Linking Industry to Neutrons and X-rays

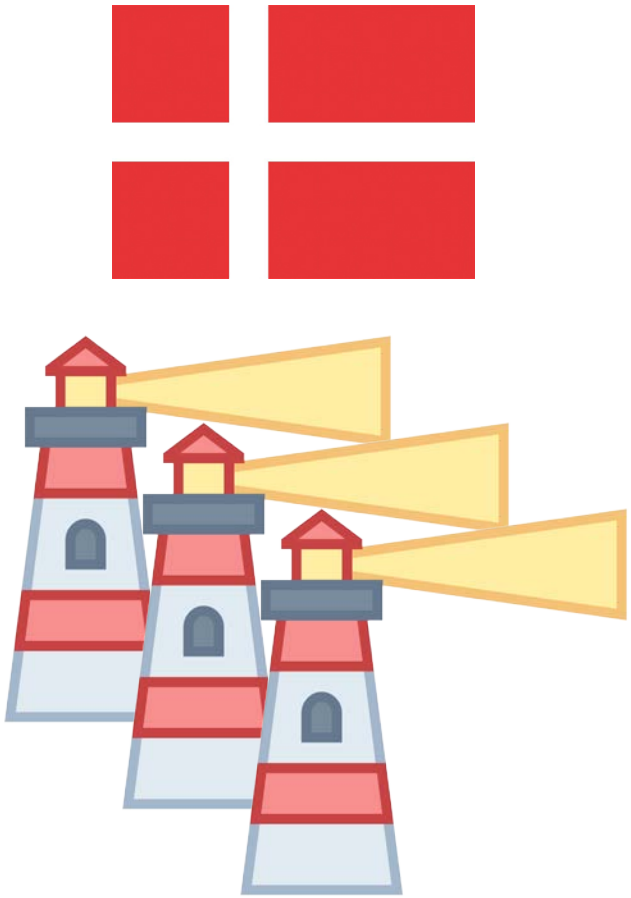
SDU Workshop August 31st, 2018

InnovationsFonden

FORSKNING, TEKNOLOGI & VÆKST I DANMARK

The Danish Strategy

- Three main elements:
  - The Grand Solutions of Danish Innovation Fund
    - Strategic impact
    - Society goals: growth & employment
  - National Scientific Lighthouse Strategy
    - Selected universities for competence centers
    - Seven dedicated and prioritised areas
    - One area is neutrons and x-rays with focus on MAX-IV and ESS
    - Specific strategy for ESS
  - DANSCATT association
    - Delegation of budget from the Ministry for Higher Education and Science
    - Focus on instrumentation and access to international science facilities
    - Board is a collection of all scientific stakeholders



Linking Industry to Neutrons and X-rays

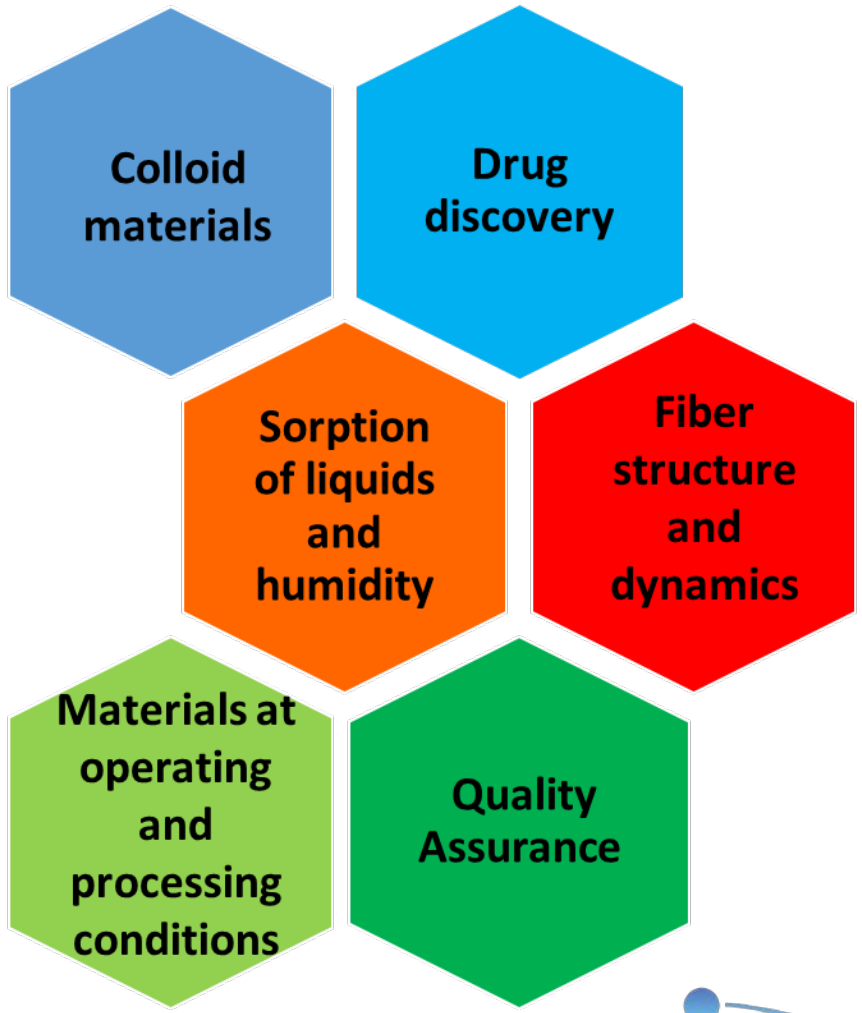
The LINX Project

- Partners:
  - 12 Industry partners
  - 3 Universities
  - 2 Danish Regions
  - Danish Industry (DI)
- Sponsors:
  - Danish Innovation Fund (Main)
  - Capital Region
  - Region Midt
  - Danish Industry Confederation
- LINX Association is growing. Currently 27 members

Linking Industry to Neutrons and X-rays

LINX focus areas and projects

- Budget: EUR 11 MIO
- Industry led priorities
- Joint projects
  - One or more industrial partners
  - One or more universities
- 6 Focus areas
- Outreach and development of new methods



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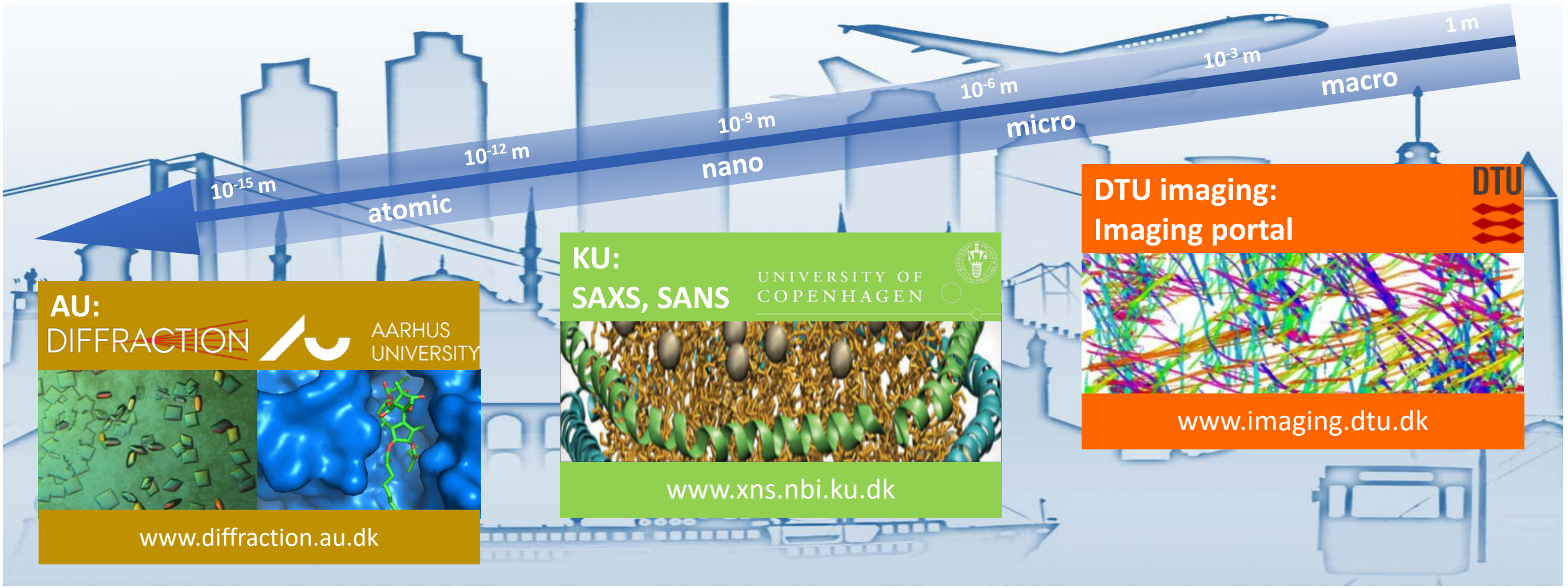
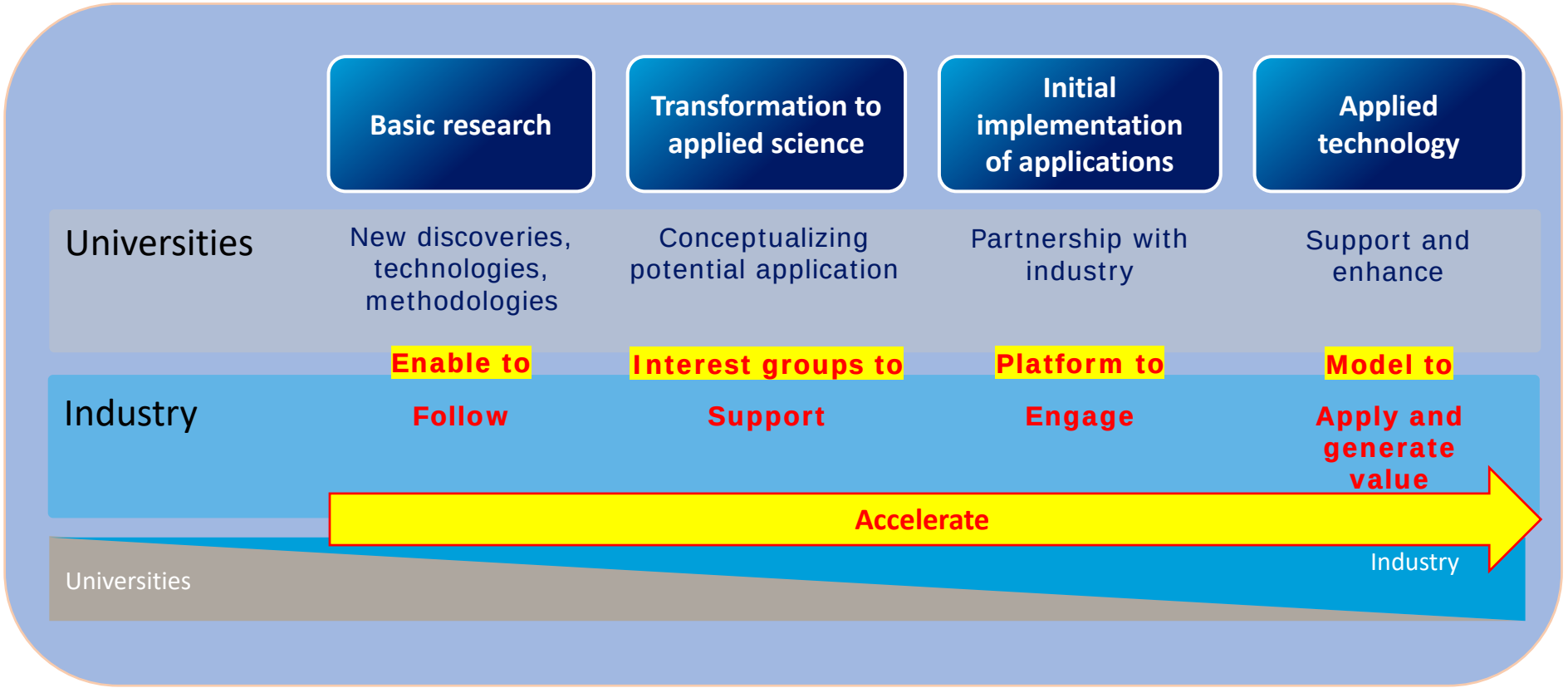
Seamless service across the length scale



Industrial challenge:
How to involve and accelerate?

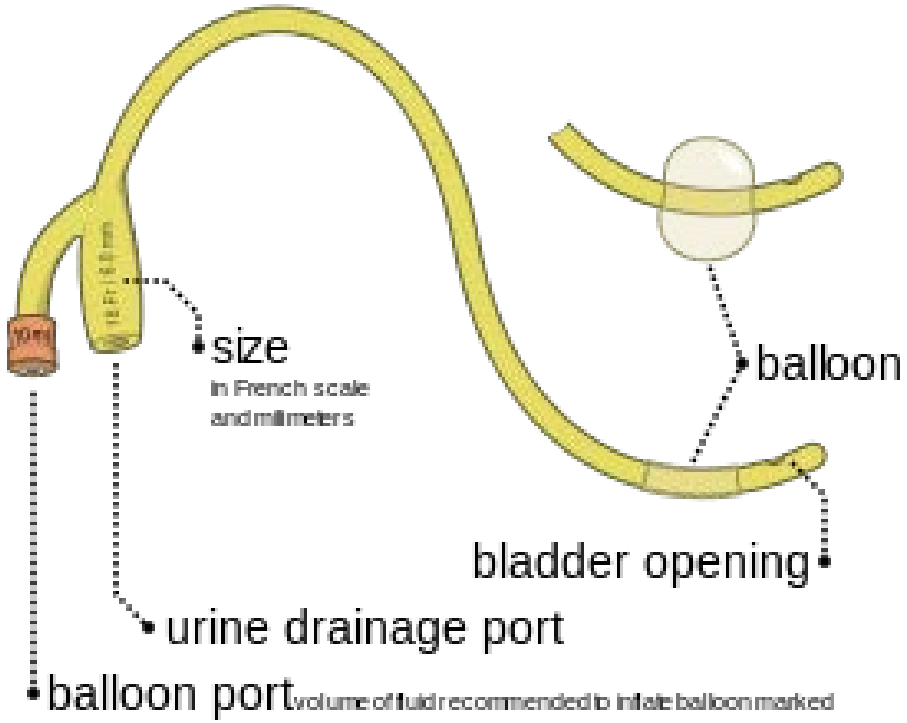


Linking Industry to Neutrons and X-rays

Example: Determining structure of hydrogel in silicone

Biomodics
Reimagine silicone

- Purpose
  - Incorporating hydrogel reduces formation of germs and present potential for drug delivery
- Goal
  - Predictable hydrogel network structure important
- Measured data set
  - SAXS lab time at Copenhagen University
  - SANS - neutron beam time purchased at FRM-II, Munich
  - SESANS – TU Delft
- Analysis
  - Incremental approach
  - Challenge to combine



LINX
Linking Industry to Neutrons and X-rays

Aging of materials at high temperatures

Converting the hydro carbons in the waste material or biomass into electricity, heat and BIOCHAR

Challenge: Fast material degradation due to extreme operating conditions in sublimator (>750 deg C)

LINX focus project goals:

- Understanding degradation and aging of materials operating at high temperatures
- Evaluating the long term stability and performance of said materials as to better guarantee operating lifetimes of products.
- Data analysis taking place

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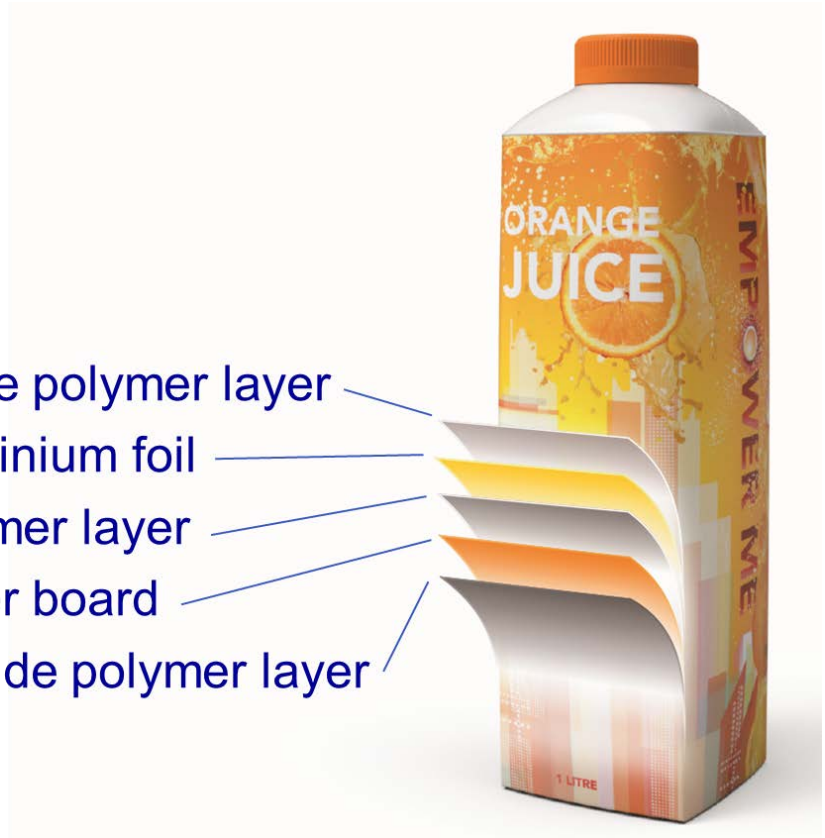
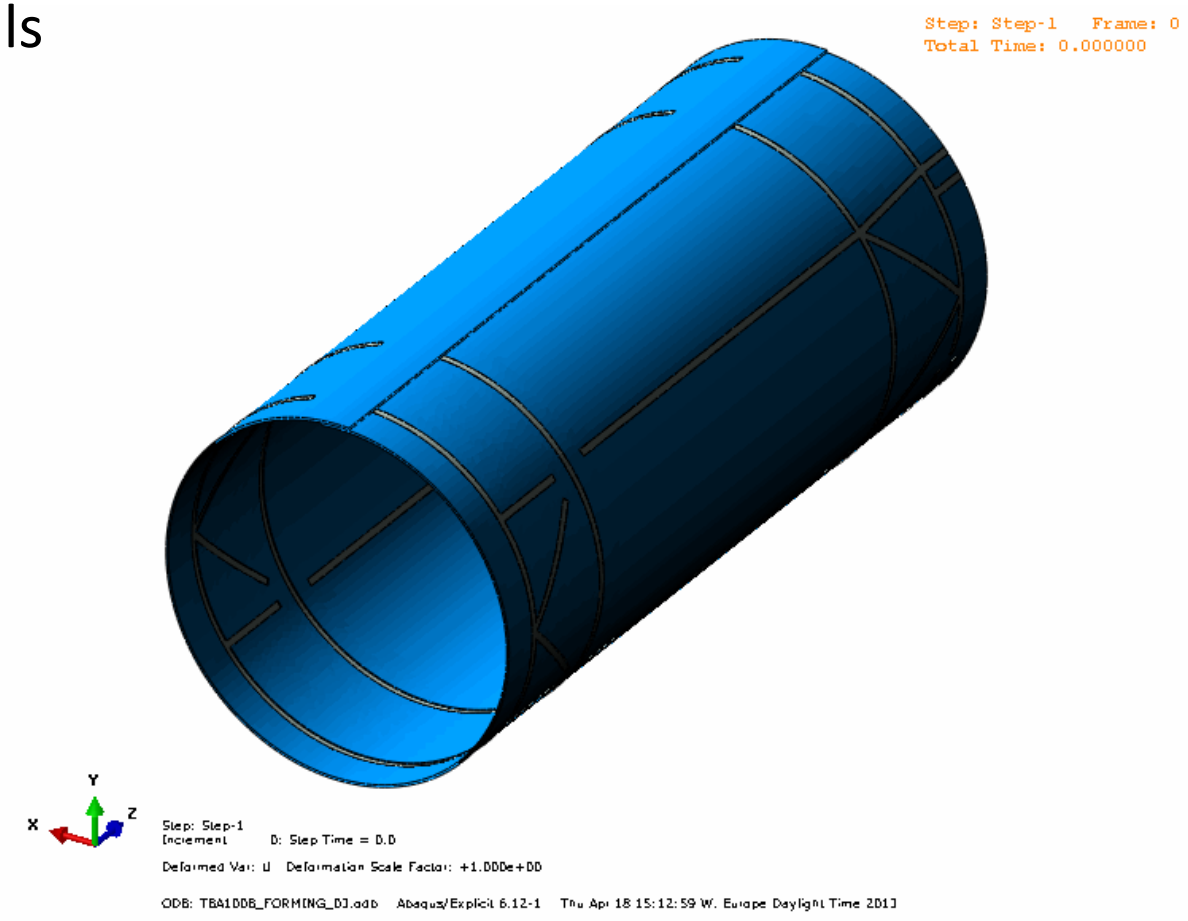
Example

Challenge: Characterisation of laminar materials



- Inside polymer layer
- Aluminium foil
- Polymer layer
- Paper board
- Outside polymer layer



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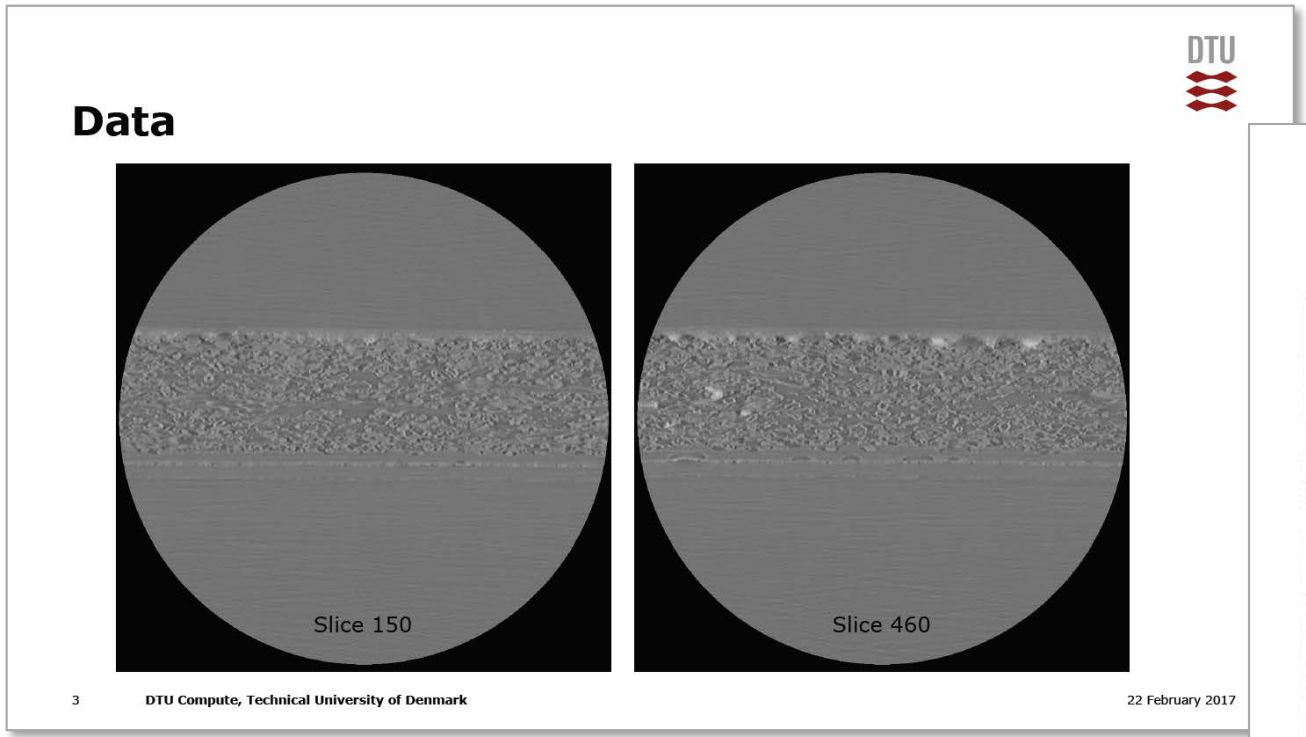
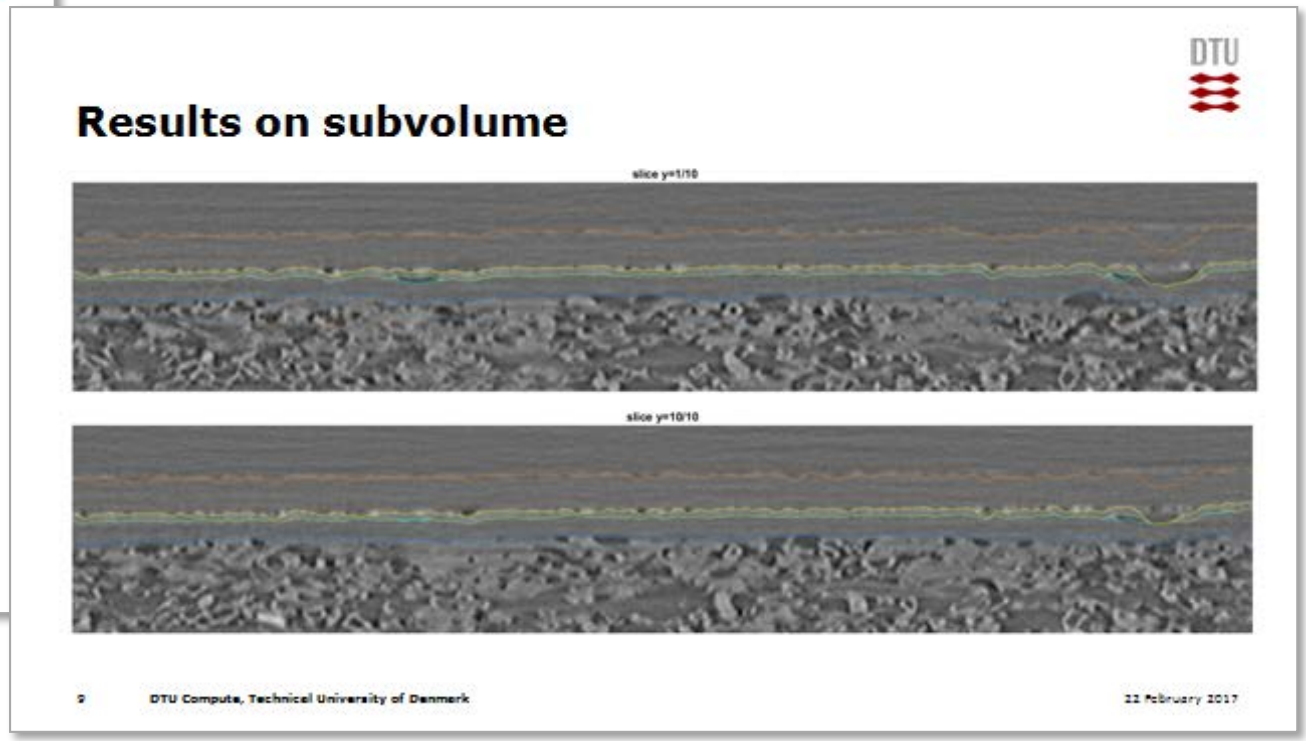
Example



High resolution scans

Layer detection by image analysis



Science: Identify all layer surfaces on that bended sample.

Commercial: Adjust and verify simulation model and consider QA implementation so packaging machines can run faster while optimising the packaging material design.

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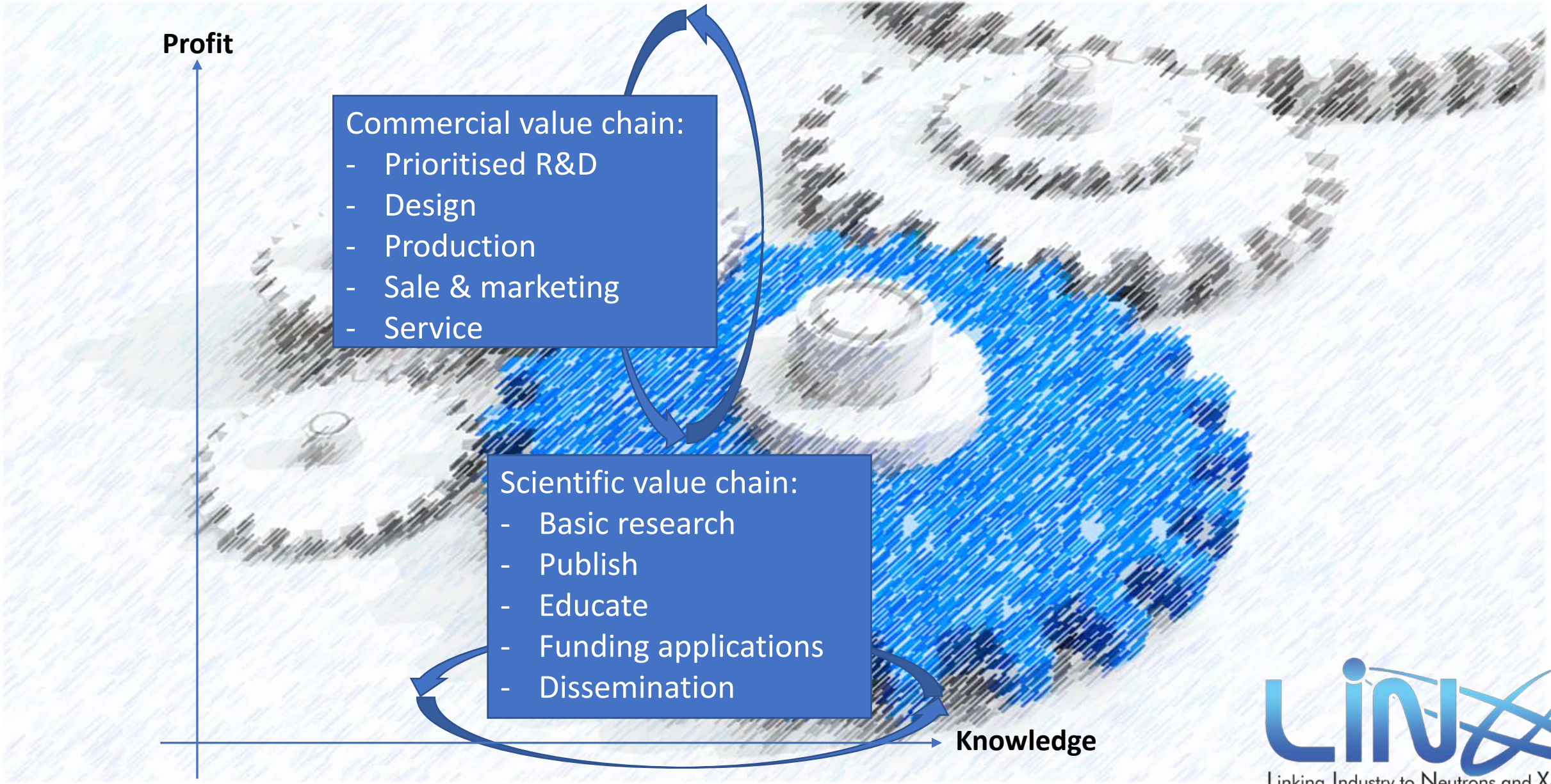
The relationship challenge



Linking Industry to Neutrons and X-rays

From project to association

LINX Association

Board

Director

Administration and Management

LINX Projects

LINX Project

1…N

The LINX Project

LINX Academy

- Classroom trainin
- Computer Based Training Hands-or training
- Insourcing of industry resource
- Workshops
- Shared or pooled Ph.D. students or Post Docs

LINX Facilities

Big scale facilities (MAX IV, ESS, XFEL, etc.)
Small scale facilities at the universities
Facilities available in industry
LINX facilities

Outreach

Global Development Projects

LINX Perspective

LINX Association Members

LINX Project Partners

midt Central Denmark Region
CPH INVENTURES
REGION The Capital Region of Denmark
DTU Technical University of Denmark
AARHUS UNIVERSITET
Biomodics Reimagine silicone
LINX Linking Industry to Neutrons and X-rays
DI Confederation of Danish Industry
ROCKWOOL
novo nordisk
UNIVERSITY OF COPENHAGEN
FRICHS A/S ECOTECH
exruptive
GRUNDFOS
TEGNOLOGY Thermo Electric Energy
VELUX
xnovotech
LM WIND POWER a GE Renewable Energy business
novozymes
Tetra Pak

SDU UNIVERSITY OF SOUTHERN DENMARK
RUC Roskilde University
GEMS
RI. SE
FORCE TECHNOLOGY
DESY.
DANISH TECHNOLOGICAL INSTITUTE
Carlsberg Group

Perspective

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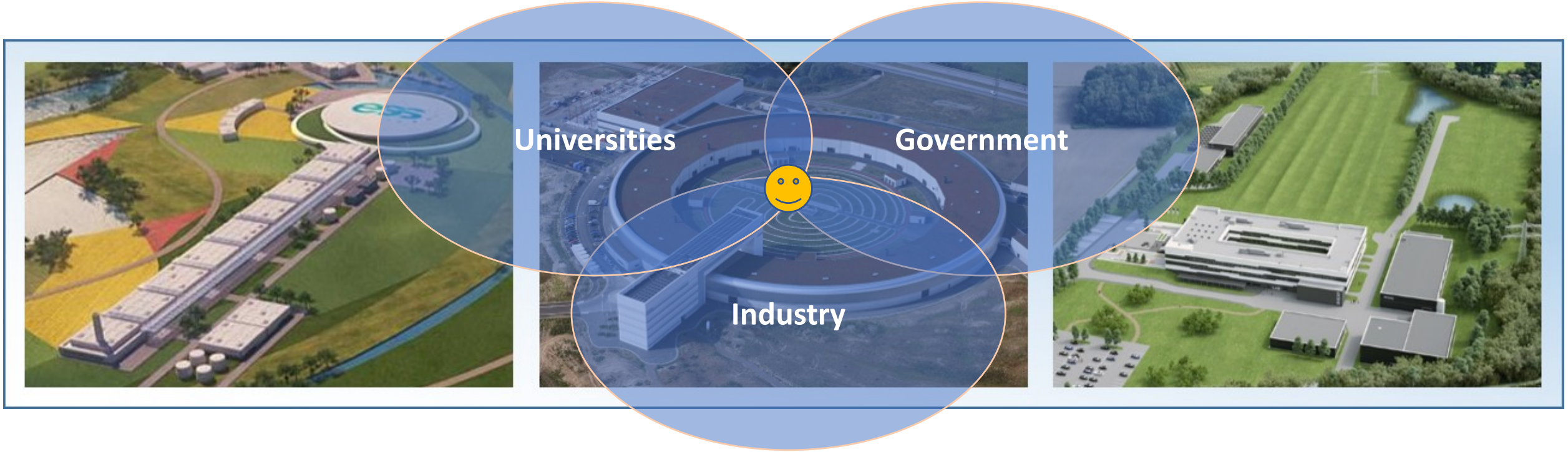
DANISH TECHNOLOGICAL INSTITUTE
Roskilde University
GEMS
Carlsberg Group
RI. SE
novo nordisk®

Maximising Value



How to engage

- Outreach activity – Let's get started
- Membership in LINX association – Let's be a part of the community
- Project activity – Let's create direct value