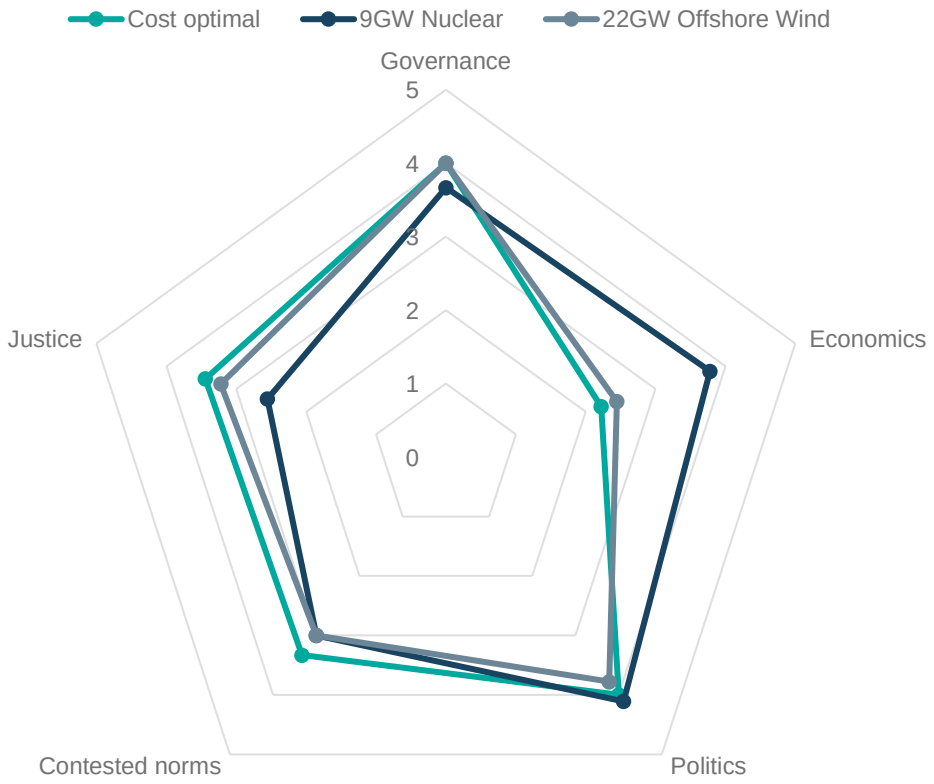
Conflicts of interest

- Nuclear and wind disputes
- Carbon instruments
- Grid capacity
- Financial compensation
- Permitting issues

Environmental values
Strong electrification vs community focus
Trust in the state

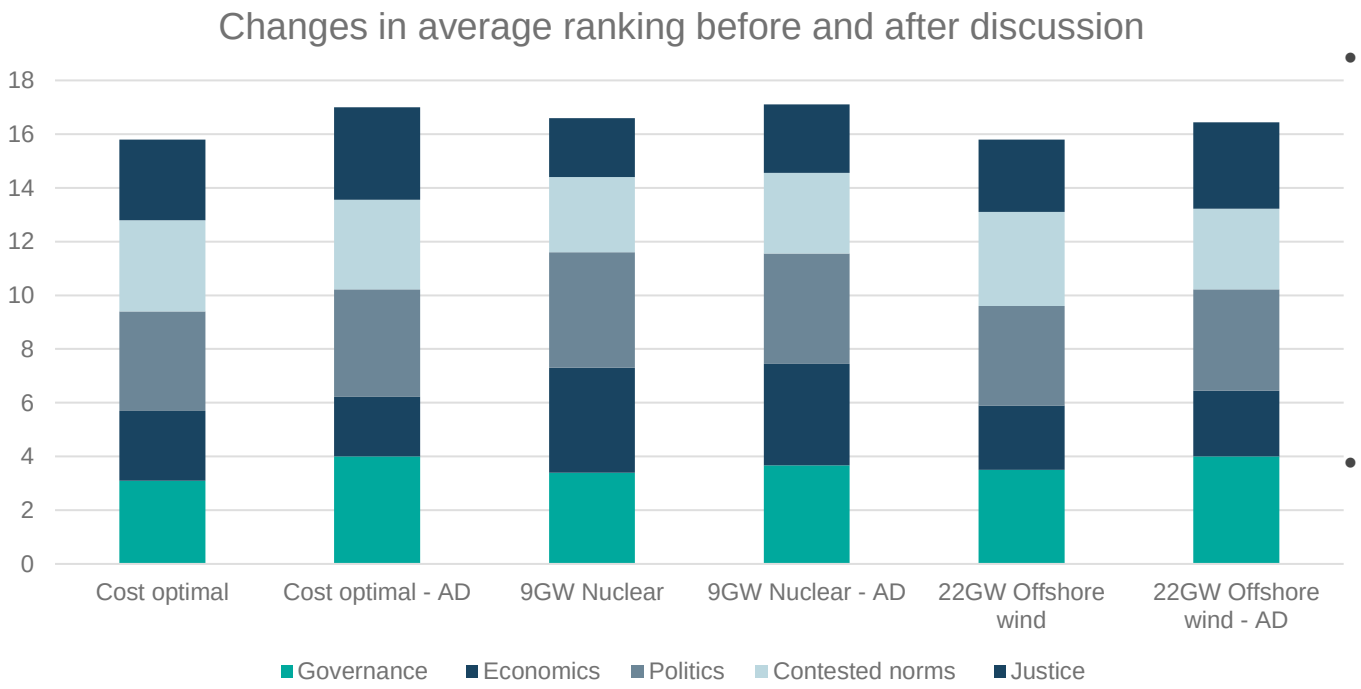
Workshop outcome – Ranking exercise

Average ranking on the importance of barriers in each scenario



- Perceived barriers differ between plannable and variable electricity generations
  - Cost optimal and 22GW offshore wind scenarios have almost overlapping rankings
  - 9GW nuclear scenario stood out and has higher total ranking
- Politics and governance barriers are ranked highly across all scenarios

Workshop outcome – Before and After discussions



- Total rankings increased post discussion but changes in individual barriers vary unevenly
  - Cost optimal scenarios: Barriers in governance increase, while economics and contested norms lose points
  - 9GW nuclear scenario: Barriers on economics and politics decrease
  - 22GW offshore wind: All barriers except contested norms gain scores
- Uncertainties persist on planning pattern, finance structure, resistance level and desirable Swedish energy futures

Conclusions

- 3 overarching perspectives on barriers to electrification from key stakeholders were identified
- Strong polarization wasn’t observed and the ranking is contigent on envisioned energy futures
- Q method highlights sources of uncertainties in the transition by enabling stakeholders to prioritize different barriers and voice their reasonings

Next steps: Formulate barriers as constraints in scenario studies

Discussion

- How to characterize barriers in order to facilitate timely policy interventions?

Get in touch

Nhu Anh Phan
nhuanh.phan@chalmers.se

Filip Johnsson
filip.johnsson@chalmers.se

Lisa Göransson
lisa.goransson@chalmers.se

CHALMERS

UNIVERSITY OF TECHNOLOGY