NTNU | Norwegian University of Science and Technology

Digital Infrastructure & Smart Maintenance

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SPIN
Signal Processing for INdustry 4.0

- **Education** (Univ. Naples "Federico II", Italy)
  - Dr.Eng. Telecommun. Eng. (2002)
  - Ph.D. Computer Eng. (2005)
- **Postdoc**
  - Univ. Naples "Federico II", Italy (2005)
  - Second Univ. Naples, Italy (2006)
  - NTNU, Norway (2006-2008)
- **Academia**
  - Assistant Prof., Second Univ. Naples, Italy (2008-2014)
  - Associate Prof., NTNU, Norway (2014-2016)
  - Full Prof., NTNU, Norway (2016-2017)
  - Full Prof., NTNU, Norway (2019-ongoing)
- **Industry**
  - Principal Engineer, Kongsberg Digital, Norway (2017-2019)
- **Visiting Appointments**
  - Drexel Univ., PA, US (2004)
  - Lund Univ., Sweden (2007, 2008)
  - NTNU, Norway (2009, 2010, 2013)
  - Uppsala Univ., Sweden (2013)

- **Machine Learning & Industry 4.0** (since 2016)
  - Anomaly Detection, Condition Monitoring
  - Digital Twins, O&G, Sensor Validation
  - Renewables, Smart Grid
  - Situational Awareness
- **IoT & Sensor Networks** (since 2012)
  - Data Fusion
  - Distributed Detection & Estimation
  - UAV Systems
  - Underwater Sensor Networks
- **Wireless Communications** (2004-2018)
  - Channel Estimation & Modeling
  - Cooperative Communications
  - Iterative Decoding, Multiuser Detection
  - Multiantenna Systems
  - Spectrum Sensing
  - Underwater Communications
- **Computer Networks** (2002-2006)
  - Loss/Delay/Traffic Modeling & Classification
- **Speech Technology** (2001-2003)
  - Prosody Modeling, Speech Synthesis

NTNU Strategic Areas for Research

NTNU Energy

NTNU Health

NTNU Oceans

NTNU Sustainability

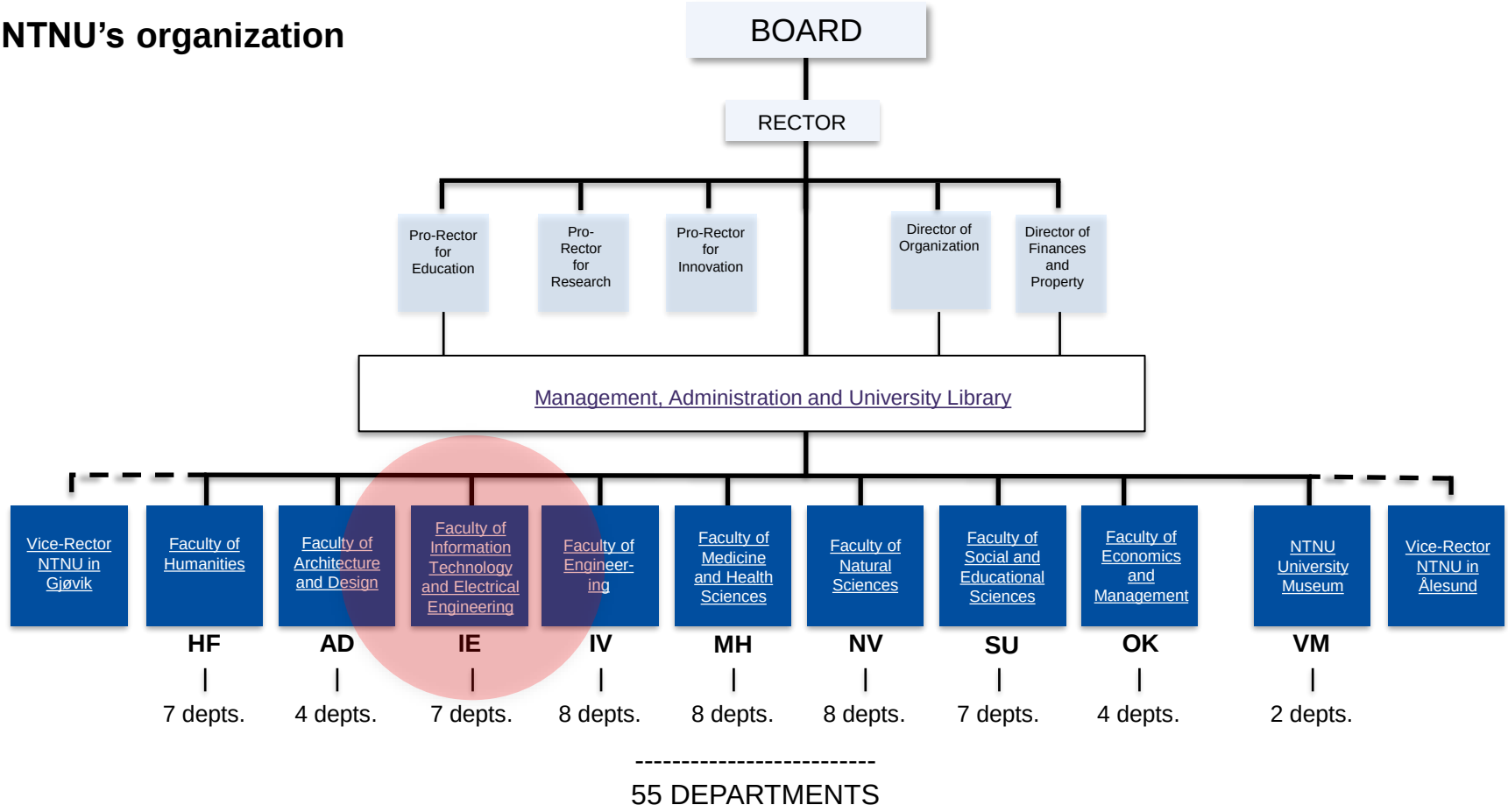
Enabling technologies

NTNU
BIOTECHNOLOGY

NTNU
DIGITAL

NTNU
NANO

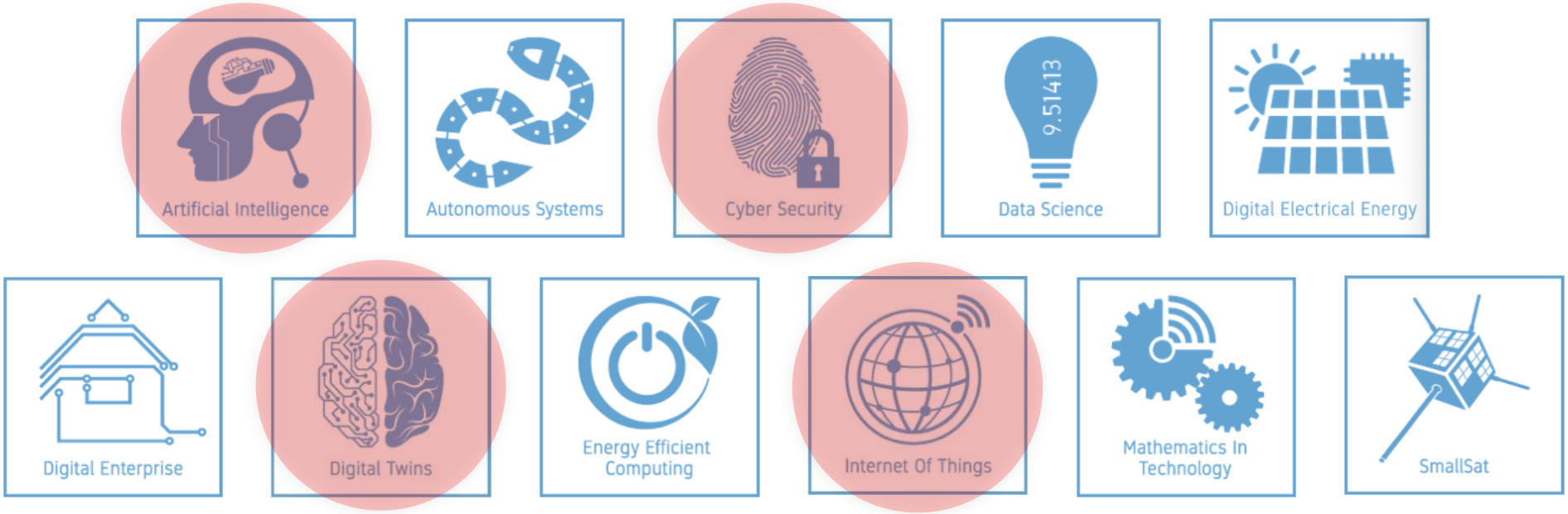
NTNU's organization



Faculty of Information Technology and Electrical Engineering (IE)

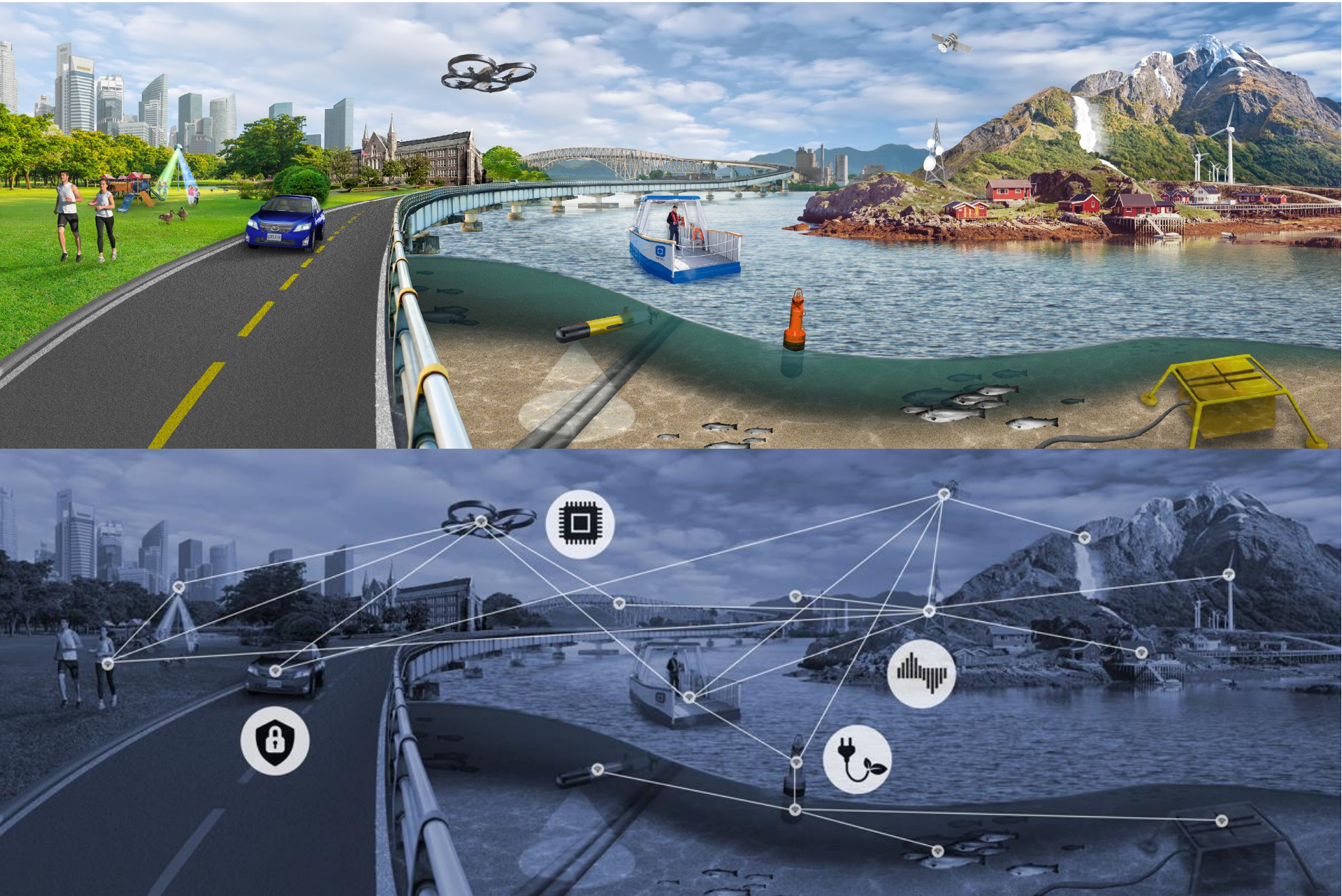
- Department of Computer Science
- Department of Electronic Systems
- Department of Electric Power Engineering
- Department of ICT and Natural Sciences
- Department of Information Security and Communication Technology
- Department of Mathematical Sciences
- Department of Engineering Cybernetics

NTNU-IE Strategic Areas for Research



Digital Twins

Internet of Things

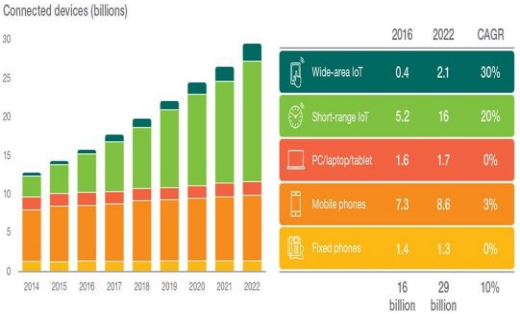


Artificial Intelligence – Cyber Security

The Perfect Storm

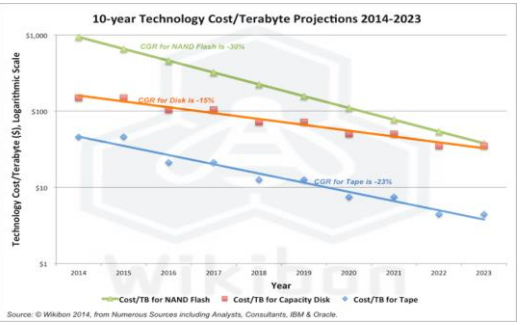
Computing Power

cloud and hyperscale computing are horizontal, commoditized enabling technologies available to anyone



Connectivity

connected devices, systems, and user-generated content have provided enormous datasets



Storage Cost

cloud-based solutions and various technologies are decreasing the cost of data storage

Research Environment

- Open Collaboration
- Open-Source Software
- Reduced Entry Barriers

Data-Driven Projects

Data

- Sensor Measurements
- Weather & Environment
- Synthetic Data
- User Interaction
- Images & Video
- Surveys

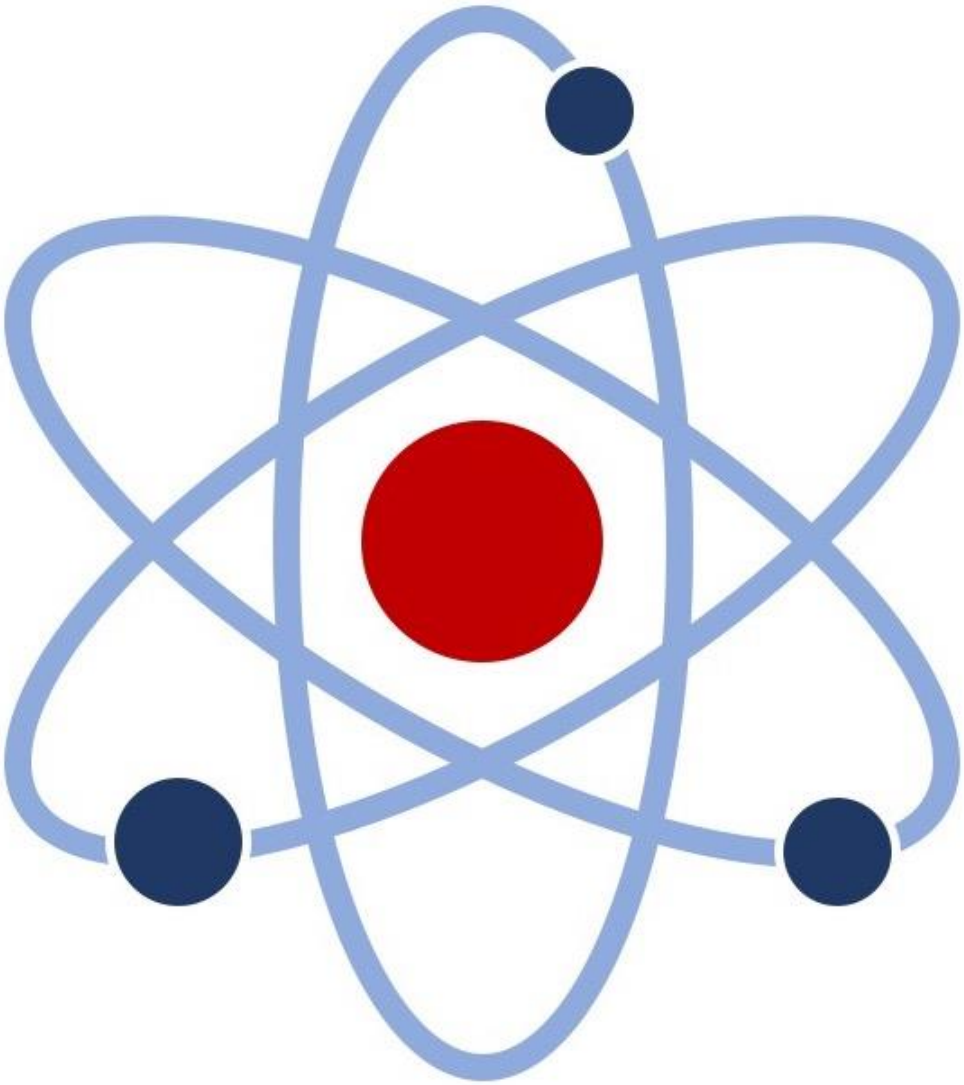
Data Issues

- Cost
- Ownership
- Anonymity
- Safety & Security
- Variability
- Burstiness
- Labeling

Advanced Analytics: Maturity Model

	Descriptive *Report*	Diagnostic *Discover & Explore*	Predictive *Forecast*	Prescriptive *Anticipate*
Question	**What** happened? **What** is happening?	**Why** is it happening? **Where** are the problems? **What** are the trends?	**What** is likely to happen next?	**What** should I do? **What** is the next best action?
Technique	Business reporting Scorecard	Agile dashboards Cause and effects	Predictive modeling Regression analysis	Artificial intelligence Machine learning Simulation
Example	Financial results Staff performance Scorecard	Risk analysis Workforce analytics	Strategy and growth analysis Customer analytics	Analytical applications with simulated outcome

Cross-Functional Teams



Domain Knowledge

- Industrial Expertise
- Goals
- Limitations

Data Science

- Model Design
- Data Processing
- Information Extraction

Software Engineering

- SW Development
- Scalability
- Real-Time Applications

Resilience

Mobility

Resource Efficiency

Green2050 – Centre for Green Shift in the Built Environment

Centre for Green Shift in the Built Environment aims to be an arena of networking and collaboration between academia and the industry. A hub for accelerating existing, planned, and new projects. The goal is to transition into a carbon neutral built environment within 2050.

The built environment is crucial if we shall achieve national and international goals related to more sustainable roads, infrastructure and cities.

The construction sector is responsible for more than 40% of the world's energy consumption today. 40 % consumption also means that there is a possibilty to be 40 % of the solution for the green shift.

Green2050 will provide research of excellence and educate candidates with high digital- and sustainability competence ready to take on the green shift.

Want to become carbon neutral by 2050 or join a project? Contact us

Contact

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Valgrinda: S.P. Andersens veg 5

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NTNU

green 2050