

HEIn4.⏻

**Boosting the role of HEIs in the industrial transformation towards the Industry 4.0 paradigm
in Georgia and Ukraine
609939-EPP-1-2019-1-BE-EPPKA2-CBHE-JP**



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UNIVERSITIES OF THE FUTURE

isep

Instituto Superior de
Engenharia do Porto

COLLABORATIVE DIGITAL SHIFT TOWARDS A NEW
FRAMEWORK FOR INDUSTRY AND EDUCATION

**Universities of the Future – Educative resources – Design and
implement of the Post graduation on I4.0 and digital
transformation and what we learn with the main results**

08 June 22

UoF overview and results

Teresa Pereira

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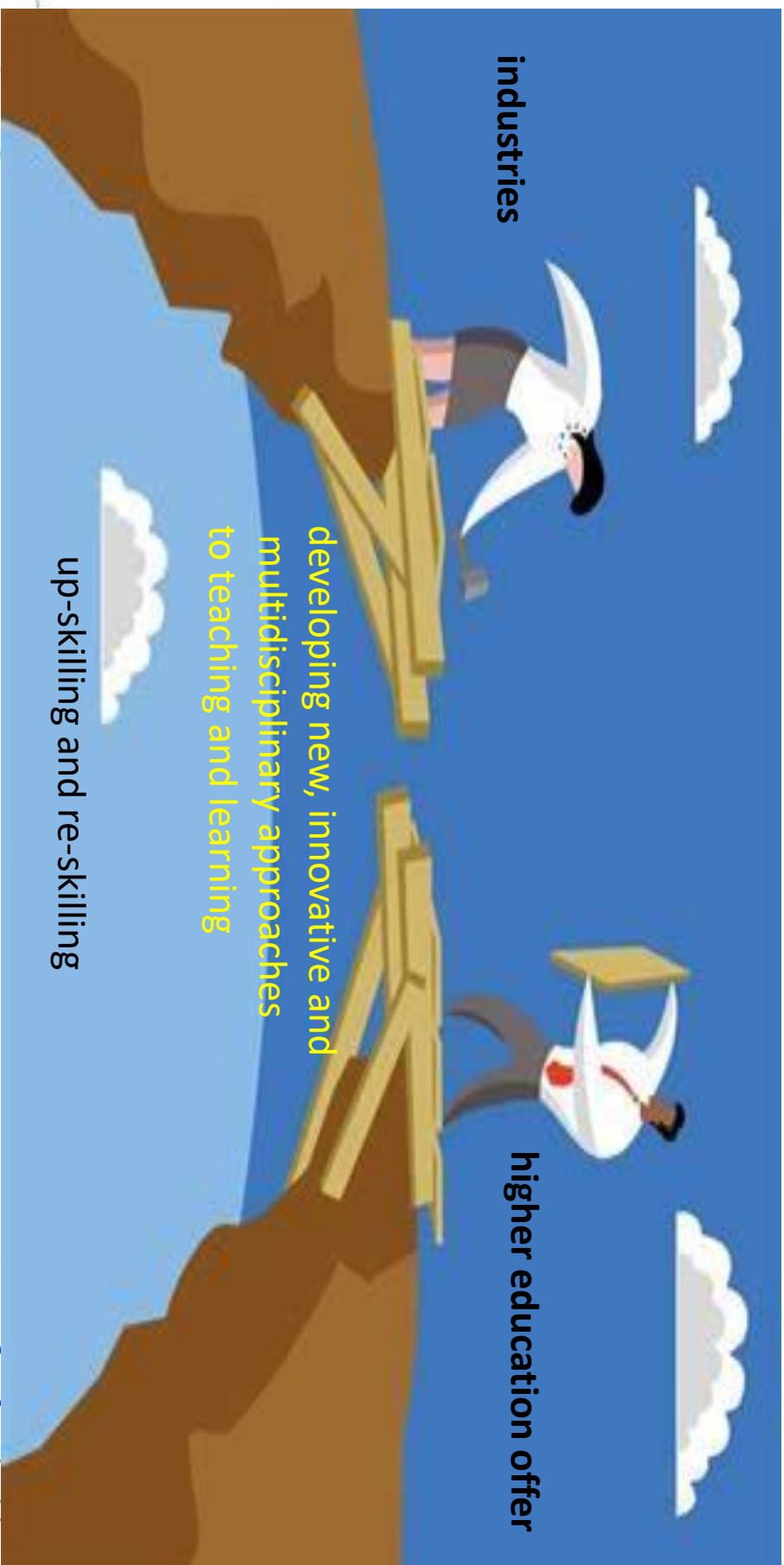
The background of the slide is a complex, abstract network of nodes and lines. The nodes are represented by small circles in various shades of gray, black, and white. They are interconnected by thin, light gray lines, creating a dense web of connections. Some nodes are larger than others, and some are highlighted with a black outline. The overall effect is that of a digital or social network, suggesting interconnectedness and future-oriented technology.

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The Project

<https://vimeo.com/313398835>

Goal



developing new, innovative and multidisciplinary approaches to teaching and learning

up-skilling and re-skilling

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Partners

HIGHER EDUCATION INSTITUTIONS



**Politechnika
Warszawska**

COMPANIES



IKEA Industry
Paços de Ferreira

Consair

**WILLSON
& BROWN**

PUBLIC BODIES



SUPPORT PARTNERS

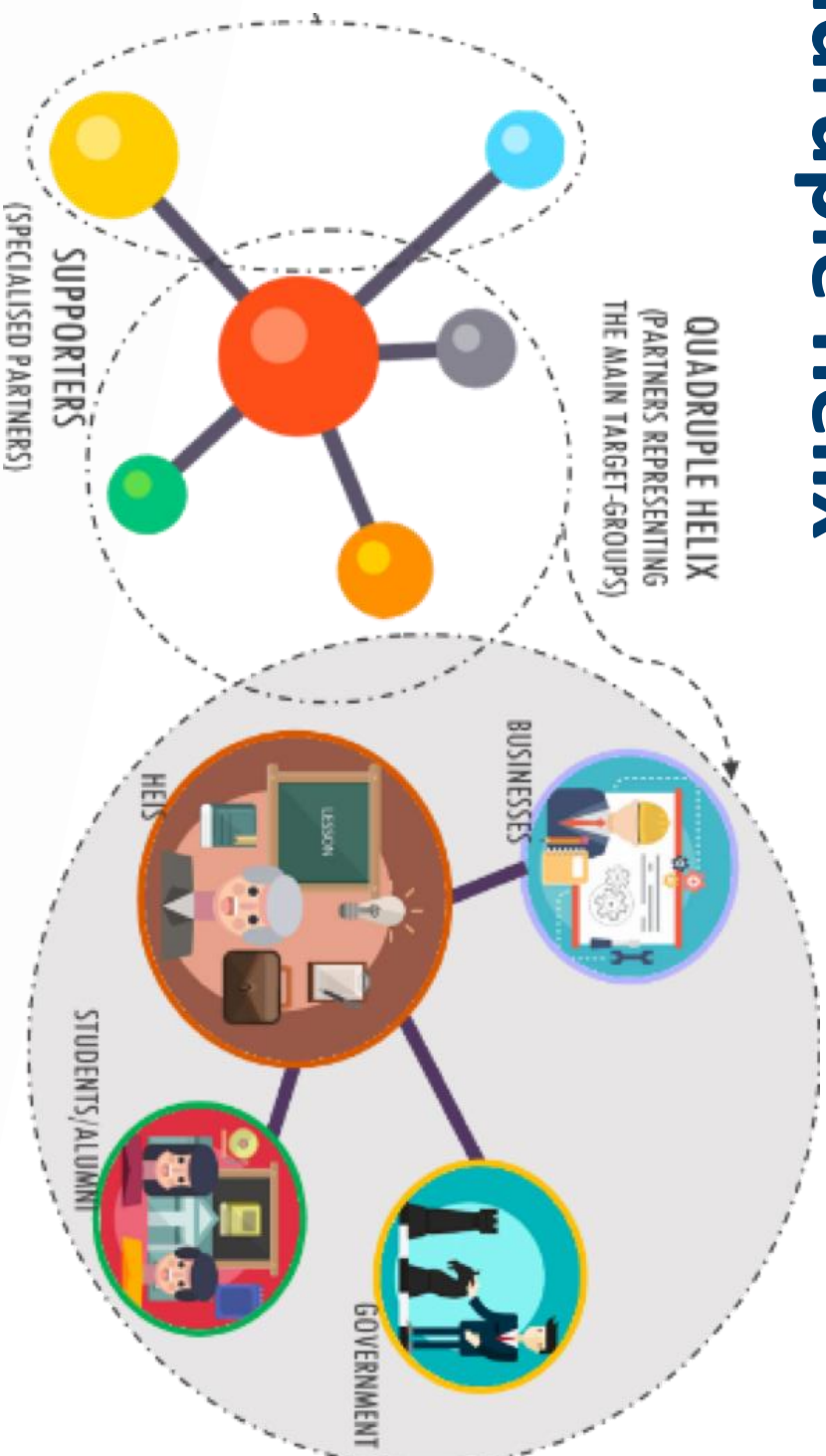


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The quadruple helix



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Main outcomes



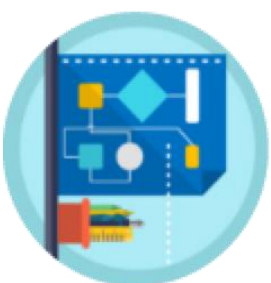
Blueprint & Roadmap

Co-development of a *Blueprint for the Universities of the Future*; Roadmap exploring different scenarios and establishing a strategy and action plan for industry/education 4.0.



Open Partnerships

Communities of practices that will set up fruitful collaboration opportunities within and between the quadruple helix key stakeholders



Educative Assets

Set of resources aimed at enriching current curricular units, expand the HEIs lifelong learning offer and provide innovative joint post-graduation programmes



Guiding Tools

Step-by-step methodologies, exercises and recommendations to create organisational strategies in HEIs and companies as well as to improve learning pedagogies



Virtual Teaching and Learning Factory

Innovative hub where users can discuss and share experiences, find the project outcomes and access simulation environments to complete practice assignments linked to Industry 4.0





Educative Assets and methodologies

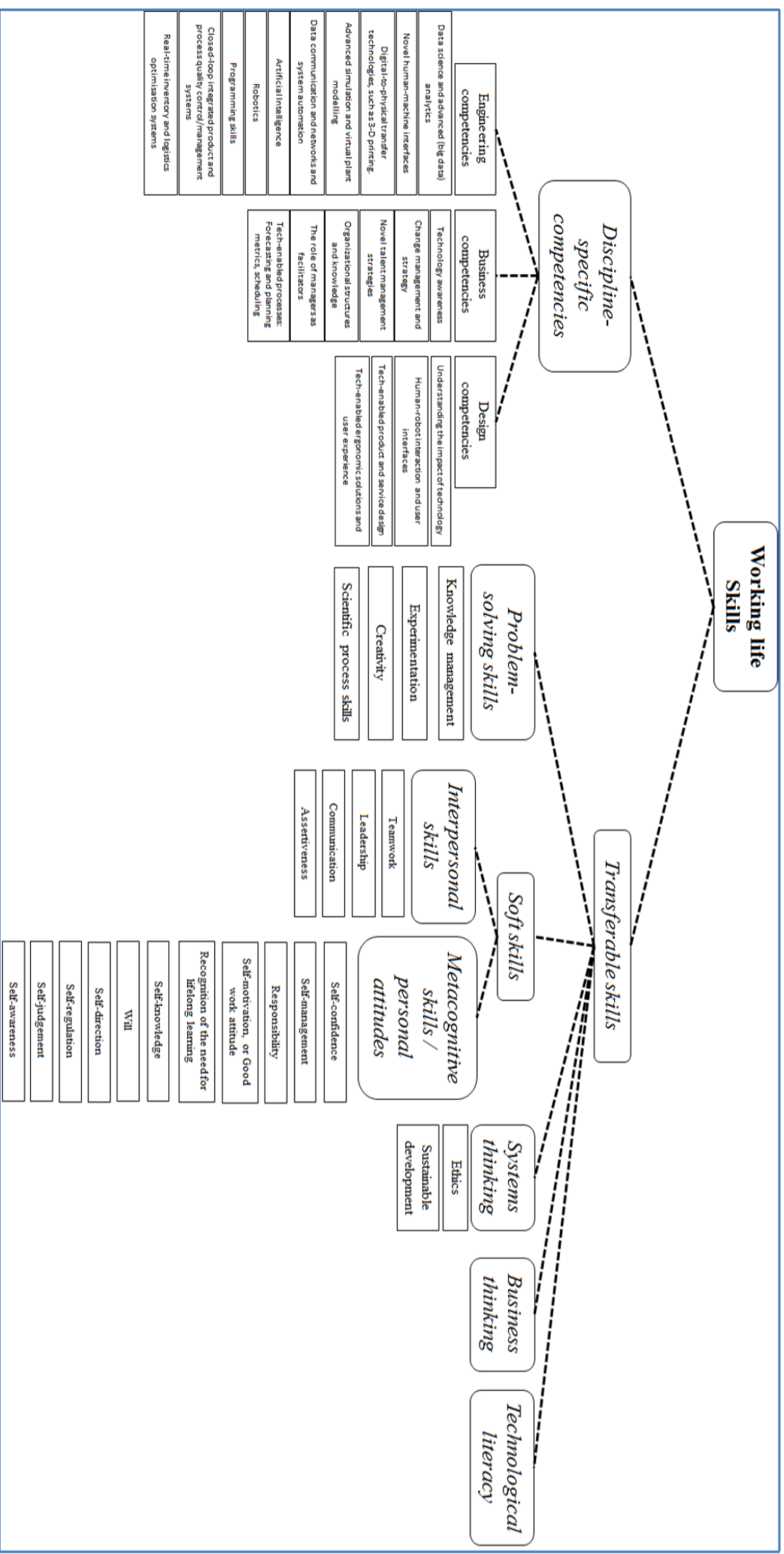
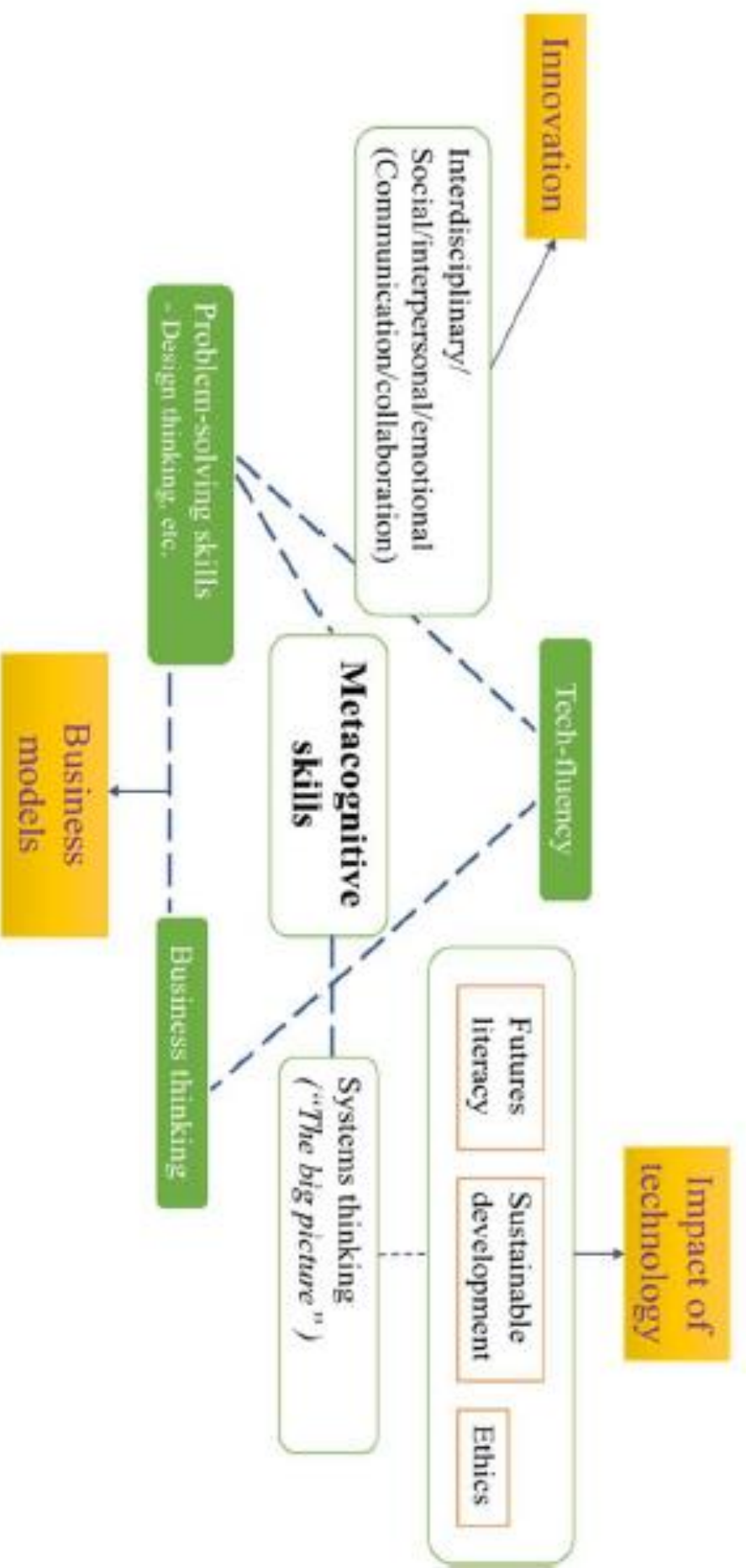


Figure 10 - Working life skills by the

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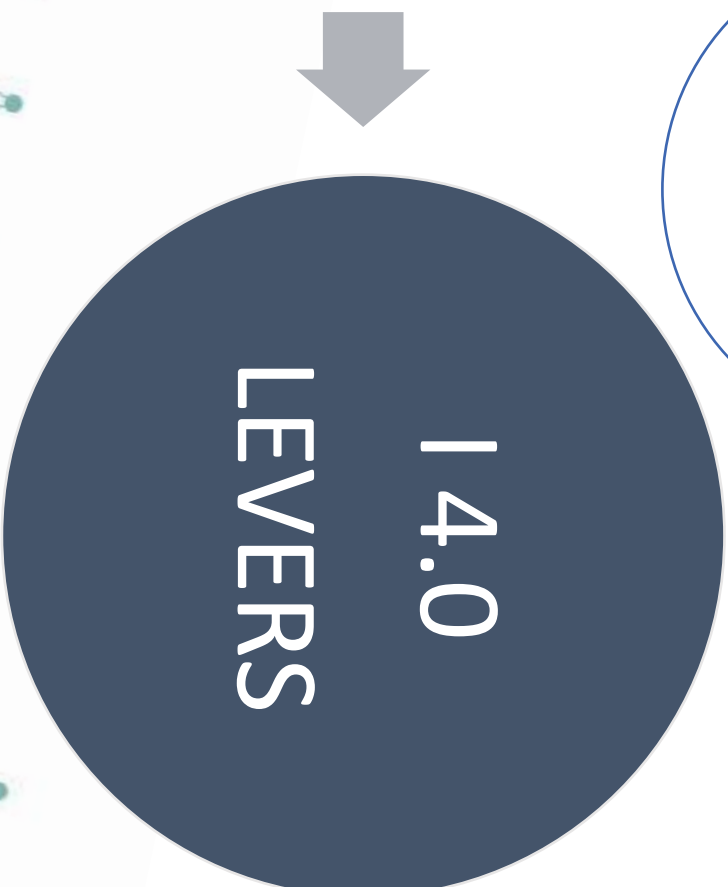
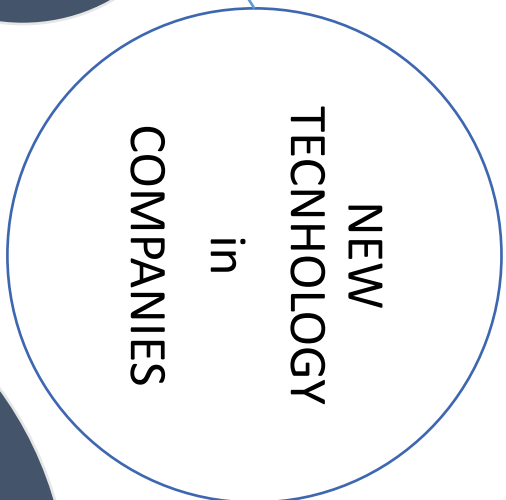
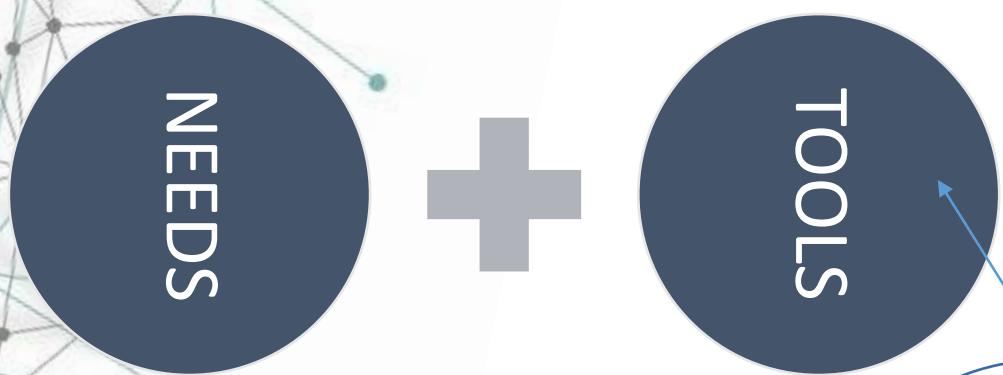


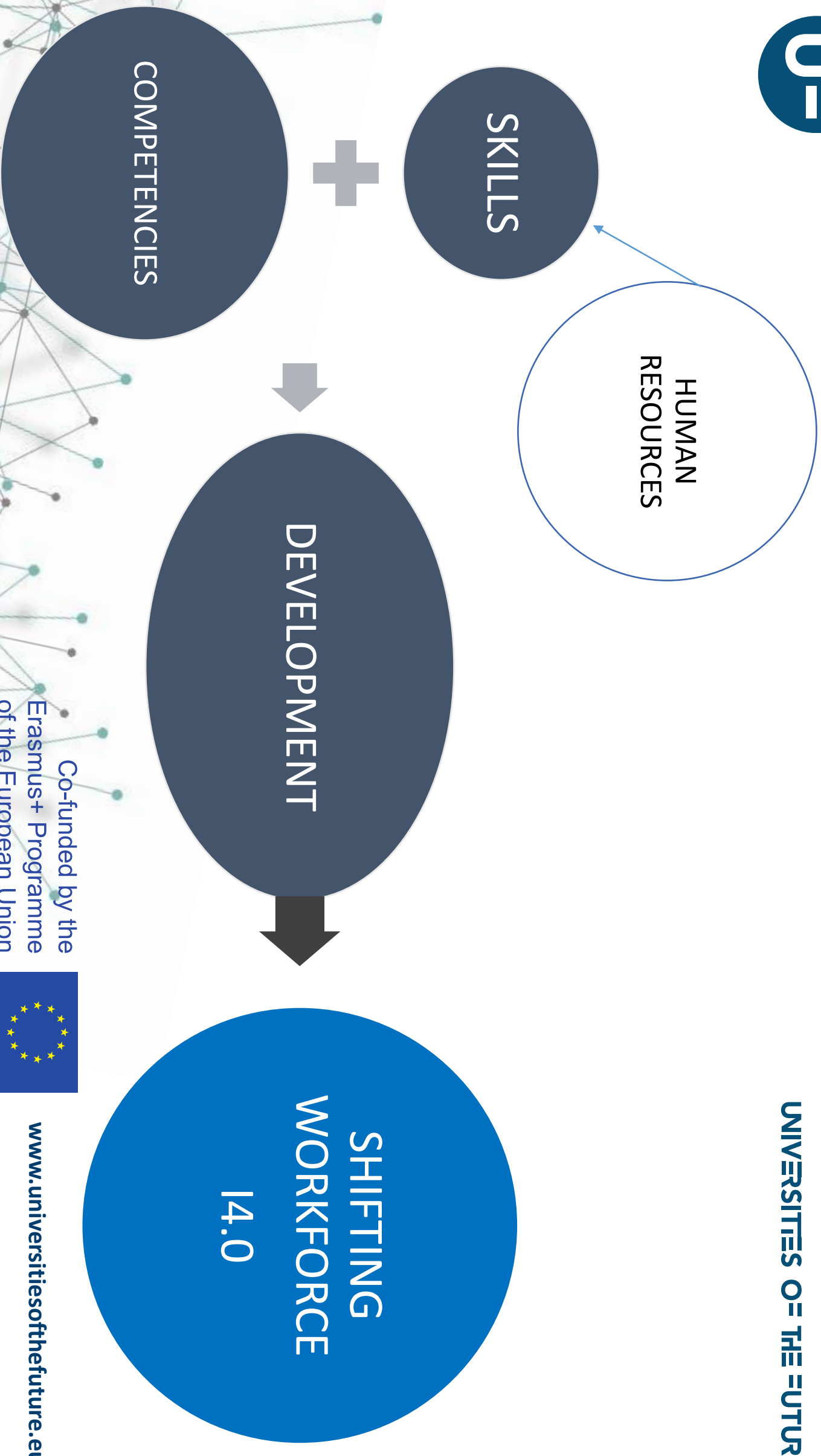
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FROM BENCHMARK

3 themes were found to be highlighted as crucial:

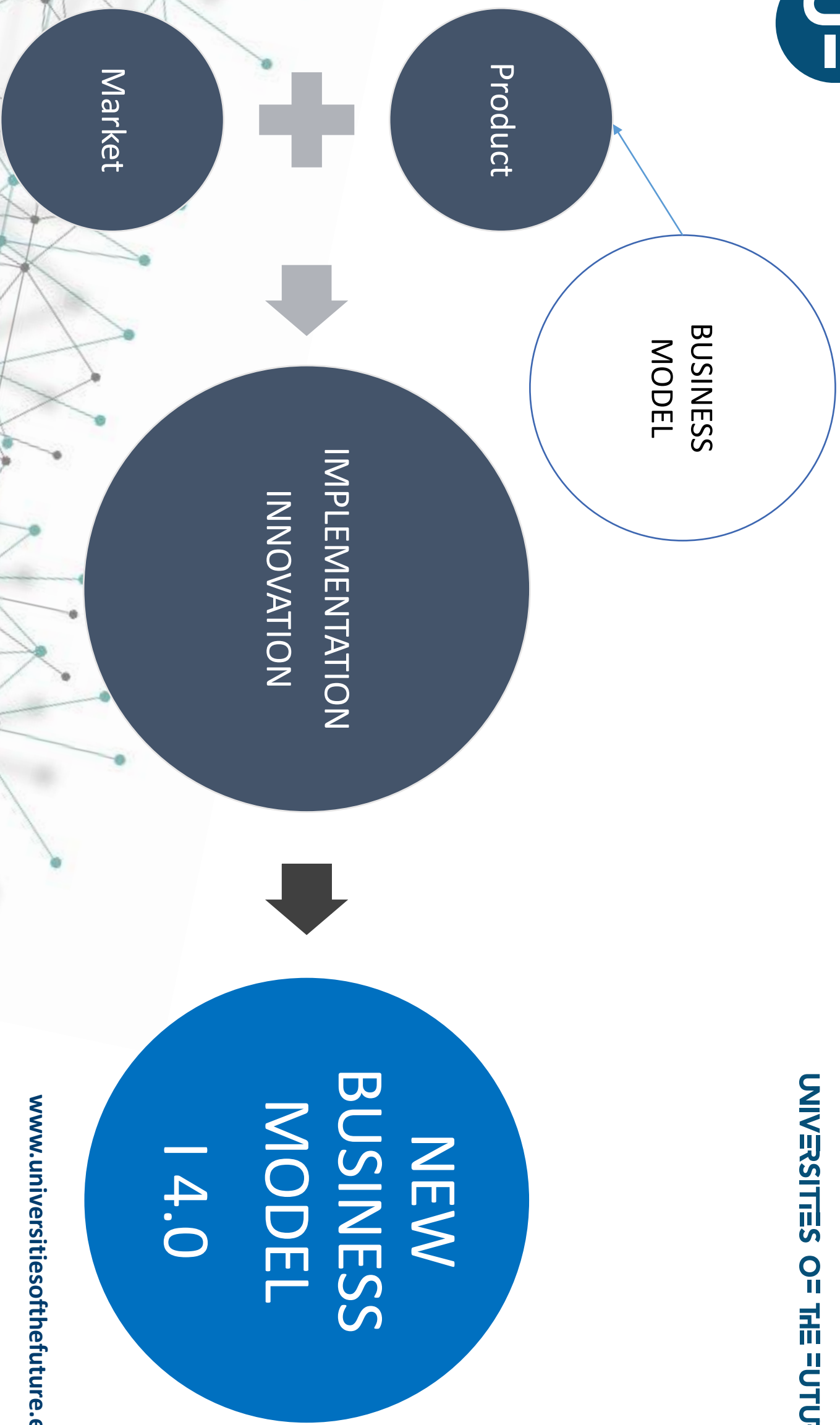
- **Promoting collaboration across disciplinary;**
- **Cultural and institutional borders; increasing the degree of interaction;**
- **Creating hands-on experiences for more in-depth understanding.**

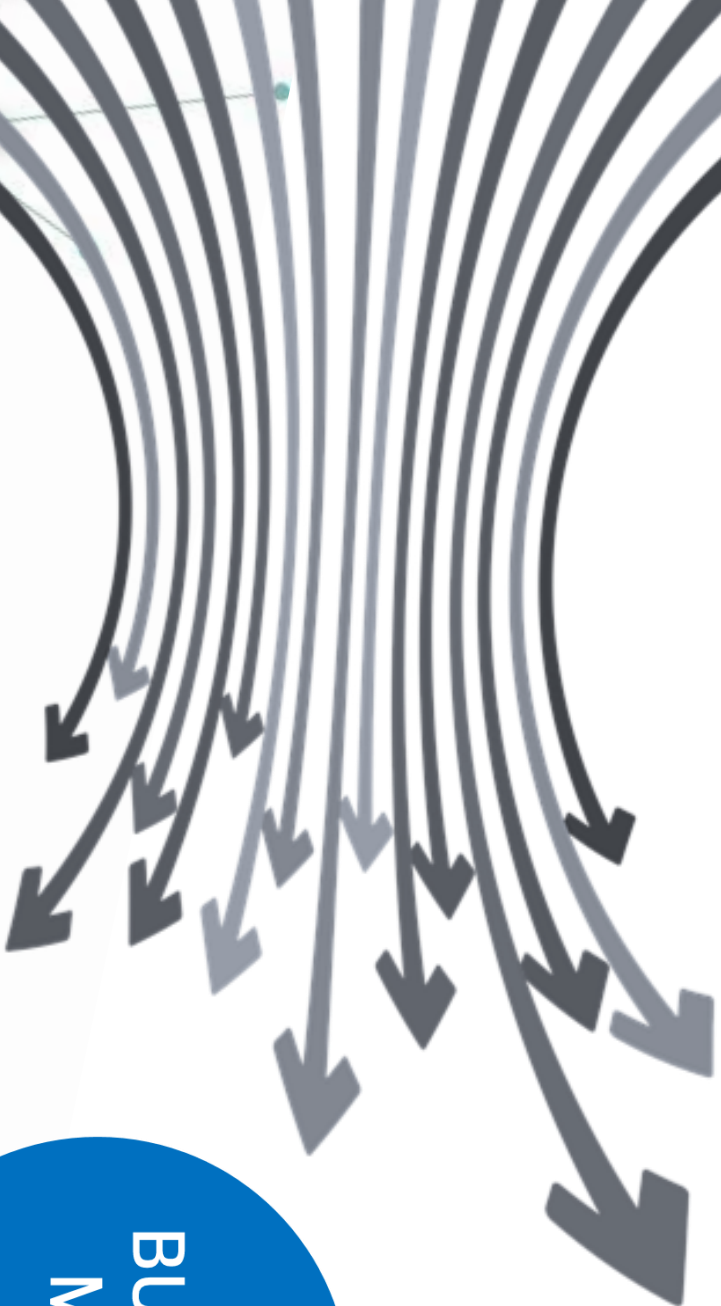




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**NEW
BUSINESS
MODEL
14.0**

**VALUE
DRIVERS
14.0**

**SHIFTING
WORKFORCE
14.0**





POSTGRADUATION

What could be the key areas?
What? Why? How?



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NEW EXPERIENCE IN INDUSTRY 4.0



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CHALLENGES IDENTIFIED?



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a lack of vision on tech



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a lack of skilled workforce



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a lack of understanding on how to prepare for future work



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New approach?



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Joint Post-graduation in Industry 4.0

5 GROUPS (with people from 3 countries interdisciplinary

A bootcamp

KO

TEAM BUILDING

Challenges To be worked both industry and / University

4.0 Enabling Technologies

Research + Benchmarking + Market + Needfinding

IT Driven 4.0

Personal and social Soft Skills Development

Soft skills

20 weeks with different skips

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Inter EXPO

TEAM PROJECT with mentoring

Final EXPO

A formal assessment with both academy/industry and governmental institutions

Other Workshops/ Talks

IoT

BD

HMII

Circular Economy and sustainability

Co-creation and Additive Production

New Business Model

AR

ML

AI

GPS

CYBER SECURITY

Intelligent Production

Intelligent Supply Chain

Intelligent Systems and Decision Support

Possible Lessons/ WEBINARS in 14.0



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Joint Post-graduation in Industry 4.0

Six main blocs supported + Virtual Teaching and Learning Factory+ hands-on challenges:

- **With workshops and talks (experts, companies)**
- **not definely closed...**





Joint Post-graduation in Industry 4.0

Six main blocs:

1- Project (Transversal, alongside with module 2)

- Co-creation
- Digital /IT available for...
- Hands-on

Main objective: Development of a project in co-creation in order to achieve the skills need in an interdisciplinary team (Team building in module 2) lead to a leadership and empowerment of human Resources...





Joint Post-graduation in Industry 4.0

Six main blocs:

2- Soft skills (Transversal alongside with module 1)

- HR driven into a I4.0 paradigm
- Transferable skills development
- Management of change
- Entrepreneurship
- ...

Main objective: Development of T-Skills in order to lead to a leadership and empowerment of human Resources...





Joint Post-graduation in Industry 4.0

Six main blocs:

3- IT driven I4.0

- Artificial Intelligence
- Big Data
- Internet of Things
- Cyber Physical Systems
- Cyber Security,
- ...

Main objective: Literacy in I4.0 enabling IT, what is, in each situations can be applied, what could be the impact in the business processes, what is need to implement it.....



Joint Post-graduation in Industry 4.0

Six main blocs:

4-Intelligent Information Systems

- Decision Support Systems
- IS Integration and Interoperability
- Collaborative IS
- Optimization
-

Main objective: Literacy in I4.0 IT, what is, in each situations can be applied, what could be the impact in the business processes, what is need to implement it.

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Joint Post-graduation in Industry 4.0

Six main blocs:

5-New Business Models

- Innovation
- Co-creation
- Digital business and services
- Business Data Analytics
 - Business Intelligence
 - Machine learning

• ...
Main objective: Literacy in I4.0 IT, what is, in each situations can be applied, what could be the impact in the business processes, what is need to implement it.

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Joint Post-graduation in Industry 4.0

Six main blocs:

6-Sustainable Enablers

- **sustainable manufacturing and distribution**
- **Additive production**
- **Smart/ Intelligent (Flexible and dynamic) processes planning**
- **Logistics and SCM4.0 -Physical internet**
- **Circular economy and sustainability**
- **...**

Main objective: Literacy in sustainable enablers and I4.0.

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HOW?



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HANDS-ON

Real cases gave by companies and worked in co-creation

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Ikea Challenge 1: Smart Intralogistic

The goal for this challenge is optimize, integrate, automate and reach an outstanding management of our internal logistical flow.

Use the innovative learnings on *Industry 4.0* to reach the preferable solution.

A safe solution that is “*intelligent*”.

Adaptable to new industrial footprints.



Miguel Pinho
Andrzej Manujto
Piotr Arczewski
Bárbara Rodrigues



Ikea Challenge 2:

Maintenance Technicians

To study (to suggest) possible solutions/ tools that improve the efficiency of maintenance technician function and adapts easily to continuous Industry changes.

At the moment, the maintenance department is made up of 4 teams of maintenance technicians (one team for each production shift), each with 6 members, distributed among the different production areas.

Different people, personalities, technical knowledge, but all with the same objective: to reduce the breakdown as much as possible and to allow the machines to work in the best possible conditions.



Paula Pinho

André Silva

Marco Sousa

Christopher Görtsch

Consair Challenge 1:

Design a system for monitoring construction site conditions



Collect the environmental
data with sensors



Understand the conditions
in real-time

Malith Prasanna

Hieu Ta

Sahara Queralt Guimerà

Hassan Ahmed

Manuel Tiago

Wilson and Brown challenge 1: SHOP of the FUTURE – FUTURE SHOPPING

Wide scope of the project:

To build functional or semi-functional prototype of the small-size shop that refers to the particular (chosen by th) sales channel.

Narrowed scope of the project:

To design a tool/ process/ functionality that will gather and analyze information from various shoppers (multicultural, different background and interests) to support AR products presentations and other engagement building tools.

Polina Ovsiannikova
Francisco Sousa
Paulo Nunes
Pedro Gonçalves

POTENTIAL CONSIDERATIONS MAY INCLUDE

- Customer and user centered solutions and platforms to use in the shop of the future
- Building comprehensive connection between e-commerce and brick-and-mortar
- Enhancing retail/ customer experience
- Augmented reality for product testing and presentation
- Virtual reality

Wilson and Brown challenge 2: SUSTAINABILITY IN RETAIL

Wide scope of the project:

To optimize processes in terms of the energy, water and fossil fuels use, establish eco-design guidelines, design easy to recycle solutions, calculate CO₂ emission.

Narrowed scope of the project:

To build fully functional prototype from recyclable materials and to design optimized packaging standard to minimize negative impact on the environment (easy to disassemble with homogenous packaging).

Mia Norhoma
Márcio Silva
Dina Goncalves
Joao Fernandes

POTENTIAL CONSIDERATIONS MAY INCLUDE

- Eco-design – how to design sustainable product (design for environment)
- Sustainable process management
- Sustainable logistics



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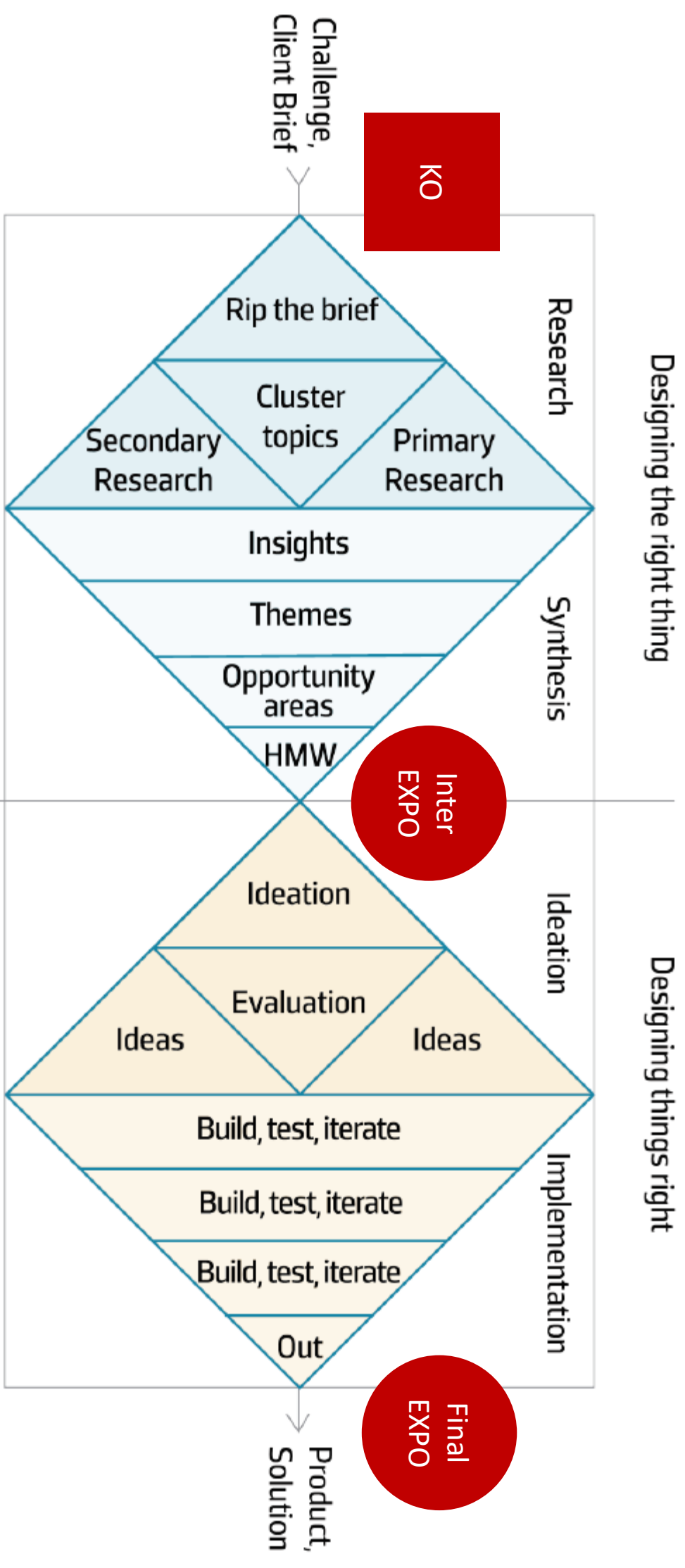
METHODOLOGY ?



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“How might we” question

Designing the right thing

Designing things right





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Results



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Documents

A common body of knowledge on industry 4.0's readiness/maturation by regions/business and its subsequent impact on skills' shifting, up/re-skilling:

Blueprint (for cooperation with and for HEIs, businesses, and governments);

Best Practice document;

Best Practices promotional video;

E-Booklets.





Results

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Community of practice and co-creation units for university-business cooperation

A Contacts database was created, 33 small scale events were organised to engage the four elements of the quadruple helix into providing input for the success of the outputs or outcomes of the project.



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Results

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- **Educative Asstes** of circa 30 minutes
12 autonomous lessons

(Located on the online platform): **(800 STUDENTS)**

Artificial Intelligence,
Soft skills,
Smart Teams and Transformation Leadership,
5G and I4.0 Cisco,
Internet of Things,
Intellectual Property,
Introduction to I4.0,
System thinking,
Sensors for Cyber-physical systems,
Wireless communication for IoT devices,
Tips to Improve Communication,
Personal Branding,
Basics of Prototyping,
Basics of Additive Manufacturing.

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Results

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Educative Asstes (CONT)

Continuous training programmes / short courses on core topics/main components of Industry 4.0, for employees interested in re/upskilling.

10 short courses, with 2 ECTS -24 contact hours: (100 STUDENTS)

Machine Learning and Data Analytics to Predictive Maintenance,
Building Internet of Things Solutions,
Vanguard Leadership Program for Industry 4.0,
Additive Technology - 3D Modelling and Printing,
Circular Economy in Industry 4.0 - a practical approach,
Systemic Design for Sustainability,
Business Processes Modelling,
User-Centred Product Development,
Ethical Product Development,
Sustainable Product Development

An international joint post-graduation program: (26 STUDENTS)

designed using creative strategies applied to industry 4.0, and targeting workers interested in applying pilot projects to accelerate their companies' digital transformation.

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Tool Kits

Two Tool Kits for Teachers:

- i) **Tools & Methods** - with the tools and methods that can be used to support learning and teaching;
- ii) **Technologies** - with the most advanced and used technologies available to support the teaching and learning activities;

One **Tool Kit for HEIs**, where Industry 4.0 is briefly presented and its potential benefits and threats for HEIs are highlighted;

One **Tool Kit for Industry**, where Industry 4.0 is briefly presented and its potential benefits are highlighted, and models for assessing maturity in I4.0 are also presented. Furthermore, it promotes a fruitful cooperation between Industry and Higher Education Institutions.\





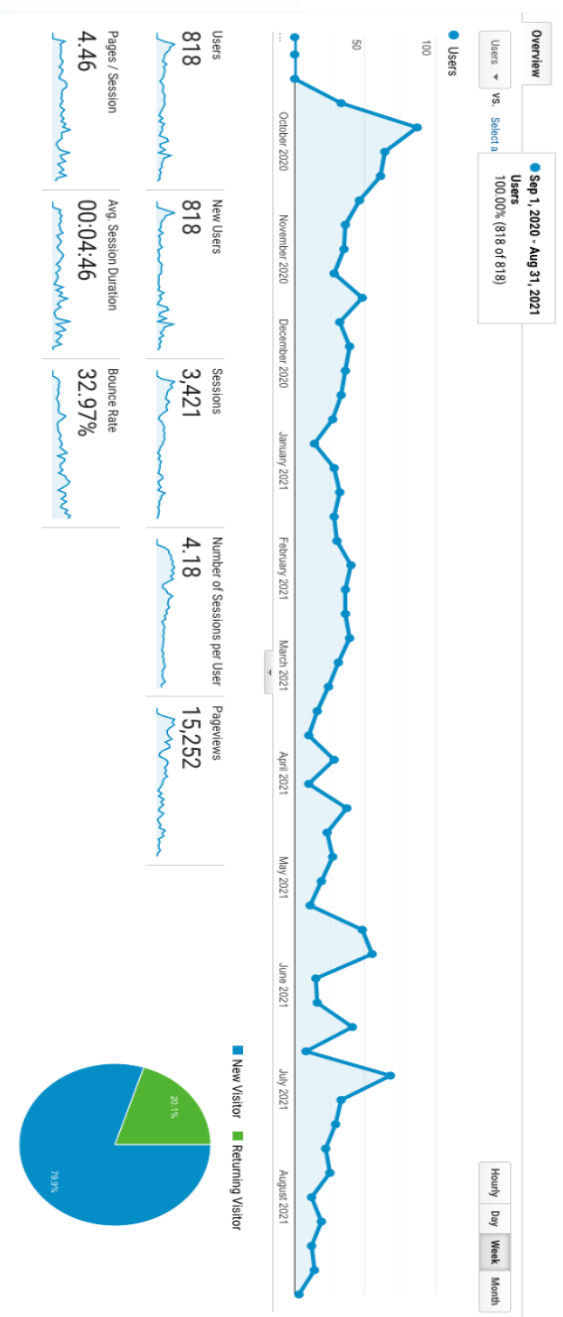
Results

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Online Platform

- Because of COVID 19, PG was lectured online, meaning that short courses were delivered to about **150** students;

The platform has reached more than 800 users until Aug2021 with multiple sessions and more and 15.000 page views, meaning a high-performance user engagement. (report attached)



Content views are at good numbers, reaching more than 2500 views with a total of 221,9925 hours of content watched online.

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Results

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Universities of the Future sought to bring together different entities, define strategies, and promote methodologies that promotes creative learning.

Like this project, many others are going in this direction, but not as many as could be needed to accelerate the process of changing the educational paradigm.

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Thank you!