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ECSS 2016 Budapest

Eötvös Loránd University (ELTE)

DIGITALIZATION **AS A STRATEGIC CHOICE AT UNIVERSITY – CHALLENGES IN RESEARCH AND EDUCATION**

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Digitalization:
Integration of digital technologies into everyday life by the digitization of everything that can be digitized.

(businessdictionary.com 2014)

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Digitalization

- Digitization
- The development, production, services, product use, product and services evolution are becoming “digitalized” i.e. “software-driven”

- Digital and physical is getting fully integrated

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Informatics

Informatics is core of digitalization

- New technologies become central
  - (Data science, Machine Learning, IoT, parallel computing, distributed systems, heterogeneous computing platforms)
- New context – everyone is using ICT
- Scaling up
  - Complexity
  - Continuous change in the infrastructure

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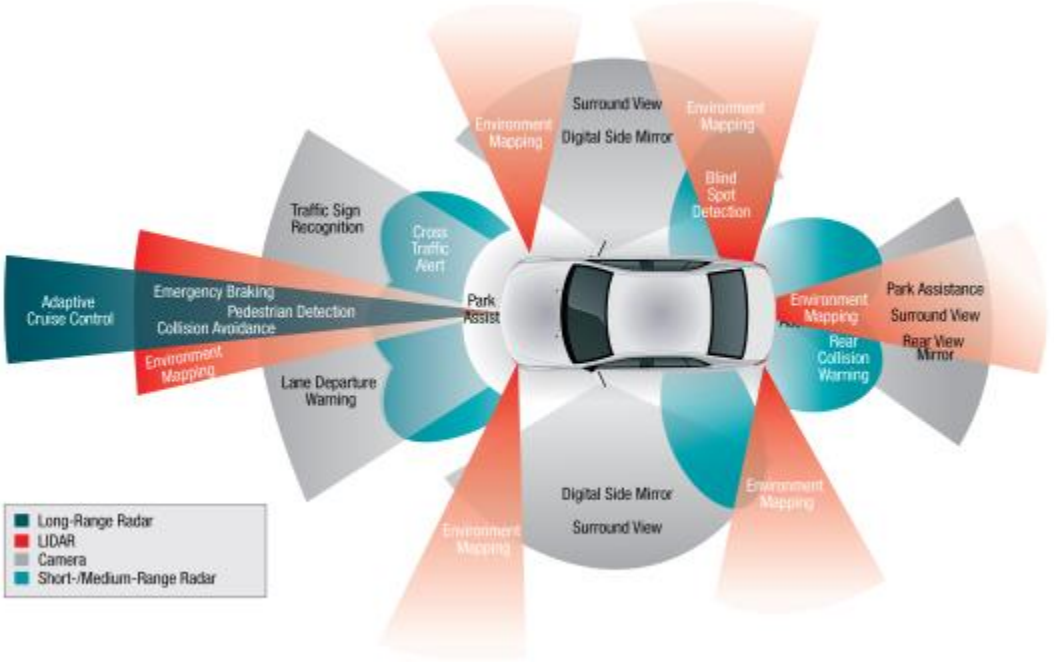
Example: Digitalization and Cyber-Physical Systems



Digitalization:

In production

In the product

In engine

In infotainment system

In performance – autonomous driving

In communication

In maintenance

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Challenges of Digitalization for CPS

Development & Production	**Products & Services**	**Systems (of Systems)**
SW and HW development processes	End-user feedback	Continuous accurate and reliable communication
SW/system architectures	Data collection & filtering	Data-driven optimisation
SW/HW product lines & continuous integration	Data analysis and visualisation	Ad-hoc system/mission integrations
Software/system quality assurance in continuous change	Cybersecurity & safety	IoT integration
Data-driven decision models	Continuous adaptation & improvements	…..
…..	Ad-hoc service integration	
	…..	

Informatics:
Fundamentals in Data Science, CyberSecurity, Communication
Applied informatics

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How to organize research and education for new interdisciplinary fields?

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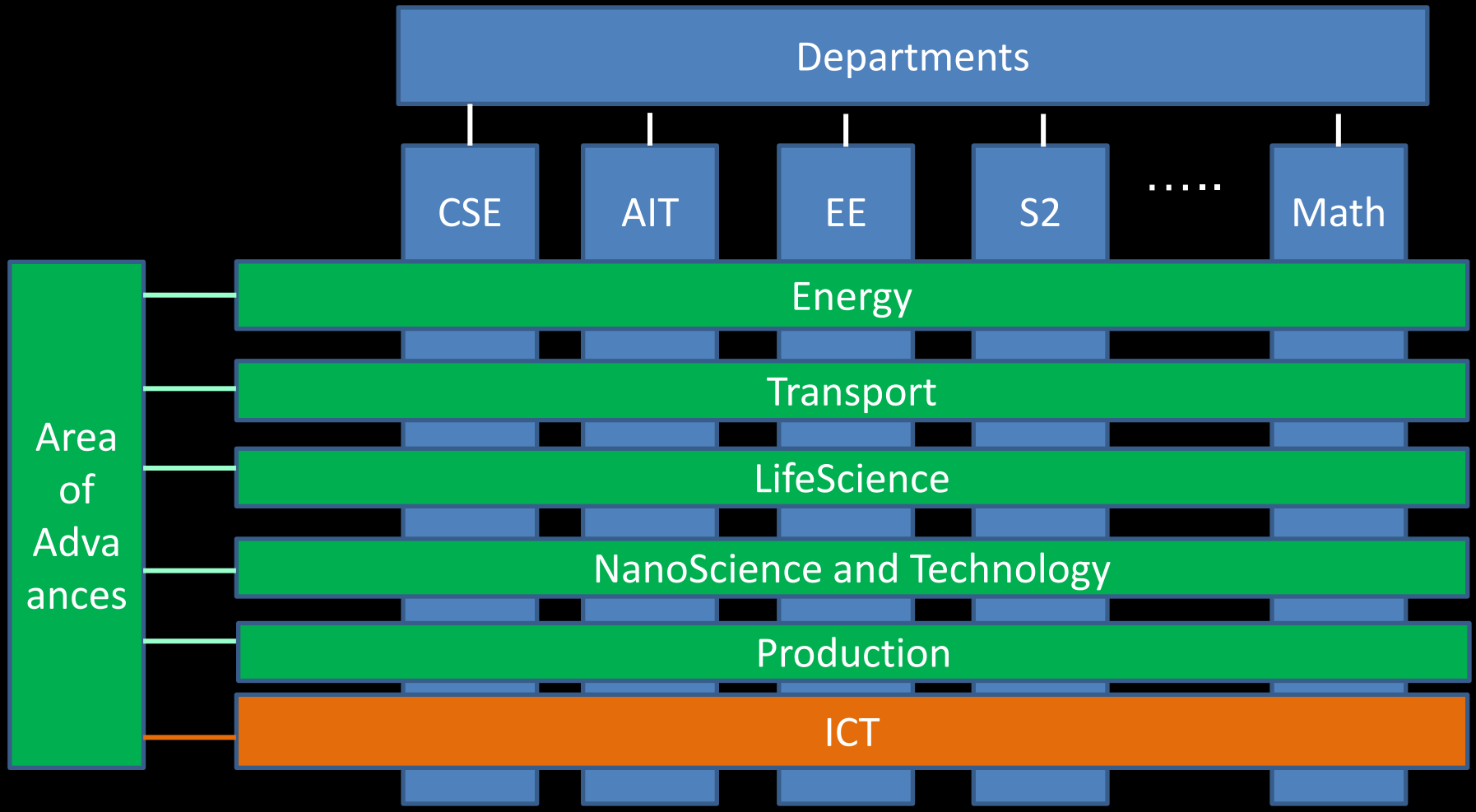
Chalmers Example



ICT bringing a paradigm shift in modern society

THE DIGITAL SOCIETY – Interdisciplinarity of research for digitalisation

Connected World	**Automated Society**	**Big Data**	**Digital sustainability**
Advanced communication, including new technologies in algorithms, hardware, software, and systems. human	Intelligent automation of manual processes through ICT support.	Managing large amount of data & advanced computation and modeling based on data.	Sustainable development (economic, social, environmental techological) with the aid of ICT technologies.

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ICT@Chalmers - current activities

- KAW project – Autonomous systems WASP – 2B€
- BIG-DATA initiative – BIG DATA experts
- Competence Centers
  - Software Center
  - e-Science Center
  - Chase, GHZ – communication (antennas and wireless)
- …..

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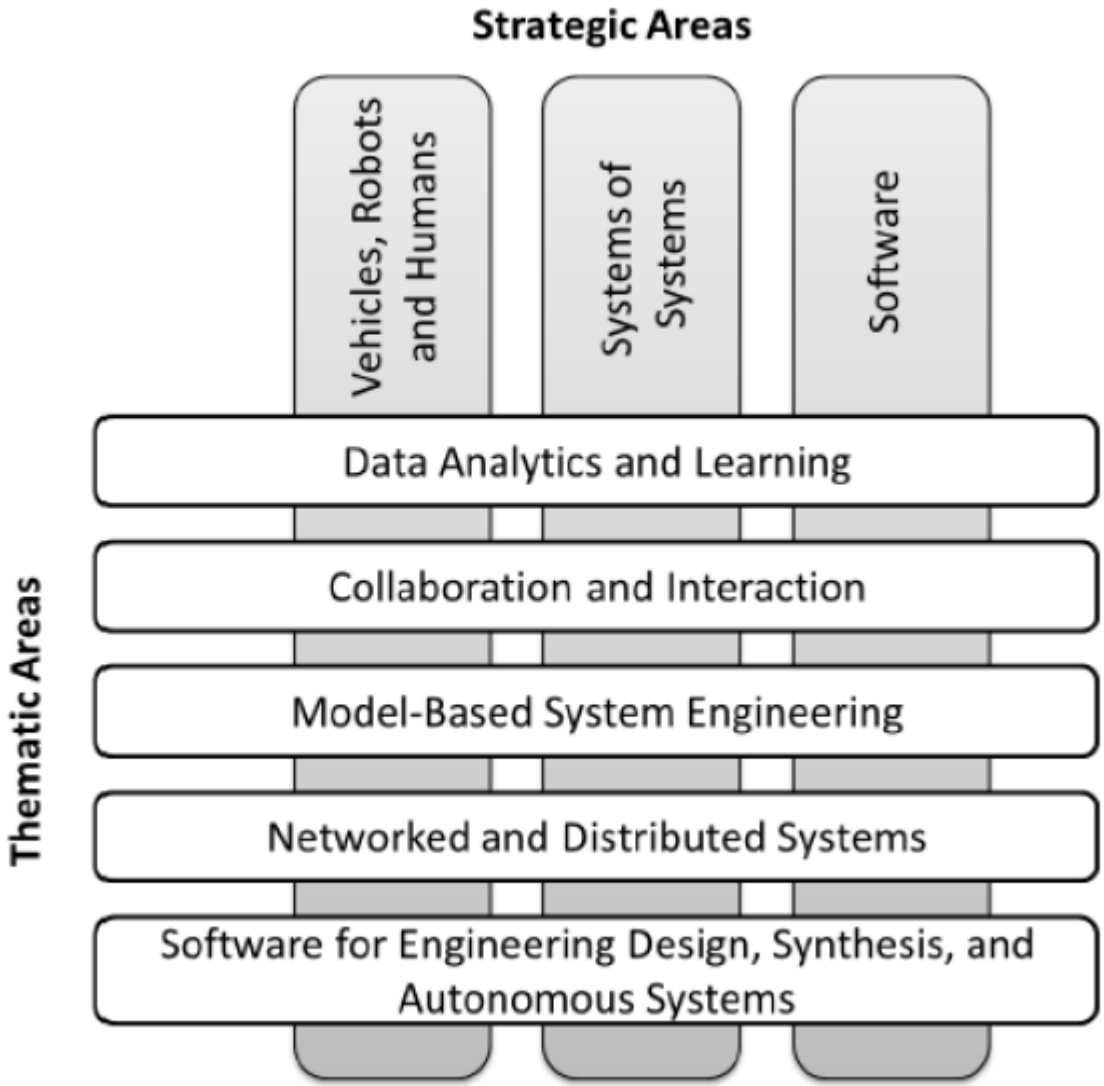
WASP Thematic Structure



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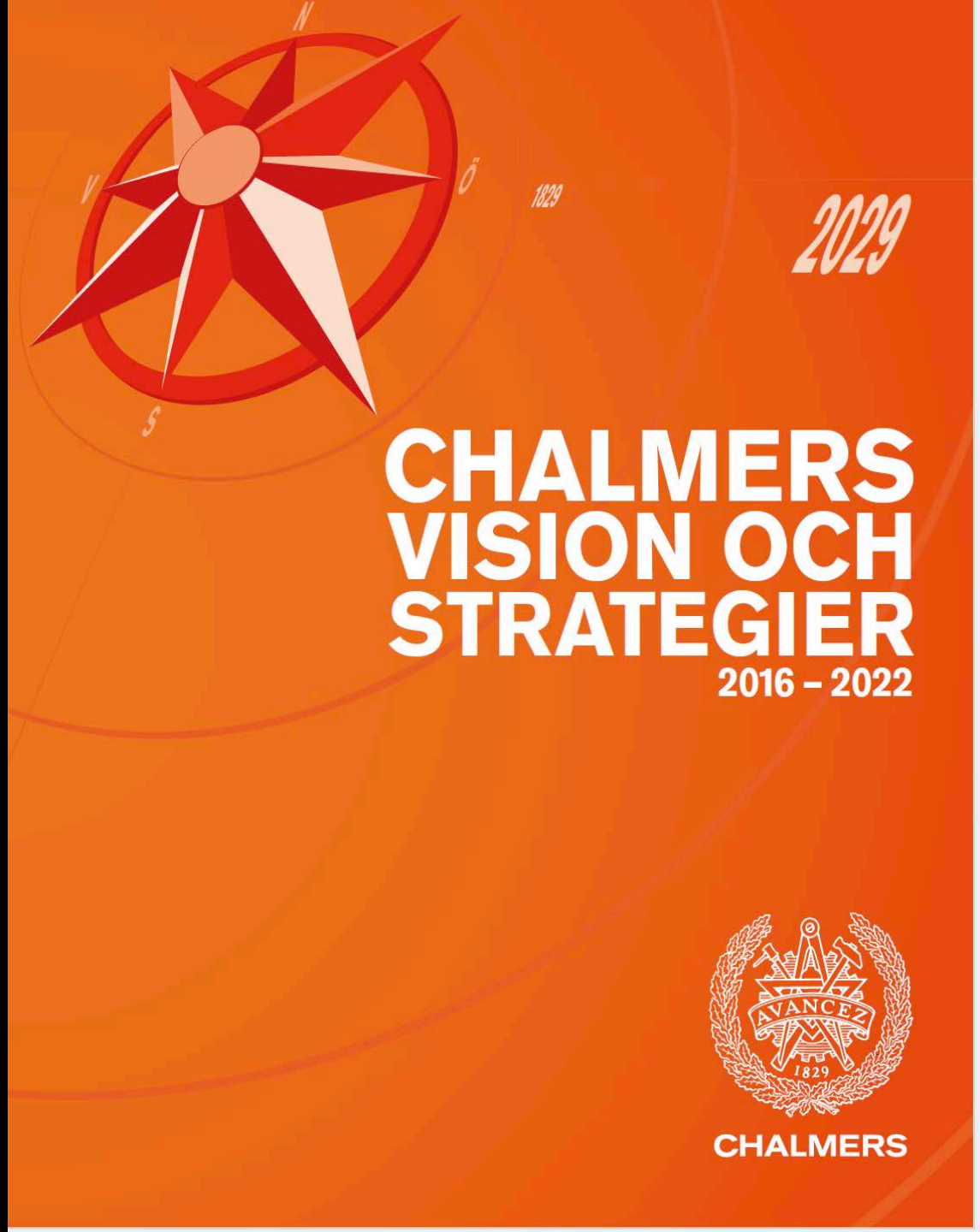
What about Digitalization @Chalmers?



DIGITALISERING
INOM ALLA OMRÅDEN

DIGITALISATION IN EVERY AREA

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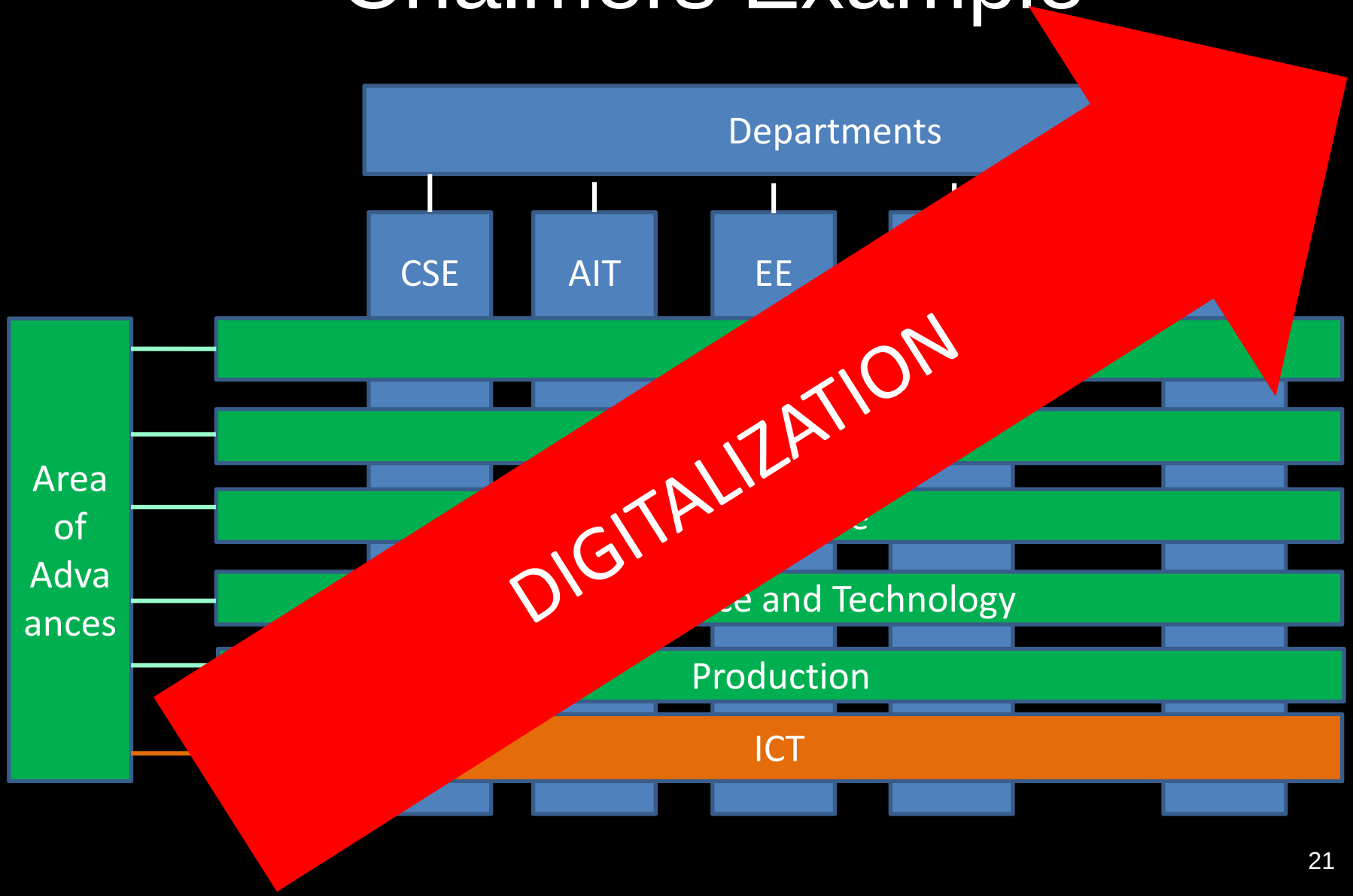
Chalmers Example



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Digitalization@Chalmers Initiative

http://www.chalmers.se/en/areas-of-advance/ict/Pages/default.aspx

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DIGITALIZATION FOR SUSTAINABLE SOCIETY SUMMIT 12-16 June, Gothenburg

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Digitalization@Chalmers Initiative

- Digitalization@AoA
  - ICT,Production, Energy, Transport
    - Current activities and & strategy for the future
- PhD School on Digitalization
  - Different fields
    - Computer Science, Software Engineering, Communication, Transport & Traffic, Cyber security, Safety, Bioinformatics
    - cognitive science
    - Social sciences (Ethics, Business)

Digitalization@Chalmers Initiative

- Education
  - ~~Data Science master program~~
  - Data Science course packages from different programs
    - Informatics (Data bases, ML)
    - Mathematics (Data analytics)
    - Communication
    - Bioinformatics
    - Visualisation

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Digitalization@ Initiative

- Education
  - Applied Data Science master program
    - **Target group: students from diverse backgrounds**
    - Broader spectrum
      - Basic data-science courses
      - Specialized courses in different fields in humanities

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Conclusion

- Digitalization – interdisciplinary research
  - Difficult to find a consensus what does it belong to digitalization
  - Difficult to have an integrated approach
  - Strategy: combinations of a top-down and bottom-up approach