

EVENTOS

XVI Jornadas CRAI

2018

e

How to achieve an association of the library as a Digital Laboratory with users: challenges and opportunities

**Alan Kay “The best way to
predict the future is
to invent it”**

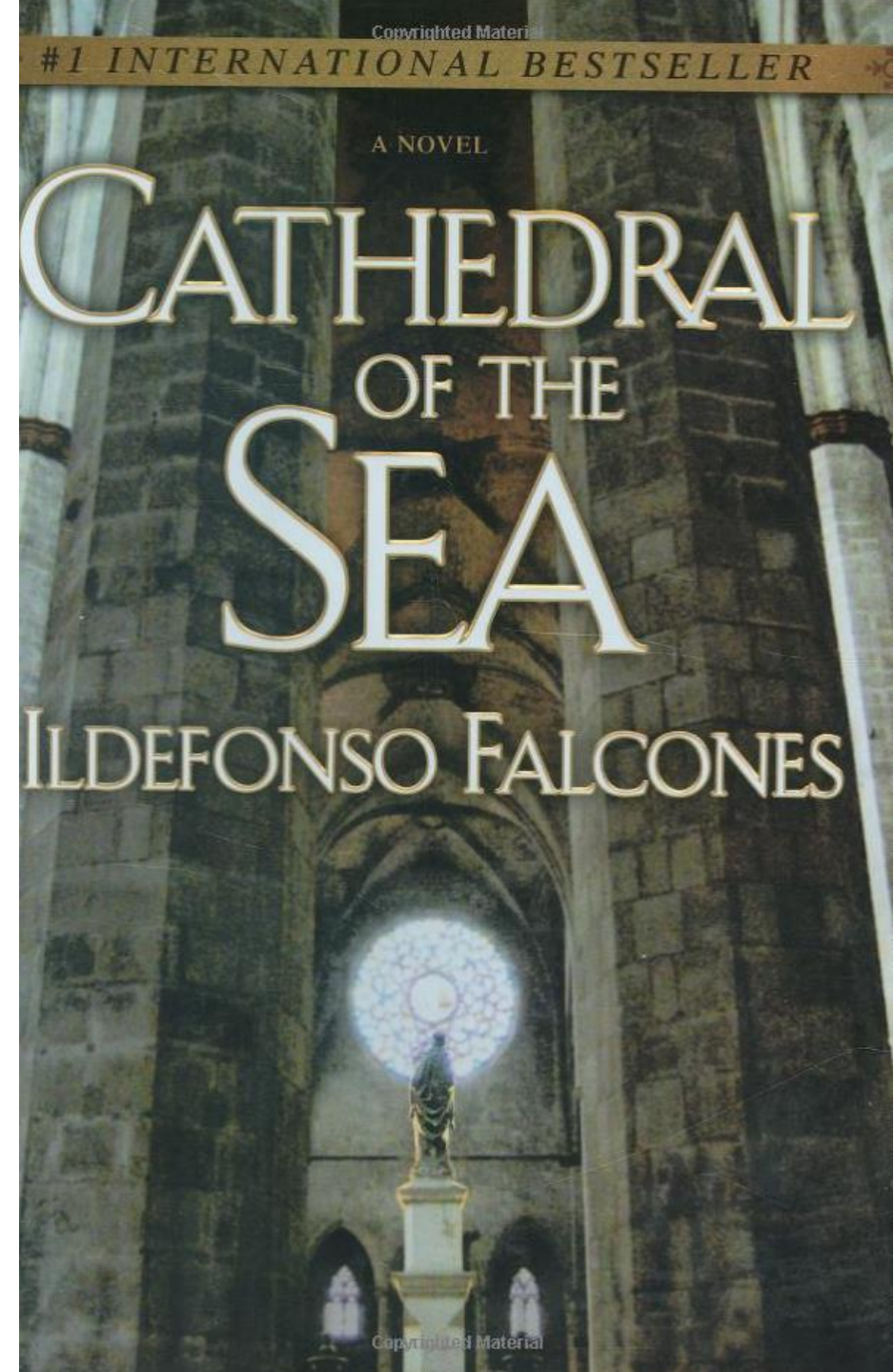


About me



About me

La catedral del mar



Agenda

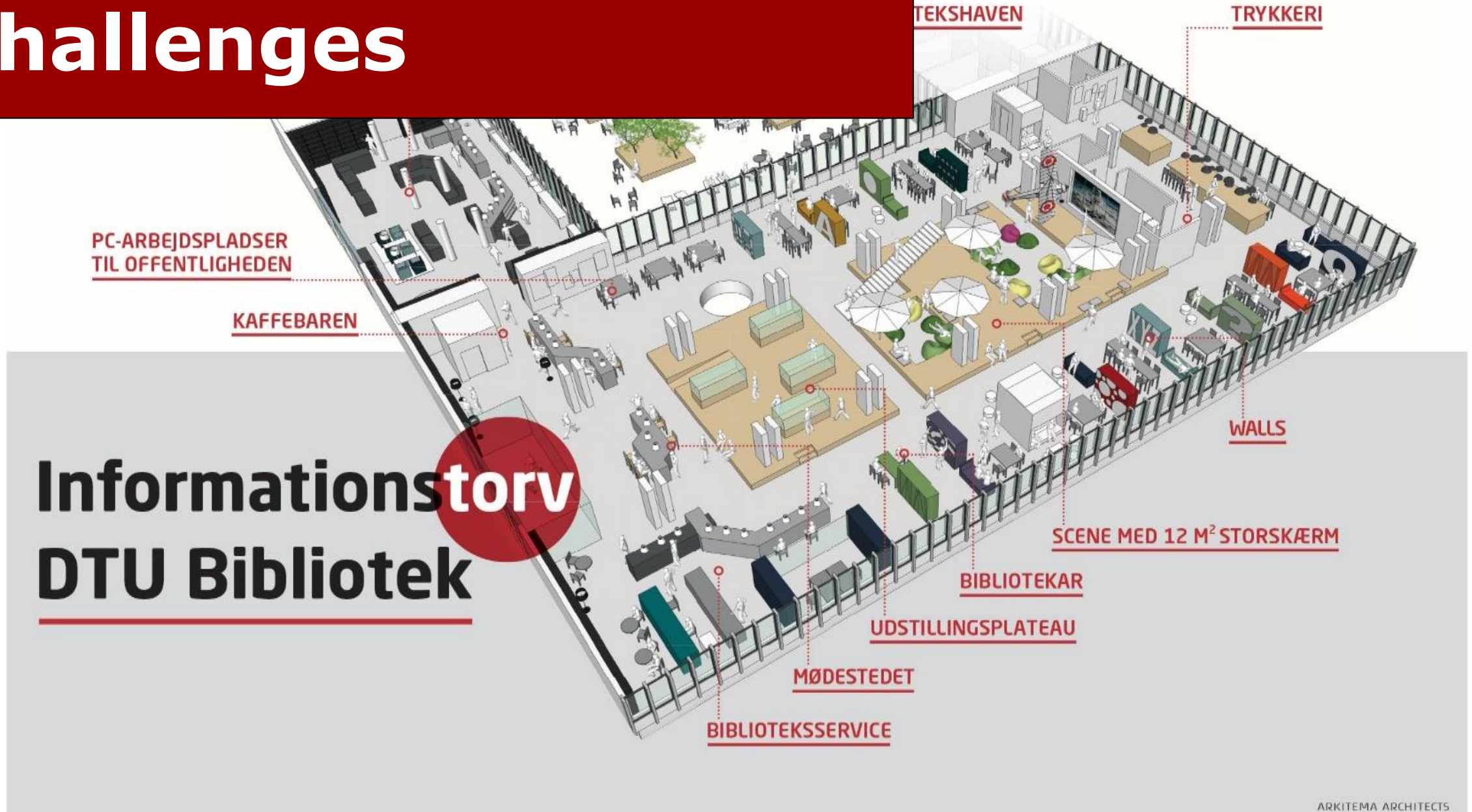
- Why
- Implementation
- The 3 areas in focus
- Final notes



Build for books, but now for people



Challenges





Comfort – feeling of being home



Flexible space

Big events with 3000-6000 extra visitors



Medico Bazar 2018





IOT -Internet of Things

Fast growing industry

Spark innovation

Reuter's Top 100: Europe's Most Innovative Universities 2018

TOP UNIVERSITIES | 2018 RANKINGS

- 1 KU Leuven
- 2 Imperial College London
- 3 University of Cambridge
- 4 Federal Polytechnic School of Lausanne
- 5 University of Erlangen Nuremberg
- 6 Technical University of Munich
- 7 University of Manchester
- 8 University of Munich
- 9 **Technical University of Denmark**
- 10 Swiss Federal Institute of Technology Zurich



Spark innovation

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- 10 Swiss Federal Institute of Technology Zurich



Digital Denmark

Danmark som digital frontløber

Anbefalinger til regeringen fra
Digitalt Vækstpanel



Digital Denmark

Figur 2.1. Nøgleteknologier i det digitale samfund



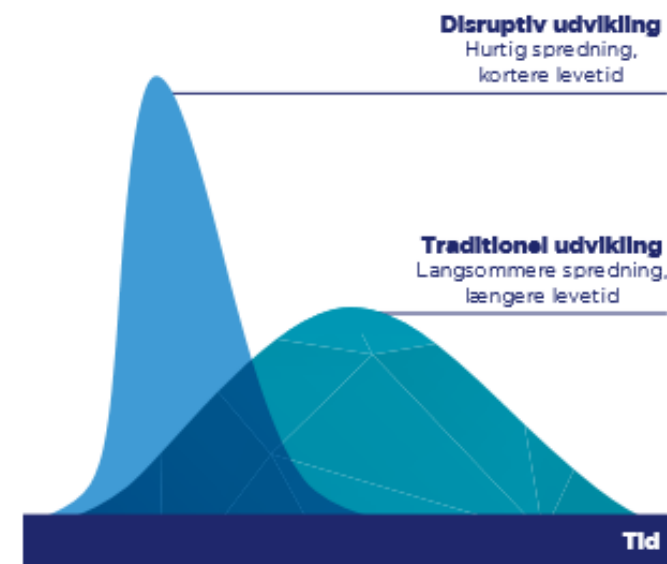
Kilde: Tilpasset fra OECD (2016), Science, Technology and Innovation Outlook 2016

Figur 2.2. Tidsperiode for at nå 50 mio. brugere

	Telefon	75 år
	Radio	38 år
	Fjernsyn	13 år
	Internet	4 år
	iPod	3 år
	Facebook	1 år
	Twitter	9 mdr.
	Angry Birds	35 dage
	PokemonGo	19 dage
	Super Mario Run	7 dage

Kilde: Egen tilvirkning på baggrund af McKinsey & Company (2012)

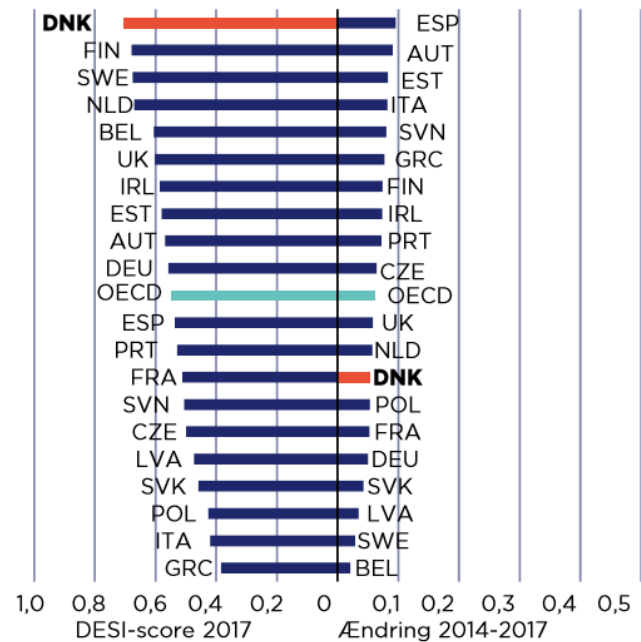
Figur 2.3. Den digitale udvikling: Hurtig spredning, kortere levetid



Kilde: Egen tilvirkning på baggrund af Downes & Nunes (2013)

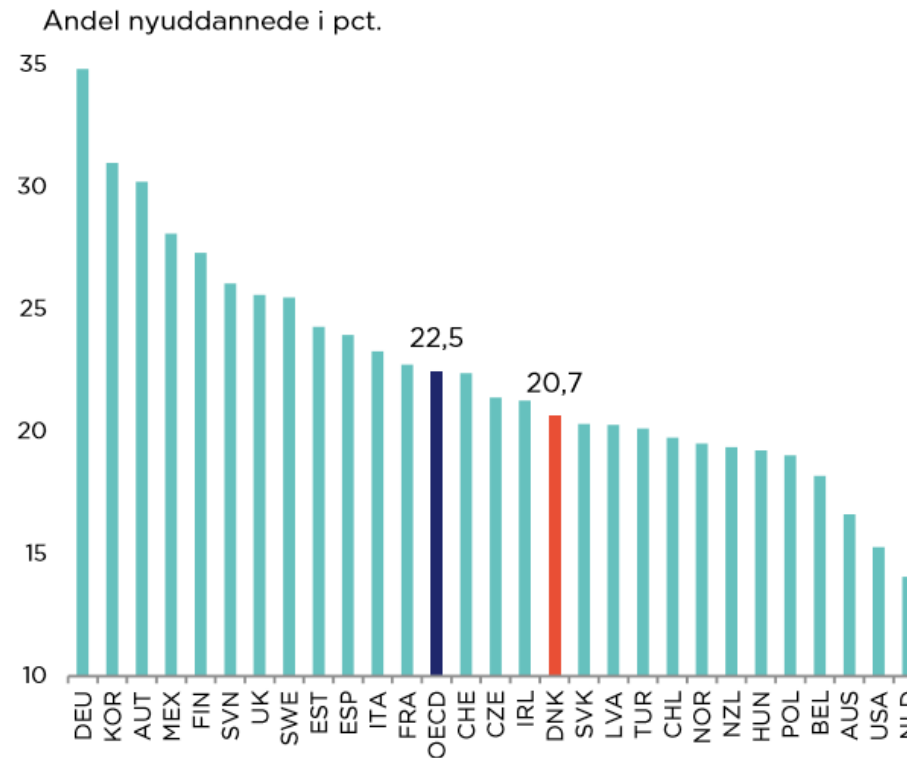
Digital Denmark

Figur 2.9 Danmark er digital, men udviklingen går langsomt (DESI-Indeks)



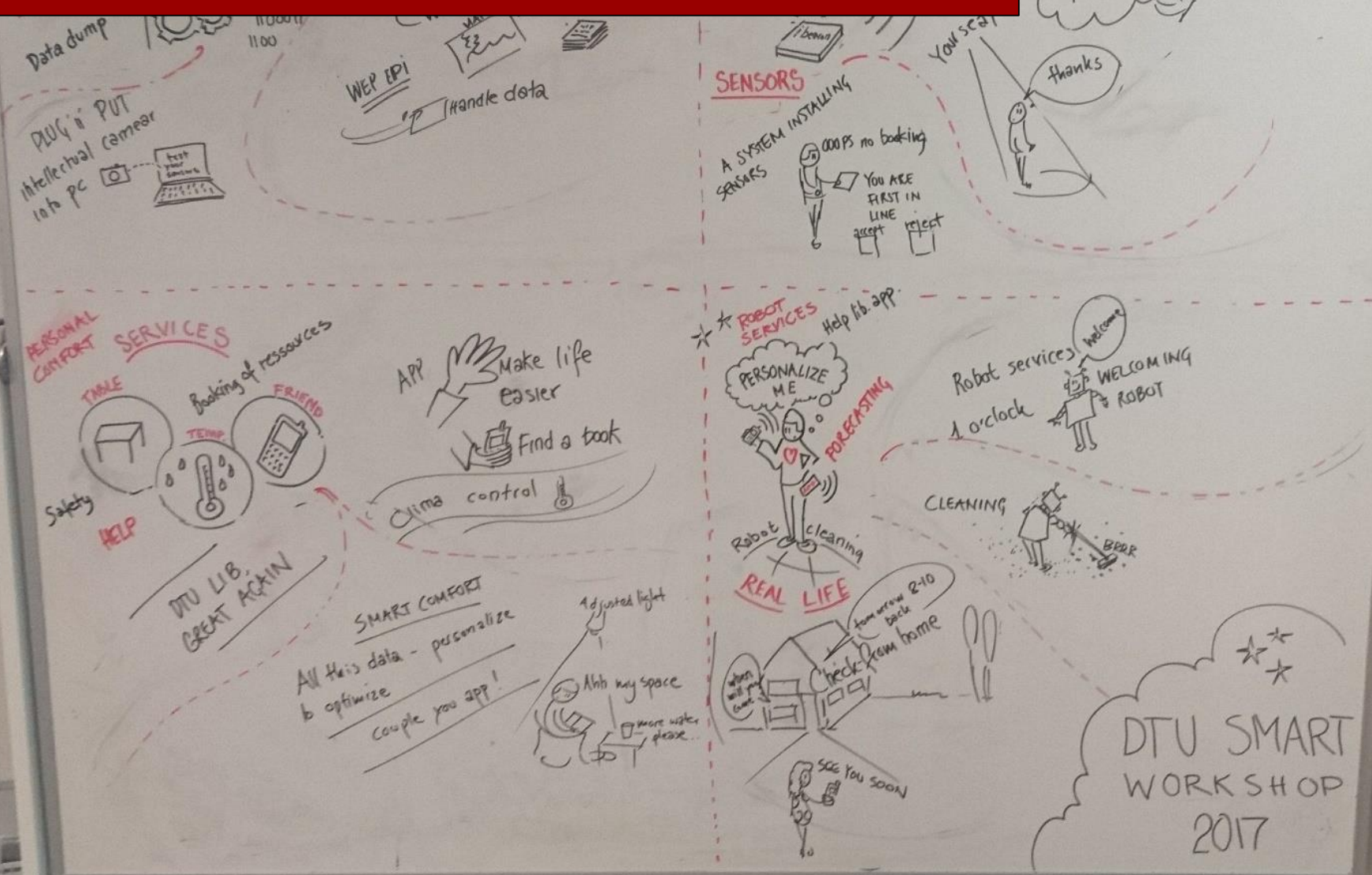
Anm: DESI er et indeks baseret på fem dimensioner med i alt 40 indikatorer: a) Digitale offentlige services, b) brug af internettet, c) digitale kompetencer, d) digital infrastruktur samt e) anvendelse af digital teknologi i virksomheder. Vækst er beregnet som ændringen fra 2014 til 2017, hvor data er tilgængeligt, hvilket betyder man skal tage metodiske forbehold. Kilde: Egne beregninger på Eurostat 2016.

Figur 3.3 Andel af nyuddannede (bachelor, kandidater og ph.d.) med STEM-kompetencer, 2014



Kilde: OECD, 2017

Workshops



Workshops



DTU Smart Library vision

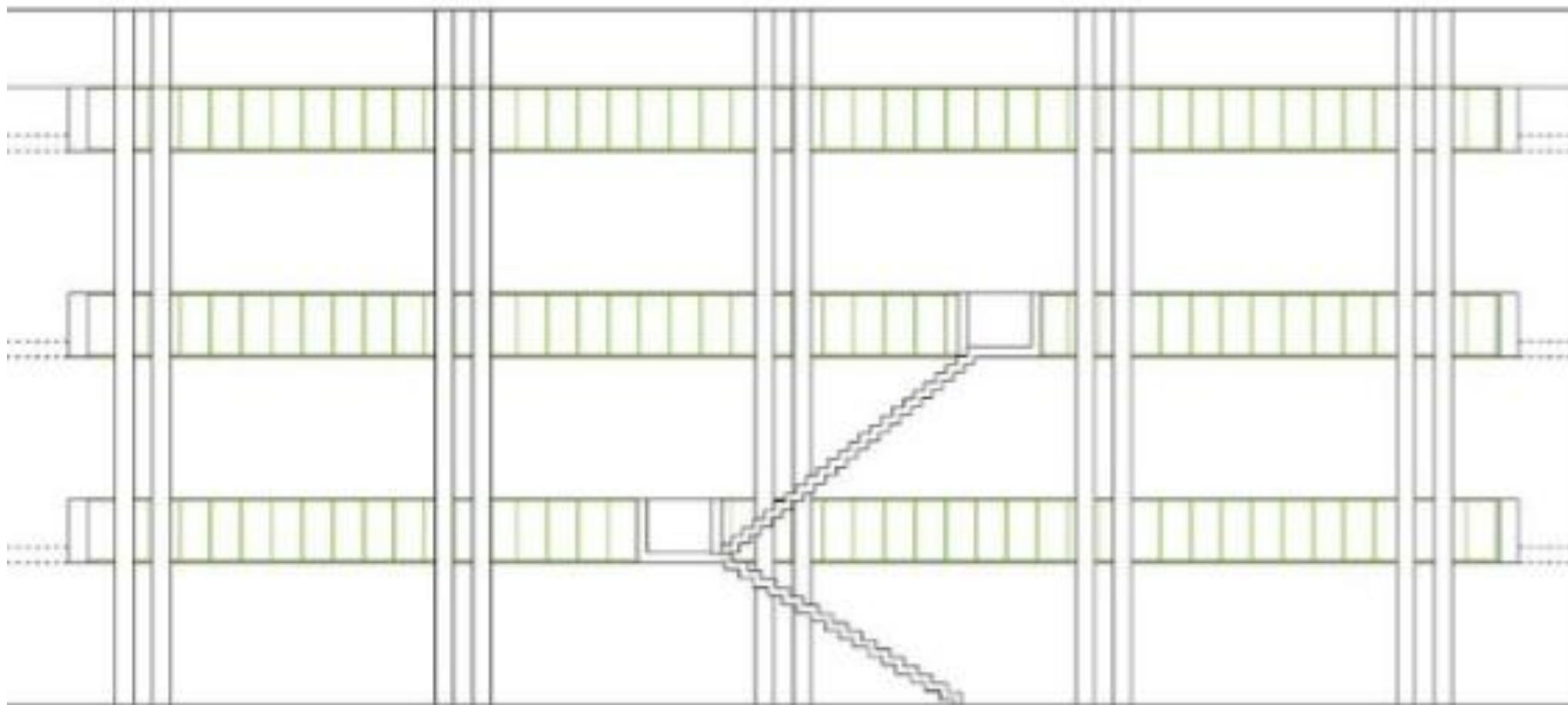
Smart start in 2013!

Led to the following vision:

The library space will be an **indoor living lab**, where students, researchers and entrepreneurs can develop, test and demonstrate **SMART technologies**, analyze the collected **data** and conduct research- and student projects, while optimizing the indoor climate, lighting and acoustics and therefore **boosting the chances of learning.**

Stillezone
Silent zone

Renovation summer 2017









DTU





ardus

ROSKILDE FESTIVAL

DTU

Mødestedet
Meeting Point

Renovation summer 2017

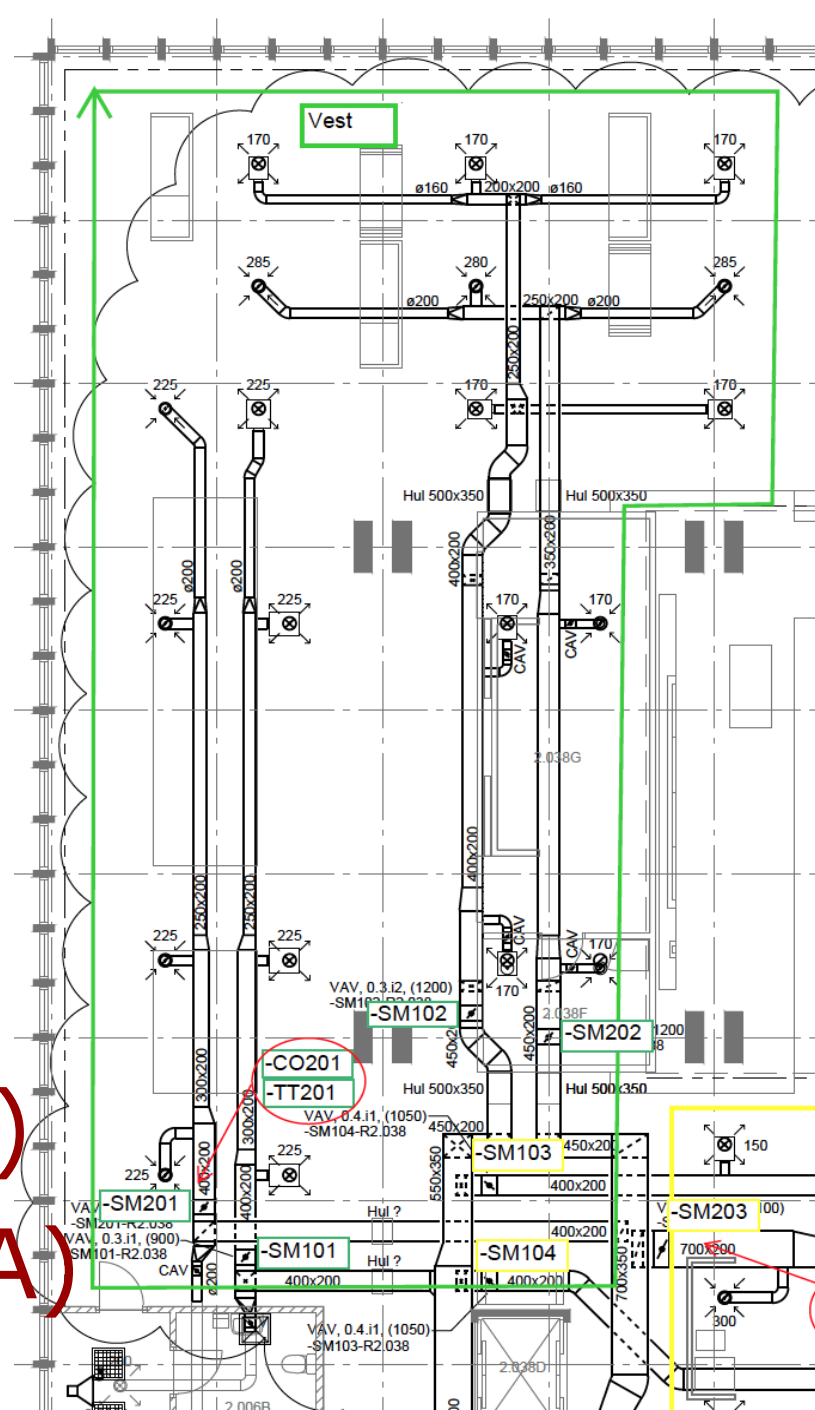




30. JUNI 2017

Safety, acoustic and comfort

- 3.600 m² new acoustic ceiling
- New ventilation system with 12 adjustable zones
- 500 ekstra power sockets
- Acoustic plates on walls
- Automatic sprinkler system (AVS)
- Automatic fire alarm system (ABA)

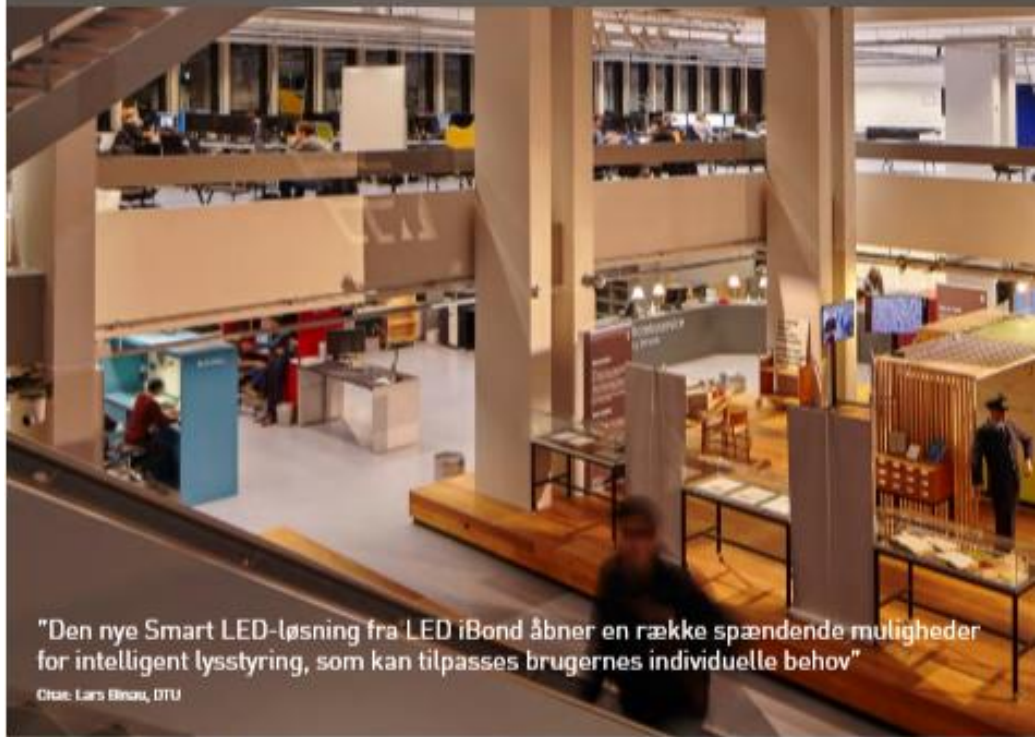


Dynamic Light

Turning the library into a showroom for innovative lighting solution

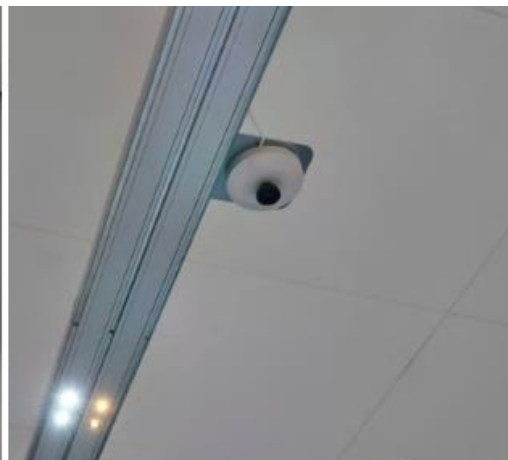


DTU Smart Library udstyret med LED-lys



"Den nye Smart LED-løsning fra LED iBond åbner en række spændende muligheder for intelligent lysstyring, som kan tilpasses brugernes individuelle behov"

Client: Lars Ørnou, DTU



"Vi etablerer infrastrukturen til et IoT Living Lab med de nyeste teknologier inden for LED-lys, varme, ventilation og lyd"

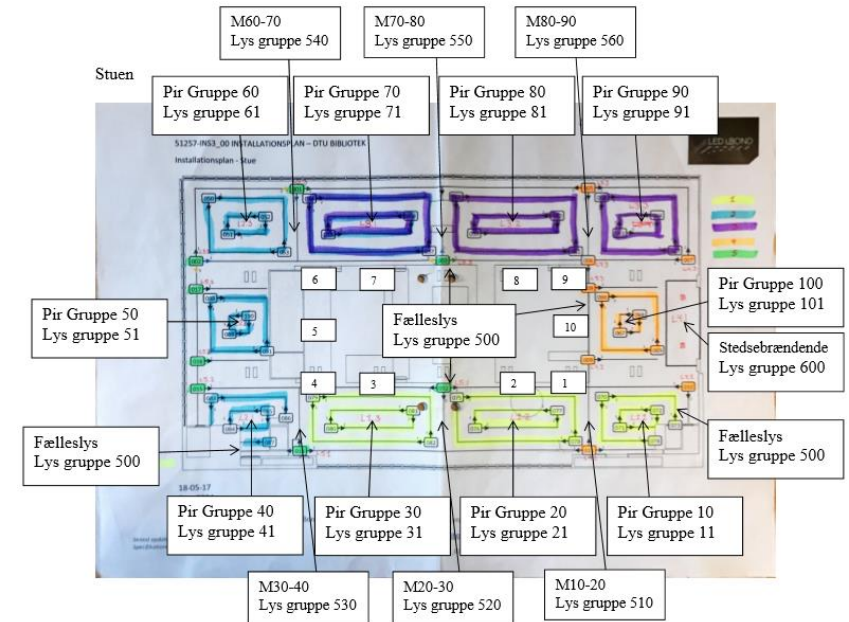
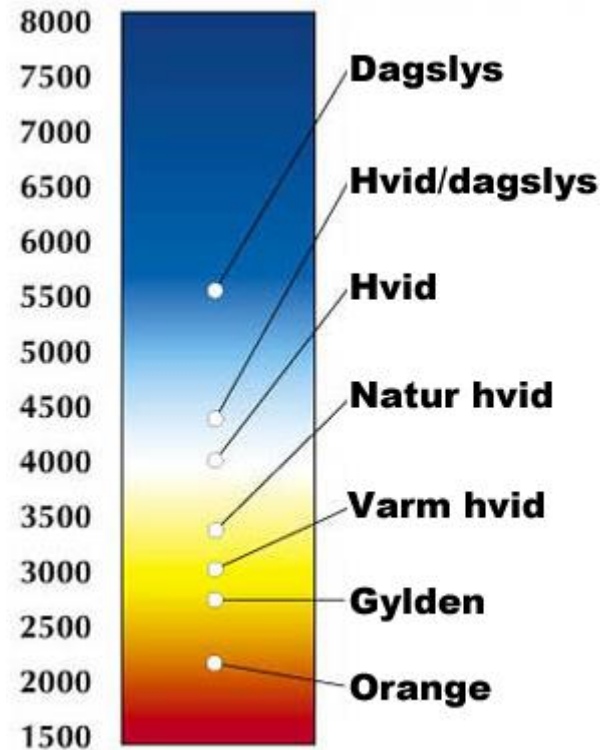
Client: Lars Ørnou, DTU



Dynamic Light

Impact of light

- LED
- 2,5 km
- 27 zones
- 5 manuel zones
- Red and Blue zones



Sensors

- IBeacons - bluetooth
- Microphones - noiselevel
- Temperature
- Humidity
- CO₂
- VOC
- Camera

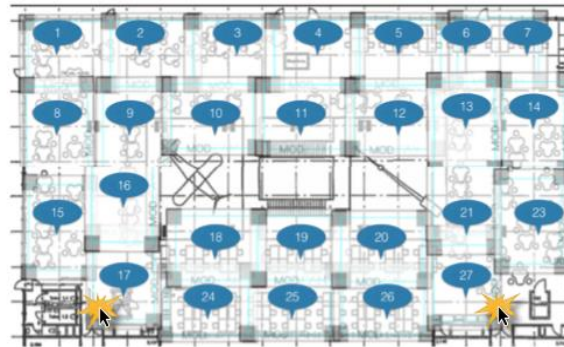


Camera

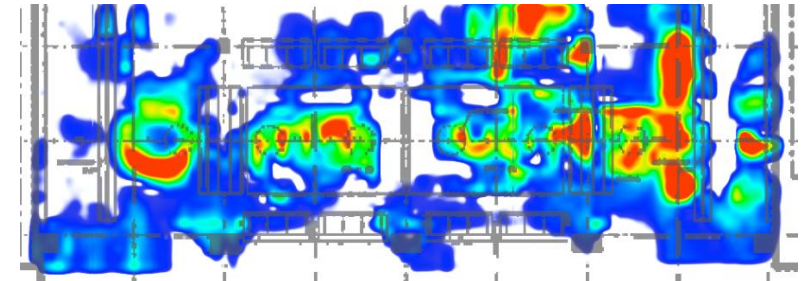
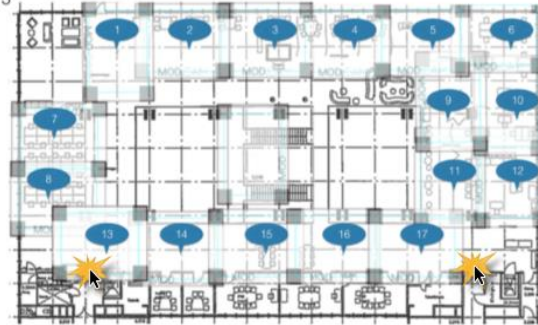
- People count
- Demographics
- Heatmap
- Trackmap

New algorithm that can count furniture!

Background specification for Trackmap coverage
Floor 1-2

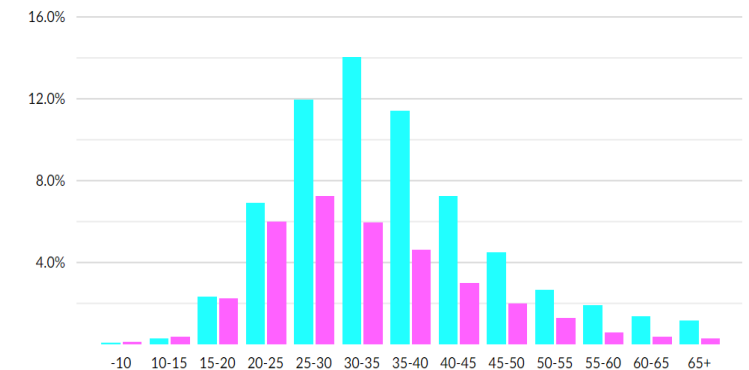


Floor 3

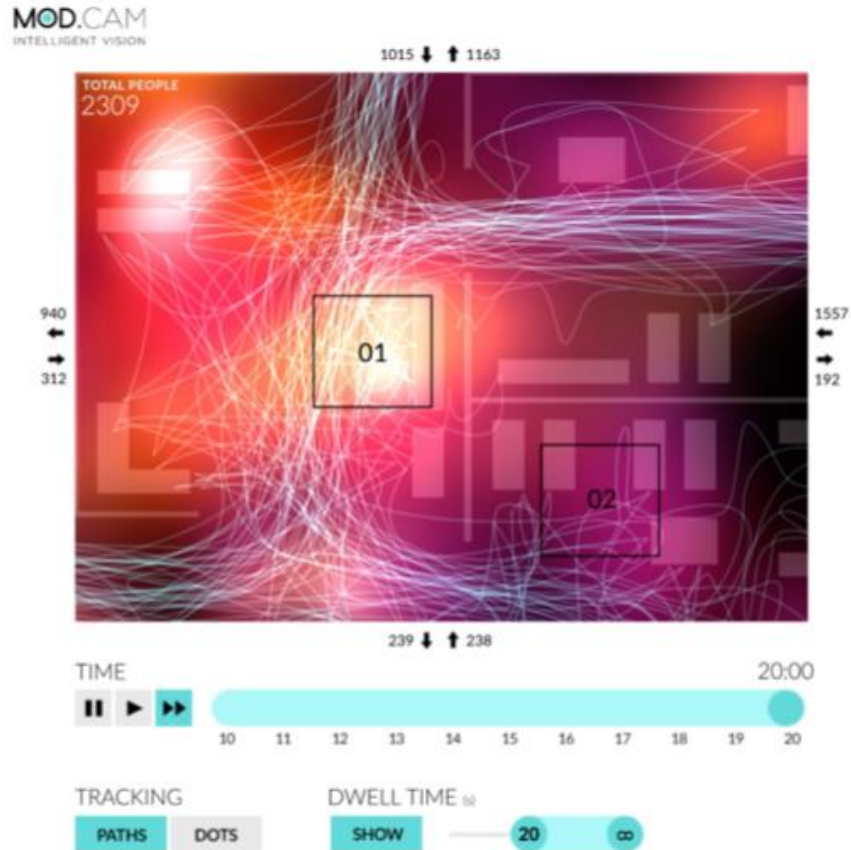


31st of May - 29th of Oct
DTU Lib Entry Demographics
Age and Gender

36 33
age
THIS PERIOD



Trackmap



	TOTAL PEOPLE	DWELL TIME AVERAGE (s)	TIME IN STORE AVERAGE (min)
2016-12-09 FRIDAY	2 147	32	38
ZOOMED AREA	1 255	94	

	TOTAL PEOPLE	DWELL TIME AVERAGE (s)	TIME IN STORE AVERAGE (min)
2017-01-06 FRIDAY	2309 +24%	31 -3%	47 +9%
ZOOMED AREA	1 230 -2%	106 +13%	
SELECTION 01	870 +24%	138 +9%	
SELECTION 02	57 -35%	14 -16%	

PRODUCT SEARCH

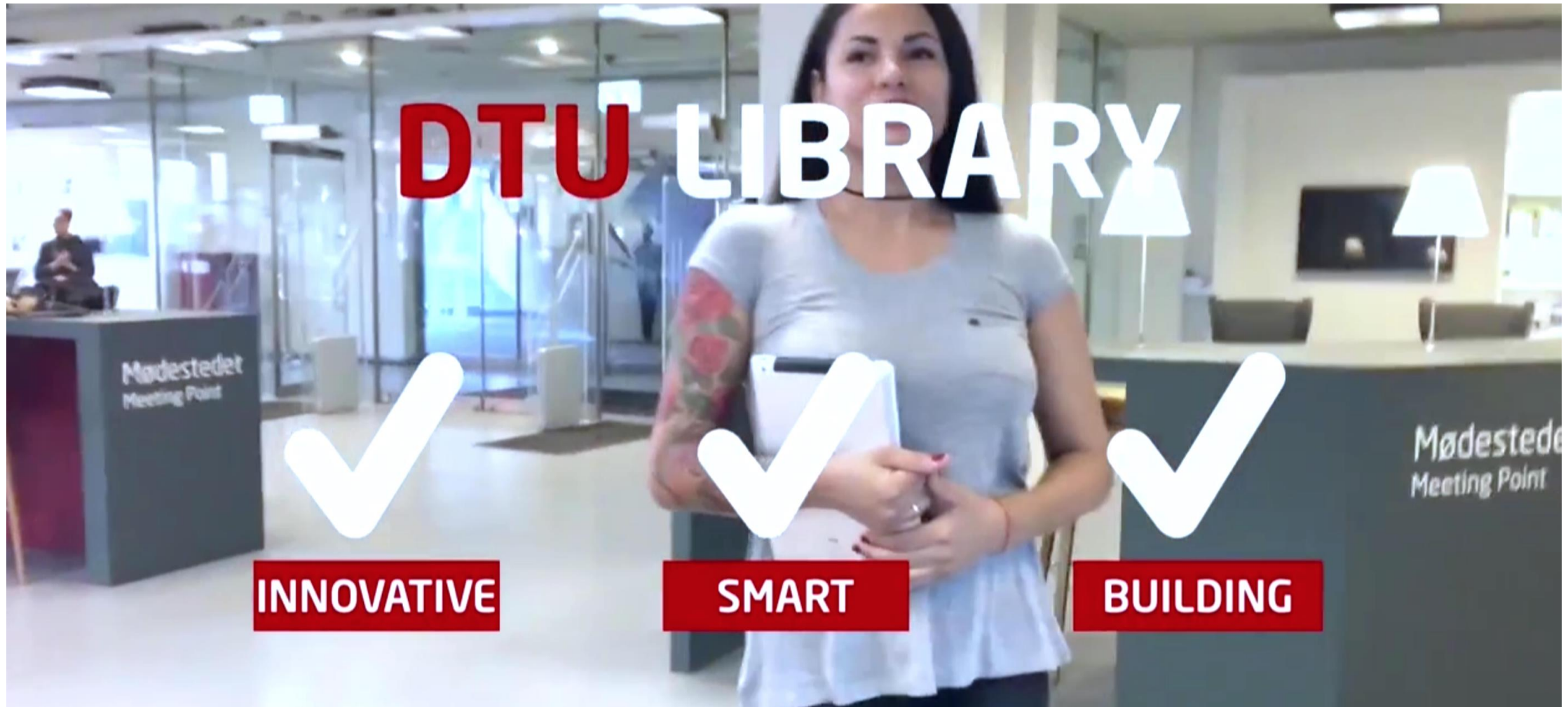
702.617.63

NORRSKEN LED LAMP E27

EAN: 702.617.63 | PRICE: USD 8.49 | IN STOCK: 1450 UNITS

SALES SUMMARY

DATE	UNITS	CONVERSION RATE (%)	TOTAL (USD)
2016-12-09	170	13,5	1443.30
2017-01-06	205 +20,6%	16,7 +23,7%	1740.45



SMART project

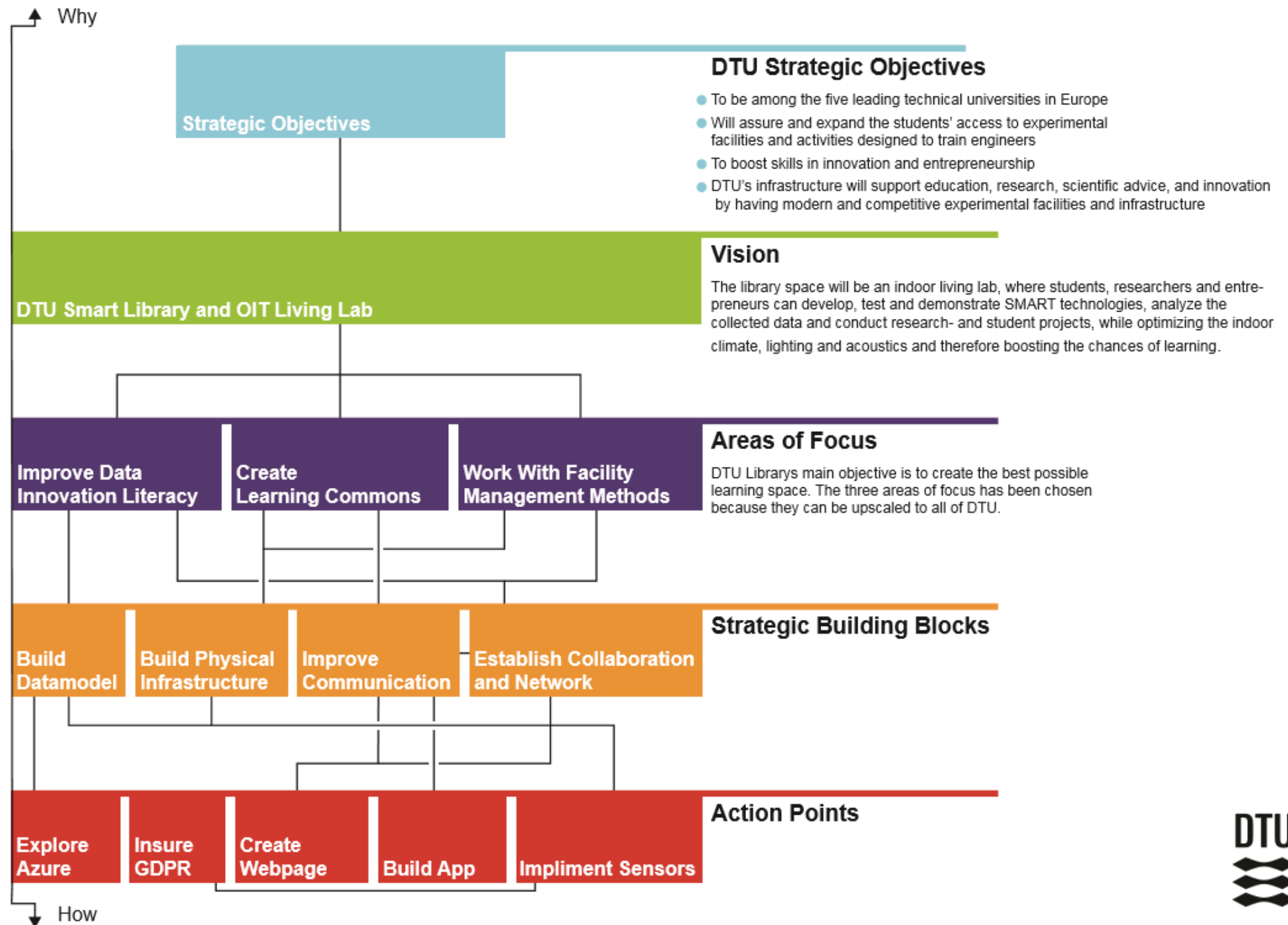


- **Specific:** The goal should target a specific area of improvement or answer a specific need.
- **Measurable:** The goal must be quantifiable, or at least allow for measurable progress.
- **Attainable:** The goal should be realistic, based on available resources and existing constraints.
- **Relevant:** The goal should align with other business objectives to be considered worthwhile.
- **Time-bound:** The goal must have a deadline or defined end.

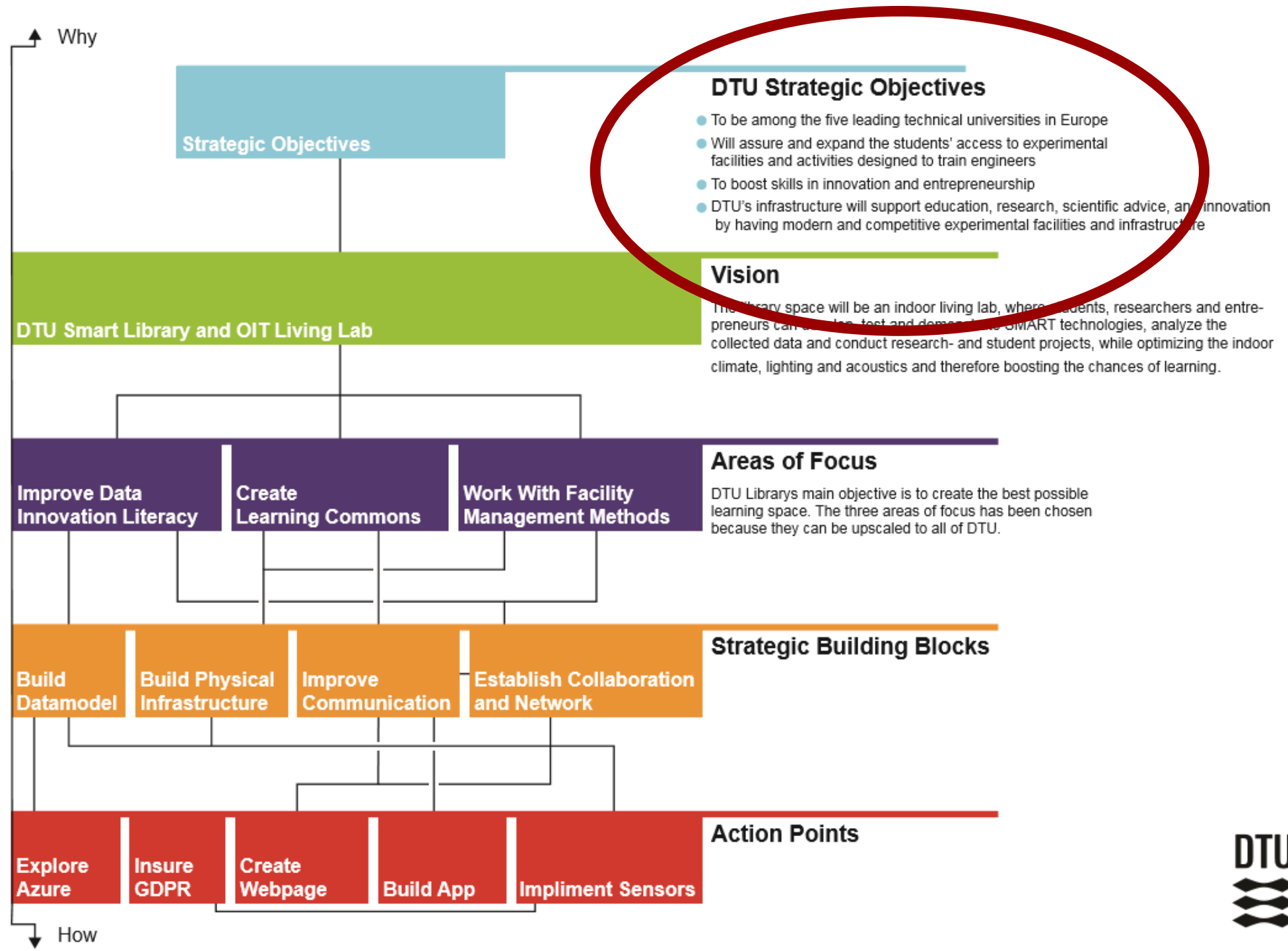
SMART project

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Strategic scope



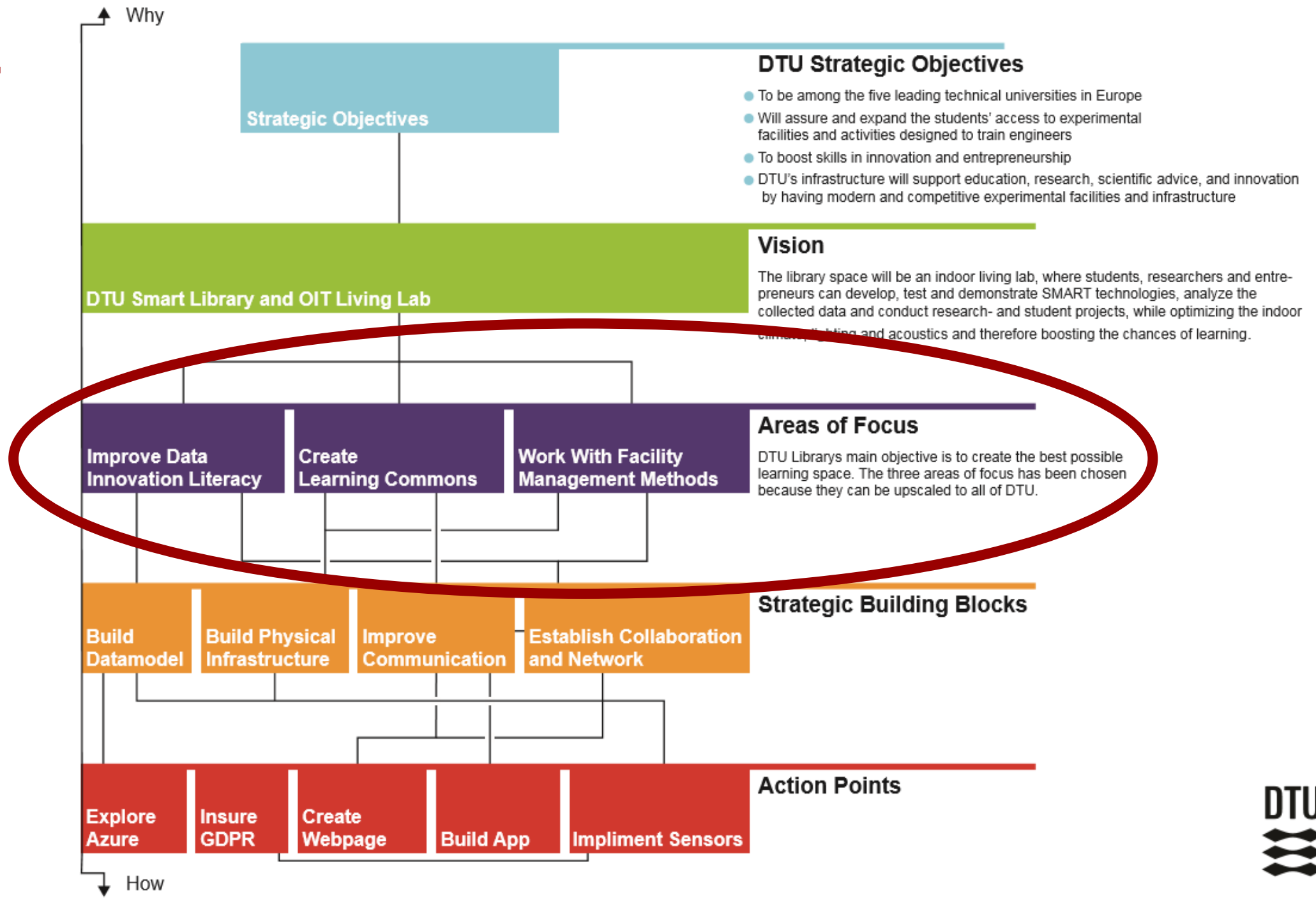
Strategic scope



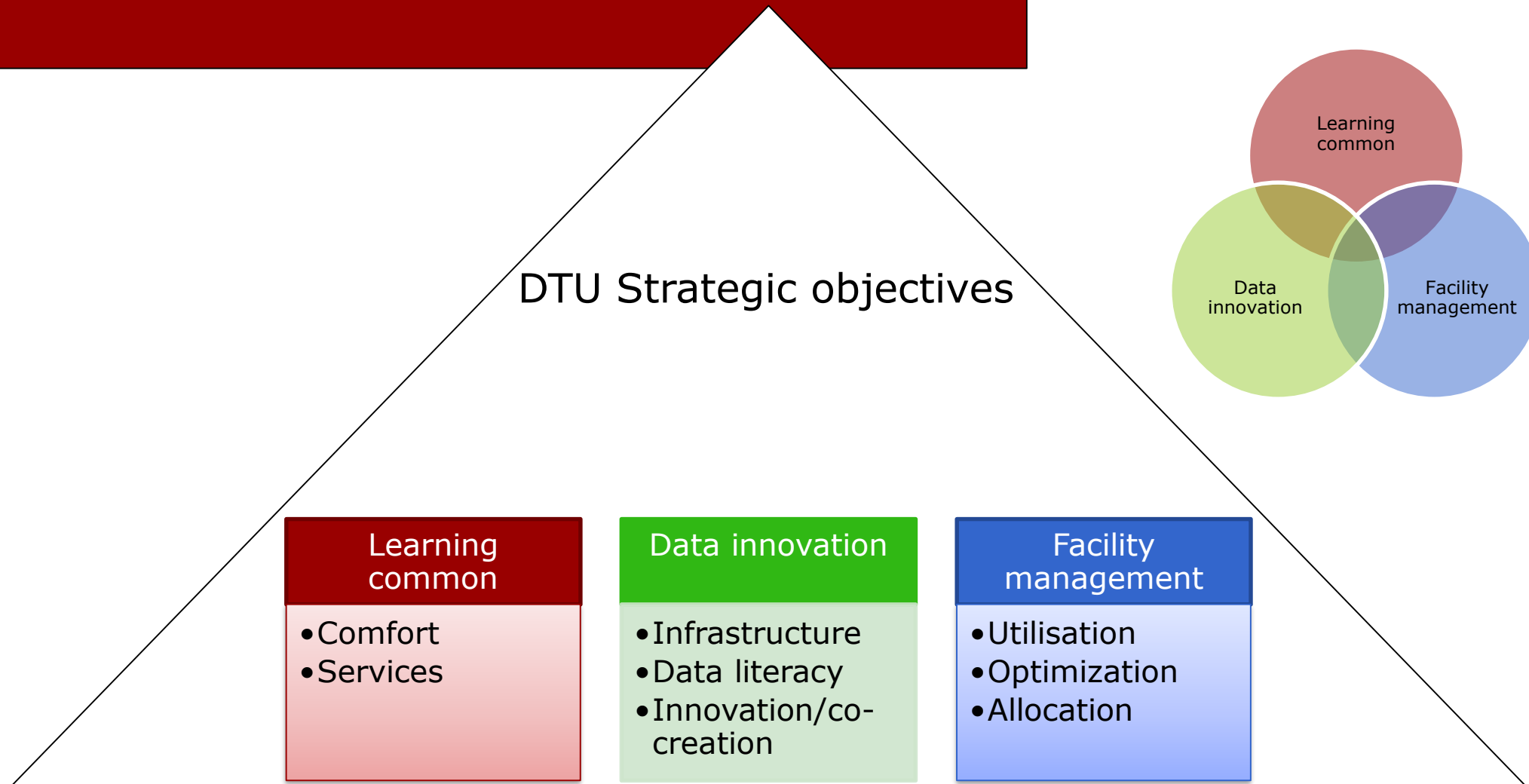
Strategic objectives

- DTU will be among the five leading technical universities in Europe.
- DTU will assure and expand the students' access to experimental facilities and activities designed to train engineers.
- ..to boost skills in innovation and entrepreneurship.
- DTU will provide facilities that allow the design, development and testing of specific product and service concepts.
- DTU's infrastructure will support education, research, scientific advice, and innovation by having modern and competitive experimental facilities and infrastructure

Areas of focus



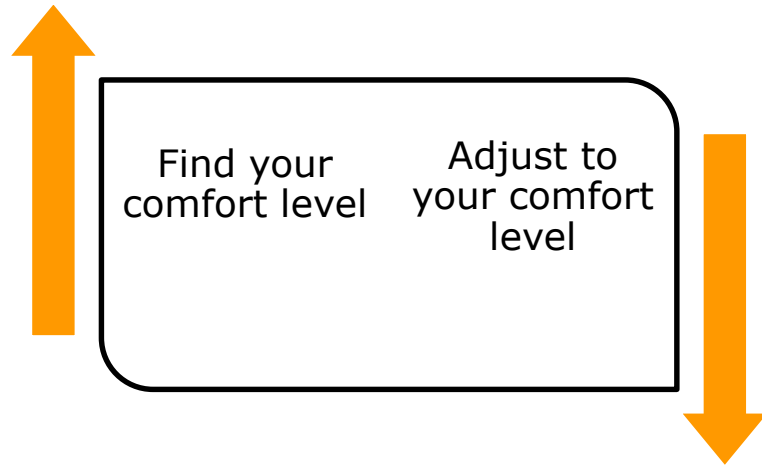
The 3 areas of focus



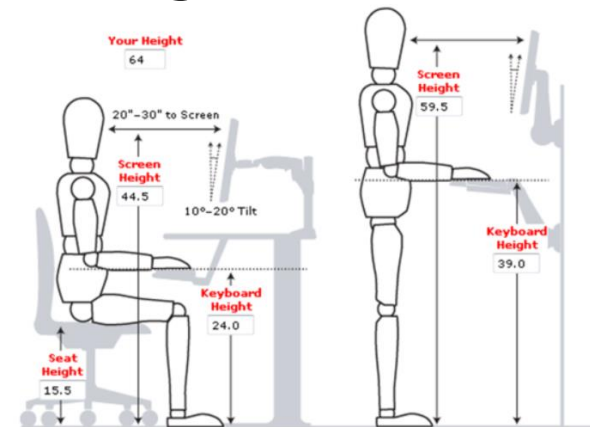
Learning Commons

- Comfort
- Services

Comfort



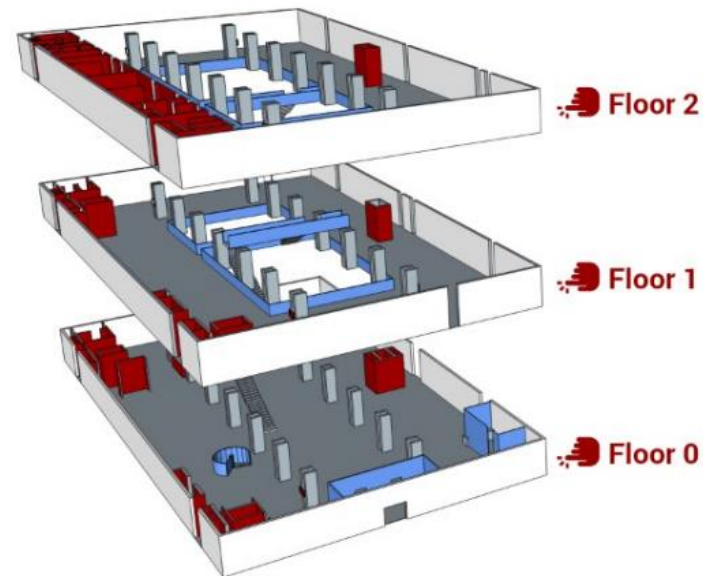
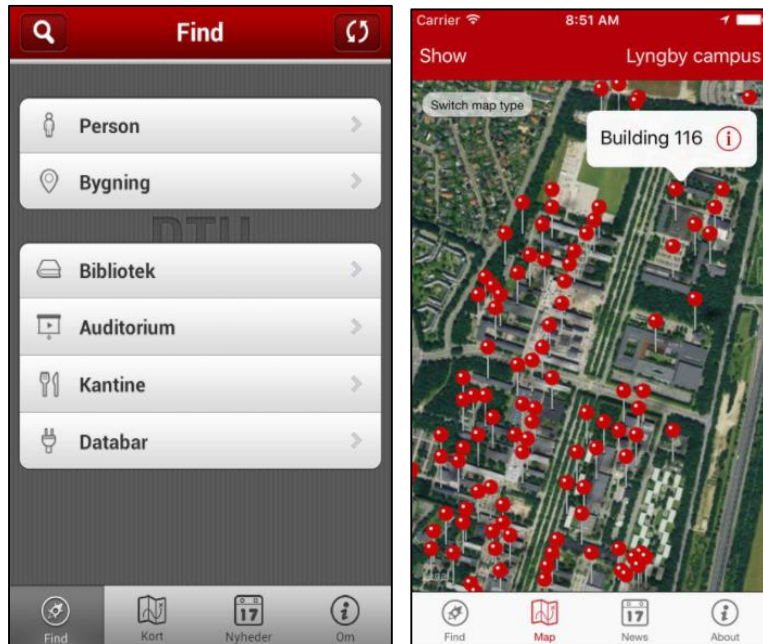
Ergonomics



<http://www.sparkproductivity.com/>

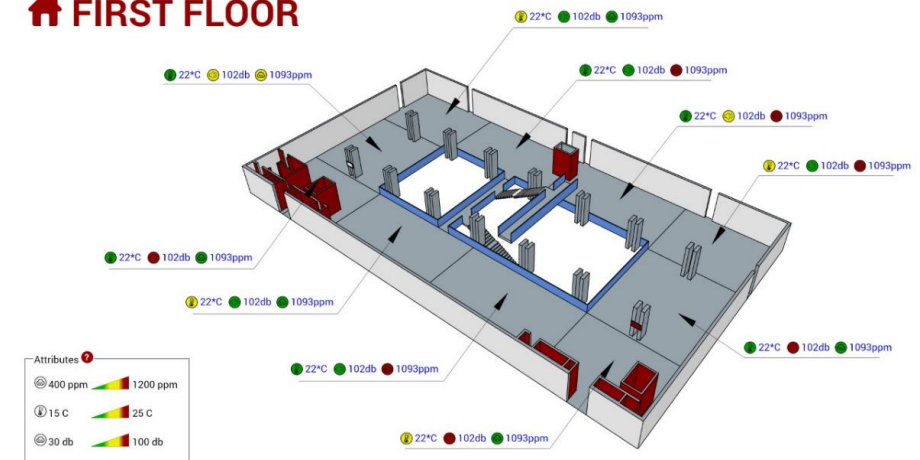
Comfort

APP



Welcome to our touchscreen

FIRST FLOOR



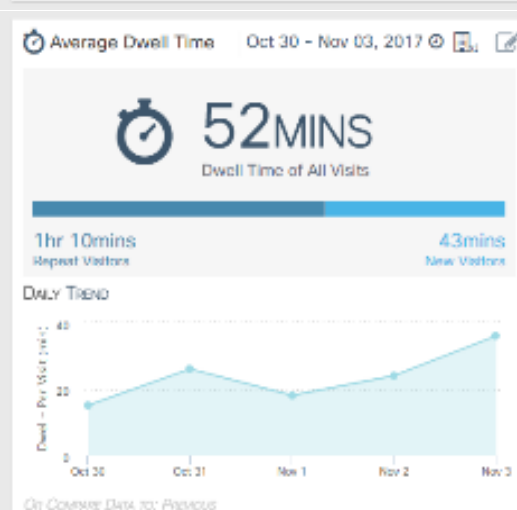
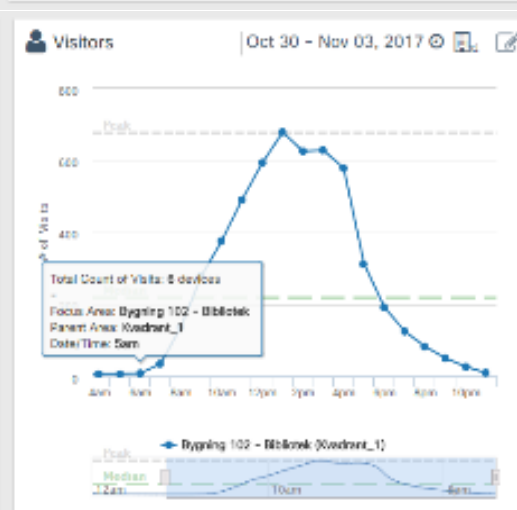
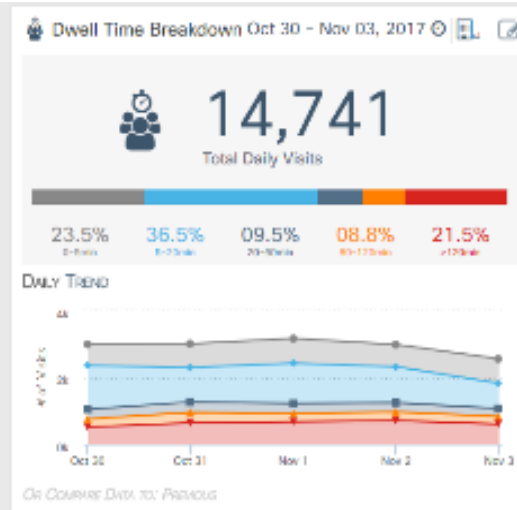
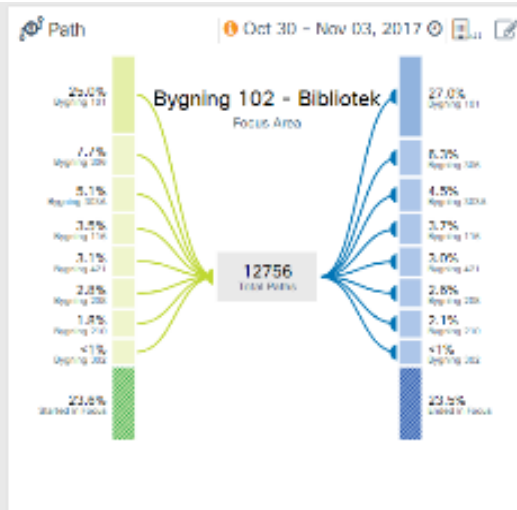
Services

When + where + who + how

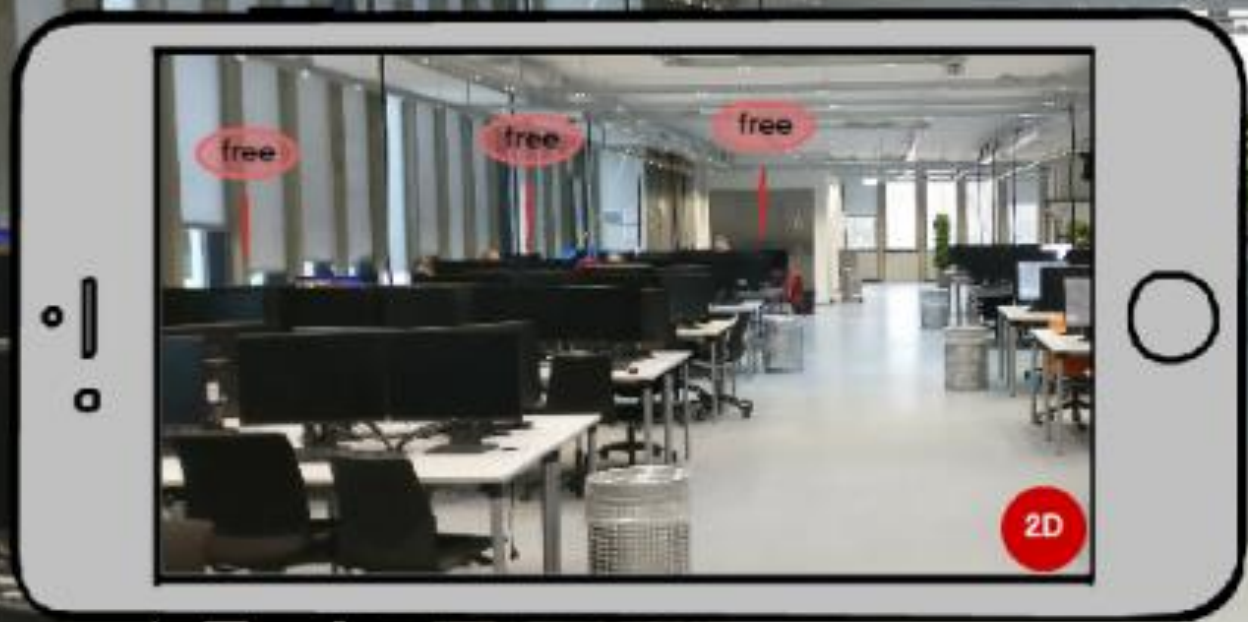
- Wayfinding
- Booking
- Forecasting
- P2P tutoring
- E2P facilitating
- Food
- Events
- Workshops
- Wi-Fi
- Power
- Watch me/don't watch me/watch my stuff
- AR for wayfinding and search
- Personalized learning



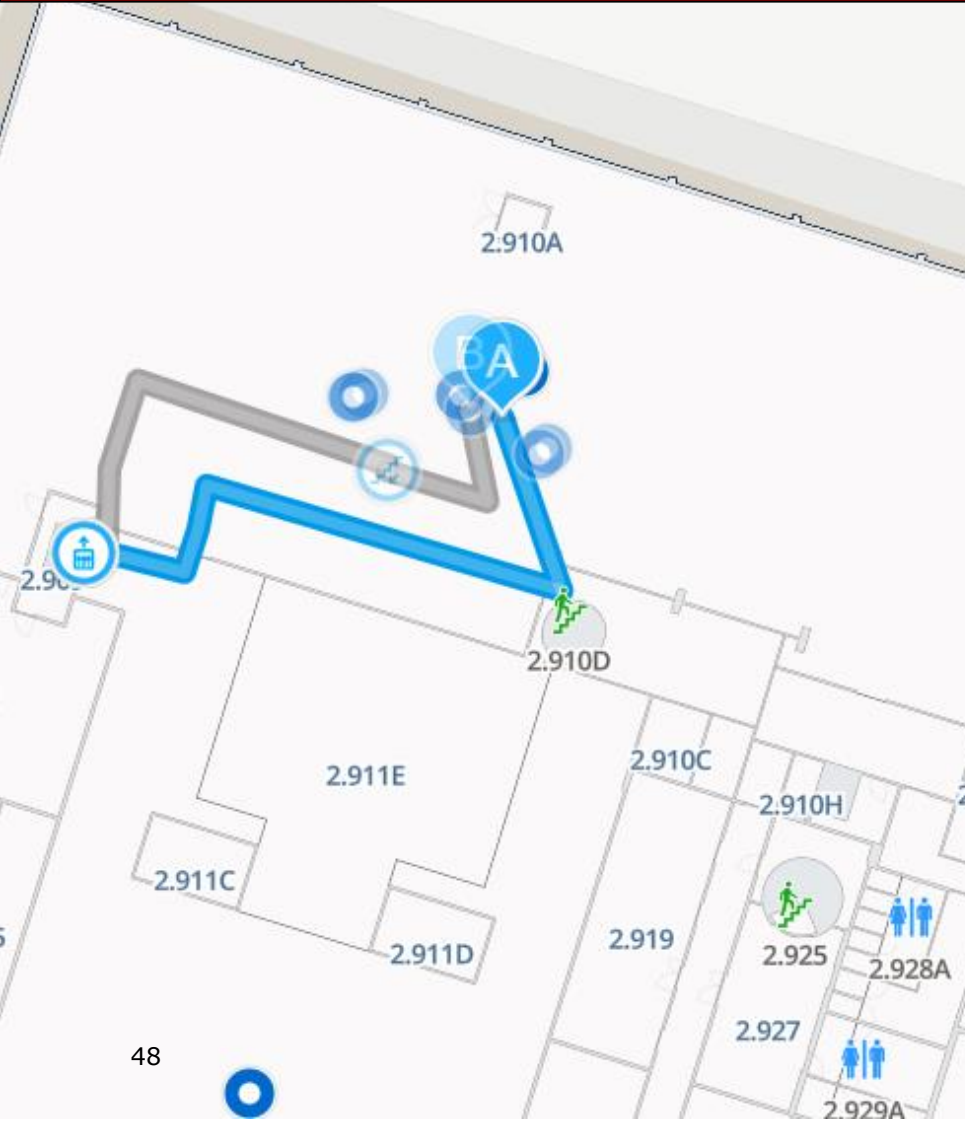
Wayfinding



Wayfinding



Wayfinding



Services



Watch me/don't watch me/watch my stuff



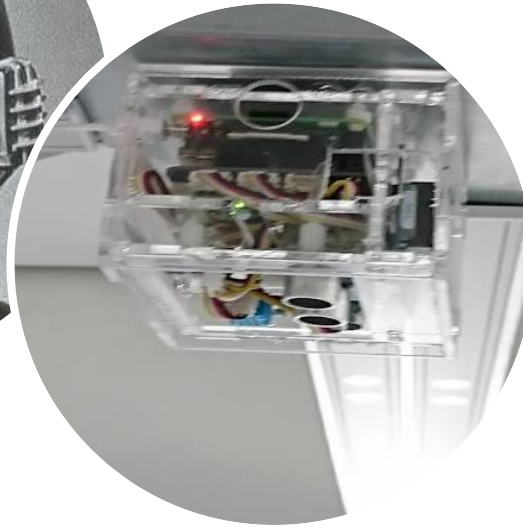
Data innovation



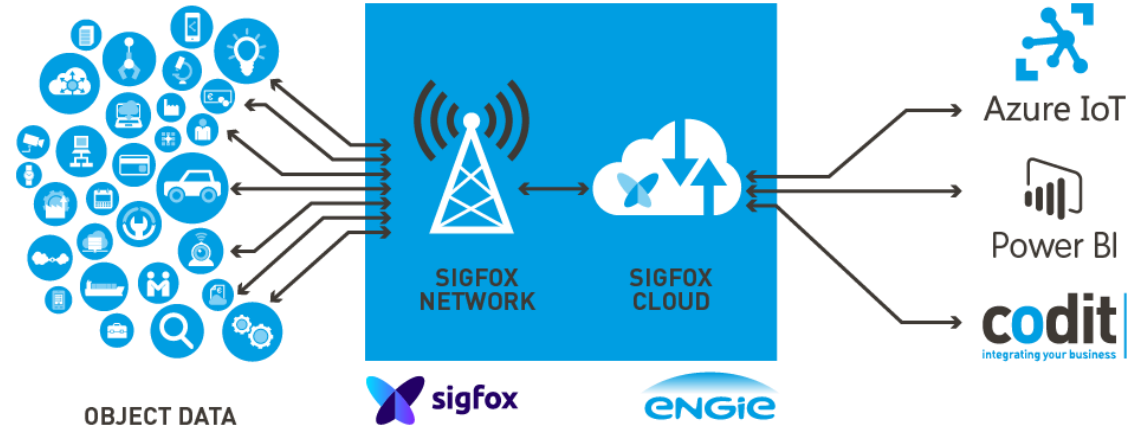
Data innovation

Infrastructure
Data literacy
Innovation/co-creation

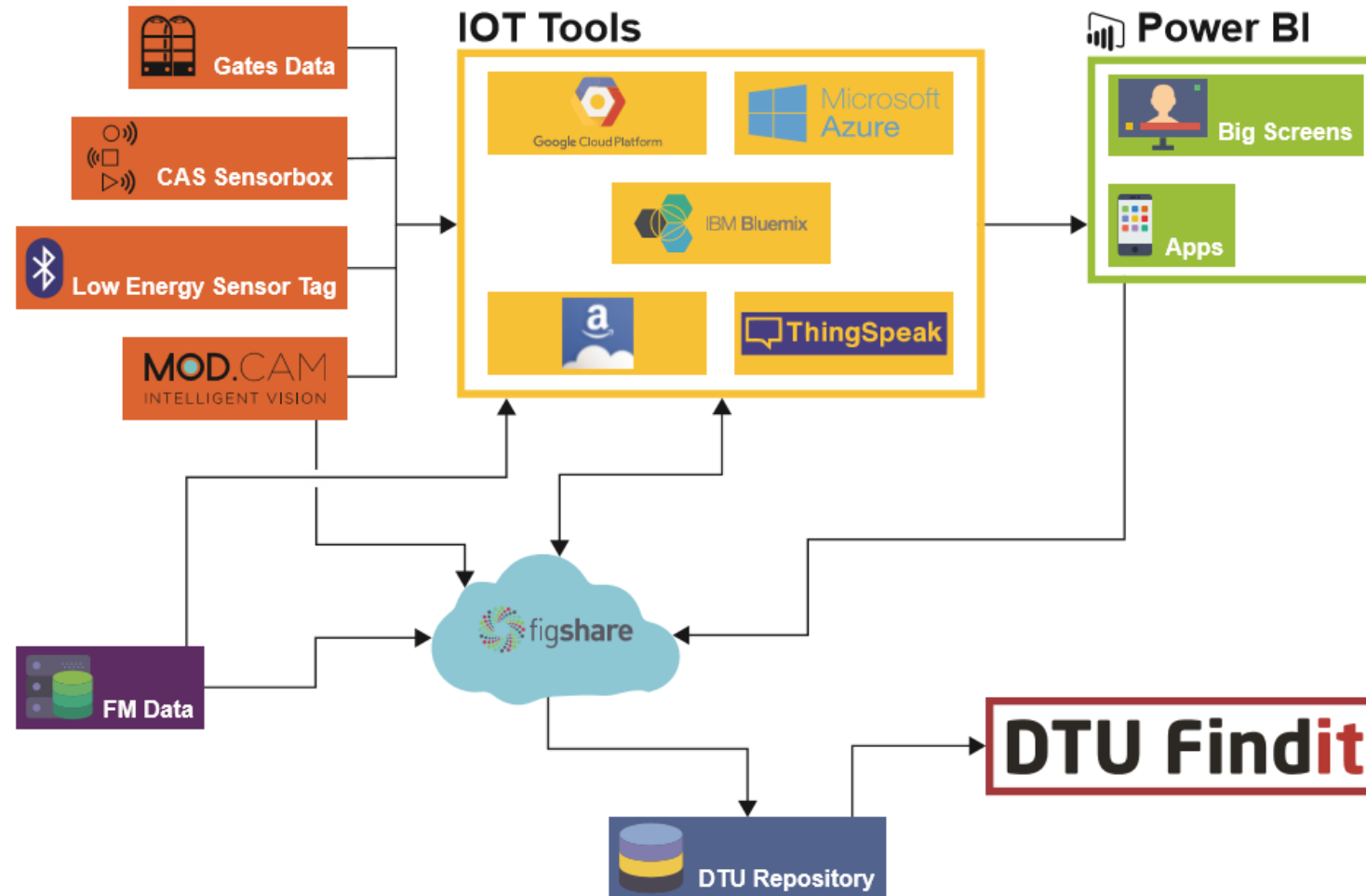
Infrastructure



- +300.000 Sensors at DTU, millions of logs pr. day
- Gateways
- WIFI
- Bluetooth
- IOT – connectivity (Sigfox,LoRa)
- Datamodel – BIG DATA
- Authentication
- DTU Media Lab – VR and AR



First draft datamodel

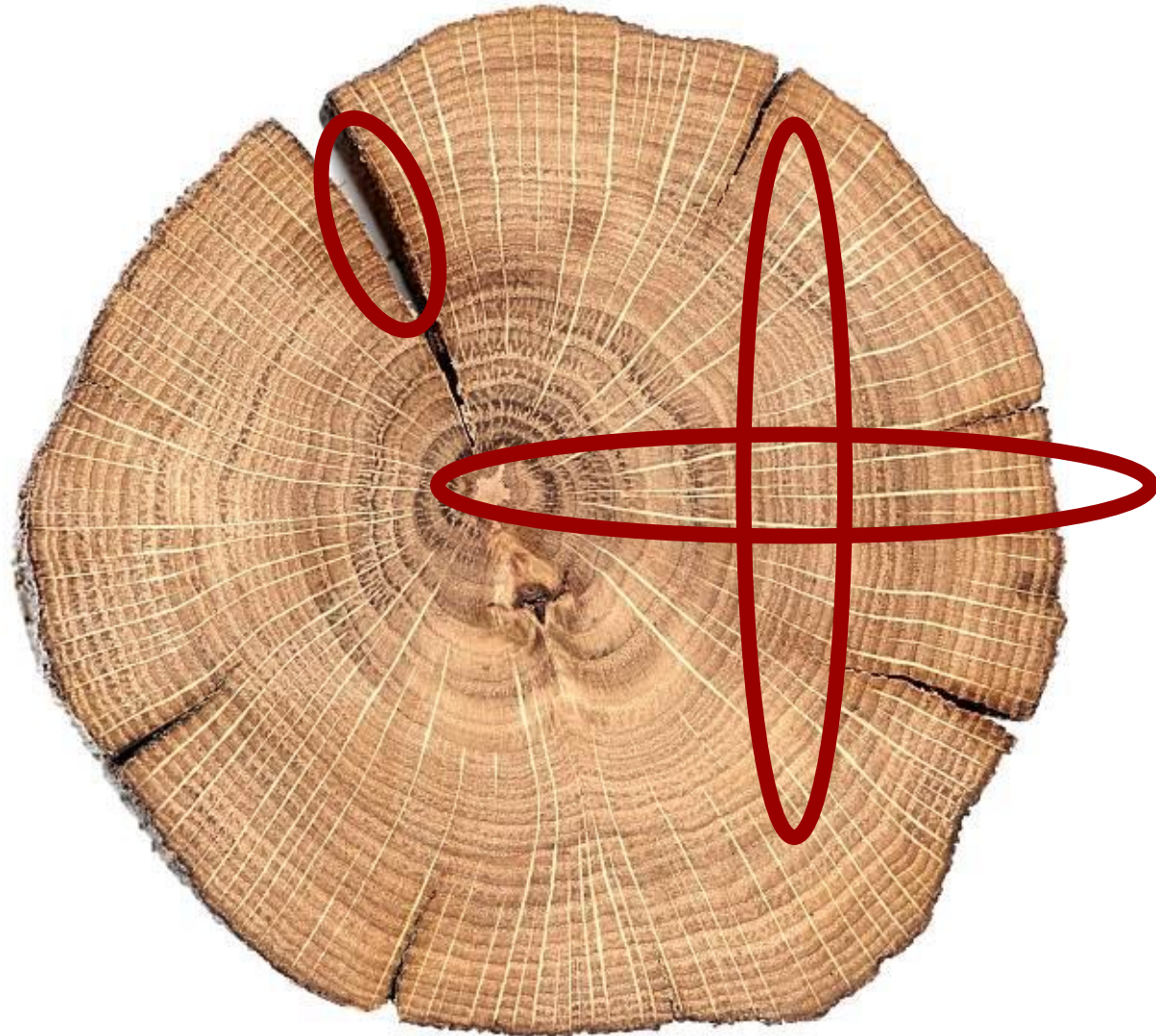


BIG DATA

90/10

Data vs research data

Many different
projects

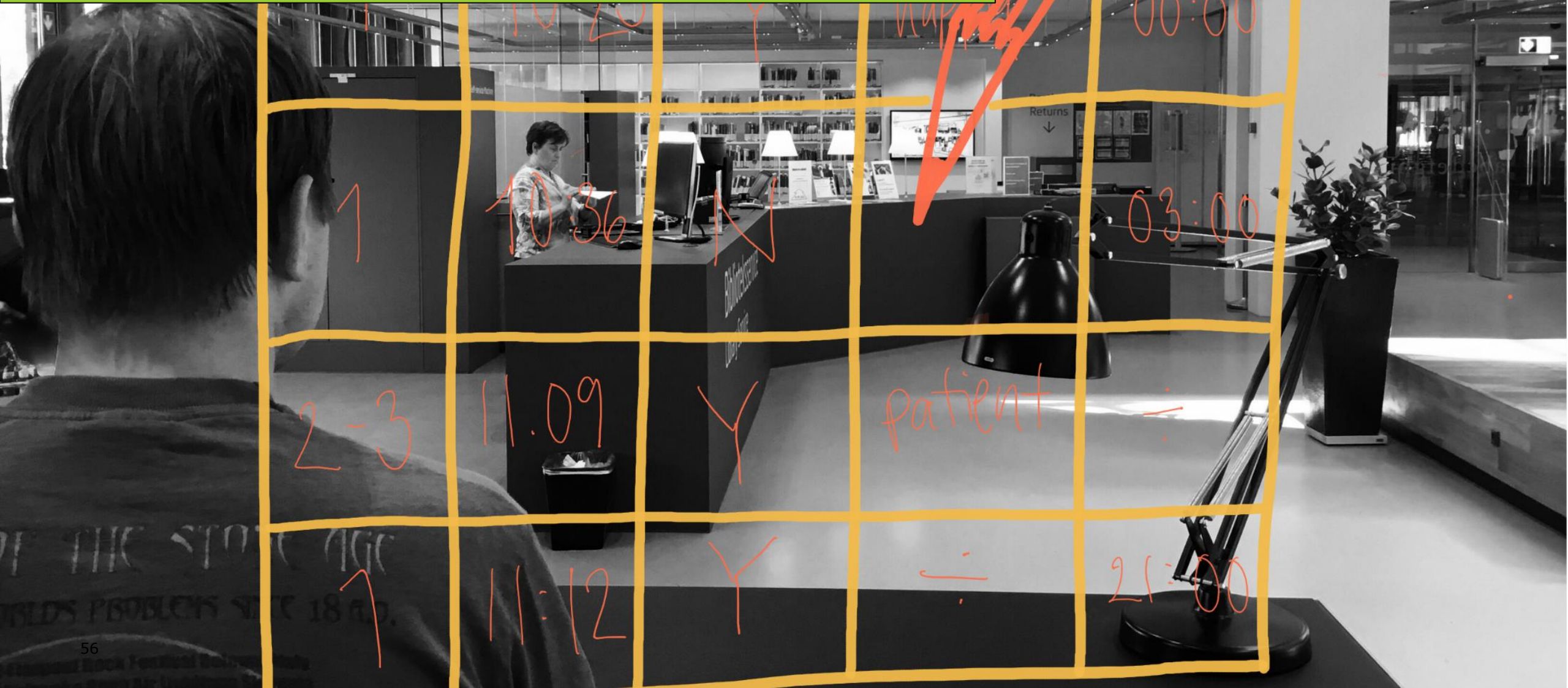


BIG DATA

- Democracy and datalibraries
- Statistical sampling
- Messy – More trumps better
- Correlation – proxy for prediction
- Predictive maintenance and learning
- Big Data vs UX-lib



BIG DATA vs UX-lib



Data literacy

LIBER working group: Digital Skills & Services

Which new skills are needed by library professionals?



Data literacy



**NMC HORIZON REPORT > 2017 LIBRARY
EDITION (CATALAN)**

Data literacy

Important Developments in Technology for Academic and Research Libraries

2017

2018

2019

2020

2021

Time-to-Adoption
Horizon: One Year
or Less



Big Data
Digital Scholarship Technologies

Time-to-Adoption
Horizon: Two to
Three Years



Library Services Platforms
Online Identity

Time-to-Adoption
Horizon: Four to
Five Years



Artificial Intelligence
The Internet of Things

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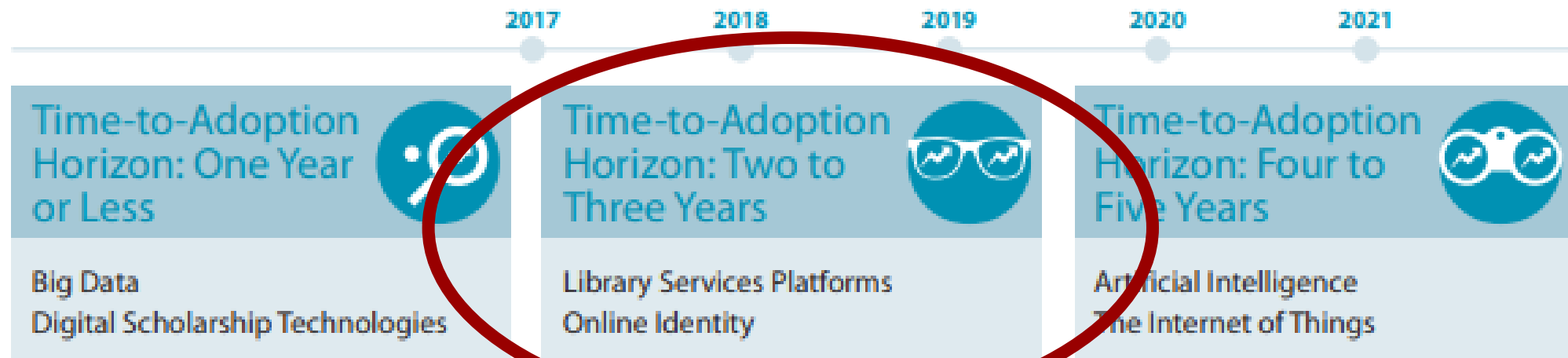


Artificial Intelligence
The Internet of Things

NMC HORIZON REPORT > 2017 LIBRARY
EDITION (CATALAN)

Data literacy

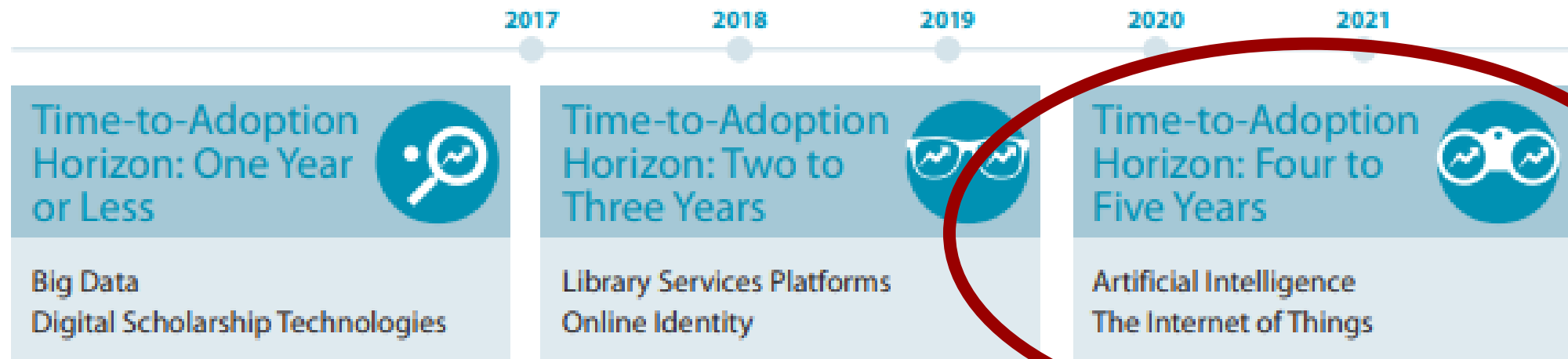
Important Developments in Technology for Academic and Research Libraries



NMC HORIZON REPORT > 2017 LIBRARY EDITION (CATALAN)

Data literacy

Important Developments in Technology for Academic and Research Libraries



NMC HORIZON REPORT > 2017 LIBRARY EDITION (CATALAN)

Data literacy

DTU H4ck Lab – A code club for students and employees



DTU Library
Technical Information Center of Denmark

JUN. 6 DTU H4ck Lab
Offentligt · Organiseret af DTU Bibliotek

★ Interesseret ✓ Deltager

Del ...

I morgen klokken 15:00 - 19:00
I morgen · 12-22° Solrigt

DTU Bibliotek
Anker Engelunds Vej 1, 2800 Kongens Lyngby

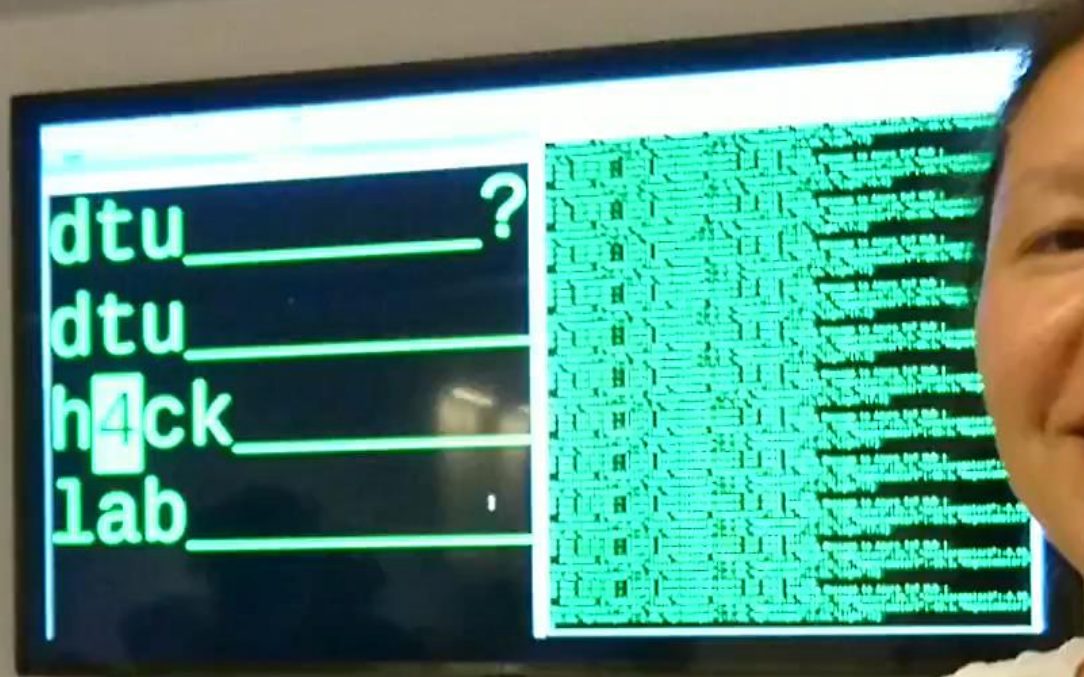
Vis kort

DATA SCIENTIST TRAINING FOR LIBRARIANS

@COPENHAGEN



<http://www.dst4l.info/>



DATA Literacy

It's no wonder that "Data Scientist" is the "best job to pursue" according to Forbes. A recent report from Glassdoor listed jobs in the data science field as the fastest growing — including a median salary for a data scientist at \$116,000."Codecademy"

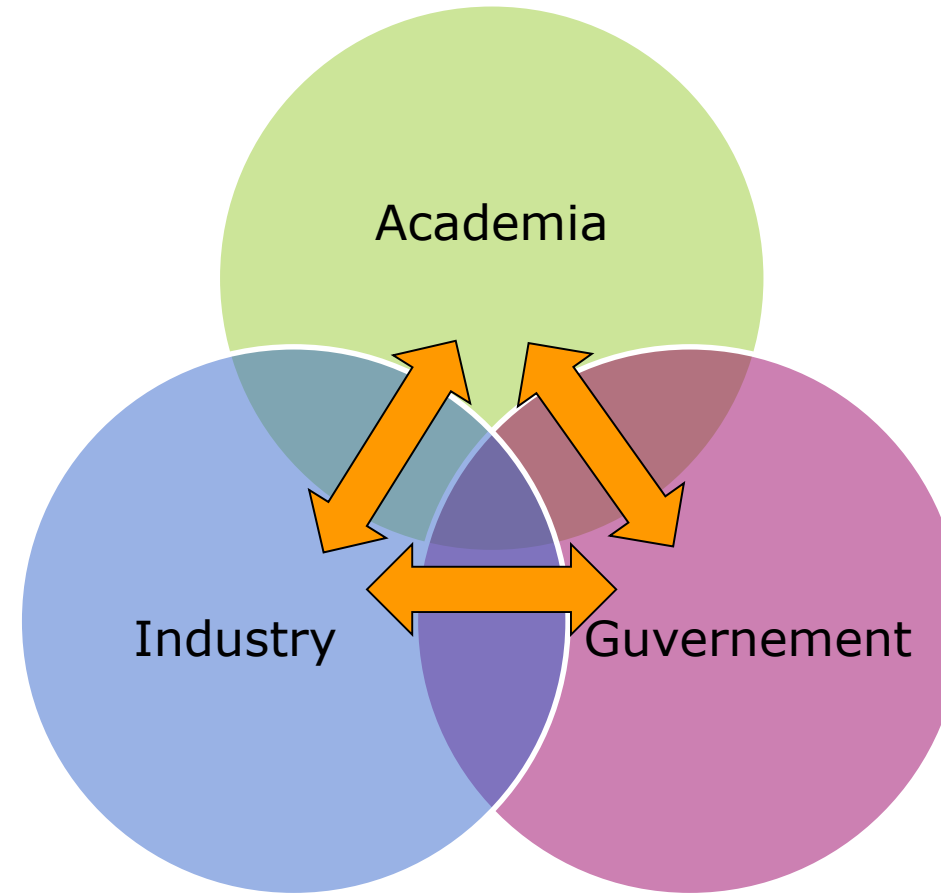
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May 13:07:47 - [info] [azureiothub:Azure IoT Hub] Sending Message to Azure IoT Hub
Payload: {"Humidity":100,"Ambient Temperature":28.08,"Object Temperature":24.9,"AccelerometerX":0.01,"AccelerometerY":0.01,"AccelerometerZ":0.01,"MagnetometerX":64.46,"MagnetometerY":64.46,"GyroscopeX":-1.69,"GyroscopeY":-7.05,"GyroscopeZ":4,"Light":9}
May 13:07:59 - [info] [azureiothub:Azure IoT Hub] String
May 13:07:59 - [info] [azureiothub:Azure IoT Hub] Sending Message to Azure IoT Hub
Payload: {"Humidity":100,"Ambient Temperature":28,"Object Temperature":24.9,"AccelerometerX":0.02,"AccelerometerY":0.02,"AccelerometerZ":0.02,"MagnetometerX":64.46,"MagnetometerY":64.46,"GyroscopeX":-1.69,"GyroscopeY":-7.05,"GyroscopeZ":4,"Light":9}
```

Data literacy



Innovation/co-creation

- Triple helix
- New sensors
- New data combinations
- Apps and services
- Aggregated data as-a-service
- RDM and DM

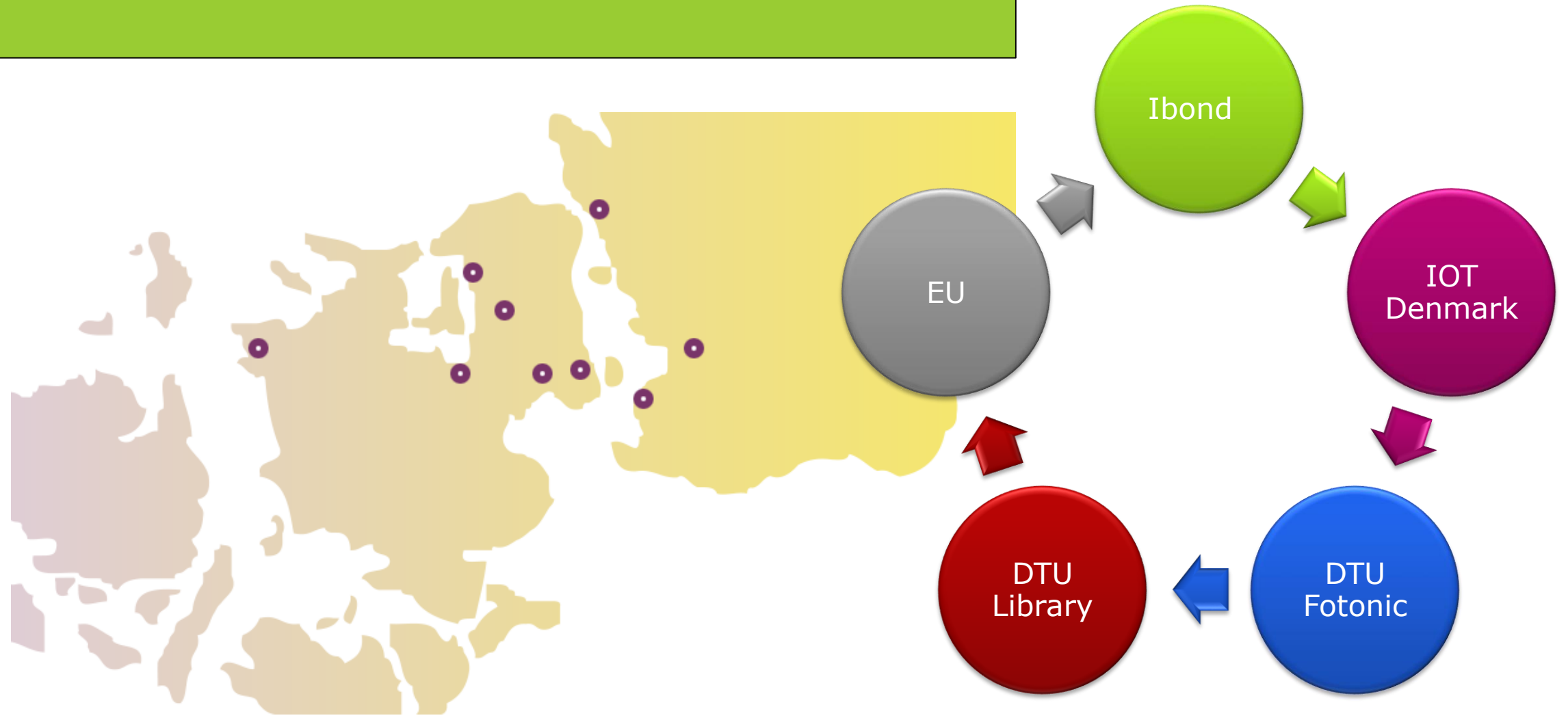


Innovation / co-creation

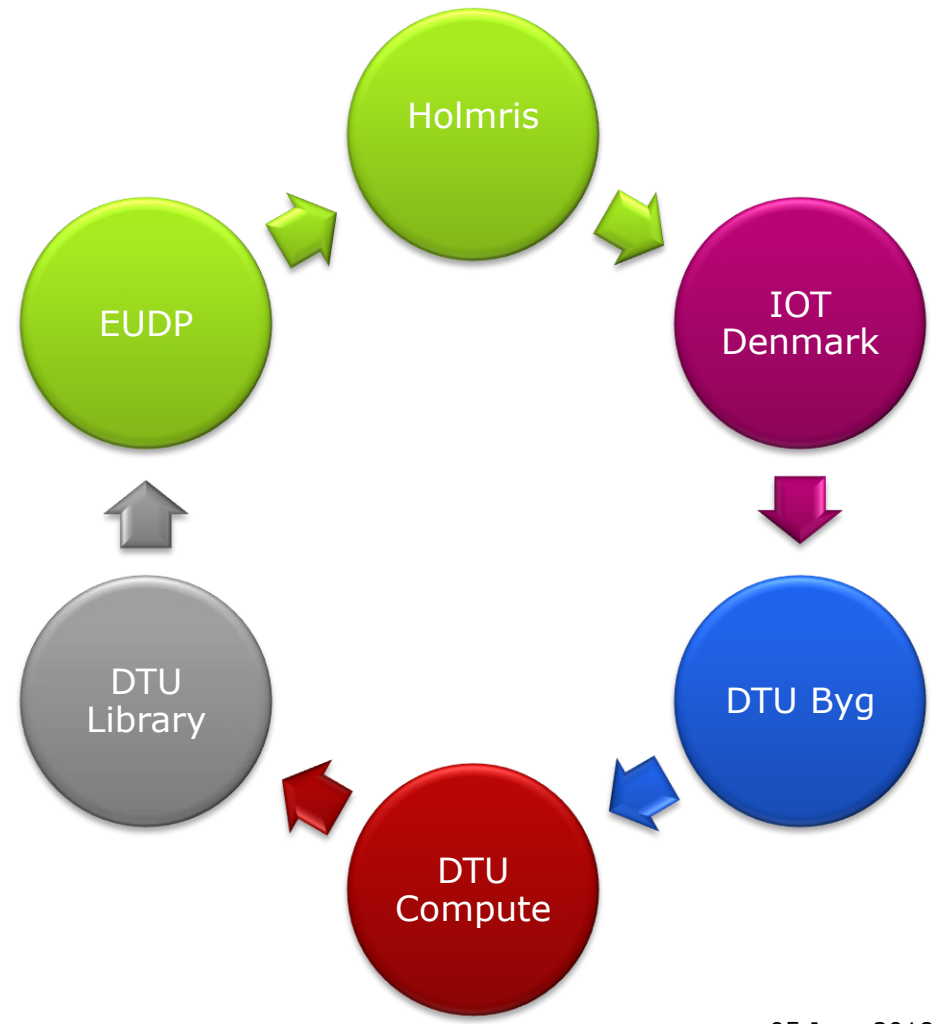
www.lightingmetropolis.com



Innovation/co-creation



Innovation/co-creation



Facility management



Facility management



- Utilisation
- Optimization
- Allocation

More students, but not more *space* or *funding*

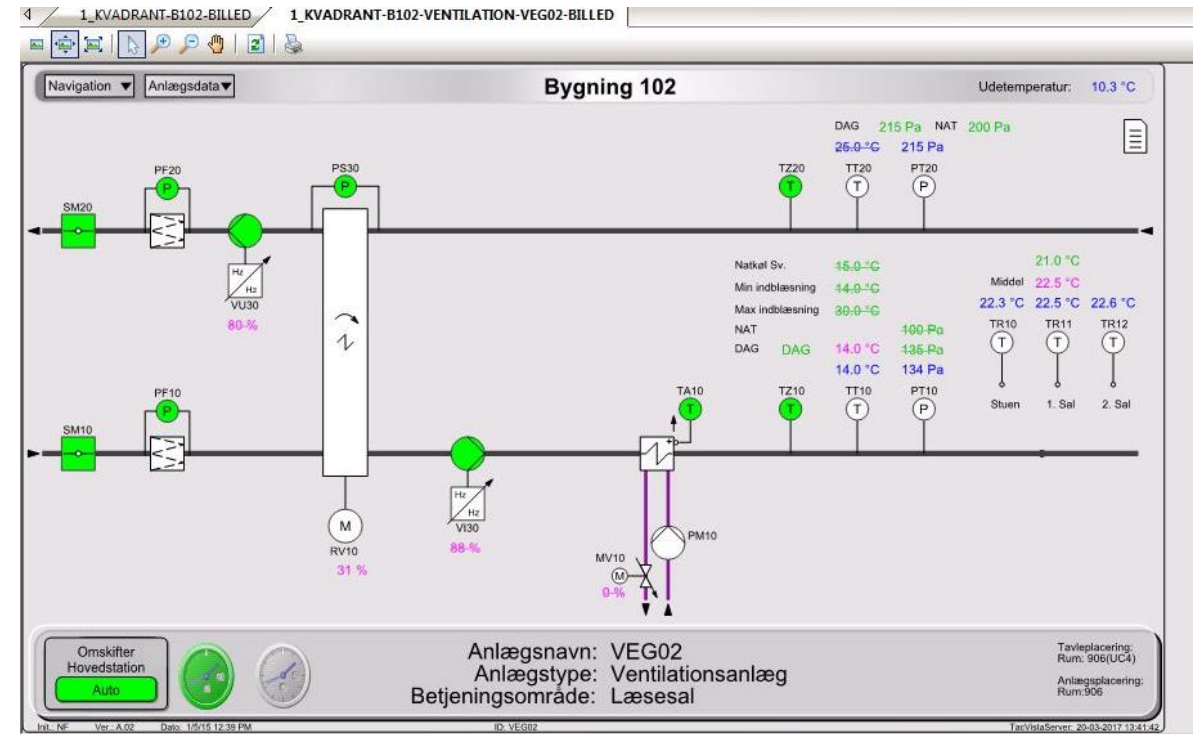
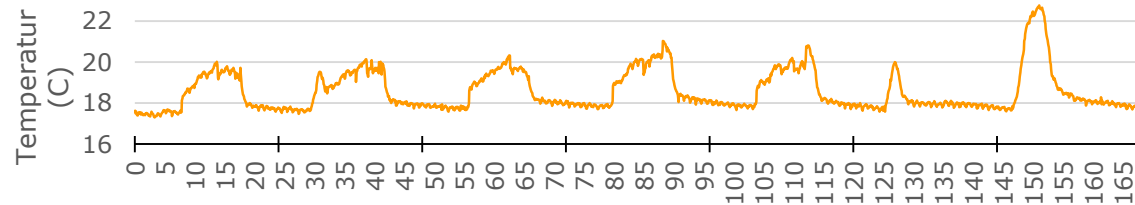
- Seats
- Seats with PC
- Single tables, group tables
- Grouprooms
- Printshop
- Utilisation, occupancy, frequency
- Seat/FTE



DeskHogging

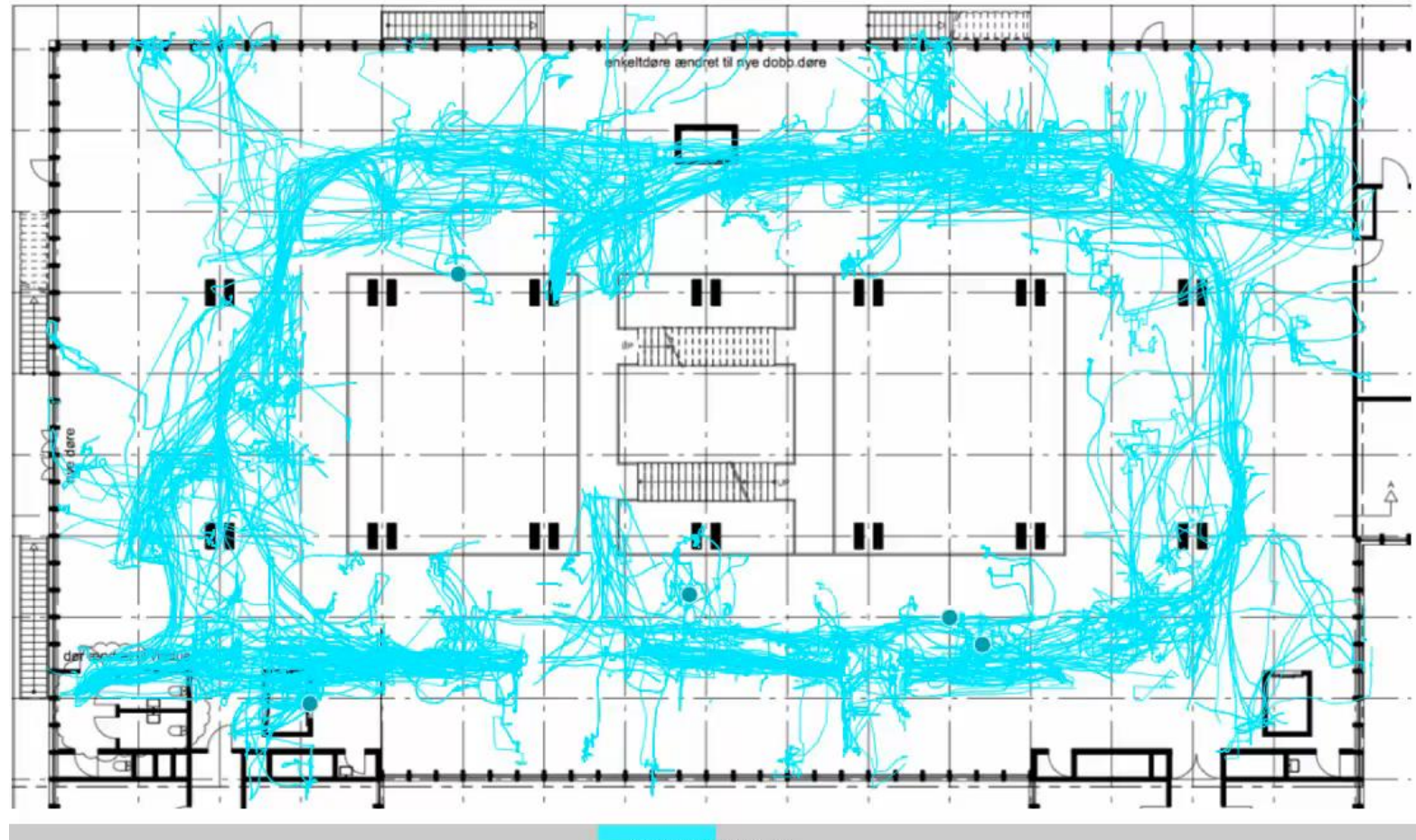
Optimization

- Environmental and economic sustainability
- Only light when there are people
- Only ventilate when needed
- Only heat and cool when needed



Allocation

- Library employees
- IT service
- Cleaning
- Security guard



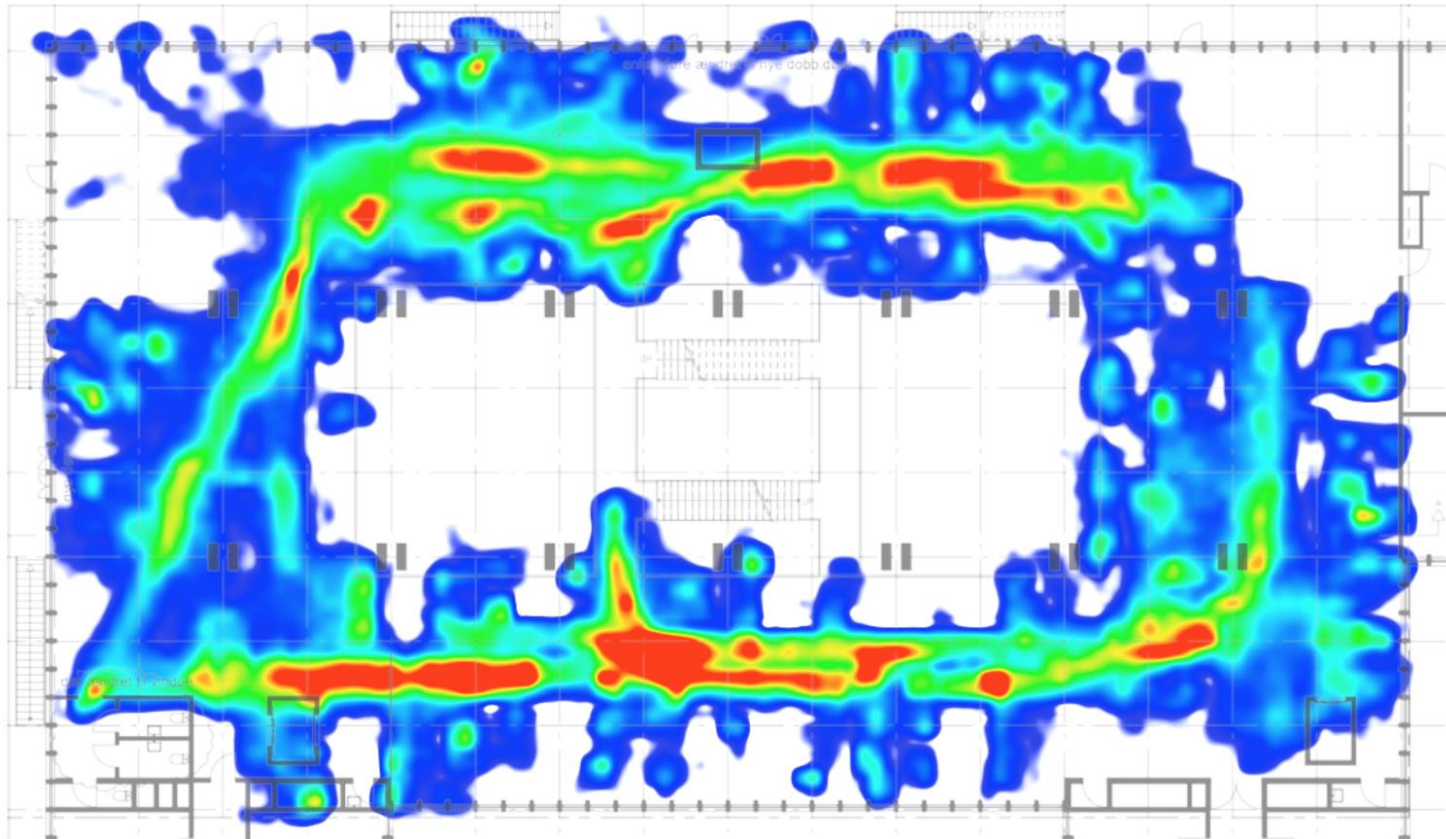
Allocation

Allocation based on utilisation

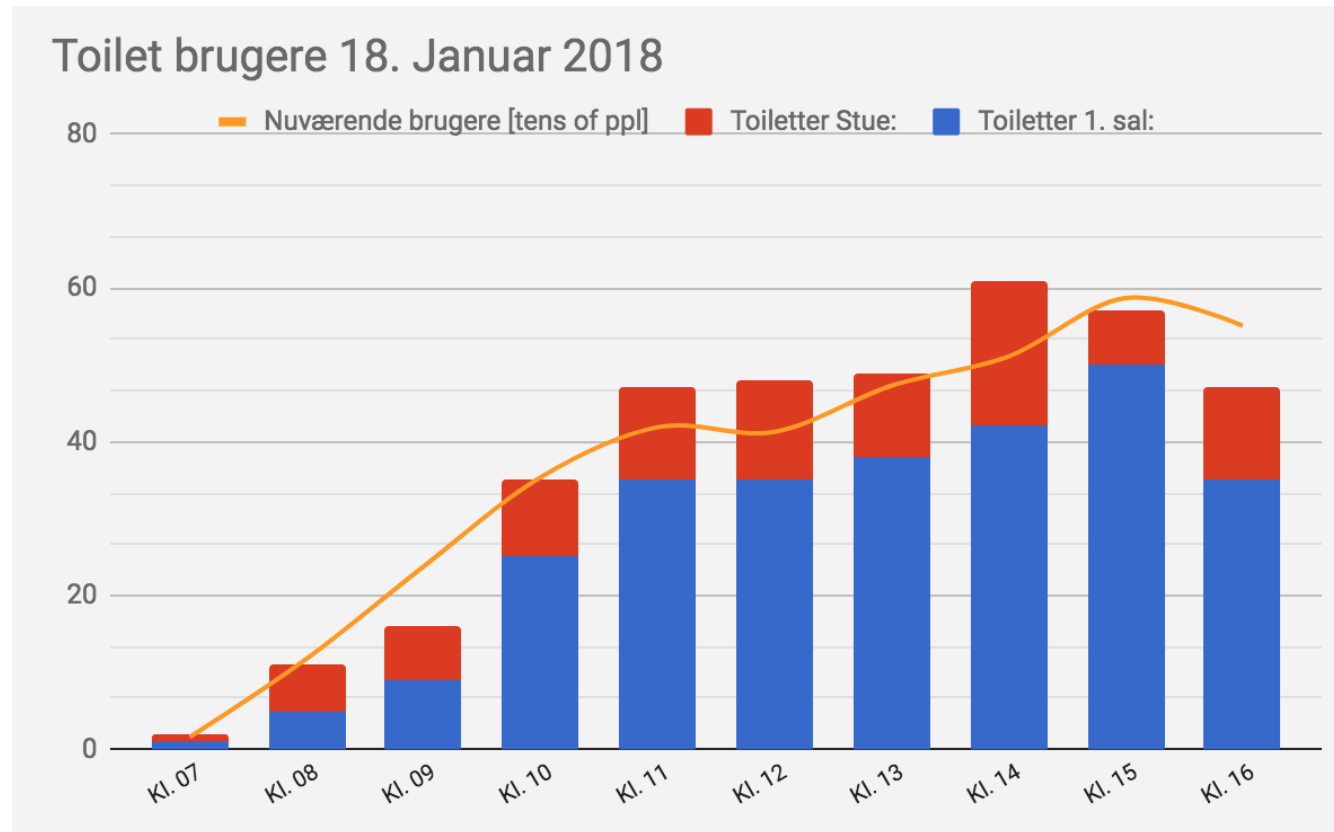


Allocation

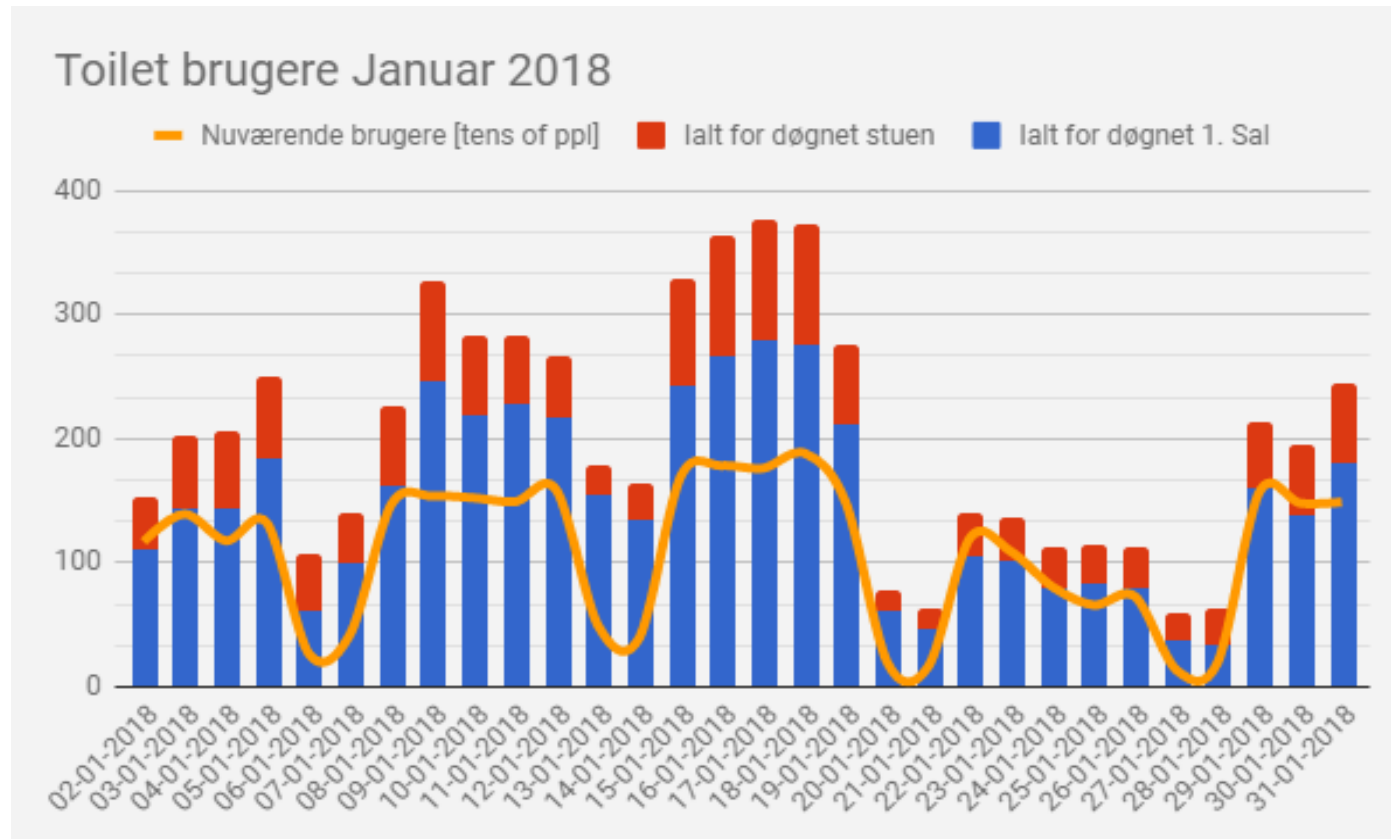
Allocation based on utilisation



Allocation based on utilisation

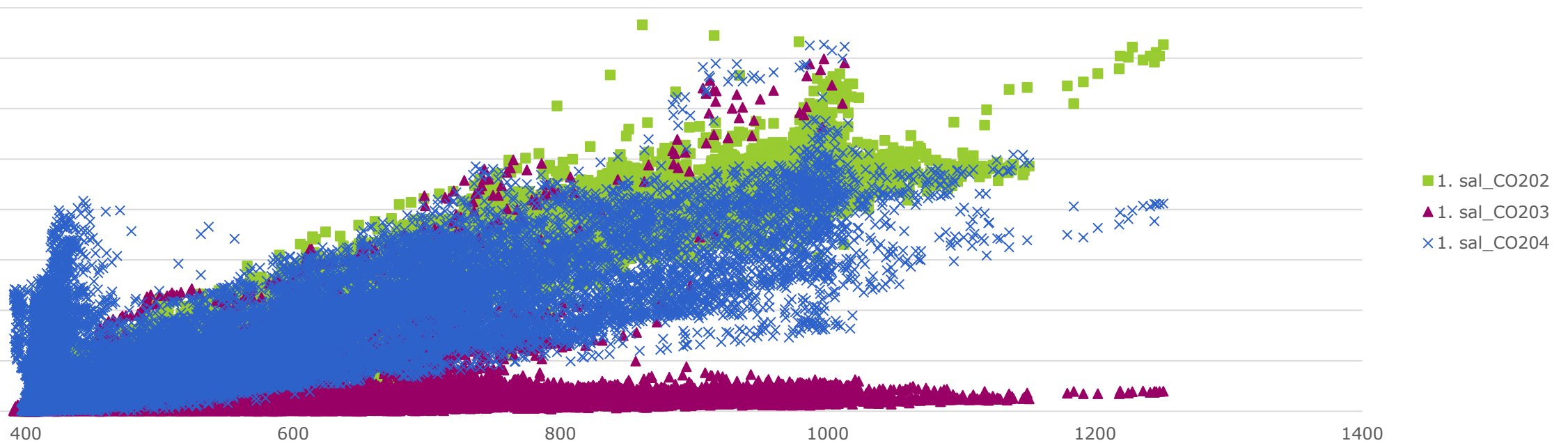


Allocation based on utilisation



Allocation

1. sal CO2_6. januar-14. maj



Final notes



Case studies

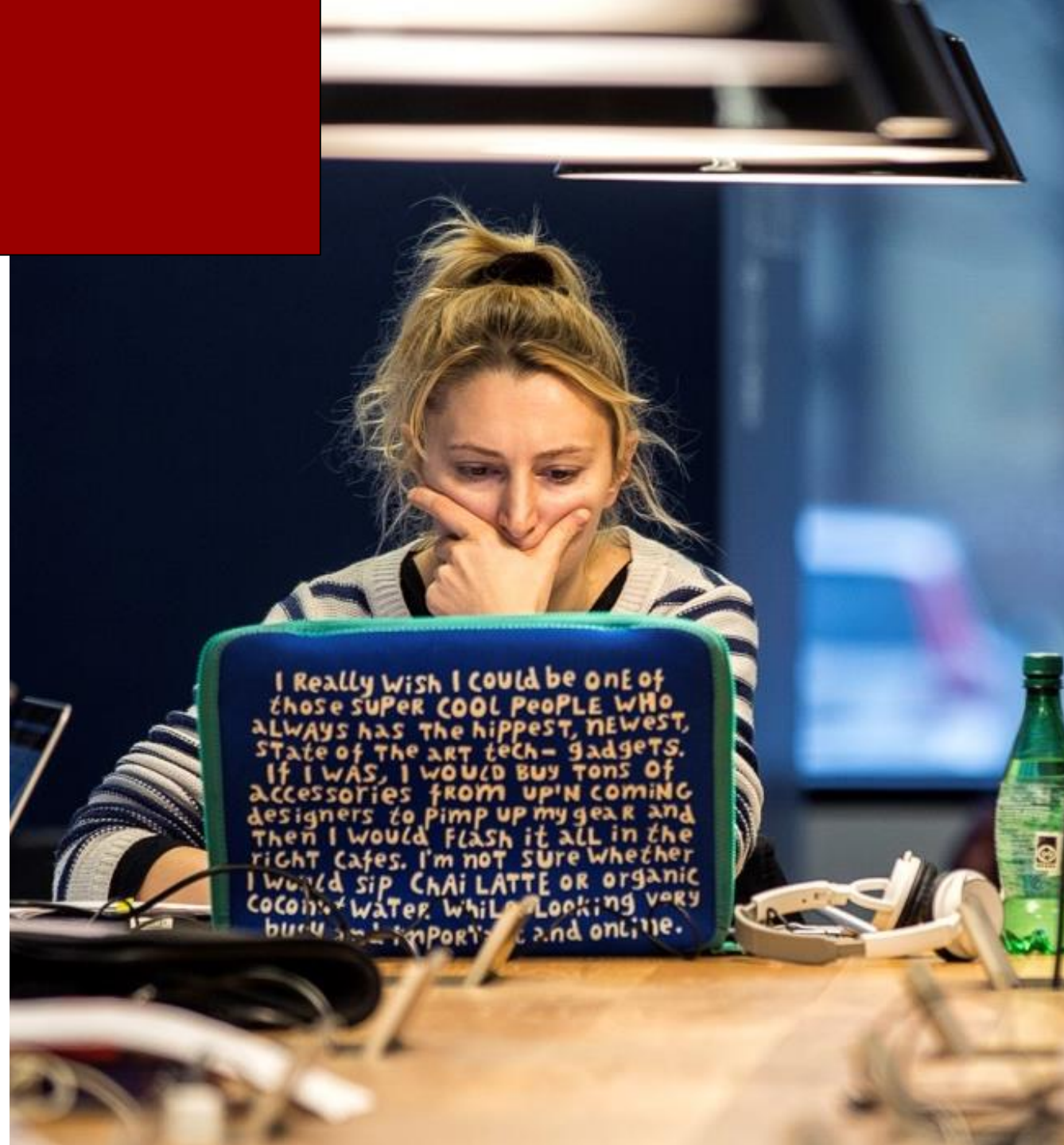


PERSPECTIVE	OBJECTIVES
Strategic Policy makers	<ul style="list-style-type: none"> Stimulate innovation Stimulate collaboration Increase quality of place Support culture Support image
Functional Users	<ul style="list-style-type: none"> Support user activities Increase user satisfaction Increase flexibility
Financial Controllers	<ul style="list-style-type: none"> Increase profitability Reduce risks Reduce costs
Physical Technical managers	<ul style="list-style-type: none"> Reduce footprint (m2) Reduce footprint (CO2)



Barriers

- Lack of talent
- Fear of moving forward – not yet ready
- EU General Data Protection Regulation
- Data ethics



Strategic potential

- Library impact on learning, grades, retention
- Service assessment
- Data-science-employees, data savvy students
- Closer collaboration with researchers
- Contributing to research and student-assignments
- Standard for excellent learning environment
- Network with industry and entrepreneurs
- Collaboration with other organisational units
- Innovation
- Inspiration



“We can’t make the students learn but we can make it easier for them!”

Thank you

Lars Binau
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DTU



**Technical University
of Denmark**