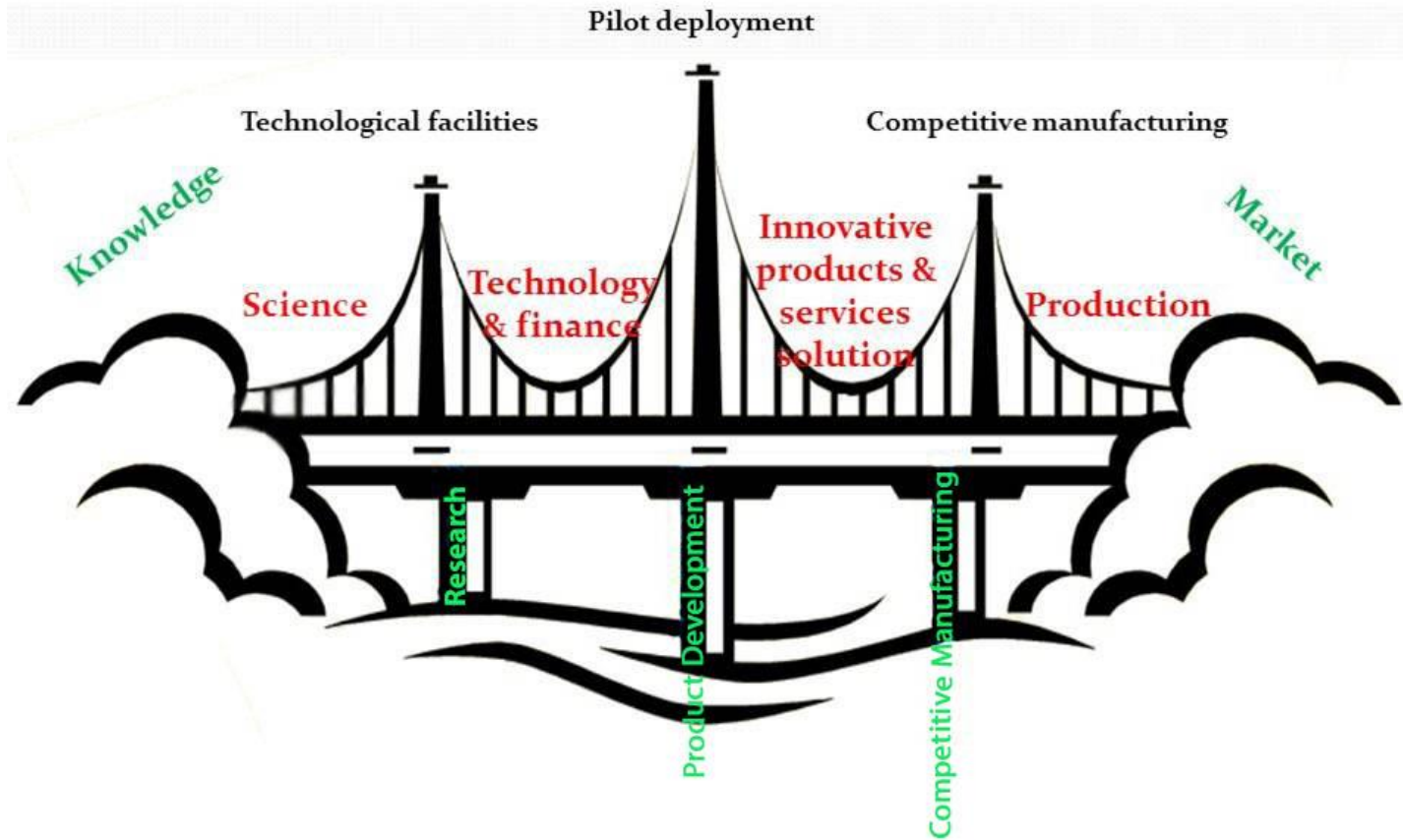


Willkommen  
Welcome  
Bienvenue



ETIF N° 5 – 8 November 2016  
Fit und agil dank Zusammenarbeit mit  
der Forschung  
Gian-Luca Bona

# Innovation Takes Time and Money



# The long Road from Ideas to Market



ETHZ, EPFL, Universities

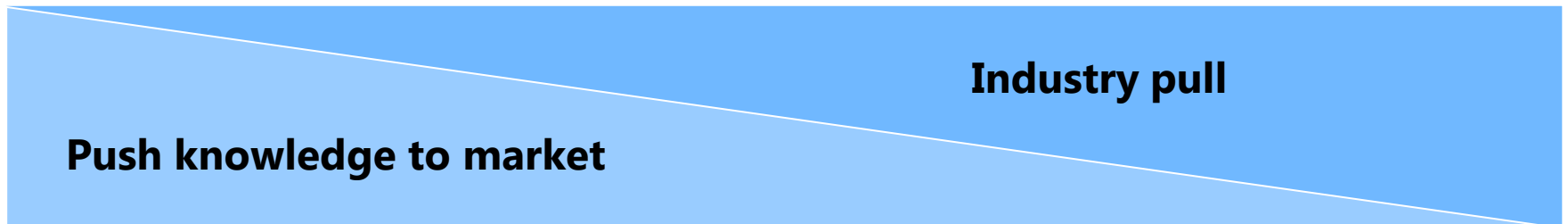
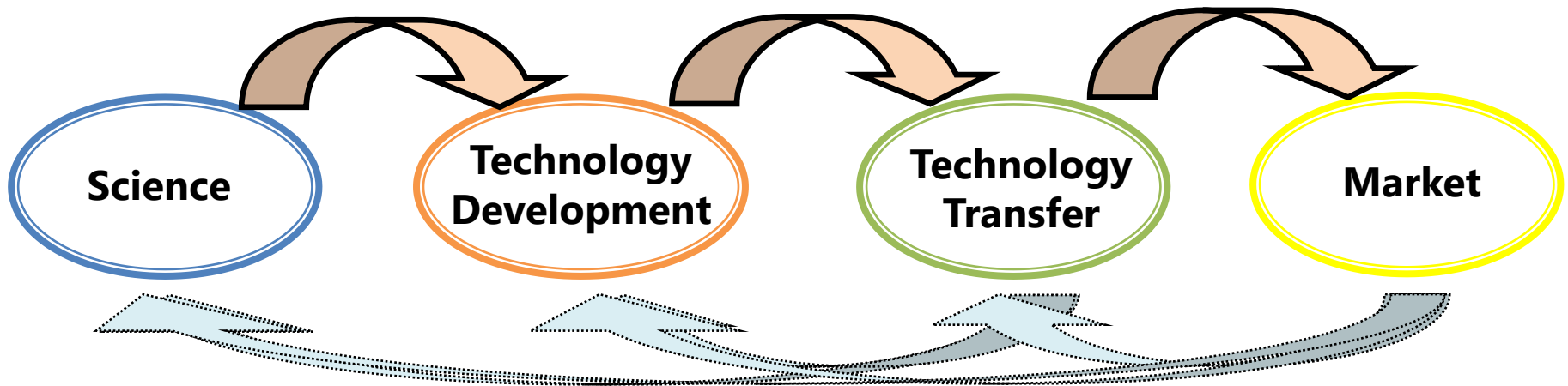
UAS

Empa

Industry

National Innovation Park (NIP)

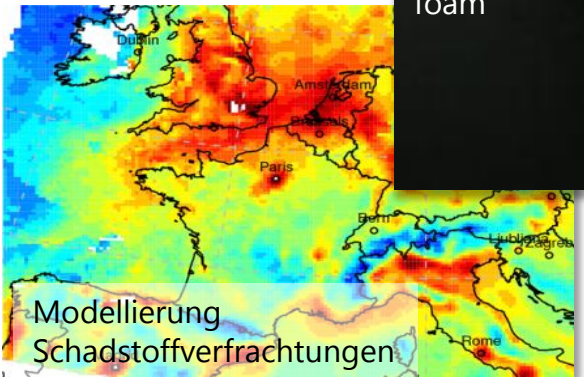
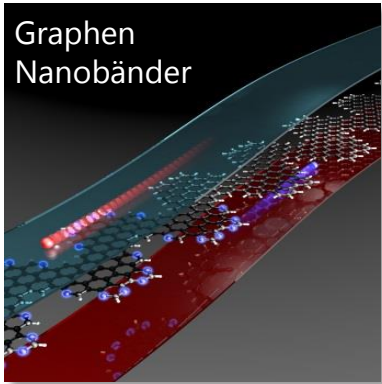
# Empa - the place where innovation starts





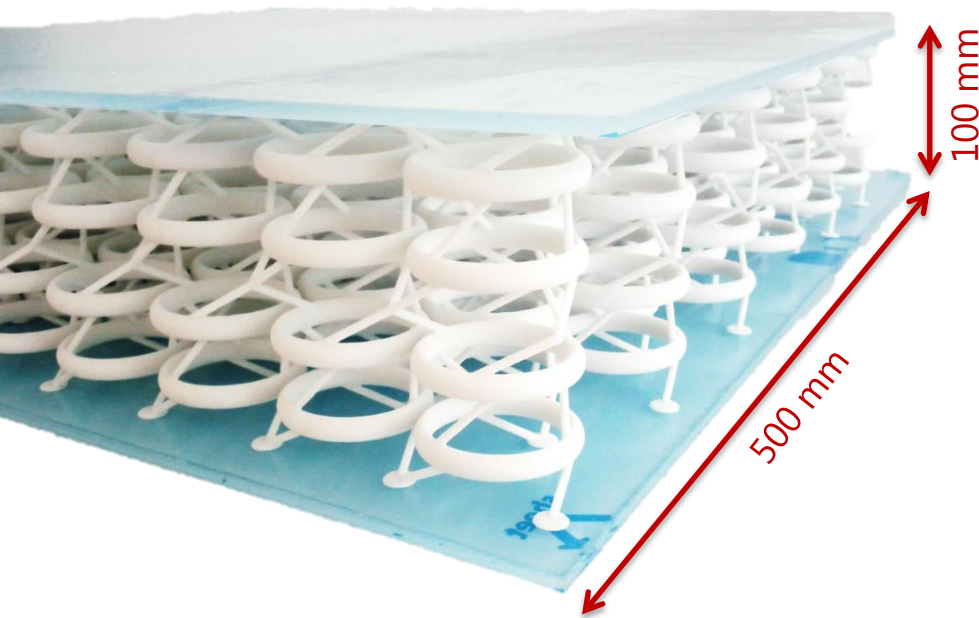
# Empa:

“The Place where Innovation Starts”



# Phononic Crystals (PC) for acoustic isolation applications

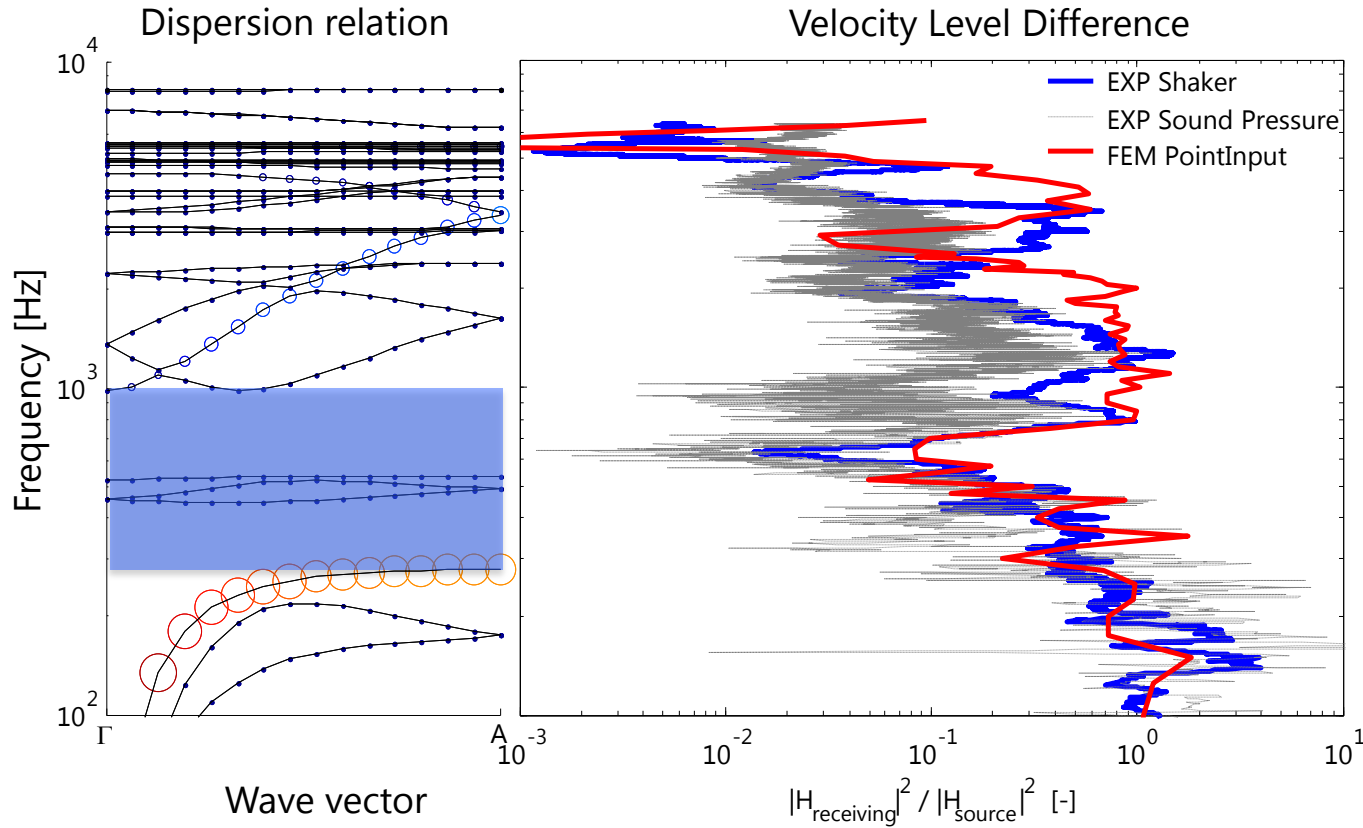
- 500 mm x 500 mm x 100 mm sample by Additive Manufacturing
- Polyamide for Selective Laser Sintering (PA12 Filled)
- Metamaterial core between two Plexiglas® sheets.



## Effective properties ( $\omega^* = 0.12$ )

Bandgap starting frequency	260 Hz
Mass density	103 kg/m <sup>3</sup>
Stiffness $C_{33}$	1.2 MPa
Unit cell length	50 mm

# acoustic isolation: experimental and numerical results.



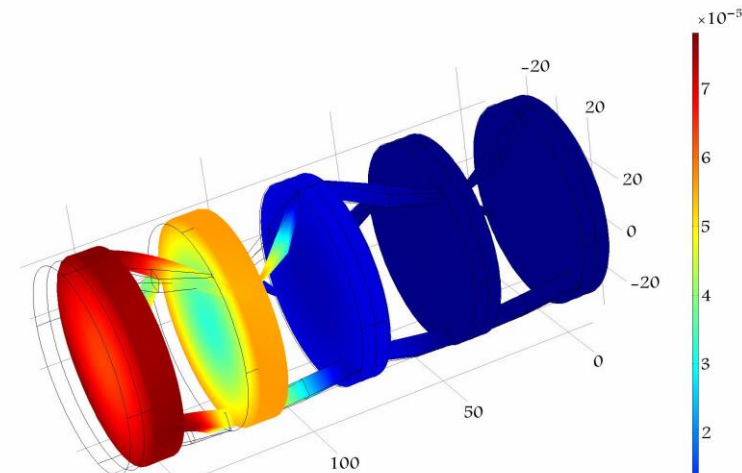
- Absorbs sound and vibrations but still exhibits a high mechanical load-bearing capacity

Attenuation band in correspondence of the predicted bandgap.  
Further for acoustic insulation applications.

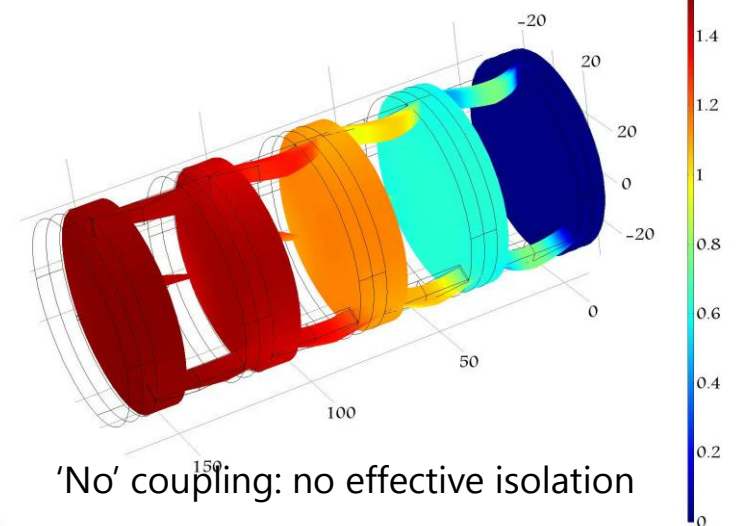


# Numeric Modelling and First Sample

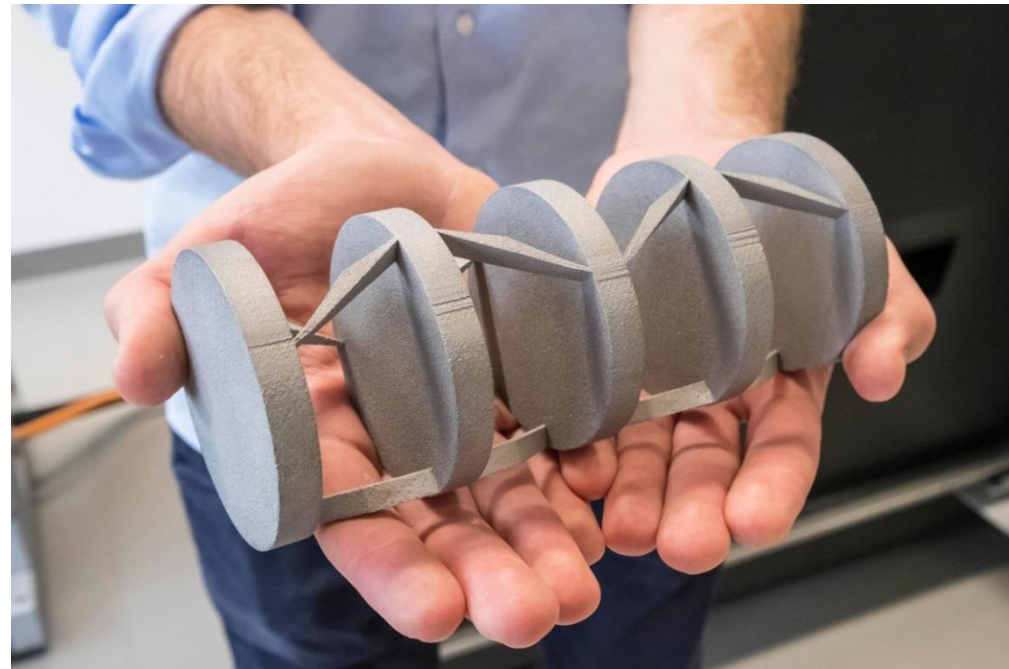
- make phononic crystals with 3D printing



Strong coupling: effective isolation

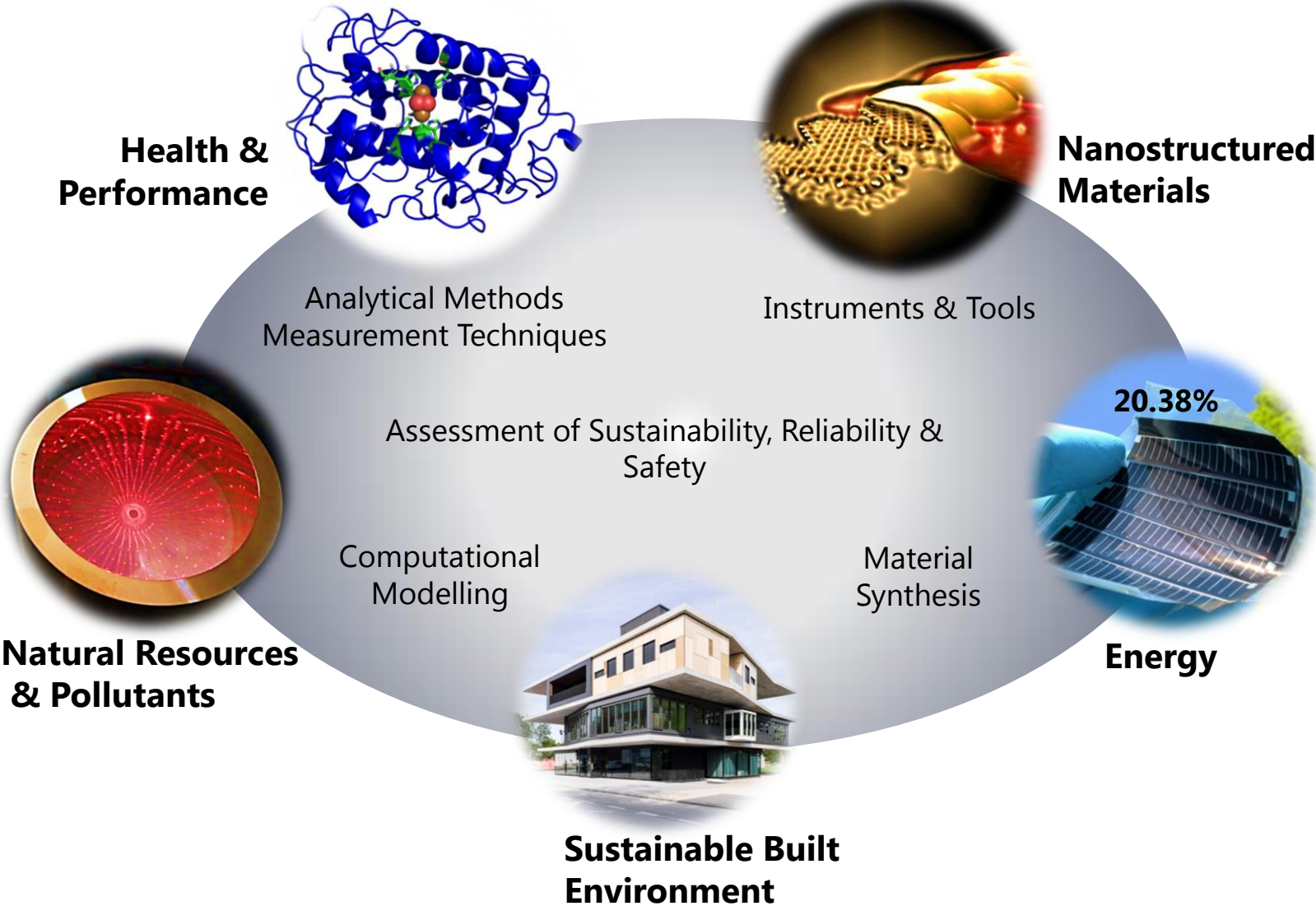


'No' coupling: no effective isolation



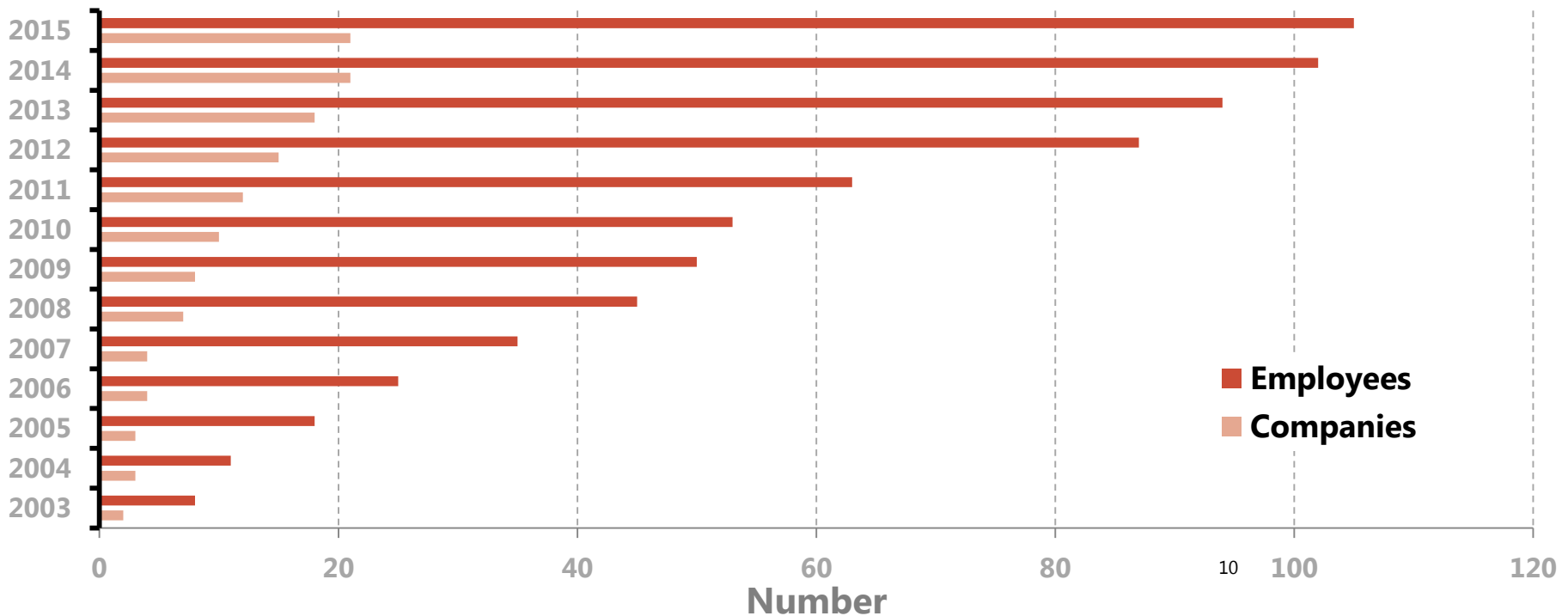
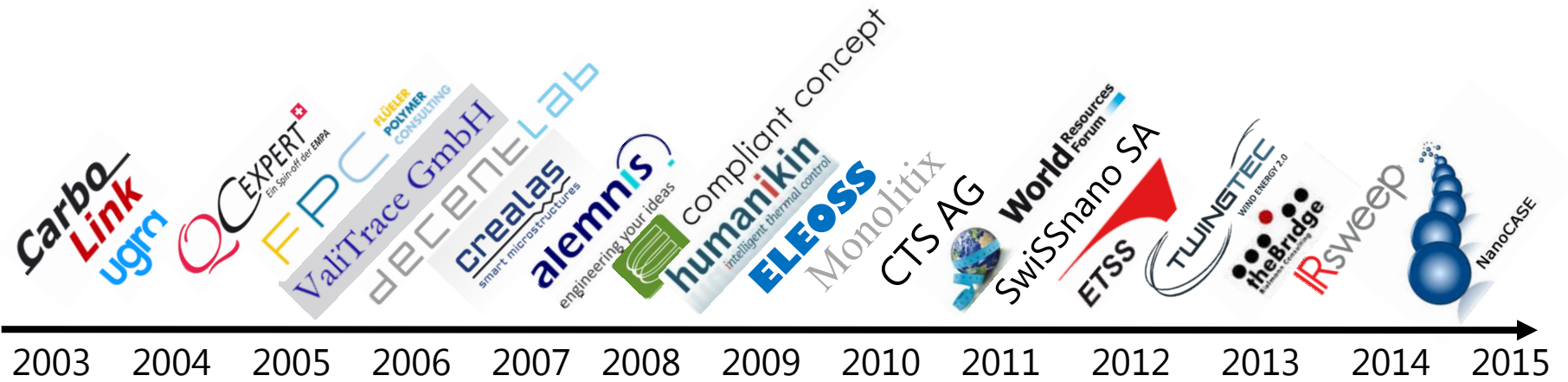


# Empa's Research Focus Areas

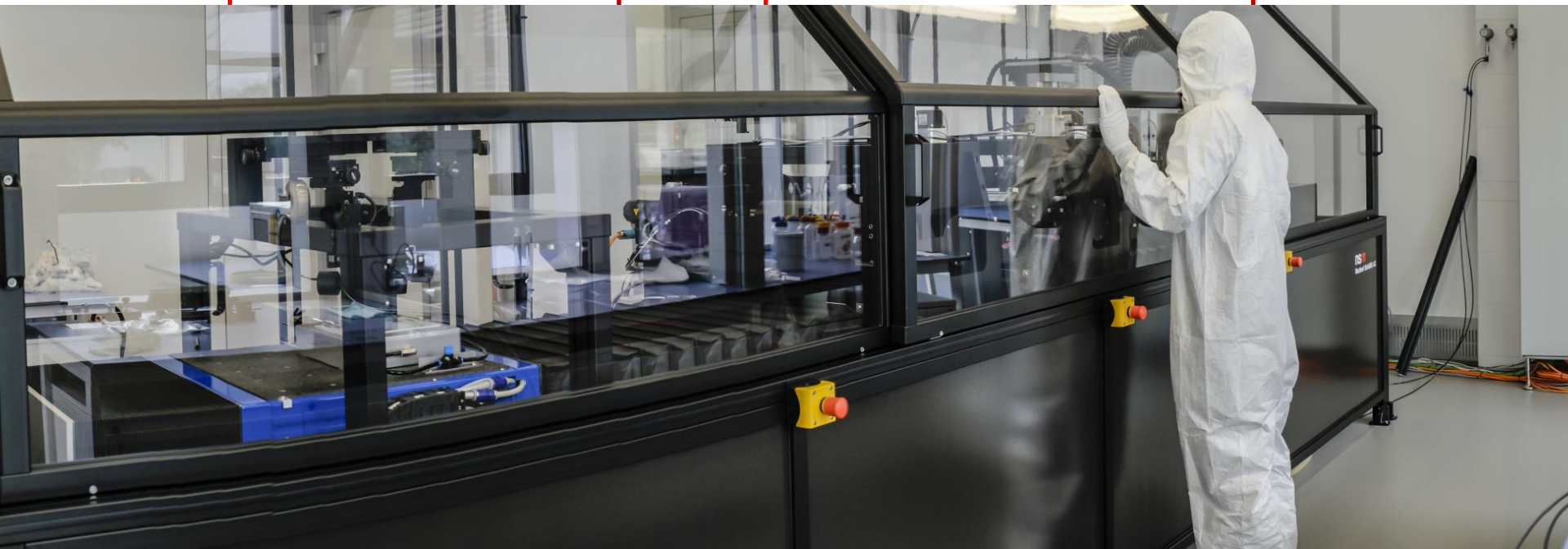
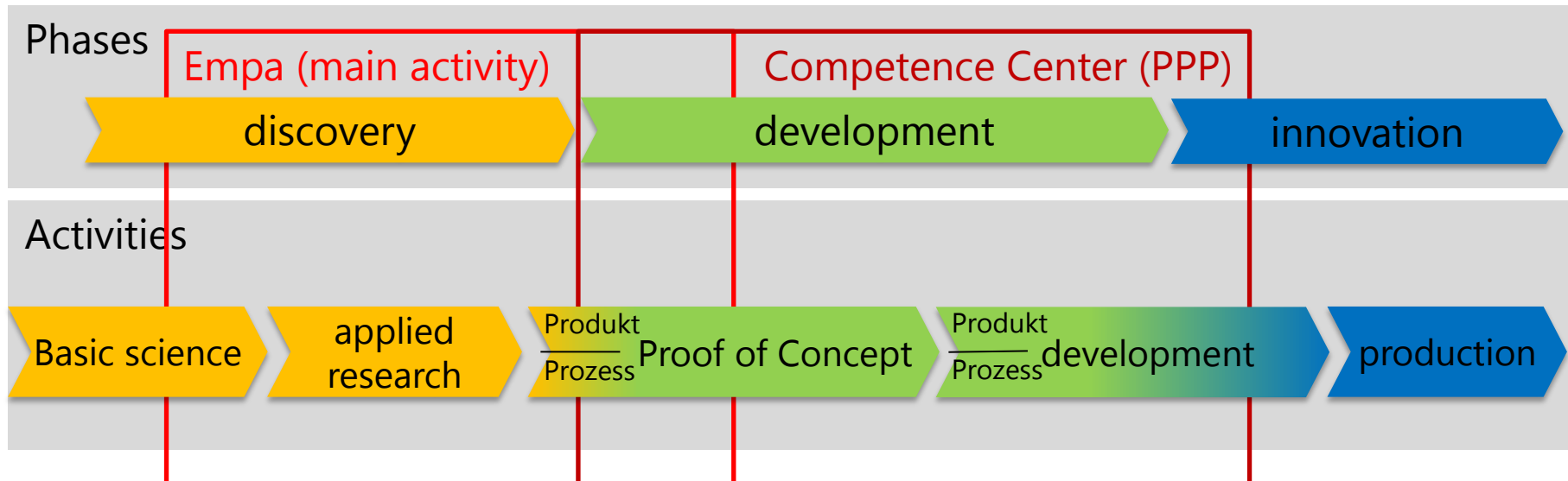


# KTT through Start-up/Spin-off Companies

## Empa Spin-offs



# From Discovery to Innovation





# ... Research and Technology Transfer Platforms

$\frac{3}{4}$  of CH-Energy consumption in housing and mobility

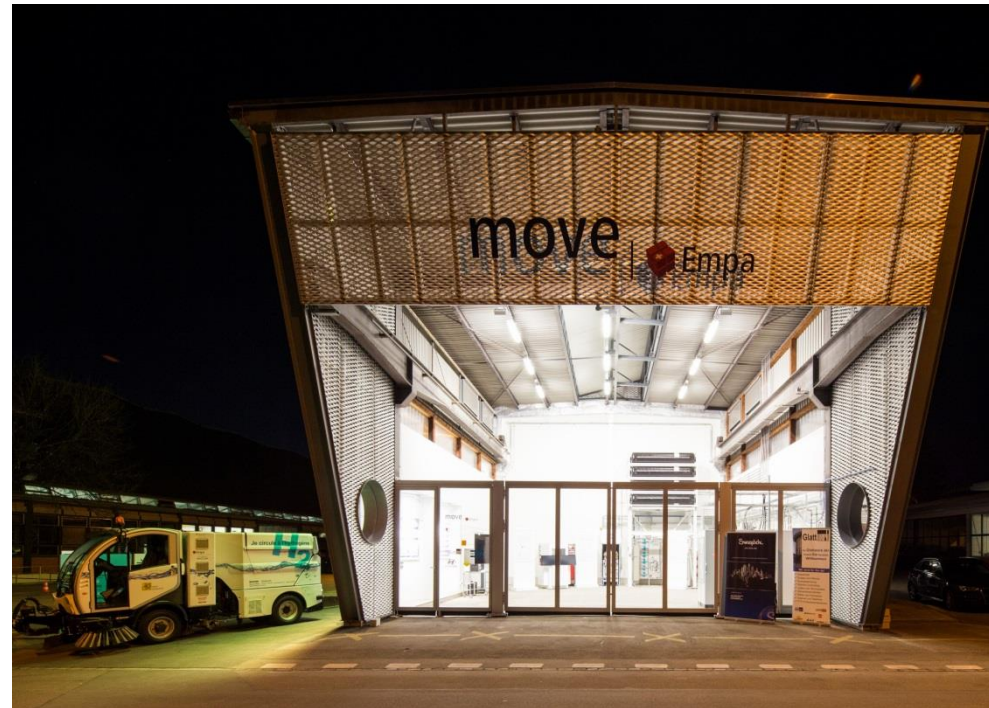
## **NEST:** housing platform

Dynamic and flexible  
with energy hub



## **Move:** Future Mobility platform

Excess renewable energy (power to gas), i.e.  
'clean' fuels (H<sub>2</sub>, ...) for power to mobility

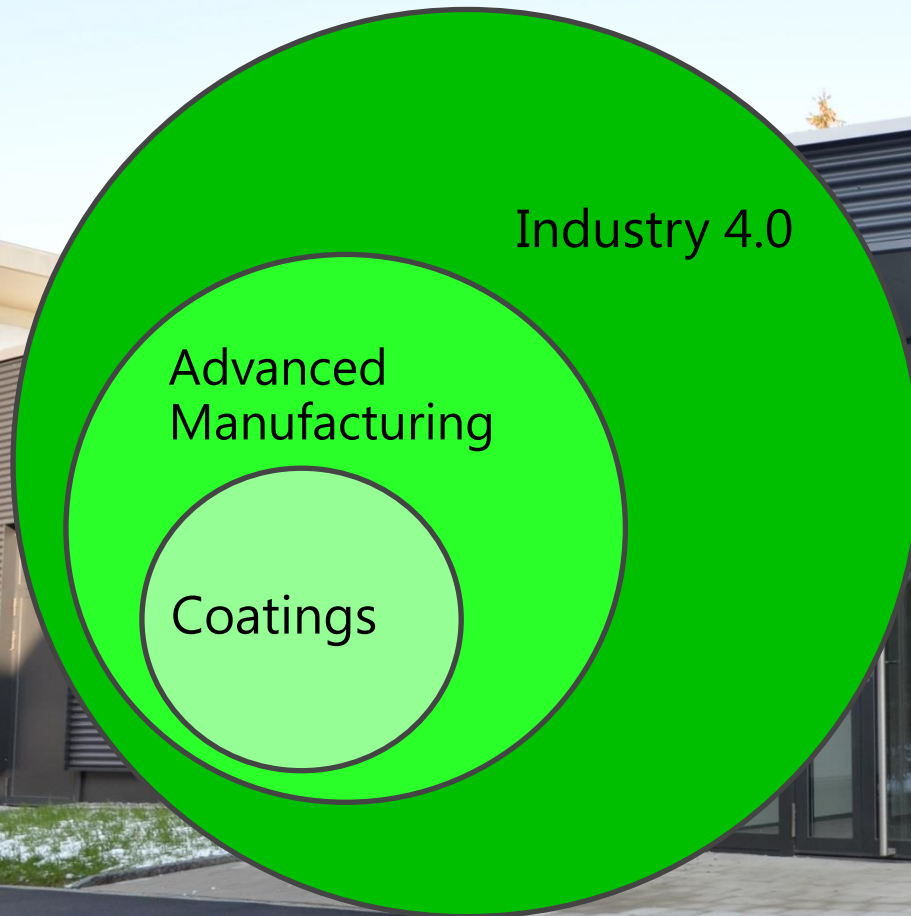


## Decentralized & Integrated Energy Management

Collaboration within ETH Domain and industry



# Working together



With our partners

# Coating Competence Center @ Empa

## Coating Infrastructure

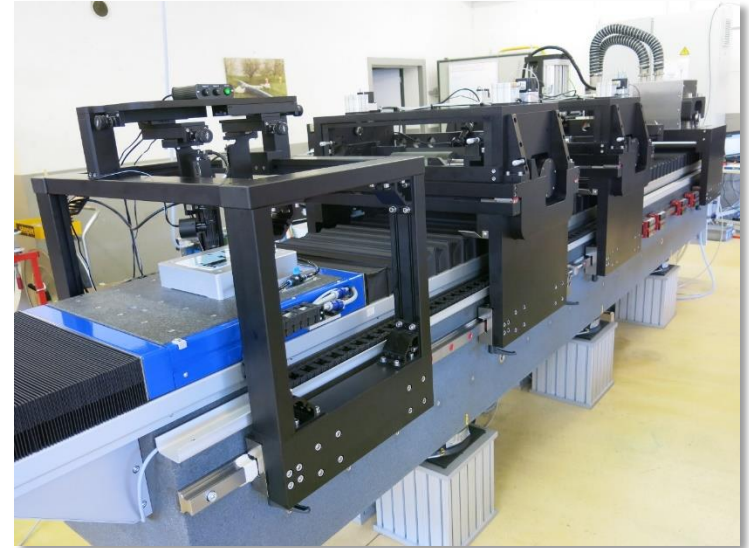
## Modular sheet printing system

INGENIA S3p™

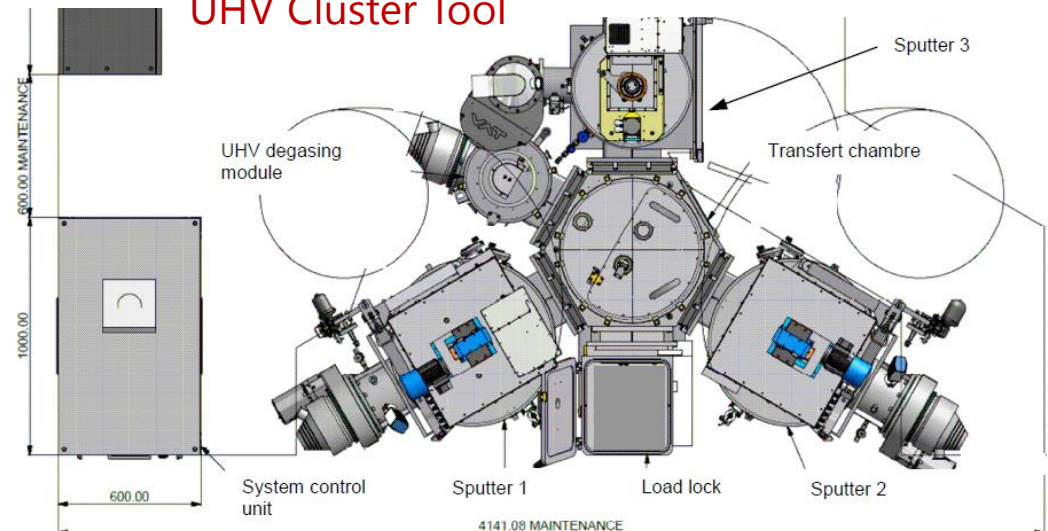
(High-Power Impulse Magnetron Sputtering)



Donation  
**œrlikon**  
balzers

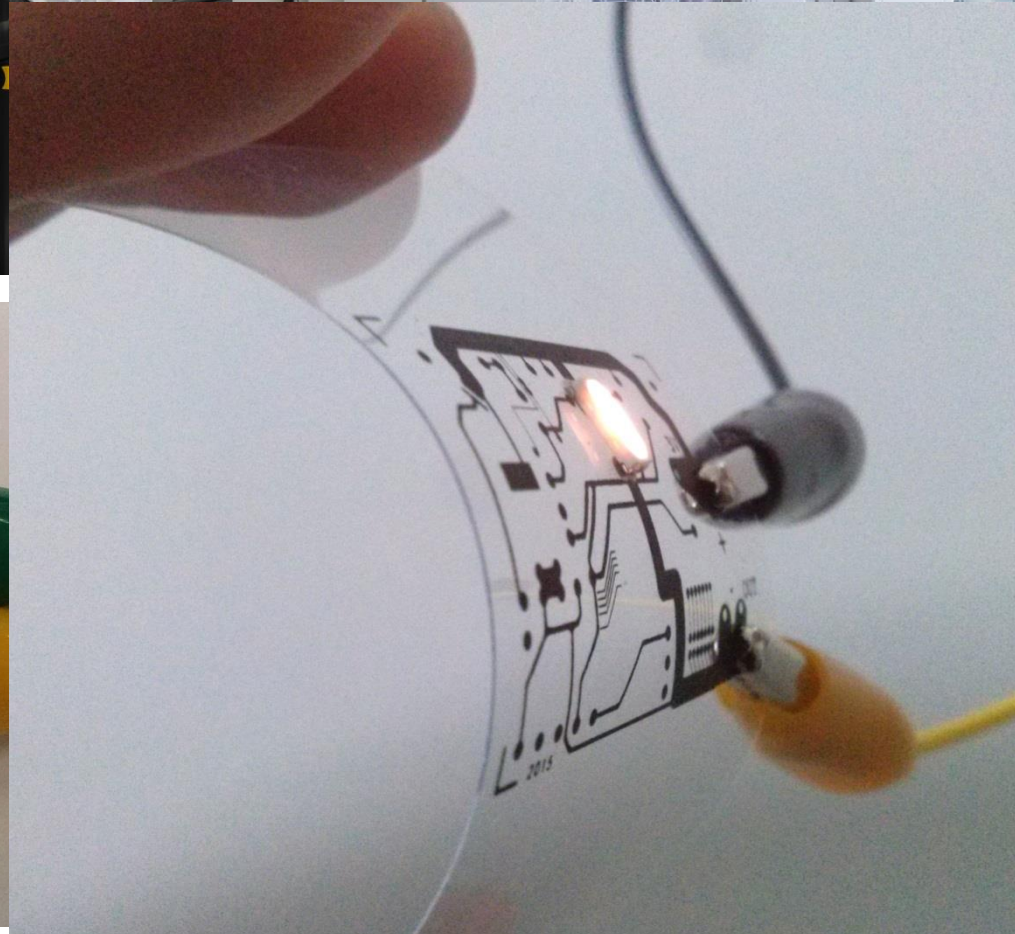
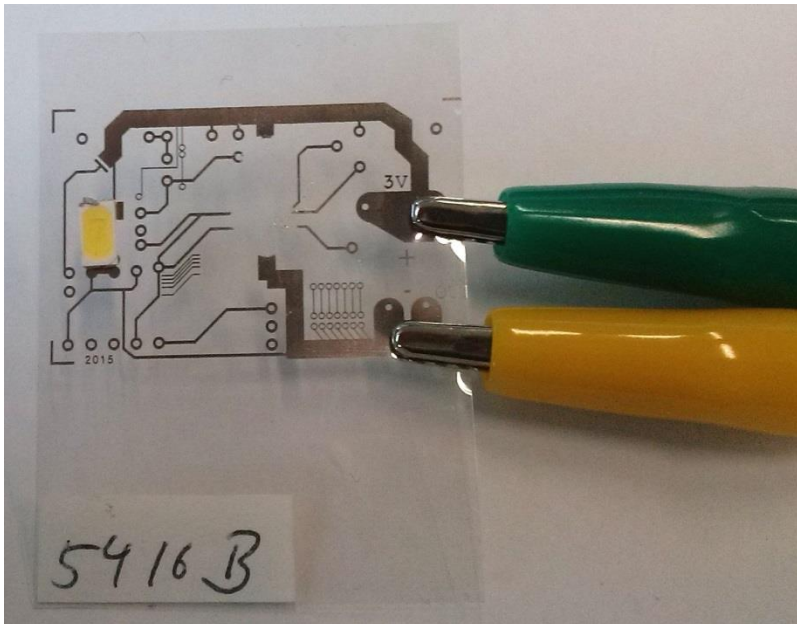


## UHV Cluster Tool



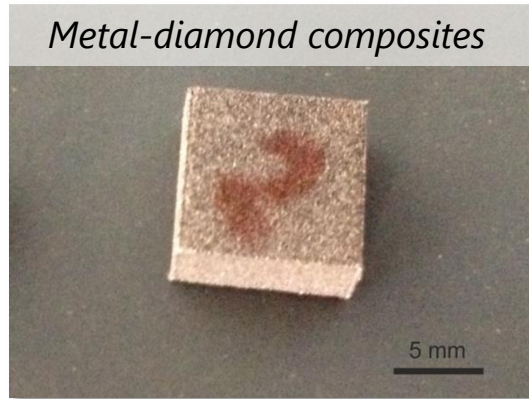


# Modular sheet printing system: example



# "Center for Advanced Manufacturing"

Example: 3D- metal printer @ Empa: selective laser melting SLM



*(ODS: Oxide Dispersion Strengthened)*

Empa's focus:

- Material science
- Analytics
- Process Control
- Process Modelling
- Projects with industry
- Open for PPP – collaboration





# Swiss Center(s) for Advanced Manufacturing

A national network of competence centers for (new) manufacturing technologies.

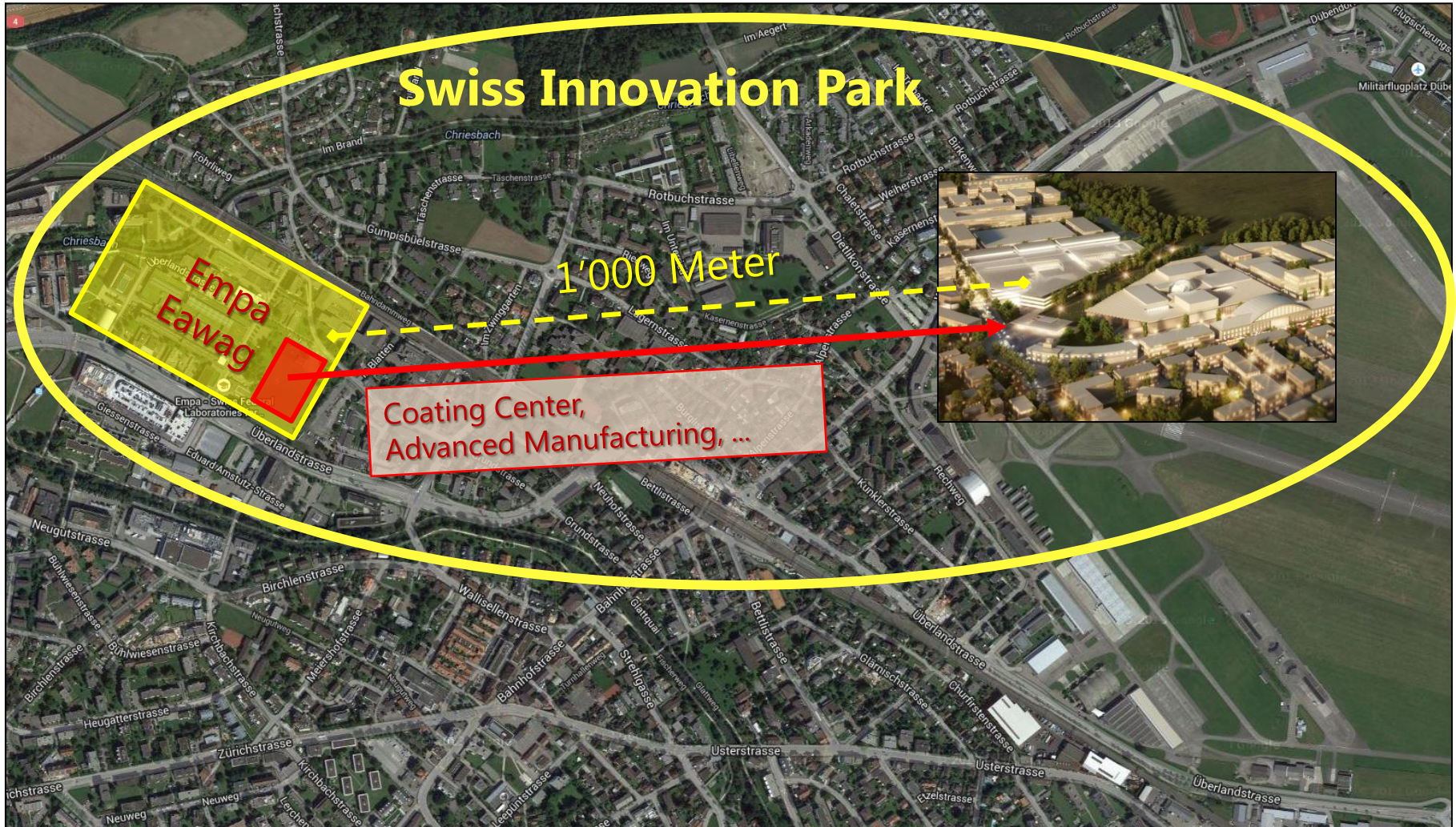
- Coatings
- Additive Manufacturing
- Industry 4.0
- ...
- ....



Strategical main research topic of the ETH domain 2017-2020



# National Innovation Park Zürich





... our labs are open for further collaboration

**Coming together is a beginning;  
keeping together is progress;  
working together is success.**

Henry Ford

