

D2.1. DETAILED AUDIT AND CHARACTERIZATION OF THE EXISTING REGIONAL INNOVATION CLUSTERS, RDI TEAMS AND THEIR ACTIVITIES

Version 1.1

30th April 2021

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1. Executive Summary

The Regional University Network – European University (RUN-EU) will strive to secure the sustainable economic, social, cultural and environmental progress of its regions and stakeholders. RUN-EU will implement this mission by delivering on the future and advanced skills necessary for its students and regional stakeholders to successfully meet the challenges of the future, engage in societal transformation and promote active citizenship, thereby leading in the creation of a new type of multinational interregional alliance, a European Zone for Interregional Development (EZ-ID).

Through the development of European Innovation Hubs (EIHs) across the RUN-EU partner network, one of the key goals of the RUN-EU mission will be achieved. This goal is the creation of collaborative, regionally oriented and novel mobility led education, research and innovation. RUN-EU sees EIHs as unique educational platforms where joint interregional research, innovation and regional stakeholder engagement activities will be created and nurtured. EIHs will seek collaborations with associated partners in government, business, society and uniquely with the OECD Secretariat of Higher Education and its Labour Market Relevance and Outcomes (LMRO) initiative. It is envisaged that the outcomes of this collaborative approach will not only feed back into education, research and innovation development opportunities within the regions of the alliance but could also inform innovative solutions for labour market relevance and outcomes which would be adaptable to different regions of Europe.

The principal aim of establishing European Innovation Hubs is to promote collaborative teaching and research excellence through the development of student-centred cutting edge pedagogical, research, innovation and engagement activities, using the strong links between the alliance members and their local ecosystems and businesses. It is envisaged that this collaborative method will nurture and stimulate the student body of RUN-EU, but also other regional stakeholders to adopt a sustainable approach to the economic, social, cultural and environmental progress of the member regions. It is envisaged the creation of innovative mobility opportunities through new multinational academies and hubs will improve the national and international competitiveness of the associated regions and their academic community thus allowing them to: (i) complement existing capital and large city regions; (ii) retain and attract young talent and (iii) correct existing unfavourable bias in development trends in peripheral European regions.

RUN-EU partners have committed to the establishment of European Innovation Hubs focusing on the three overarching thematic areas of: 1) Future and Sustainable Industries, 2) Bioeconomy, and 3) Social Innovation.

The working group on the establishment of EIHs has carried out an initial audit on current Research Clusters, Associated External Partners, Associated Hubs and Facilities that exist across the network as part of delivering Task 2.1.

This report details the outputs from the audit which proposes the development of the EIH Strategic Plan based on the following goals:

1. Identification of Clusters and Hubs of similar critical mass across the network and within each Thematic Area and aligning for immediate collaborative opportunities on a regional, national or European stage.
2. Identification of strategies of interlinking activities with other RUN-EU activities to further the overarching Mission and Vision of RUN-EU. This involves cross representation on other working groups by EIH working group members and sharing of activities and outputs to further enrich the knowledge base and collaborative opportunities.
3. Identification of research groups / centres in early stages of development and partnering them with a well-established Cluster(s) to enable activation and nurturing of early-stage talent thus accelerating their development through partnership with the identified Cluster(s) and associated partners.

The audit has provided a graphic insight into the network partners, which clarifies the main interests of the network partners and provides a primary focus point.

The graphic also directly connects the network partners with their own external partners. The graphic provides an extra layer in the audit, which will help the network partners not only to reach their primary shared goals within the network, but also to act for our external partners as a turntable of knowledge. The external partners are facilitated to contact / connect with other external partners with the help of the network partners, to reach goals out of scope of our RUN EU-network.

The next step for this working group is the formulation of an EIH Strategic Plan which will be presented to the RUN-EU partnership. This plan will include:

- Implementation of the Strategic Vision and Mission based on current cluster activity and supporting evolution of current clusters into three EIHs in thematic areas of 1) Future and Sustainable Industries; 2) Bioeconomy and 3) Social Innovation.
- Integration of overarching goals into secondary goals of other work packages such as WP3 – FASA, WP4 – SAP; WP 5 Research; WP6 – Mobility.

One of the interesting, if not thrilling, results of this process, is the emerging cooperation between our institutes based upon curiosity, shared values, complementary skills and experience. Knowing each other does not just have an effect in the described areas – it goes much deeper and will have a long-term impact beyond the formal end of the RUN-EU programme.

These structured interactions through RUN-EU always start with curiosity, of staff members looking for interactions to enhance programmes, or to start some new areas of research. They find their way in the network partners by colleagues already involved in the programme. These structured yet more or less spontaneous started interactions are already an important side effect of the RUN-EU programme which cannot be underestimated.

This report was prepared by the following members from the RUN-EU Partner Institutions:

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30th April 2021

1.1 Complete list of research groups, external partners, and associated facilities

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Robotics Research Group	23
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2Ai - Applied Artificial Intelligence Laboratory	24
Research Institute for Design, Media and Culture (ID+)	25
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Polytechnic of Leiria (RC)	
CDRSP (Centre for Rapid and Sustainable Product Development, e.g. Multiscale Direct Digital Manufacturing)	26
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NHL Stenden (RC)

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SZE (RC)

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MST Labs	56
Autonomous Vehicles facilities	57

2. European Innovation Hubs within the RUN-EU project

European Innovation Hubs constitute the ultimate output envisaged by work package 2 (WP2), within the generic work plan of RUN-EU (Figure 1).

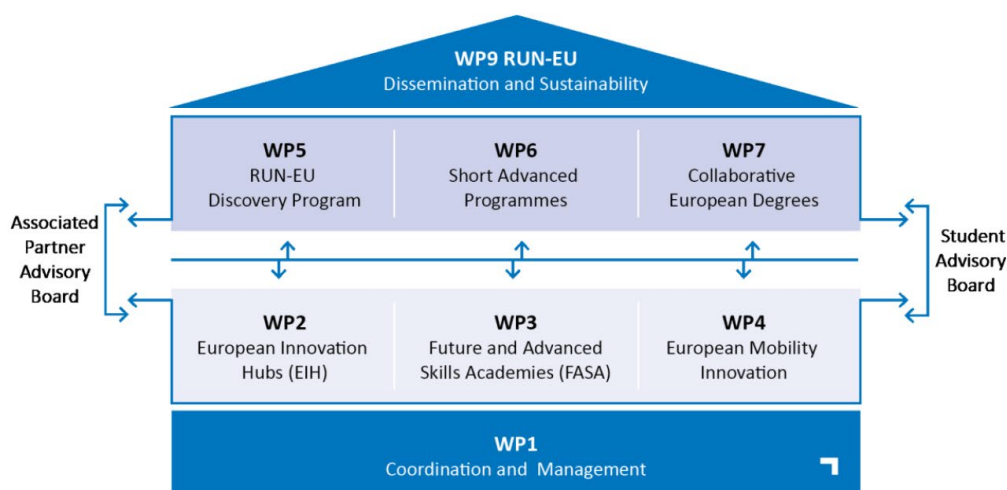


Figure 1 – The work plan for RUN-EU alliance

In WP2, inter-university European Innovation Hubs will be created, by using the strong links between the alliance members and their local ecosystems and businesses in the definition and provision of collaborative future-proofed skills-based educational opportunities, joint research and knowledge exchange; thus, contributing to adopting a sustainable approach to the economic, social, cultural and environmental progress of the member regions.

This alliance believes the existing members’ regional innovation clusters and the collaborative European Innovation Hubs to be developed from them, constitute one of the central pillars of sustainable regional development. It will therefore underpin the collaborative activities to be developed within this European University.

This report is focused in the **Social Innovation** area, presenting a detailed audit and characterization of each member’s existing regional innovation cluster activities, identifying areas for cooperation and gaps and opportunities to enhance research and innovation in collaboration with society.

Once areas for intense collaboration have been identified, the next step will be to create inter-university European Innovation Hubs, through the creation of advanced, multinational research and innovation units and networks with shared teams and infrastructures, focused on the creation and dissemination of cutting-edge knowledge in the identified areas. The principal

output of these hubs will be the delivery of interregional Research, Development and Innovation (RD&I) activities designed to deliver on societal transformation requirements, within the framework of the relevant Smart Specialisation Strategies (RIS3) and the UN goals for sustainable development. The European Innovation Hubs will support and influence the members’ regions economic global competitiveness, environmental responsibility and inclusive social policies, as well as guiding higher education strategies, future skills programmes, interregional activities and joint applications to European funding calls by alliance members.

Figure 2 provides a diagrammatic description of the operating principles of the European Innovation Hubs.

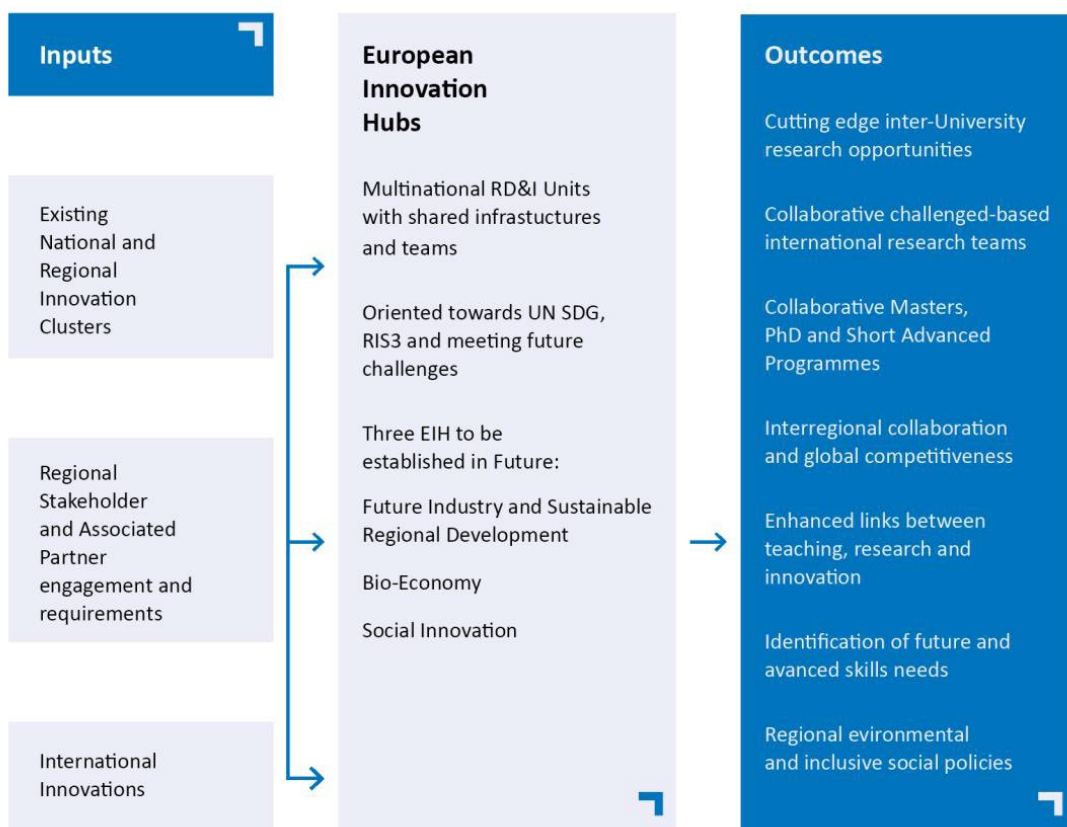


Figure 2 – European Innovation Hubs Operating Principles

3. Definitions and terms, sources of information

To produce this audit report, each of the eight RUN-EU alliance members was asked to indicate, to each thematic area, in a predefined form (an Excel file), the Research Institute / Centre / Group that could be related to such area, principal researchers' contacts, specific infrastructures, research policies and procedures, main projects awarded and main recent publications. They were also asked to list their main external partners or other entities, relevant for each thematic area.

This first form was spread to all the eight members, in articulation with the leaders of WP5, given the similar and complementary information that would be needed for the first audit, due in both work packages.

The audit responses obtained in the first iteration from the several RUN-EU members revealed diversity in the way research and researchers are organised in each HEI. While in some cases the responses included only reference to established research centres, organised by scientific area, in other cases there were mostly research groups, multidisciplinary, mainly organised by focus theme. Differences arise not only from each HEI organisational option, but also from distinct evaluations mechanisms put in place by the responsible science regulating agencies in the different countries.

Given this diverse scenario, we opted for a broad and inclusive approach, to produce the first version of this audit. Thus, for the purposes of this report, the following definitions and terms were considered:

- **Research units** – include established research centres, that somehow tackle the topics within each hub area, as well as research groups, with or without an external recognition or evaluation, with or without their own facilities.
- **Contact PI** – contacts provided by the HEIs, of the researchers associated to the research units listed in the previous point.
- **External partners** – external partners identified by the RUN-EU members as being related to each hub's thematic area. For the sake of generalisation, the option here was to include only representative entities (e.g.: incubators, accelerators, associations, etc.) and not isolated firms operating in each domain.
- **Facilities** – based on the data received, the option was to consider only those facilities that are specific to each thematic area, and not common facilities such as meeting rooms with computers.
- **Training courses** - based on the data received, the criterion was to consider training courses specifically related to each thematic area issues and mainly directed to professionals, with a view to contributing to their upskilling or reskilling.

4. European Innovation Hub in Future Industries and Sustainable Regional Development (EIHFI)

4.1 Research Centres, research groups and faculties working on Future Industries

AIT (RC)

Materials Research Institute (MRI)

The Materials Research Institute (MRI), is an interdisciplinary research and innovation institute housed in AIT with a core focus on polymer materials research, drug delivery technologies, thermoplastic composites, product design, additive manufacturing, construction and renewable materials, circular economy of plastics and biomedical polymers in addition to providing contract and bespoke testing for industrial partners. The MRI enables AIT to build on core competencies and provides a significant focus for industry-academic collaborations in the Midlands Region and nationally.

<http://mri.ait.ie/>

Main researcher(s)' contact(s)

Dr Declan Devine, Director of MRI

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Devine is the Director of the Materials Research Institute at Athlone Institute of Technology which incorporates both the Enterprise Ireland funded APT Technology Gateway and the Centre for Industrial Services and Design. He holds a BEng and PhD in polymer from AIT. Prior to taking up this role, Declan has fulfilled a variety of roles both nationally and internationally since completing his PhD studies. These roles include an industry-based post-doctoral, a Senior Project Leader in the at the AO Research Institute in Switzerland and fellowships in both Harvard Medical Schools Center for Advanced Orthopaedic Studies and the Mayo Clinic's Rehabilitation Medicine Center as a part of his ERA Marie Curie Fellowship.

Dr Noel Gately, Centre Manager of APT Enterprise Gateway

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Dr Noel Gately is the Centre Manager of the APT Technology Gateway hosted at the Materials Research Institute at Athlone Institute of Technology. As Centre Manager he is responsible for delivering and implementing the centre business plan and takes a leadership role in fostering polymer materials and manufacturing research at a national and international level, in conjunction with industrial and academic partners, World Class Researchers and funding agencies. Dr. Gately holds a first class honours degree in Toxicology and completed his PhD in Biomedical Engineering in 2014. Following his PhD studies, Dr. Gately worked on an industry based post-doctoral research within APT

before gaining medical device experience as an R&D Engineer in Creagh Medical Ltd/
Surmodics Ireland.

Software Research Institute (SRI)

The SRI conducts applied research in digital media communications and applications and network and infrastructure management. The centre has built a reputation for applied research in the communications and network management domain and has collaborated extensively with SME and multinational companies. The group is focused on bringing leading edge research to the marketplace.

Research areas:

- Connected Media
- Network and Infrastructure management
- Immersive Media
- Cloud security.

<http://sri.ait.ie/>

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Dr. Niall Murray is founder (in 2014) and principal investigator (PI) in the truly Immersive and Interactive Multimedia Experiences (tiIMEx) research group in AIT. He is an associate PI on the Enterprise Ireland funded Technology Gateway COMAND.

Biosciences Research Institute (BRI)

The Bioscience Research Institute (BRI) at Athlone Institute of Technology is recognised as a Technology Core Facility (Interreg Atlantic Area Sharebiotech 9 <https://keep.eu/projects/440/Sharing-life-science-infrastr-EN/>) for the Irish midlands that encompasses life sciences and Bioeconomy linked to academic providers. The main objective of Sharebiotech was to strengthen the biotechnology sector, through the maximisation of the benefits of life science infrastructures and skills for the development of the Atlantic Area, which has notable areas of excellence (notably in marine science, rich and increasing number of SMEs, policy initiatives), but also weaknesses. This included definition of resources and skillset with nexus between academia and industry. Over the decades, BRI has a grow reputation of supporting enterprise, research, along with community engagement and social enterprises in the Bioeconomy domain. This links to strong background in resource utilisation, novel processing, life cycle assessment, ecotoxicology and so forth that addresses the technological, social and political readiness levels of products and services. This is exemplified by funding on the Just Transition for establishment of first 'Empower Eco Hub' in the peatlands with view to accelerating green innovation that will aid community transitioning to low carbon economy. Regional funded projects are also supplemented with international benchmarking consortium

projects including RUN-EU and adjacent Interreg Neptunus, H2020 MSCA RISE IVCHTHYS and H2020 BioICEP projects. BRI is also an active partner and member of the Irish Bioeconomy Foundation (<https://bioeconomyfoundation.com/>) along with partnering with key stakeholders including EPA, Bord Iascaigh Mhara, Teagasc, Enterprise Ireland, IDA and so forth.

BRI has a long standing tradition of delivering research, enterprise for 'circularity'. This has recently culminated in the Establishment of the aforementioned triple-helix multi-actor Hub for Eco-Sustainability (termed 'Empower Eco') ; this assembles main stakeholders and beneficiaries regionally for developing green innovation (aligned with EU Green Deal and UN Sustainable Development Goals). Carbon sink and energy measurements dually occur at demo/test beds in intended environment. BRI has built scale and capacity in this and offers case study Hub for RUN-EU from an Irish example perspective.

Bioeconomy and related topics under BRI include Eco-sustainability; novel processing and sterilisation; hydroponics; bio-based solutions; mycology and enzyme catalysis, testing innovation for functionality and impact. Nutraceuticals; Risk Mitigation and Modelling; One Health approach; AMR; Toxicology; resource utilisation Lipid metabolism, Antimicrobials, Microbial biofilms of human and verterinary importance

www.bri.ait.ie

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Prof Neil Rowan is Director of the Bioscience Research Institute at AIT since 2012. He has 30 years of academic and industry experience in the development of biotechnology and applied biosciences as it relates to problem solving and technology development, such as bioeconomy. He has supervised 25 PhDs to completion in this area and published 130 papers (H factor 37 with 4,801 citations). His expertise is also in transnational modelling of regional clusters and econometric modelling, such as multi-actor hub operation as technology core facilities linking academia, industry and policy. He has led and partnered on several national and international research projects in this domain (including Interreg Sharbiotech, and Interreg Neptunus) and holds adjunct professorships at NUI Galway and University of Kwa-Zulu Natal in South Africa. He is also a partner on Horizon2020 MSCA RISE for training and mobility of industry and academia in this related area. He is founding director of Empower Eco CLG, the first eco-sustainability hub in Ireland focusing on peatland innovation.

Dr Mark Lynch (BRI HUB Manager)

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Dr Mark Lynch is HUB Officer working with Prof Rowan in the BRI. He is responsible for researcher induction and training on specialist equipment and has strong record of postgraduate supervisory experience. He interfaces with industry through the BRI HUB and is na active member of Empower Eco Sustainability hub in the Irish Midlands. Dr Lynch is partner and collaborator on several national and international projecst in this area.

Sinead Mellett (BRI Senior Postdoctoral Researcher)

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Dr Mellett is Senior Postdoctoral Researcher on Interreg Neptunus project reporting to Prof Rowan. Sinead has extensive expertise in communication channels, and digitization that is required for optimal impact and implementation of complex multi-actor projects. The Neptunus project investigates interface between academia and industry transnationally for the development of the seafood sector – particularly, energy-water-food interface.

Michelle McKeon Bennett

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Michelle McKeon-Bennett, MSc., is the Dean of Faculty of Business and Hospitality in Athlone Institute of Technology and Co-Principal Investigator in Empower Eco Innovation Hub; Co-Founding PI of CELLS and Shannon ABC in LIT. She has a background in peatland and plant science, educational management, business development, enterprise and knowledge transfer and has overseen the development of numerous undergraduate and postgraduate programmes across disciplines along with research output and knowledge transfer activities. She has supervised over 15 Masters and PhD students to completion and generated over €4m in RDI activity outputs. Ms. McKeon-Bennett was seconded to NASA's Kennedy Space Centre (KSC), Florida as a Research Fellow in September 2003 and led CELLS in the H2020-SPACE funded EDEN ISS consortium of 14 leading European, Canadian and US-American universities, research institutes, corporations and SMEs. EDEN-ISS involved the development of safe food production and technology for on-board the International Space Station and for future space exploration. Her research focus in AIT is the application these frontier food technologies to terrestrial applications such as assisting SMEs in establishing large scale fresh food production for regional consumer supply.

FHV (RC)

Research Centre Digital Factory Vorarlberg

The Research Centre Digital Factory Vorarlberg is specializing in various areas of industrial digitalization, such as Cloud Manufacturing, Data Analytics, Machine-Learning and Artificial Intelligence, Digital Twins of industrial machinery and controls, IT-Security at plant level, IoT and Machine Supervision, and other relevant topics for the digitalization of manufacturing and production.

<https://www.fhv.at/en/research/digital-factory-vorarlberg/>

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Prof. (FH) DI Dr. Robert Merz is Head of the Research Center Digital Factory Vorarlberg. In the past, he was Head of the Area of Mechatronics at FH Salzburg, the initiator and head of the Research Center for Microtechnologies and Vice Rector for Research at FHV. At Carnegie Mellon University and Stanford University he developed a metal-based 3D-printing method called SDM by digitally integrating CNC-machines and robotically

controlled deposition welding. He gained industrial experience as a Controls Engineer at Voest Alpine Industries and as a Development Engineer at BMW AG. His main teaching areas are industrial and mobile robotics and controls engineering.

Ralph Hoch

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Ralph Hoch studied Computer Science at the Technical University of Vienna and received his PhD. in Electrical Engineering in 2019. During his master and PhD. studies, he worked for TU Wien on various projects related to formal modelling, verification of CPS and model-driven software engineering (MDSE). Since 2018, he is principal scientist with the Digital Factory Vorarlberg and specializes in digital twins, symbolic AI and knowledge representation.

Sebastian Hegenbart

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DI Dr. Sebastian Hegenbart is head of the Data Analytics and Artificial Intelligence Group at the research center. He is a lecturer at the Computer Science Department and specialized in Artificial Intelligence, application of Neural Networks and self-learning algorithms.

Research Centre Business Informatics

New information and communication technologies (ICT) not only support established business processes but are increasingly triggering disruptive innovations in business processes and products. In a globally distributed economy, the speed and agility with which companies can adapt to new technologies and organizational changes determine their long-term success. The Business Informatics research centre investigates new information and communication technologies and analyses their business potential in cooperation with regional, national and international industry and research partners. The re-organisation of business processes and products is the focus of the technology-driven, applied research in the research centre. The Business Informatics research centre is particularly interested in the impact of new "enabling technologies" (e.g., IoT, Blockchain, etc.) in the areas of Extended Product and Extended Enterprise.

The main research areas of the Business Informatics Research Centre can be subdivided into the areas of technologies, methods, organization and concepts.

<https://www.fhv.at/en/research/business-informatics/>

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Prof. (FH) Dr.-Ing. Jens Schumacher is the head and research professor of FHV's research department Business Informatics. He received his Master Science in computer science in 1992 at the University of Bremen. He started as research Engineer at BIBA in 1992. From 1998 onwards he was Head of Department "Logistics and Globally Distributed

Production" at BIBA PLT/IKAP and responsible for managing over 50 Projects for BIBA including over 10 Projects funded by the European Commission. From March 2003 until October 2005 he was a research assistant in the production technology faculty at the University of Bremen. From 2005 on he has been appointed to a research professorship in the research centre for Business Informatics at the Vorarlberg University of Applied Sciences where he successfully continues his research activities in several EU-funded projects.

Research Centre User Centred Technologies

The interdisciplinary research centre for user-centred technologies (UCT Research) deals with knowledge and interaction technologies in general and with assistance and health technologies in particular. Within these application areas, we develop innovative solutions and investigate their benefits and effects in scientific field and laboratory studies.

<https://www.fhv.at/en/research/user-centred-technologies/>

Main researcher(s)' contact(s)

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Prof. (FH) PD Dr. Guido Kempter, founder and director of UCT Research at the University of Applied Sciences Vorarlberg, private lecturer at the University of Duisburg (computer science and applied cognitive science) and associated university researcher at the Private University for Health Sciences, Medical Informatics and Technology in Hall. He studied psychology and biology at the Universities of Innsbruck (A), Munich (D) and Illinois (USA); worked at Dartmouth College (USA, Department of Psychological and Brain Sciences), the University of Munich (D, Institute of Medical Psychology) and the University of Paris (F, Laboratoire Cognition & Usages).

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Dr. Katrin Paldán is senior researcher at UCT Research. She worked at the University Hospital Essen and was deputy head of the interdisciplinary research project Personal Analytics of the Department of Computer Science and Applied Cognitive Science at the University of Duisburg-Essen. She is a member of the German Society for Social Medicine and Prevention (DGSMP) and acting as a reviewer for journals (JMIR; Journal IJC Heart & Vasculature) and conferences.

Hubert Jocham

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Dr. Hubert Jocham is university lecturer in the Department of Health and Social Affairs since 2018. Diploma as a nurse in 1982. Further postdiploma training in intensive care and anaesthesia care. Establishment and management as lead of Clinic Home Interface, the first German Specialized Palliative Home Care Team. Master's degree in advanced nurse practitioner (ANP) at University of Surrey, England. Work experience in Pain Management, Cleveland Clinic Foundation, Ohio, USA. Doctorate in nursing science at the Charite Berlin and Maastricht University, Netherlands. From 2013 to 2018 Professor of Nursing Science and Head of ANP masters studies at the Ernst Abbe Hochschule Jena, Germany.

Research Centre for Photonics & Microtechnology

The Research Centre for Photonics & Microtechnology focuses on the development of micro-technical production processes and components of Microsystems.

The core areas of the Research Centre for Microtechnology are:

- the development and production of micro-systems
- the development of processes for micro-technical manufacture
- the research and development for industrial applications
- the fabrication of prototypes and studies on feasibility
- scanning electron microscopy and the analysis of materials"

<https://www.fhv.at/en/research/microtechnology/>

Main researcher(s)' contact(s)

Heinz Seyringer

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Dr. Heinz Seyringer studied at the Swiss Federal Institute of Technology (ETH) Physics and Mathematics and has a PhD in Physics. He has 20 years of industry experience in various management positions, served for two terms in the board of directors of the European Photonics Industry Consortium (EPIC), serves currently in the Executive Board of Photonics21, where he is responsible for the European photonics strategy in the areas of display, lighting and electronics and is CEO of V-Research and head of research at the University of Applied Sciences Vorarlberg.

Research Group Empirical Social Sciences

Analysis of social and organizational resources and utilities; customer and market research, employee surveys, incl. analysis of attitudes, opinions, motives, behaviour, etc. of various target groups; performance evaluation –supervision, evaluation, impact measurement and development of methods, interventions and projects. - - Research designs of quantitative and qualitative social research, e.g., standardised surveys on specific target groups, qualitative interviews, focus groups, content analysis of sources, documents and literature. - - Research fields: demographics and social reporting, social inequality, poverty and homelessness, age, identity, diversity and inclusion, social capital, health and care management, social work, cultural management research, education, psycho-social aspects of work and organizational development.

<https://www.fhv.at/en/research/research-group-empirical-social-sciences/>

Main researcher(s)' contact(s)

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Fabian A. Rebitzer is head of the Empirical Social Sciences Research Group, the Staff Unit for Diversity and Equal Treatment and the Diversity Committee at Vorarlberg University of Applied Sciences. He is vice-chairman of the Research Ethics Committee at Vorarlberg University of Applied Sciences. He teaches and supervises theses in the faculties of

Health and Social Work as well as Business and Management. He is a sociologist specialising in organization and development, diversity and methods of empirical social research. His main research fields are social inequality and diversity, social capital, participation, demographic change, age and health, and cultural management.

Erika Geser-Engleitner

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Prof. (FH) Dr. Erika Geser-Engleitner (born in 1964) is a lecturer of Sociology and Empirical Social Research at the University of Applied Sciences Vorarlberg in Dornbirn, Austria. Her main research areas are nursing and care systems, family and generations, homelessness, poverty/ wealth research. She is particularly happy to lead and carry out international evaluation and impact measurement projects. She was awarded a science prize from the Austrian Social Forum and a science prize of the University of Linz (Austria) for her scientific work.

Research Centre Energy

The research center energy is the key scientific hub for research in energy and environment at Vorarlberg University of Applied Sciences. Main research areas are autonomous load management, grid simulation, system dynamics, integration of renewables and alternative water treatment systems.

<https://www.fhv.at/en/research/energy/>

Main researcher(s)' contact(s)

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Prof. Dr. Markus Preißinger studied environmental and bioengineering with a focus on energy technology at the University of Bayreuth, Germany. He completed his doctorate at the Chair of Technical Thermodynamics at the University of Bayreuth, where he was group leader for energy systems and technologies from 2012 to 2017. In his dissertation, which was assessed with Summa Cum Laude, he developed a thermoeconomic model for electricity generation from industrial waste heat using the Organic Rankine Cycle. From 2012 to 2017, he was also managing director of the Centre for Energy Technology at the University of Bayreuth. In August 2017, he accepted the call to the illwerke vkw Endowed Chair for Energy Efficiency at the University of Applied Sciences Vorarlberg. In this role, he has since headed the Energy Research Centre at Vorarlberg University of Applied Sciences. Since February 2020, he has also been head of the Josef Ressel Centre for Intelligent Thermal Energy Systems.

Peter Kepplinger

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Peter Kepplinger is head of the Energy Systems and Components research group of the Energy Research Center, at Vorarlberg University of Applied Sciences. He studied applied mathematics at the University of Vienna and did a PhD concerning domestic hot water heaters at University of Innsbruck, Austria. His main research interest is the development of energy management algorithms for thermal and electrical systems and components. The main fields of his research are autonomous demand side management

of energy storage systems, demand response, system dynamics, distribution grid simulation, integration of renewables, and electric vehicle - grid interaction.

Stefan Arzbacher

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Dr. Stefan Arzbacher is a junior post-doc at the Research Centre Energy (RCE) at FHV, which he joined in 2013, only one year after its foundation, for conducting the work of his dissertation and for teaching. His work focussed on the mCT imaging of mesoscopic changes during the formation and dissociation of CHs and the application of TBNS for the modeling of classical physics on complex domains. He designed and implemented all experimental and computational infrastructure from scratch. The outcomes of these efforts are two patents (EU, WO) regarding the synthesis procedure of co-deposition by PTE and five peer-reviewed publications regarding CHs and TBNS. Besides, he developed and built novel setups which significantly advanced the state of the art of CH investigation by mCT and CH synthesis.

HAMK (RC)

Long Term durability research group

Circular economy in materials and products research area focuses on sustainable materials and products that are using industrial side stream materials as the raw material. The focus will be on consumable products, such as packages, coatings and dyes. The intention is to create new interdisciplinary connections between industries and new value chains.

(<https://www.hamk.fi/research/hamk-tech/weathering-testing-and-material-durability/?lang=en>)

Main researcher(s)' contact(s)

Päivi Laaksonen

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Päivi Laaksonen obtained the PhD in physical chemistry 2008 after which she has worked as senior scientist at VTT Technical Research Centre of Finland (2008-2013), as assistant professor at Aalto University (2013-2019) and as principal research scientist at HAMK (2019-), published > 50 articles in peer reviewed journals and filed 5 patents. Her H index is 22 and the work has been cited over 2000 times. She has supervised / advised 2 doctoral thesis, 6 master theses and >10 bachelor theses and currently acts as advisor for 2 doctoral and 1 master student. Päivi's area of expertise is in nanomaterials and interfaces, especially in the molecular adhesion and self-assembly. At her current position, Päivi leads a research group in the Long-term durability at HAMK Tech and focuses on applied research of bio-based materials, such as nature-derived colourants and other components. The research group activities include publicly funded research projects, R&D research in collaboration with the industry and delivering research service for the industry. Currently, she acts as the vice consortium leader in an Academy of Finland funded research project called Bio Based Dyes and Pigments for Colour Palette (BioColour).

Robotics research group

Robotics for Sustainable Manufacturing research area focuses on manufacturing optimization during the entire lifecycle of products. The research involves design for reuse and recycling, machine vision for products and parts recognition, IIoT, PLM system interoperability, robotics for product disassembly, and parts inspection for reusability.

<https://www.hamk.fi/research/hamk-tech/robotics/?lang=en>

Main researcher(s)' contact(s)

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Francois Christophe received M.Sc. (Tech.) degree in Software Engineering from Brest National Engineering School, France, in 2007. He then pursued his doctoral thesis in co-supervision between Aalto University School of Engineering (Finland) and Nantes Centrale Engineering School (France) which he defended in 2012. After post-doctoral research on bio-integrated sensor networks at the Pervasive Computing Department of Tampere University of Technology (2014-2017) and working as university researcher in the Empirical Software Engineering research group, at the Department of Computer Science of University of Helsinki (2017-2019), he is currently leading the Robotics group as Principal researcher at HAMK Tech, Häme University of Applied Sciences. His research interests evolve around collaborative robotics, machine vision, swarm robotics, autonomy and artificial intelligence.

Operation research group

has competence in mathematical and statistical analysis, optimization, modelling and the application and implementation of machine learning algorithms in the industrial context. Our team has competence to translate a business question in a mathematical optimization question which can be solved by using mathematical tools. As an example in industrial applications, we have taken part in developing the Smart Factory algorithm of industrial companies to improve production efficiency and improving energy efficiency. With the methods of machine learning and artificial intelligence, the resulting data collected from the real industrial environment is used in the creation of a computational model for improving production efficiency or reducing energy consumption.

<https://www.hamk.fi/research/hamk-smart/data-and-business-analytics/?lang=en>

Main researcher(s)' contact(s)

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Dr. Jukka Pulkkinen holds a PhD in Automation and System Technology from the Helsinki University of Technology. Currently he is director of HAMK Smart research unit in Häme University of Applied Sciences. From 2003 to 2017, he held several management positions in a global technology company Valmet. He has also held several research positions in Tampere University of Technology in 1990s. His current research interests include business strategy and management, operation research, as well as digital services.

IPCA (RC)

2Ai - Applied Artificial Intelligence Laboratory

“AI technologies to increase production capabilities through more reliable forecast of market demand, increased flexibility in operations and the supply chain and equipment failure prediction will drive this research area. By applying these solutions, smarter, faster, cheaper production approaches are expected. Furthermore, the application of game-based learning tools, with virtual and augmented reality, collaborative robots and smart virtual assistants are expected to improve productivity and the employees’ health and safety. Keywords: Industry 4.0, Artificial Vision, Artificial Intelligence, Robotics, Digital Twins, IoT & EdgeAI, Computer Vision, Image Processing”

<https://2ai.ipca.pt/>

<WP5 Research Areas 4,5,6,7,8>

Main researcher(s)’ contact(s)

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João L. Vilaça graduated in Industrial Electronics and Computers at University of Minho, Portugal in 2004. In 2008, he obtained the PhD degree in Industrial Electronics from the University of Minho, Guimarães, Portugal. From 2009, he has been at the Technology Department of the School of Technology, Polytechnic Institute of Cávado and Ave, Portugal, where he is Associate Professor (since 2017) and the head of the Technology Department (since 2015). From 2009 to 2018, he was also researcher at the ICVS/3B’s Laboratory, university of Minho, Portugal. In February 2018, he joined the 2Ai as Associate Research, where he is currently its Director. João L. Vilaça direct his daily efforts towards challenge driven research, aiming to solve industrial practical problems. His research work focuses on augmenting the information throughout specific industrial processes and potentiating its precision. To this end, he focused on robotics, computer vision, image processing and artificial intelligence. He has more than 97 indexed papers and 5 patents. Moreover, he has already performed two technology transfers to relevant international companies.

Nuno Lopes

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Nuno Alberto Ferreira Lopes holds a PhD in Computer Science from the University of Minho and a Bachelor in Systems and Computer Engineering from the same university. He is currently an Assistant Professor at the Polytechnic Institute of Cávado and Ave and an integrated researcher at the 2AI – Applied Artificial Intelligence Research Center at the Polytechnic Institute of Cávado and Ave, and a collaborating member of the Algoritmi Research Center at the University of Minho.

He is the Director of the Post-graduate course in Cybersecurity and Forensic Informatics, member of the directing board of the Master Degree in Computer Engineering and previously Director of the Bsc Degree in Computer Systems Engineering and member of the directing board of the Master Degree in Integrated Management Systems - Quality, Environment and Safety and. He lectures courses in Computer Architecture, Operating Systems, Computer Networks, Data Communications, Programming Languages, Concurrent and Distributed Programming, Information Security and Auditing, and

Information Systems for Quality, Environment and Security. His research areas of interest include Cybersecurity, Industry4.0, High-Performance Computing, Information Security, Business Process Management, and Parallel and Distributed Systems.

Research Institute for Design, Media and Culture (ID+)

“Art and Design” - Applied Research and creation of ways of transferring knowledge between scientific and technological disciplines of different origins through Art and Design methodologies and the heuristic potential of creativity in the relation between technology and art.”

“Design for Health – focuses its scientific activity on the interface between people and health, developing environments, products and services.”

<https://idmais.org/>

<WP5 Research Area 1 >

Main researcher(s)' contact(s)

Paula Tavares

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Paula Tavares is a Professor, Artist and Researcher. She obtained the PhD degree in Fine Arts from the Faculty of Fine arts, University of Vigo in 2006, with the thesis "The complex relations between art and politics in Western culture. The political art as institutional contradiction." She is graduated in Drawing at Artistic Superior School of Porto (ESAP) in 1994, and she made her second graduation in Painting at Faculty of Fine Arts of Porto in 1999. From 2007 she has been working as Professor at Polytechnic Institute of Cávado and Ave, Portugal, where she is Associate Professor (since 2015) and the Dean of the Design School (since 2015). In January 2017, she joined the ID+ Research Institute for Design, Media and Culture (<http://www.idmais.org/pt-pt/>), where she is Director at IPCA's Polo, and she also coordinates the CAOS group Communication, Art, Object and Synergies. Her research interests are focused in: 1. Applied Research in Art and Design; 2. Drawing and Audiovisuals; 3. Gender and Politics in Animation and Illustration. She has been involved in a set of financed projects in the design area, as well in artistic projects with different institutions and entities. She is also the General Chair of CONFIA - International Conference on Illustration and Animation (annual conference since 2012) (<http://www.confia.ipca.pt/>). Has participated in several design competitions - national and international, academic and professional - as a jury. She is represented as an artist in several collections and she has been participating in exhibitions and artistic events since the 1990s.

Demétrio Matos

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Demétrio Matos is a Adjunct Professor at the School of Design of the Polytechnic Institute of Cávado and Ave, director of the Department of Industrial Design and Product since 2017 and director of the undergraduate degree in Industrial Design since 2016. PhD in Design, by the Faculty of Architecture of the University of Lisbon (Faculdade de Arquitetura da Universidade de Lisboa - FA.UL), in the area of knowledge of Industrial Design, Master in Industrial Design by the Faculty of Engineering of the University of in partnership with the School of Arts and Design of Matosinhos, and graduated in Equipment Design by the School of Arts and Design of Matosinhos (ESAD).

Member of the Research Institute in Design, Media and Culture (ID +), in the research group of the health area. The main areas of interest include industrial design, health design, human enhancement and inclusive design.

Research group on Engineering Design and Advanced Manufacturing

“This group aims to tackle challenges related either to Engineering Design or Advanced Manufacturing. In the scope of Engineering Design, we develop projects in complex product development, in which a multidisciplinary approach is required to integrate multiple competences together, such as materials selection, electronic components, computer science, usability, etc, often requiring computational tools to aid in 3d modelling and dimensioning parts. In the scope of Advanced Manufacturing, we develop projects in the optimization of manufacturing processes, quality control and assurance, and reliability of parts, usually associated with a sustainability goal by considering the entire product lifecycle. In both cases, we are particularly focused on plastic (or polymer-based) products and processes.”

<https://linkslist.app/AYrkvtG>

<WP5 Research Area 6>

Main researcher(s)' contact(s)

Ricardo Simoes

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Ricardo Simoes is an Associate Professor (Tenured) with Habilitation at the Polytechnic Institute of Cávado and Ave. He has a Ph.D. in Materials Science and Engineering from the University of North Texas (USA). His areas of research include Engineering Design, Sustainability, and Medical Devices. He has supervised 11 PhDs and over 30 Masters theses in the scope of these research areas, and coordinated a total of 20 National and International research projects funded by competitive programs, including institutional coordination of mobilizer projects AAL4ALL and PT-XXI, and Interreg SUDOE ICT4Silver. He has over 80 Publications in Refereed Scientific Journals, 14 Book Chapters, 99 Publications in International Conference Proceedings, 2 Edited Books, and 65 oral presentations in International Conferences. Founder and director of the Product Development Laboratory, he coordinated the creation of the Masters' Program in Product Design and Development at IPCA (accredited by A3ES since 2010).

Polytechnic of Leiria (RC)

CDRSP (Centre for Rapid and Sustainable Product Development, e.g. Multiscale Direct Digital Manufacturing)

Contribute to scientific and technological development, leading to new products, materials and processes that are more fitted, more effective and more efficient, contributing to a generation of added value to the industry and promoting the conscience of the importance and of the role of the rapid and sustainable product development in the society. In order to accomplish this mission, the CDRSP-IPLeia leads scientific and technological research and promotes dissemination, training and consultancy actions in strategic areas of product development.

The aim of the strategic research programme is to consolidate and reinforce the national and international position of the CDRSP-IPLeia as a leading research group in the field of Multiscale Direct Digital Manufacturing based on Additive Manufacturing, moving towards the fully

integrated concept of added-value manufacturing. This is possible due to the multidisciplinary nature of the CDRSP Research Team, comprising researchers from different scientific backgrounds. The main Scientific Research Areas of CDRSP-IPLEIRIA lays on Additive Manufacturing, having a focus on 60% of applied research and 40% of basic research. To do so, the development of Additive Manufacturing is supported by 3 core interconnected scientific pillars: (i) Geometry and topology/Computer simulation (ii) Advanced materials; and (iii) Novel manufacturing processes.

<https://cdrsp.ipleiria.pt/>

Main researcher(s)' contact(s)

Nuno Alves

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Nuno Alves is the Director of the Centre for Rapid and Sustainable Product Development (CDRSP). Nuno Alves received a first degree, a MSc and a PhD degree in Mechanical Engineering, all from IST at Technical University of Lisbon.

Nuno Alves has co-edited 8 books, authored and co-authored more than 100 papers published in books, international journals, international conferences and 9 patents.

He received 5 awards: 2 best papers, 1 best teaching award in Mechanical engineering at PIL (from Academic Association), and a grant for PhD studies.

Nuno Alves is involved in several research projects on the fields of the AM/3D-4D Printing, Bio-Manufacturing, Reverse Engineering and Plastic Injection Moulding.

His research interests are based on the development and exploitation of novel direct digital manufacturing systems, contributing for the new paradigm of the industry 4.0 (as recently named new industrial and societal revolution), mainly based on additive manufacturing/printing techniques, including computer-aided modelling and fabrication of complex multi-material 3D and 4D structures (with spatio-temporal varying properties) for both industrial and biomedical applications; Computer vision and photogrammetry; Biomimetics and bioinspiration (learn from nature); Tissue engineering; Mould design and polymer injection moulding; Rapid product development; and Circular economy.

Artur Mateus

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Artur Mateus is an Adjunct Professor of Mechanical Engineering Department, on Rapid Tooling and Manufacturing, at the Polytechnic Institute of Leiria (PIL), since 1997. Also is Vice-Director of the Centre for Rapid and Sustainable Product Development at the Polytechnic Institute of Leiria (PIL). He is member of the scientific and technological council of the Incubator for startups, OPEN (Marinha Grande – Portugal). Artur Mateus has a PhD in Polymer Physics from the University of Reading (UK), a MSc from the Technical University of Lisbon (Portugal) and a first degree in Mechanical Engineering from the University of Coimbra.

He has co-edited three books, authored and co-authored more than 70 papers published in books, international journals, and proceedings of international conferences. Artur Mateus has participated in more than 60 Research Projects, national and international, in consortium with companies and firms related to Rapid Tooling and Manufacturing, rapid design and advanced materials processing.

Geoffrey Mitchel

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Geoffrey Mitchell is a Vice-Director of the Centre for Rapid and Sustainable Product Development, a Coordinator Investigator at the Polytechnic Institute of Leiria and Emeritus Professor at the University of Reading UK. He is/was supervisor/co-supervisor of fifty PhD and forty MSc Students.

He has authored and edited fifteen books, authored and co-authored forty-two Book Chapters and over three hundred papers published in international journals, international conferences and six patents.

He is involved in a broad range of research projects in materials, 3D/4D printing, in Additive Manufacturing, in neutron scattering and time-resolved x-ray scattering at Synchrotron Facilities as a PI (4) and Research Member (8). He is currently PI on a novel programme at the ALBA Synchrotron Light Source to study in real time the structural reorganisation in polymers during 3d and 4d printing.

His research interests are focused on materials, especially molecular materials, smart and functional materials, the use of neutron and x-ray scattering coupled to computational modelling, new technologies for additive manufacturing including 3D/4D printing, programmable moulds, biopolymers and sustainability, mitigating climate change, Biomedical Engineering, Manufacturing/Bio-Manufacturing, and Tissue Engineering.

IT (IT expertise spans all areas of telecommunications and supporting sciences)

IT expertise spans all areas of telecommunications and supporting sciences including wireless and optical communications, networks and multimedia and enabling sciences and technologies from applied mathematics and quantum information, to electronics. This involves I&D activities in many areas like digital manufacturing, health supporting technologies, multimedia communications, IoT, embedded systems, development of communications systems, antennas, radio propagation, cybersecurity, among others.

<https://it.pt/>

Main researcher(s)' contact(s)

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Sérgio M. M. de Faria, Lic. in Electrical Engineering (1988) and MSc (1992) from University of Coimbra, Portugal, Ph.D. (Electronics and Telecommunications, 1996,), University of Essex, UK, Title of "Agregado", 2014, IST, University of Lisbon, Portugal.

He is Full Professor in Polytechnic of Leiria (Electrical Engineering), Portugal, since 1990. He has taught in MSc courses in University of Coimbra, Portugal. He is Auditor of A3ES organization since 2003. He is a Senior Researcher with Institute of Telecommunications and Head of the Delegation in Leiria.

His research interests include 2D/3D image and video processing and coding, motion representation, and medical imaging. In this field, he has published 1 book, edited 2 books and authored 14 book chapters, 33 journal papers, 158 conference papers and 2

patents. He participates and is responsible for several, national (25) and international (8), funded projects, and 6 MPEG and JPEG documents.

He is Associate Editor of IEEE Transaction on Image Processing and Area Editor of Signal Processing: Image Communication, Elsevier. He has been a Scientific and Program Committee Member of many international conferences. He is a reviewer for several international scientific journals and conferences (IEEE, IET and EURASIP). He is a Senior Member of the IEEE.

Pedro António Amado Assunção

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Pedro A. Assunção received the BSc and MSC degrees in electrical engineering from the University of Coimbra in 1988 and 1993, respectively, and the Ph.D. degree in electronic systems engineering from the University of Essex, U.K., in 1998. He is currently a Coordinator Professor of electronic and telecommunications with Politécnico de Leiria. He is also a Senior Researcher with Instituto de Telecomunicações, Portugal, in the field of Networks and Multimedia. He has been teaching Electronics, Analog and Digital Communications, and Multimedia Communications, in undergraduate and M.Sc. courses of electrical engineering. He has been active as a Researcher and a Supervisor of M.Sc. and Ph.D. students. He has authored/co-authored over 100 publications in international conferences, journals, book chapters, books, and four U.S. patents. His current research interests include high efficiency coding and processing of 3-D video, light field and UHD panoramic video, quality of experience in multimedia communications systems, complexity of High Efficiency Video Codecs, and visual attention modeling and applications. He has been a reviewer for several scientific conferences and journals published by the IEEE, Elsevier, and Springer. He was the Chair of COST Action 3-D-ConTourNet (IC1105) and the General Chair of 3DTV-Con 2015.

Rafael Ferreira da Silva Caldeirinha

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Rafael F. S. Caldeirinha received the B.Eng. degree (Hons.) in Electronic and Communication Engineering and the Ph.D. degree from the University of Glamorgan, U.K., in 1997 and 2001, respectively, and the Habilitation (Agregação) title by the University of Aveiro (Portugal) in 2020. He is currently a Senior Researcher and Head of the Antennas & Propagation (A&P-Lr) Research Group, Instituto de Telecomunicações, Leiria, and Coordinator Professor in Mobile Communications at Polytechnic of Leiria (Portugal).

His research interests include antennas, radiowave propagation and smart radio environments, for applications at microwave and millimeter-wave frequencies. He has authored or co-authored more than 190 articles in conferences and international journals and four contributions to the ITU-R Study Group (ITU-R P.833-5, 2005). He is the author of 4 technical-scientific reports to the Ministry of Internal Administration (MAI), within the scope of the national security and communication network (SIRESP). He has been involved in more than 25 funded projects, examined 13 PhD thesis (5 international) and 32 master's dissertation, (co) supervised 12 doctoral thesis (3 running), 19 master's theses (4 running), more than 50 final year projects, and supervised 6 Postdoctoral researchers within the scope of research projects.

He is Associate Editor of the IEEE Transactions on Antennas and Propagation journal; Associate Editor of the IET on Microwaves, Antennas and Propagation journal; Member of the editorial board of the International Journal of Communication Systems, IJCS (New York, Wiley); Chair of the IEEE Portugal Joint Chapter on Antennas & Propagation -

Electron Devices - Microwave Theory & Techniques since 2016; Regional Delegate of European Association for Antennas and Propagation (EurAAP) for Andorra, Portugal and Spain since March, 2017; and a Senior Member of IEEE and URSI and Fellow Member of IET.

CIIC (education in the areas of information and communication systems and technologies)

CIIC's mission is to implement, conduct and facilitate high quality research, aligned with IPEiria's strategy and policies. In particular, CIIC aims to create, to promote and to disseminate scientific knowledge and technological development, and benefit society through research integrated with education in the areas of information and communication systems and technologies; namely, multimedia systems and human-machine interfaces, evolutionary and complex systems, software engineering, network and communication services and Smart Internet of Things (IoT) Ecosystems. Also, since 2014 CIIC has been increasing its competence in the Cybersecurity and Digital Forensic areas through several activities such as Erasmus mobilities, collaboration protocols, establishing new degrees in collaboration with Portuguese Scientific Police – MSc and post-graduate, supervision of both PhD and MSc theses, knowledge transfer to the industrial associations, a digital forensics laboratory setup and service provision for the Attorney General of the Portuguese Republic, among others. Ambient Assisted Living (AAL) is also an area where CIIC has been strengthening its skills, using IoT to provide any service, through any access, anytime and anywhere, to help to extend the time that people can live in their houses, increasing their quality of life and reducing the social isolation, namely of the elder. Virtual and Augmented Reality has also been subject of intense R&D to provide means to access and process information in diverse areas such as Industry 4.0, tourism and cultural heritage, being one of CIIC's earliest fields of proficiency. The use of Artificial Intelligence and Machine Learning are crucial for performing Data Analytics and keeping in pace with current and modern technology, being present in all lines of research explored by CIIC.

<http://ciic.ipleiria.pt>

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Carlos Rabadão is Coordinator Professor at Department of Computer Science Engineering at School of Technology and Management of Polytechnic of Leiria (ESTG). He is the Head of Computer Science and Communication Research Centre (CIIC) of Polytechnic of Leiria and Chair of the Technical-Scientific Council of ESTG. He received his PhD degree in Computer Science Engineering from University of Coimbra, Portugal, in 2007, his MSc degree in Electronics and Telecommunications Engineering, from University of Aveiro, Portugal, in 1996 and his BSc degree in Electrical Engineering, specialization in Telecommunications and Electronics, from University of Coimbra, Portugal, in 1989. He has more than 24 years of teaching and research experience in Computer Engineering, namely in the areas of Cybersecurity and Computer Networks. He has published around 50 papers in international conferences and journals in the areas of Cybersecurity, Computer Science and Data Communications. He has participated in more than 20 national and international R&D projects, having coordinated 5 of these. His major research interests includes Information and Networks Security, Information Security Management Systems, Security Incident Response

Systems for Industry 4.0, Next Generation Networks and Services and Wireless Networks.

António Pereira

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António Manuel de Jesus Pereira is Full Professor at Department of Computer Science Engineering at Superior School of Technology and Management of Leiria Polytechnic Institute. He is the founder of Computer Science and Communications Research Center at Leiria Polytechnic Institute, Portugal. He received his Habilitation degree in Computer Science from University of Aveiro, Portugal in 2018, his Ph.D. degree in Computer Science Engineering from University of Coimbra, Portugal, in 2006, his M.S degree in Electronical and Telecommunications Engineering, from University of Aveiro, Portugal, in 1995 and his B.S degree in Electronical and Telecommunications Engineering, from University of Aveiro, Portugal, in 1992. He has published more than 100 conference papers and refereed journals in the areas of Computer Science and Communications. He received 2 best papers awards at international conferences. Also he is the author of 3 national patents. His major research interests include Internet of Things, Next Generation Networks and Services, Health Informatics, Body Area Networks, Wireless Sensor Networks, Quality of Service, TeleHealth, Ambient Assisted Living.

Alexandrino Gonçalves

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Alexandrino Gonçalves (PhD, male) is an Associate Professor in the Department of Computer Science Engineering, at the School of Technology and Management of the Polytechnic Institute of Leiria (Portugal), a researcher of the Computer Graphics and Sound Research team of the Computer Science and Communications Research Centre (CIIC) of the same institute and is a member of the Eurographics Association and the Portuguese Computer Graphics Group (the Portuguese Eurographics Chapter). Most of his research is focused in the development of virtual reality applications applied in a cultural heritage context, where he got his PhD degree at the University of Trás-os-Montes and Alto Douro (Portugal) in cooperation with the University of Warwick (UK), and his MSc at the University of Coimbra (Portugal). This research in the cultural heritage area led him to some scientific recognition, namely: one of his projects was highlighted in renowned scientific journals like “Nature” and “New Scientist”; awarded with some prizes; invited to perform public presentations in some national and international conferences or events; and author of several dozens of papers in international journals and conferences proceedings. Currently, he is the head of the Computer Graphics and Multimedia Group at CIIC and member of the directive board of the (Eurographics) Portuguese Computer Graphics Chapter. As a professor, he is responsible and teacher for curricular units in this field of expertise, such as Computer Graphics, 3D Modelling, Graphical Systems and Interaction or Multimedia Technologies; was coordinator of the Computer Engineering graduation course of this institute; and is the supervisor of several MSc and PhD students. As a researcher he has also been involved in several funded research projects; has experience in organizing national and international scientific events; belongs to the scientific committee of several international conferences; and is reviewer of some area related journals such as Computer & Graphics (Elsevier) or Journal on Computing and Cultural Heritage (ACM). His major research interests include: Virtual Reality, Augmented Reality, High-fidelity Computer Graphics, High Dynamic Range Imaging, Human-Computer Interaction.

LSRE/LCM - Laboratory of Separation and Reaction Engineering

LSRE-LCM is a leading national R&D Unit and Associate Laboratory in the field of Chemical Engineering and has achieved international recognition in many areas. The mission of LSRE-LCM is to contribute for the scientific and technological know-how advance, towards the sustainable development of the country, including training of high-competence researchers and technicians through post-graduate and post-doctoral programs. Expertise areas: Separation Processes; Reaction Engineering; Modelling, Simulation and Control of Processes and Environmental from fundamental research to the development of products and industrial processes. Currently with 126 researchers, 62 with PhD degree and 60 PhD students, LSRE-LCM outputs since 2005 count: 7 books, >2000 ISI papers, >120 book chapters, 25 families of patents, >140 PhD and >400 MSc theses, and 3 spin-off companies.

<https://lsre-lcm.fe.up.pt>

Main researcher(s)' contact(s)

Judite dos Santos Vieira

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Judite dos Santos Vieira graduated in Chemistry - branch of Food Chemistry at the University of Aveiro in 1997. From 1997 to 1998 she was collaborated as Researcher Fellow in the Laboratory of Organic Chemistry, Chemistry Department of the University of Aveiro. In 1998 she integrated as Teaching Assistant the Mechanical Engineering Department of Polytechnic of Leiria (IPLeiria). She obtained her Master degree in 2000 in Chemistry of Natural Products at the University of Aveiro. In 2008, she completed her PhD degree in Science of Engineering at the University of Porto, in the area of water quality of surface fresh waters. Since 2008 she has pursued her teaching at IPLeiria and research career at LSRE-LCM (pole IPLeiria) in water management. She is author and co-author of some scientific publications and she has participated actively in different projects. Presently, her research interests focus on sustainable development and environmental friendly technologies for pollution control, particularly in water quality monitoring, hydroponic and aquaponic technologies, vermifiltration technology and water/waste reuse and recycling & valorization. The main of the research activities has been developed in collaboration with national enterprises (Águas do Centro Litoral, Águas do Oeste, Pedrosa & Irmãos, Lda, Better2Earth, Consórcio SmartFarmCoLAB).

Raúl Bernardino

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Raul Bernardino graduated in Technological Chemistry at the Faculty of Sciences of the University of Lisboa (FCUL) in 1993. After graduation, he worked in the Food Industry (Garina Ltd) and then joined the Department of Chemical Engineering of the Polytechnic Institute of Tomar (IPT) as Teaching Assistant. In 1998, he started his post-graduate studies in the Department of Chemistry of FCUL, where in 2002 he obtained his Ph.D. degree in Computational Chemistry applied to Supramolecular Chemistry. In the same year, he moved to Polytechnic Institute of Leiria where he pursues his teaching and research career. From 2005 to 2009 he was the director of "Laboratório Biotecnológico do Oeste" (LBO) and in 2009 to 2012 was the coordinator of the aquaculture master degree. From 2011 to 2012 he made a specialist degree in Aquaculture in the Polytechnic University of Valencia, Spain. More recently has dedicated his research to the theme of

sustainability, more specifically to sustainable aquaculture and horticultural production, especially in its aquaponic component.

Dorinda Silva

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Dorinda Marques da Silva is a Biochemist and since 2019 is a contracted Researcher at Polytechnic Institute of Leiria in Portugal under the scope of the project MBStox (PTDC/BIA-MIB/31864/2017 - <https://mbstoxproject.wixsite.com/mbstox>). Dorinda is also voluntary researcher for Congenital Disorders of Glycosylation maintaining contact to her former experience as post-doctoral researcher. Additional research interests include studies of cell signaling and antimicrobial compounds. After concluding her PhD in the area of Cell Signalling and Associated Pathologies (Cum Laude) in Spain at University of Extremadura, she received a travel fellowship from the European Association for the Study of Diabetes. Dorinda awards include the Young Investigator Award Society from the Free Radical Research Europe in 2009, the Cost Action BM1005 grant for ENOG Training School in 2014 and the Microgrant award from the Rare Disease Foundation in 2017. She is member of the Portuguese Society of Biochemistry (for more than 15 years), since 2016 member of the Portuguese Association for Congenital Disorders of Glycosylation and of the CDG & Allies - Professionals and Patient Associations International Network. Teaching activities of Dorinda include areas as microbiology, cell culture and food security. She is author of 24 scientific articles published in international peer-reviewed scientific journals and 4 book chapters. As first author she presented 8 oral communications and more than 15 posters in several scientific events. Dorinda has a broad vision about biochemical applications to address societal challenges that results from her experience as biochemist in several research areas such as neuroscience, neurobiology, rare diseases, microbiology and toxicology.

ADAI - Aerodynamics Development Association

The ADAI / IPEiria Delegation fits into one of the research areas of ADAI, the Energy, Environment and Comfort area, with special interest in its application to the Automobile.

The main lines of research are in particular in the area of Mechanical and Automotive Engineering:

- Aerodynamics (CFD);
- Energy / thermal management of vehicles;
- Fuels and emission of pollutants;
- Mechanical and electronic engine development.

www.adai.pt

Main researcher(s)' contact(s)

Nuno Martinho

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Nuno Martinho took his PhD in Mechanical Engineering (2012), specialty of Aerodynamics, by Coimbra's University. Master and under graduation degree in Mechanical Engineering, area of Thermodynamics and Fluids, by the Faculty of Sciences and Technology of the same University.

Since 1998/1999: Adjunct Professor in the Mechanical Engineering Department of the School of Technology and Management - Polytechnic of Leiria (IPLeia), teaching courses in Fluid Mechanics, Thermodynamics, Heat Transfer, Aerodynamics and Turbomachines.

2012-2018: Coordinator of the Automotive Engineering under graduation course.

Integrated several internal councils of IPLeia - Pedagogical Council, the Main Representative

Supervisor of several master's and Final Project of students, namely in Automotive and Mechanical Engineering. Currently he is co-supervisor of a PhD student.

Member of the Association for the Development of Industrial Aerodynamics (ADAI/LAETA). Participation in several scientific projects, both with public and private institutions, funded by the Portuguese Scientific Foundation for Technology.

Participation and/or responsible by several technical and scientific works developed with/for several public and private institutions.

He is author and co-author of scientific papers published in national and international journals and articles/communications in international and national conferences.

Helder Santos

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Helder Manuel Ferreira Santos received his mechanical engineering bachelor's degree at University of Coimbra, Portugal, in 2000 and his master and Ph.D. degrees from Lisbon Technical University, Portugal, in 2006 and 2010 respectively.

He started the teaching activity in 2000 as Assistant Professor and is today Adjunct Professor with the Mechanical Engineering Department, School of Technology and Management (ESTG), Polytechnic Institute of Leiria, Leiria, Portugal.

Prof. Helder Santos is member of the R&D center ADAI-LAETA, Polytechnic Institute of Leiria (IPL) delegation.

His research interests include vehicle exhaust gas after treatment systems and waste heat recovery in automotive vehicles.

He has been coordinator of various research projects, some of them with industrial partners.

He has also supervised several Master thesis. He has published about 30 papers, 13 of them in international Journals, at the present his h index is 6.

He has been the reviewer of numerous scientific publications in international journals and conferences.

He has also participated in several conferences, having presented several communications.

Luís Serrano

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PhD in Coimbra University in 2013 with the title: Comparative Analysis of Internal Combustion Engine Performance when Using Biofuels.

Several research works in the area of fuels and combustion, namely biofuels (Biodiesel and Biomethane), alternative fuels (LPG, Natural Gas) and additive fuels.

Professor in Mechanical Engineering Department Polytechnic Institute being the actual Coordinator of Automotive Engineering degree.

Technical and scientific publications, namely some technical reports resulting from the several services provided to different companies, mostly in the field of combustion and use of different fuels.

He has participated in numerous national and international conferences where he has published more than 40 publications. He has 2 book chapters and 9 peer-reviewed articles which corresponds to a h=5 index.

He holds a patent as an inventor.

Participation as coordinator or part of the research team in several projects funded by FCT e MIT or directly by the industry companies (PRIO-Energy, GALP, Biogold, Sintética, DP).

Qualified Evaluator by IPAC for Labs (ISO 17025) in vehicle area, and for Inspection Bodies (ISO 17020).

Reviewer for international ISI Journals related with energy.

INESCC - Institute for Systems and Computer Engineering of Coimbra

The Advanced Robotics and Smart Factories research and development group has its headquarters at the Technology and Management School, Polytechnic of Leiria (ESTG), Leiria, Portugal. The group is integrated in the Polytechnic of Leiria branch of the Institute for Systems Engineering and Computers – Coimbra (INESCC). It is a multi-field research group, with its members coming from the departments of Electrical Engineering, Mechanical Engineering and Mathematics.

The group's main research and development work focus on areas strongly connected to the industry, with short-term and medium-term applications, but also with fundamental theoretical work for long-term applications. The key scientific areas where the group is working are:

- Industry 4.0 and the Factories of the Future
- Industrial Robotics
- Automatic Inspection and Maintenance
- Educational Robotics
- Materials and Technologies
- Autonomous Driving

<https://www.uc.pt/en/org/inescc>

Main researcher(s)' contact(s)

Luís Pires Neves

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Luís Pires Neves received his Electrical Engineering degree in 1992, his MSc degree in Systems in Automation in 1998, and his PhD degree in 2005, all from the University of Coimbra. He is currently Professor Coordenador at the School of Technology and Management of the Polytechnic Institute of Leiria. As researcher at the INESC Coimbra R&D unit, he has participated in several research projects, including two SAVE projects funded by the EC where he acted as main researcher at INESCC, two COST actions in which he participated as member of the Management Committee, and several research contracts with companies and national institutions. His research areas include Smart-Grids, Demand-Side Management, Power Systems Planning and Analysis and Operational Research. Since 2007 he acts as coordinator of the Delegation of INESC Coimbra at the Polytechnic Institute of Leiria and since January 2009 as member of the board of Directors of this R&D unit. <https://orcid.org/0000-0002-2600-5622>

Hugo Costelha

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Professor Coordinator at the School of Technology and Management, Polytechnic of Leiria, Portugal, Hugo Costelha received his PhD in 2010 in the field of Robotics by the Technical University of Lisbon. He is currently a researcher at INESC Coimbra, having developed extensive work in the field of autonomous robotic systems with sensory and actuation capacity, where it is necessary to develop intelligent systems supported by the integration of different hardware and software modules. He has collaborated mainly with the industry of the Leiria region in the scope of R&D projects, as well as in the scope of the final undergraduate projects and master's dissertations supervision. In the scope of his teaching activity, he has been responsible of the of Advanced Robotics course in the master's degree in Electrotechnical and Computer Engineering and the Robotics and Computer Vision course of the Degree in Electrotechnical and Computer Engineering. He was one of the founders of the ARISE (Advanced Robotics and Smart Factories) research group. He has also participated in several competitions in the field of robotics, particularly mobile robotics, having been twice part of the national champion in the Autonomous Driving competition of the Portuguese Robotics Open. He has also collaborated in the organization of several international conferences and events in the field of robotics, both in the Leiria region and other regions in Portugal.

Carlos Neves

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Carlos Fernando Couceiro de Sousa Neves graduated in mechanical engineering in 1988 at Instituto Superior Técnico in Lisbon. He obtained his Ph.D. in electrical engineering in 1998 at the University of Salford, in the United Kingdom, with the thesis "A Generalised Framework for the Analysis of System Architectures in Autonomous Robots". He joined the Politécnico de Leiria in 1989 as an assistant and remains today as a professor (professor coordenador) since 1999.

He Lectures subjects in the scientific areas of mechanical and electrical engineering, presently under his responsibility the subjects of "control and instrumentation" and of "automation and robotics" in different master's degrees at the Politécnico de Leiria. He supervised PhD thesis and several Master's degree dissertations, projects or internships, as well as more than 20 undergraduate final year projects.

His research areas of interest include instrumentation, control, automation and robotics, and has been also developing projects of interactive systems in museums and interpretation/information centres for several years.

He serves regularly as an external evaluator for competitive R&D industrial projects (QREN, P2020, SIFIDE) for IAPMEI(Portugal) and ANI(Portugal).

LIT (RC)

ACORN (Intelligent Solutions for Industrial, Commercial and Energy Applications)

Intelligent Systems: ICT, Informatics, InfoGraphics, SCADA, Data Historians, PLCs, Controls, Embedded Systems, Sensor Networks. Renewable Energy: Technologies Electrical Generation from Renewables, Thermal Generation from Renewables, Bio-Fuels, Renewable Energy Technologies. Energy Management and Environmental Ecosystems: Energy Management and Monitoring Systems, ISO50001, Environmental Ecosystem Monitoring and Management, ISO14000. Air, Water and Soil; Sustainability and Policy. Sustainable Manufacturing: Zero Carbon

Production, Human Factors, Energy Awareness and Sustainability. Smart Facilities: Smart Maintenance Systems; Resources Usage in Facilities / Utilities, Energy, Water, Waste; Condition based Maintenance. Smart Electrical Networks: Smart Grids, Demand Side Management, Power Quality, Integration of Renewable Energy, Alternative Energy (CHP) and Embedded Electrical Generation.

<http://www.acornresearch.ie/about-us/>

Main researcher(s)' contact(s)

John Cosgrove

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John has led research projects on Intelligent Solutions for Industrial, Commercial and Energy Applications in conjunction with 12 industry partners and has provided research mentoring to over 30 enterprises. John has been awarded competitive funding of over €2.8 million and was co-ordinator of a large multi-partner project in industry (TEMPO 2011-2015). In Academic terms, John has contributed to 35 international conference /journal publications and has supervised 14 research masters. In addition, he works with the European Commission as an Expert Reviewer and Evaluator under a range of EU Research Programme, including, ICT, Factories of the Future, and Secure, Clean and Efficient Energy. In 2010, John led an EU Roadmap Project on the role of ICT in the Factories of the Future

Joe Sullivan

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Dr. O'Sullivan has worked 15 years in the electronics industry in a number of engineering design roles, including at Analog Devices and Ashling Micro System. Joe is currently the CTO of NVMDurance Ltd, a research spin out company focused on the manufacturability of cutting edge memory technologies. He completed his Doctorate in Computer Science in 2013 on the 'Extension of life in NOR flash Memory Using Genetic Algorithms'. He holds 15 internationally awarded patents with several more pending and has a similar number of published papers. He is currently active in research and collaborate with a multitude of industrial partners, mostly in California's silicon valley, such as Dell/EMC, Intel, Micron and Hynix to mention just a few. Joe also collaborates with colleagues at the University of Limerick where he has recently been awarded a research collaboration agreement (€1.8m) with SFI, UL and LIT in the area of automatic generation of FPGA designs

CaIR Group (Computing and Informatics Research)

[https://lit.ie/en-IE/Research-Development/research/Centres-Groups/Computing-and-Informatics-Research-\(CaIR\)-Group](https://lit.ie/en-IE/Research-Development/research/Centres-Groups/Computing-and-Informatics-Research-(CaIR)-Group)

The Computing and Informatics Research Group (CaIR) is the Department of Information Technology's research group and was formed in 2018. Information and Communications Technology (ICT) is a critical research priority theme for Ireland and, arising from the pace of developments and diffusion of technologies since 2012, it is also highlighted as a key enabler to support developments and advancements across all other research areas. The ambition of the CaIR group is to facilitate research across the entire spectrum of ICT, including Future Networks, Communications and Internet of Things; Data Analytics, Management, Security, Privacy, Robotics and Artificial Intelligence (including

Machine Learning); and Digital Platforms, Content and Applications, and Augmented Reality and Virtual Reality

Main contact

Niall Corcoran

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Dr Niall Corcoran B.Eng., M.Sc., DBA, MIEI, CDCS, is a Senior Lecturer in the Department of Information Technology, and Head of the Computing and Informatics Research (CaIR) Group. Holding degree-level qualifications in engineering, science and business, Dr Corcoran has extensive experience across multiple disciplines, including industrial, mechanical, and civil engineering, software development, and information technology (IT) management, including serving 16 years as IT Manager at Limerick Institute of Technology (LIT), building the Computer Services Department from a small support unit to a large and efficient services operation. Since moving to academia, he has produced several well-cited publications, including book chapters, journal, and conference papers, primarily in the fields of enterprise social networking, communities of practice, and knowledge management, in the context of higher education. He was the Conference Chair for the European Conference on Social Media (ECSM) held at LIT in 2018. Current research projects include further work on knowledge sharing in higher education, and applications of artificial intelligence in sports and medical contexts. Other research interests focus on the environmental impacts of IT, including the electronic waste lifecycle and the use of different types of network transmission media. Dr Corcoran lectures at Level 8 and Level 9 on subjects covering computer architecture and science, IT governance and management, data centre design, and networking. He also coordinates work placement and final year projects, providing support on research and academic writing across the department. He is a Certified Data Centre Design Specialist (CDCS) and a Cisco Certified Network Associate (CCNA) Instructor.

Jacqueline Humphries

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Jacqueline Humphries is the Project Manager, and leads a team of researchers, on an Industry 4.0 Zero-Defect Project known as the INtelligent Cognitive Assistance SystEm (InCASE). A collaboration with Cook Medical and Vistamed, InCASE aims at the development of a cyber-physical system using Machine Learning on real time video feeds which integrates vision systems, image projection and augmented reality concepts to provide immersion and synergy between the operator and the production system, in order to provide Quality Check (QCs) automatically and in real-time. Jacqueline is also a lecturer in Computer Science, specialising in database administration and data analytics. She is the Programme Chair for the BSc in Computer Services Management, and for the Certificate in Coding & Computational Thinking. She has considerable experience in both public and private sectors having worked in industry in technical and project management roles. Her project work include a one year secondment to design a data system for the European Common Agricultural Policy Rural Development Programme, which involved the Digitalisation of the Department of Agriculture's data statistics in compliance with a European-wide initiative that was worth €6 Billion to the Irish economy. She has also been Principal Investigator on a project capturing tacit knowledge on an Experts Exchange and is the former Head of Flexible Learning in LIT.

Carol Rainsford

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Lecturer in database systems, machine learning and predictive analytics. Keen interest in the areas of social networking, machine learning, analytics and IoT. A member of the CaIR research group. An active research supervisor in both undergraduate and post graduate studies. Projects include the analysis of traffic flow using IoT technology and Fog computing, A framework for the integration of Blockchain, A framework for the integration of Augmented Reality into Primary Digital Literacy and a large amount of data analysis and IoT project under graduate projects

The Centre for Energy Efficiency and De-Carbonisation (CEEDD)

The Centre for Energy Efficiency and Deep Decarbonisation [CEEDD] is based in the Limerick Institute of Technology campuses in Limerick and Thurles. The Centre brings together expertise from 16 Academic Researchers with a sterling track record in energy projects in housing, communities and industry. The Centre is deeply involved in public engagement, education, training and skills development through innovative programmes from Level 6 to 9 on the NQF. Notable successes include the training of over 200 staff in local and regional energy agencies across the EU, the training of 300 construction workers on near Zero Energy Building and the development of training courses /apprenticeships addressing industry needs.

<https://lit.ie/en-IE/Research-Development/research/Centres-Groups/CEEDD>

Main researcher(s)' contact(s)

John Cosgrove

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John has led research projects on Intelligent Solutions for Industrial, Commercial and Energy Applications in conjunction with 12 industry partners and has provided research mentoring to over 30 enterprises. John has been awarded competitive funding of over €2.8 million and was co-ordinator of a large multi-partner project in industry (TEMPO 2011-2015). In Academic terms, John has contributed to 35 international conference /journal publications and has supervised 14 research masters. In addition, he works with the European Commission as an Expert Reviewer and Evaluator under a range of EU Research Programme, including, ICT, Factories of the Future, and Secure, Clean and Efficient Energy. In 2010, John led an EU Roadmap Project on the role of ICT in the Factories of the Future

Centre for Rural & Sustainable Development (CRSD)

The aim of the Centre for Rural and Sustainable Development (CRSD) is to re-enforce LIT's position as a leading actor in the sustainable development sector, thereby creating opportunities for engagement in research, development and academic activities. Sustainable development refers to the concept of activities that seek to balance social and economic improvement with the need to ensure that the use of scarce non-renewable natural resources is minimised, that the carrying capacity of the environment is not exceeded and that individuals and communities are facilitated in participating to the fullest extent possible in the making of the decisions that affect their lives. Sustainable development also seeks to attain justice between nations, between regions, between communities and between generations.

<https://lit.ie/rdi/development/rural-development>

Main researcher(s)' contact(s)

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Seamus is a highly experienced manager with 25 years' experience in energy, education and flexible learning environments. He has developed extensive networks regionally, nationally and internationally in the sustainable energy and higher education fields. Seamus has acquired a thorough knowledge and experience of Europe and national funding schemes with experience of coordinating large scale multi-national projects. He currently manages the growing team within the LIT Development Unit which focuses primarily on issues related to sustainable development at a local, regional, national and international level. He leads and partners in consortia to secure funding from a range of national and EU funding programmes. He manages programmes across H2020, Interreg, Erasmus+ and other programmes providing strategic and project management, technical input and leadership. He is joint Principle Investigator for the Centre for Energy Efficiency and Deep Decarbonisation (CEEDD) which focuses on supporting individuals, communities, businesses and industry to achieve energy transition goals.

Shane O' Sullivan

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Experienced lecturer and researcher with a demonstrated history of working in the higher education sector. Skilled in Social Enterprise, Spatial Analysis, Rural Geography, Economic Development, Lecturing, and Project Management. Strong administrative professional with a Doctor of Philosophy (Ph.D.) focused in Geography from Mary Immaculate College, Limerick.

Food@LIT

Food@LIT is a centre of excellence in food research, capable of food development and innovation that provides solutions to specific problems that food producers can encounter. The benefits for businesses are wide ranging and far reaching in terms of their impact on the clients' commercial success, whether they are start-up companies or established enterprises. This centre consists of an innovative and multidisciplinary team of researchers and commercial specialists. Food@LIT is a synergy between food, consumer needs and science and is led by Agnes Bouchier-Hayes & Dr Tracey Larkin

<https://www.foodlit.ie/>

Main researcher(s)' contact(s)

Tracey Larkin

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Dr. Tracey Larkin is a B.Sc. Ph.D. Biochemistry graduate from the National University of Galway. Dr Larkin is involved in sensory evaluation and is the service director for the Shannon ABC Sensory Evaluation Service. This service supports new product development, product improvement, benchmarking and quality-testing for SME's. Following her undergraduate study, Dr Larkin completed a post doctorate with the Life

Science Dept. of the University of Limerick in the area of food biochemistry and modified atmosphere packaging. Dr Larkin then worked with Olympus Diagnostica in clinical research and development as a project/program manager for a number of years. Currently Dr Larkin is lecturing a range of subjects including Analytical Techniques and Quality Management. Dr Larkin's current research focuses on analysis of antioxidants/bio-actives in foods and has an IRC funded project to investigate organic fruits and vegetables.

Agnes Bouchier Hayes
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NHL Stenden (RC)

Center of Expertise Smart, Sustainable Manufacturing

Digitisation and automation are indispensable in the manufacturing industry. Exploiting the opportunities that these new work practices provide and capitalising on all available data arising from these opportunities, creates a completely new playing field for businesses and researchers. Associate professor Wilbert van den Eijnde and the business community are discovering the possibilities and challenges that this fourth industrial revolution has to offer.

<https://www.nhlstenden.com/onderzoek/lectoraat/smart-sustainable-manufacturing>

Main researcher(s)' contact(s)

Wilbert van den Eijnde
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Research Group Computer Vision & Data Science

The quality of a product or service is important to companies. Using Computer Vision you can carry out automated visual assessments of the quality. This contributes to a smart industry: a higher quality, and cheaper, more flexible and/or labour-friendly (production) processes. Computer Vision - the automation of visual inspections - involves making interpretations with the help of computer camera images, after which this information is used to control other processes. Take, for example, quality control, automatic position and orientation determination, disease detection, defect measurements and sorting products. The professorship of applied sciences works closely with the professorship of applied sciences Data Science in a single research laboratory. Together they form the Centre of Expertise of Computer Vision & Data Science within higher vocational education in the Netherlands. The strength of professorship is that it has both the know-how and equipment for the entire chain of lighting, cameras, optics, configuration, vision algorithms, deep learning algorithms and the embedding of computer vision solutions in existing systems.

<https://www.nhlstenden.com/en/research/professorships/computer-vision>

Main researcher(s)' contact(s)

Jaap van de Loosdrecht
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Many decisions made today are based on images. Take the medical world, for instance, where doctors study x-rays to diagnose a tumour. Cameras are also widely used in the industrial sector. And of course, the careful viewing and interpretation of camera images is essential in security. Professor Jaap van de Loosdrecht and his Computer Vision professorship focus on the entire spectrum.]

Research group Circular Plastics and Center of Expertise GreenPAC (Polymere Application Center)

Imagine a large pile of plastics, 126 kilograms in weight. That's how much plastic packaging the average person uses per year. If we don't want to continue having a plastic soup in our seas, we will have to radically change our production processes and consumption habits, as well as take steps towards a sustainable raw materials management and circular economy. A good start would be to make better reuse of waste. So how can we separate our waste and reuse plastics more effectively? The Circular Plastics professor of applied sciences carries out applied research into closing the plastics recycling process. The professorship analyses and optimises the separation processes by connecting the entire northern chain of raw materials, production, consumption and waste together. The professorship also studies chemical recycling, that is to say plastics being chemically returned to their original raw materials. The research into the reuse of raw materials includes investigating the possible further applications of recycled plastics. Even upcycling is among the possibilities: plastics are then reused to form something of greater value.

<https://www.nhlstenden.com/en/research/circular-plastics>

<https://www.greenpac.eu/nl/>

Main researcher(s)' contact(s)

Jan Jager

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Rudy Folkersma

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Plastic is a hot item nowadays. The term plastic increasingly has negative connotations, whereas plastic is a fantastic material to work with, argue professors Jan Jager and Rudy Folkersma. In fact, a life without plastic is unimaginable in this day and age. The two professors are jointly committed to a circular economy with sustainable plastics.

Marcel Crul

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How can you design products that are circular by definition? How can we prevent our need for plastics? And which plastics can easily be replaced by other materials? Associate Professor Marcel Crul is the bridge between the Open Innovation and Circular Plastics professorships.

Research Group Serious Gaming

Fighting chronic pain by means of a VR game, learning to work together effectively during a simulated emergency situation or effortlessly gaining insight into the challenges of energy transition: serious gaming is rapidly on the rise in companies and social organisations to create sustainable impact. The Lectorate Serious Gaming distinguishes two research approaches for carrying out design-oriented and socially impactful research: research with serious gaming and research about serious gaming. In both cases the main focus is on addressing and promoting the issue at hand. In addition, the acquisition, recording and publication of generated knowledge is definitely one of the core tasks of the research group. As indicated, the contexts in which research is conducted are diverse, but the serious gaming research objectives are by no means the same.

Main researcher(s)' contact(s)

Dr. Ivo Wenzler

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In his role as serious gaming lecturer, Ivo Wenzler focuses on conducting innovative research on the design, implementation and value contribution of serious gaming, as well as on the development of university-level curricula with and about serious gaming. Prior to his appointment at NHL Stenden, he had a long career at Accenture Strategy and Delft University of Technology. Before Accenture, he was Head of the Policy Analysis Group at Radboud University Nijmegen and Research Associate at the University of Michigan. Throughout his career, he has focused on the development and implementation of change management, simulation and serious gaming approaches with the goal of helping his clients with their transformation challenges. He often presents at international conferences and publishes regularly in the fields of serious gaming, change management and simulation-based modeling, with over 50 publications in journals and books.

SZE (RC)

Research Center for Vehicle Industry

The Research Center of Vehicle Industry aims at providing appropriate research and development cooperation between the automotive partners and higher education involving:

- Basic and targeted basic research
- Ensuring R&D human resource and service
- Improvement of R&D services
- Common work in research and innovation
- Establishing R&D and innovation activities with infrastructure

The Research Center of Vehicle Industry has been working since May 2011 and consists of the following research groups: Vehicle Dynamics, Vehicle Electronics, Electronic Vehicle Powertrain, Self-driving / Autonomous, Artificial intelligence, Simulation and Optimization. These groups give an excellent background for the planned basic and targeted researches on the topics of modeling and analyzing complex hybrid and electric vehicle dynamics, electronic measuring and control methods, mathematical models and optimization processes, automotive infocommunication technologies. Based on the results of the different research areas significant and continuous cooperative industrial developments of vehicle (sub)systems can be achieved. Our latest and most researched topic is self-driving (a.k.a autonomous) vehicles. We believe that

fully self-driving technology can lead to safe, easy and sustainable transportation. We are preparing for this new technology-to-come by studying and researching its fundamentals and exploring the possibilities it offers. This process helps us gain unique knowledge on the mixed field of mechatronics, robotics and artificial intelligence. Future transportation can be safe, easy and sustainable without compromises.

https://jkk.sze.hu/en_GB/main

<https://admissions.sze.hu/competence-centres>

Main researcher(s)' contact(s)

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Ferenc Szauter is an associate professor of the Department of Road and Railway Vehicles and the Head of the Vehicle Industry Research Centre.

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Petra Szakonyi is an associate professor of the Department of Transport Infrastructure and Water Resources Engineering and the coordinator of the H2020/Horizon Europe Information Point of the SZE UNI.

Management Campus Competence Centre

The Management Campus Competence Center is a collaboration platform that supports the international competitiveness and development of the innovation capabilities of local companies, especially small and medium-sized enterprises.

Thematically designated research conducted in the Management Campus is meant to secure the theoretical and methodological findings for the innovation services and trainings described above. The results are presented at conferences and get published in national and international scientific journals by our university faculty members. There are four central research fields pursued by the Management Campus:

open and user innovation research;

trend analysis and investigation of collaboration networks;

investigation of family businesses with special attention to the impact of generation change;

the role of Artificial Intelligence in the restructuring of work.

<https://mc.sze.hu/rolunk>

Main researcher(s)' contact(s)

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Mr. Kornél Vági is the head of the Management Competence Centre.

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Mr. Gábor Dósa is the business development consultant and specialist of the Management Campus. Managing director of UNI-Inno Ltd.

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Dr. Tibor Dóry Phd. president of the Mangement Competence Centre. Managing director of the MOBILIS Interactive Exhibition Centre.

4.2 External partners with whom HEI's interact in Future Industries issues

AIT (EP)

CONFIRM SFI (HUB)

CONFIRM is a new research centre for smart manufacturing with €45M in funding (www.confirm.ie). MRI researchers are funded investigators in the SFI funded Confirm Centre leading the development of Smart injection moulding cells and Sensor embedded 3D printed tooling. CONFIRM works with 9 partner institutions nationwide to transform the Smart Manufacturing ecosystem, enabling industry to be at the forefront of Smart Manufacturing.

<https://confirm.ie/>

APT Ireland (HUB)

The Applied Polymer Technologies gateway centre is a nationally funded centre which is a part of the enterprise ireland Technology Gateway network. its core competences are in the area of polymer processing and characterisation and offers a range of services including polymer processing, characterisation and design for manufacture.

<https://aptireland.ie/>

COMAND (HUB)

COMAND Connected Media Application Design and Delivery is part of the Technology Gateway Network funded by Enterprise Ireland - a nationwide resource for industry based in the IoTs delivering solutions on near to market problems for industrial partners.

COMAND is working with a range of SME's & Multinationals across various industries in the IT, Software and Connected Media Fields. Its AIT's Software Research Institute(SRI) based research engineers have extensive experience working with industry and other academic collaborators worldwide.

<https://comand.ie/>

Meat Technology Ireland

ICOMP network

DTIF recycling of plastics

FHV (EP)

Austrian Blockchain Centre

<https://www.abc-research.at/>

The Centre's mission is to be the one-stop-shop Austrian Research Centre for Blockchain (and related) technologies to be applied in industrial applications like industry 4.0 / IoT as well as financial, energy, logistics, government and administrative applications. Those new applications and business models resulting from collaborations between established players, innovative start-ups and top R&D institutes will be the key for the creation of new jobs and establishing Austria among the top ten innovative countries in Europe.

Austrian Institute of Technology (AIT)

<https://www.ait.ac.at/>

According to this mission, AIT is strategically positioned as a key player in the Austrian and European innovation system by performing applied research for and enabling the market exploitation of innovative infrastructure related solutions. The functionality of "bridging the gap" between research and technology commercialisation is a key aspect of developing new technologies and enabling an economic boom.

With regard to the Austrian innovation landscape, the AIT fulfils this role by its new orientation, providing a research environment to help key industries facing mid- to long-term challenges.

Unlike universities that are focusing on basic research and addressing short-term exploitation, AIT covers the entire spectrum from taking up emerging technologies, first proof of concepts, applied research to transferring these emerging technologies into specific applications up to demonstrators and prototyping.

This allows us to connect basic research and the usage of new technologies for the industry and thereby pave the way for commercialisation.

Digital Innovation Hub West

<https://dih-west.at/>

DIH West is a hub for digital innovation in the western part of Austria (Vorarlberg, Tyrol, Salzburg).

CDP - Austrian Centre for Digital Production

<https://acdpc.at/de/en/>

The Austrian Centre for Digital Production supports companies in the digitalization and automation of discrete manufacturing and production processes. Special focus is on the needs of SMEs and the tasks arising from the production of small batch sizes. The portfolio of expertise ranges from the virtual representation of products and production systems to the automation of design tasks, machine-to-machine communication, including sensor integration,

integration with and into IT systems, data science and the consideration of socio-economic aspects.

Start-up Centre 'startupstube'

<http://www.startupstube.at/>

The startupstube brings students from different disciplines together and supports them during the startup process. It offers start-ups and innovators entrepreneurial development space and inspiration, creates proximity to the regional and international innovation ecosystem and promotes exchange with like-minded people.

Plattform-V

<https://www.plattform-v.io/>

Plattform-V is an agile, registered non-profit association. Representatives of the member companies are to motivate them to become active and promote the networking of member companies through digital business models to strengthen Vorarlberg and the region. Members of the association are Vorarlberg companies of all sizes from different sectors, with a current focus on manufacturing companies. The organisational management and strategic orientation of the platform is in the hands of the "Platform V Core Team". This is made up of representatives of several member companies - large and small - and care is taken to ensure that new members are appointed on a regular basis.

Wirtschafts-Standort Vorarlberg GmbH - WISTO

<https://www.wisto.at/en/home/>

WISTO supports local companies in research, development and innovation, assists start-ups and coordinates the digitization agendas in Vorarlberg. As a direct interface to companies and institutions, we implement lead projects. In addition, we are responsible for location marketing and promotion and the development and implementation of the Marke Vorarlberg.

HAMK (EP)

Steel Construction Excellence Centre - SCEC

<https://www.hamk.fi/scec-in-english/?lang=en>

RiiCycle - Recycle Cluster in Riihimäki Area

RiiCycle supports local companies in Riihimäki Area to enhance recycling. RiiCycle cluster consists of different companies and HAMK

Häme Regional Federation of Finnish Enterprises

Association representing entrepreneurs in Häme region. They influence and interact with Finnish decision-makers at all levels: locally, nationally and in the European Union.

ICP Materials

<http://www.corr-institute.se/icp-materials/web/page.aspx?sid=3293>

Kanta-Häme Science NetWork

Universities and research centers invited to increase competence in Häme region. HAMK interacts actively with all members

Finnish Deep Drawing Research Group - FinnDDRG

<https://www.finddrg.fi/>

IPCA (EP)

InvestBraga

<https://www.investbraga.com/>

DST Group

https://www.dstsgps.com/?locale=en_US

F3M

<https://www.f3m.pt/gb/home>

Portuguese Textile Cluster (HUB)

<https://www.clustertextil.pt/en/home-en>

Iberian Nanotechnology Laboratory (INL)

<https://inl.int/>

ATTRACT DIH - Digital Innovation Hub for Artificial Intelligence and High-Performance Computing @ Portugal (HUB)

<https://s3platform.jrc.ec.europa.eu/digital-innovation-hubs-tool/-/dih/1345/view>

LASI - Associated Laboratory in Intelligent Systems

<https://cts.uninova.pt/>

Polytechnic of Leiria (EP)

CENTIMFE – Centro Tecnológico da Indústria de Moldes, Ferramentas Especiais e Plásticos

CENTIMFE is a portuguese non-profit Public Utility institution, created in 1991, with over 230 Associates, integrating Companies, the sector associations CEFAMOL (Portuguese Association of the Moulds Industry) and APIP (Portuguese Association of the Plastics Industry), the public partners, IAPMEI and IPQ and, the Municipalities of Marinha Grande, Leiria, Batalha, and Oliveira de Azeméis. By promoting and developing activities like Technical assistance, R&D, Technological transfer and Specialized training, CENTIMFE reinforces Industrial competitiveness.

<https://www.centimfe.com/about-us.html>

OBITEC – Parque Tecnológico de Óbidos

Óbidos Parque - Parque Tecnológico de Óbidos was created in 2008 as part of a local strategy for development of a creative economy. With a total construction area of over 4,000 square meters and 29 plots with an already established infrastructure (first stage), Óbidos Parque has

all the necessary conditions for companies to establish and operate. From dedicated fiber optic network to proximity to an exceptional road network that allows direct access not only to Lisbon and Oporto, but also to the countryside and Spain, technological and market connectivity is guaranteed. The park is not a traditional business location area. It is a space that privileges architecture and green spaces. Óbidos Parque is looking for projects that may change the territory and help create an innovative hub for companies.

<https://obidosparque.com/>

StartUpLeiria (HUB)

It is a non-profit association established in July 2004 at the initiative of the Polytechnic of Leiria, the Business Association of the Leiria Region (NERLEI) and the City Council of Leiria. Today it has 34 members, mostly companies.

<https://startupleiria.com/en/home-en/>

OPEN – Oportunidades Específicas de Negócio

Oportunidades Específicas de Negócio (Business Specific Opportunities) is a non-profit private institution, created in November 2002 for the promotion of innovation and employment through several different actions:

- Dynamise the flourishing entrepreneurship in the Region, supporting the start up of innovative enterprises;
- Create the suitable conditions to attract new enterprises, services and industrial processes;
- Stimulate business cooperation;
- Support the development of professional skills;
- Stimulate partnerships between the industry and the institutions in possession of funds for business modernization.

<http://www.open.pt/open/en/>

CCDRC

Regional Coordination and Development Commission - Região Centro

(<https://www.ccdrc.pt/>)

NERLEI

NERLEI - Business Association of the Leiria Region was founded on June 25, 1985 and in 1992 acquired the status of Public Utility Institution.

NERLEI's main MISSION is to provide useful services that positively affect the results achieved by its members and, at the same time, is firmly committed to help strengthening their business performance and to promote the economic growth and the social development of Leiria region. Conducting its activity based on the slogan "Aggregate to Develop", NERLEI defines its VISION: "Strongly committed to assist Leiria to become one of the most attractive regions in Portugal. Economically and socially prosperous and highly competitive."

NERLEI is a cross-sectorial association, that is, it brings together companies from all sectors of activity in this region of Portugal, and represents the business sector of the Leiria Region, located in the center of Portugal.

Currently, NERLEI has approximately 1200 members, 38 percent of which in the industrial sector, 32 percent in the services sector, 23 percent in the trade sector and the remaining members are distributed between construction and tourism sectors.

Additionally, among our members, several secondary and higher education institutions stand out, as well as several cluster associations, linked to the moulding making industry, plastics industry, construction industry, and local business associations.

(<https://www.nerlei.pt/en/nerlei>)

LIT (EP)

Hartnett Enterprise Acceleration Centre

The Hartnett Enterprise Acceleration Centre is a business acceleration centre serving Ireland's Mid-West region located on campus within Limerick Institute of Technology (LIT). Our mission is to deliver a unique business environment that stimulates innovation, research commercialisation, internationalisation and entrepreneurship. The Hartnett Centre supports growth companies through programmes of support such as the Enterprise Ireland New Frontiers Programme, the national entrepreneur development programme. Additionally, the centre is host to an Entrepreneur in Residence programme where individuals who have been hugely successful in their sector support their nascent entrepreneurs on their start-up journey. Other supports include a mentoring programme, start-up clinics, workshops, network connections, funding opportunities and investor connections. The centre also co-locates research centres including Shannon ABC and ACORN.

LIT QUESTUM Acceleration Centre

Questum is an LIT innovation centre based in Clonmel Tipperary, with enterprise, education and research at its core. Our enterprise and innovation mission is to turn ideas into innovation and innovation into thriving business, helping to drive economic growth within our region and across Ireland. The centre has a mix of lab, office space, meeting and training rooms. Similar to the Hartnett Centre, Questum has an Entrepreneur in Residence Programme with Tom Brennan co-founder of EirGen Pharma and Trivum Vet amongst other roles. The centre has a high value advisory team who support the start-up companies based in the centre who are all high growth innovative companies. The centre also has an LIT digital lab that is host to funded projects driven by LITs Clonmel campus.

Thurles Chamber Enterprise Centre

TCEC is one of LITs on campus incubators for innovation and growth, driving business start-ups in the Mid-West region of Ireland. TCEC has been running entrepreneur development and start-up support programmes, business development, mentoring and events such as breakfast club and lunch'n'learn since opening in 2012 supporting the creation of around ~250 jobs.

Limerick for Engineering

Limerick for IT

Skillnet

Enterprise Ireland, Limerick

NHL Stenden (EP)

Dutch Techzone

<https://dutchtechzone.nl/>

Digital Innovation Hub – Region of Smart Factories

The DIH/RoSf will be a non-profit service oriented competence center to accelerate the digital transformation (Industry 4.0) of the Industry in The Northern Netherlands.

<https://rosf.nl/dih/>

Innovatie Cluster Drachten

We are a group of high-tech companies in Northern Netherlands that work together on solutions for future challenges at the cutting edge of technology. We call this the Big 5 of high-tech: metal 3D printing, remote sensing and big data, robotics, visual intelligence and renewable propulsion. We use the latest technology and, if needed, we develop it ourselves. Our R&D departments work together in a unique way and, instead of competing with each other, support and reinforce each other. Every year, we create more than 50 innovative products worldwide. These products contribute to society in the areas of safety, simplifying the operation of complex systems, providing access to data that improve food quality, and tailoring them to individual consumer needs. Our collaboration is called Innovatiecluster Drachten and is centrally located in the smart factory region of North-West Europe.

<https://www.icdrachten.nl/en/>

Morssinkhof- Rymoplast

Since the emerging usage of plastics Morssinkhof - Rymoplast is the pioneer in plastic recycling. Morssinkhof - Rymoplast is one of Europe's largest producers of high grade recycled raw materials. The company serves the European market, ranging from small companies in the plastics processing industry to the world's largest multinational corporations. Morssinkhof - Rymoplast has 10 processing facilities in Europe, each with their own specialism. The company uses innovative technologies to process sorted post-consumer and pure post-industrial plastics.

<https://www.morssinkhofplastics.nl/en/>

SZE (EP)

AUDI Hungaria Llc.

[AUDI HUNGARIA Zrt.](https://www.audi-hungaria.com/)

Is an automotive factory. Profile and main activities: engine production, car production, technical development, tool factory, logistics, quality assurance, management, environmental protection, primary, secondary and higher education.

DANA Hungary Ltd.

<https://www.dana.com/>

Global leader in drivetrain and e-propulsion system.

ZalaZone

<https://zalazone.hu/introduction/>

The Zalaegerszeg test track is unique, the traditional test track features focusing on driving and driving stability are implemented together with the research and development infrastructure

elements connection with future vehicles on multi-level system for validation. The proving ground provides not only dynamics tests for conventional vehicle, but it also allows validation tests for autonomous vehicles and electric vehicles.

Hiventures Ltd.

<https://www.hiventures.hu/en>

Our venture capital investment programmes provide new funding opportunities for early-stage, innovative and traditional SMEs and large enterprises.

ALPROSYS Ltd.

<https://www.alprosys.hu/>

Alprosys Ltd. has many years of experience in the field of machine manufacturing.

Jankovits Engineering Ltd.

<https://www.jankovits.hu/>

Mechanical engineering, design, hydraulic systems, power supplies, cylinders, R&D.

Wiedenmann Gépgyártó Ltd.

<http://www.wiedenmann.hu/>

Agricultural machinery manufacturing.

NKFIH

<https://nkfi.gov.hu/english-nkfi>

Győr-Moson-Sopron Megyei Kereskedelmi és Iparkamara

<https://gymsmkik.hu/kezdolap>

Győr-Mosons-Sopron Megyei Mérnöki kamara

<http://www.mernokkamara-gyor.hu/>

4.3. Facilities available in partner HEIs which may be used in Future Industries projects in collaborative innovation with external partners

AIT (F)

CISD

CISD Design: From generation of photo realistic renderings through to final product manufacture ready 3D CAD data and prototyping using a suite of polymer based 3d printers, CISD can support development of your product.

There are a number of step by step design stages that we go through with our clients to ensure as much as possible that a successful, technical and commercially feasible product is manufactured.

<http://www.cisd.ie/>

FHV (F)

Digital Factory facilities

- Industrial grade, digital model factory for fabrication of customised fidget spinners. The factory comprises a CNC-milling station, an assembly station with collaborative robots, an intelligent storage system, a transport system to link all stations, and a digitally networked factory control system. The factory is linked to a Cloud-Manufacturing system, which was developed at FHV.
- Data Analytics center (GPU-Server)
- Cyber Range (available 2022)

UCT facilities

- Virtual reality (VR) and augmented reality (AR) technologies for research, development and innovation
- user experience analysis systems with integrated psycho-physiological measuring instruments and other recording devices
- intelligent rooms with sensors and actuators as well as automation systems
- manufacturing equipment for the digital production of prototypes from combinations of different materials

Photonics & microtechnology

ISO class 5 clean room with approx. 240 m²; 150 m² of laboratory floor space with flow boxes; dedicated equipment in multiple areas:

- Lithography
- Laser Ablation
- Sputter units
- Etching
- Thermal Oxidation
- Analytics
- Sample preparation

Energy Center facilities

- about 140 m² in fully equipped laboratory space
- different test rigs on heat pump boilers, thermal water treatment systems and other
- different material analysis tools with special focus on micro-tomography

HAMK (F)

Robotics for Sustainable Manufacturing

- Robotics laboratory including multiple collaborative robots, mobile platform, various equipment's and accessories

Modern 3D technologies and materials

- Materials laboratory: <https://www.hamk.fi/research/hamk-tech/sheet-metal-forming-and-joining/?lang=en>
- 3D Scanning devices

Decentralized energy systems and energy storage

- <https://www.hamk.fi/research/hamk-tech/energy-efficiency/?lang=en>
- Hybrid energy production module (combustion process, solar and storage, emission measurements, full capability for system optimization) + digital twin: <https://iot.research.hamk.fi/venect/>
- Experimental building, upcoming 2021 (multivariable HVAC systems, integrated measurements, full capability for system optimization)
- Seasonal thermal energy storage, upcoming/ plan 2022/2023: (lab level storage for material optimization, full sized storage /field lab)

Reusable and Circular Constructions

- Structural testing laboratory: <https://www.hamk.fi/research/hamk-tech/test-loading-and-analysis/?lang=en>

Circular economy in materials and products

- Long term durability laboratory: <https://www.hamk.fi/research/hamk-tech/weathering-testing-and-material-durability/?lang=en>
- Materials laboratory: <https://www.hamk.fi/research/hamk-tech/sheet-metal-forming-and-joining/?lang=en>

IPCA (F)

Audiovisuals Laboratory

Product Design Laboratory

Applied Artificial Intelligence Laboratories

These facilities include laboratories on:

- Robotics
- Image and surface acquisition systems
- Production support equipments (laser cutting, 3D printing, CNC milling, CNC turning)

- Virtual and augmented reality
- Motion tracking and haptic feedback
- Embedded systems and sensors

Polytechnic of Leiria (F)

BUILT COLAB – Laboratório Colaborativo para o Ambiente Construído do Futuro

The Collaborative Laboratory for the Built Environment of the Future.

We promote the digital and environmental transition of buildings and infrastructures, making them adaptable, intelligent, resilient and sustainable.

(<https://builtcolab.pt/en/>)

SmartFarm - Laboratório Colaborativo para a Inovação Digital na Agricultura

The SMART FARM CoLAB create solutions to the challenges of climate change, digitisation of the Agriculture and the development of circular economy adapted to medium-and small-scale farms.

(<https://www.sfcolab.org/>)

LIT (F)

Shannon ABC – Instrumental Laboratories

CELLS – Phytotron Plant Growth Laboratory and Tissue Culture Lab

IT Labs

- Unity, Blender, Adobe Creative Cloud, Xcode, Visual studio, Audacity

Sports Lab

ACORN center facilities

- 'SolidWorks CAD' with 'Flow Simulation' add in (Mathematical Modelling Software), ANSYS (Mathematical Modelling Software), MATLAB (Mathematical Modelling Software) Anaconda, Keras, Tensorflow, Matplotlib, DAQ devices, RTX 2070 GPU, Python

NHL Stenden (F)

GreenPAC (polymere application center)

Green PAC is an open innovation center for (green) plastics, fibers and composites. We initiate and facilitate 'businessdriven' knowledge development.

Within Green PAC, applied research is conducted, knowledge is developed and (accelerated) innovations are realized through a unique cooperation between universities of applied sciences, universities and companies in the plastics industry.

By making use of the various facilities offered by Green PAC, the business community is enabled to develop and implement innovative projects under favorable conditions. In addition, Green PAC focuses on education in the northeastern Netherlands in order to strengthen the innovative power around plastics technology.

<https://www.greenpac.eu/>

Circular Design Lab

A new lab has arisen in the Blokhuispoort, namely the Circular Design Lab. It is an impressive lab boasting various workplaces, machines, 3D printers and trays filled with plastic. A machine for processing plastic chips with which new filament can be made for 3D printers catches the eye. The lab is a place for students to carry out projects in the context of internships or graduation. The students' activities centre on plastics and product development based on the principles of circular design.

Circular design is about designing products in the most sustainable way possible, saving and reusing as much raw material as possible. Prototypes and products can be produced in the lab with the available facilities.

The lab was officially opened on 26 September 2019, but they were already working on a pilot in 2018. The Circular Design Lab collaborates with the d'lab of the Friesland College (fablab for developing prototypes) and NHL Stenden's Business Model Studio. Students who study the minors at the Frisian Design Factory can also go to the Circular Design Lab if they are required to work with plastics. All these labs are located closely together in the Blokhuispoort, which facilitates contact and collaboration.

We have also applied the circular design concept to the furnishing of the lab. For a new partition, for example, we used the windows, window frames and doors from different old buildings.

The Circular Design Lab is not only a place for students, but also a research location. Here, the Circular Plastics professorship conducts research into product development, mechanical recycling and chemical recycling. The professorship is a collaboration between Van Hall Larenstein and NHL Stenden and consists of three professors, 2 researchers and 10 lecturer-researchers. In terms of product development, they are working with at least 30 companies to study how the use of plastics in new products can be minimised and how the plastic cycle can be closed.

<https://exploretheunknown.nhlstenden.com/en/explore-stories/circulair-design-lab>

Serious Gaming Lab

The Lectorate Serious Gaming distinguishes two research approaches for carrying out design-oriented and socially impactful research: research with serious gaming and research about serious gaming. In both cases the main focus is on addressing and promoting the issue at hand. In addition, the acquisition, recording and publication of generated knowledge is definitely one of the core tasks of the lectorate.

<https://www.nhlstenden.com/onderzoek/serious-gaming>

SIZE (F)

MST Labs

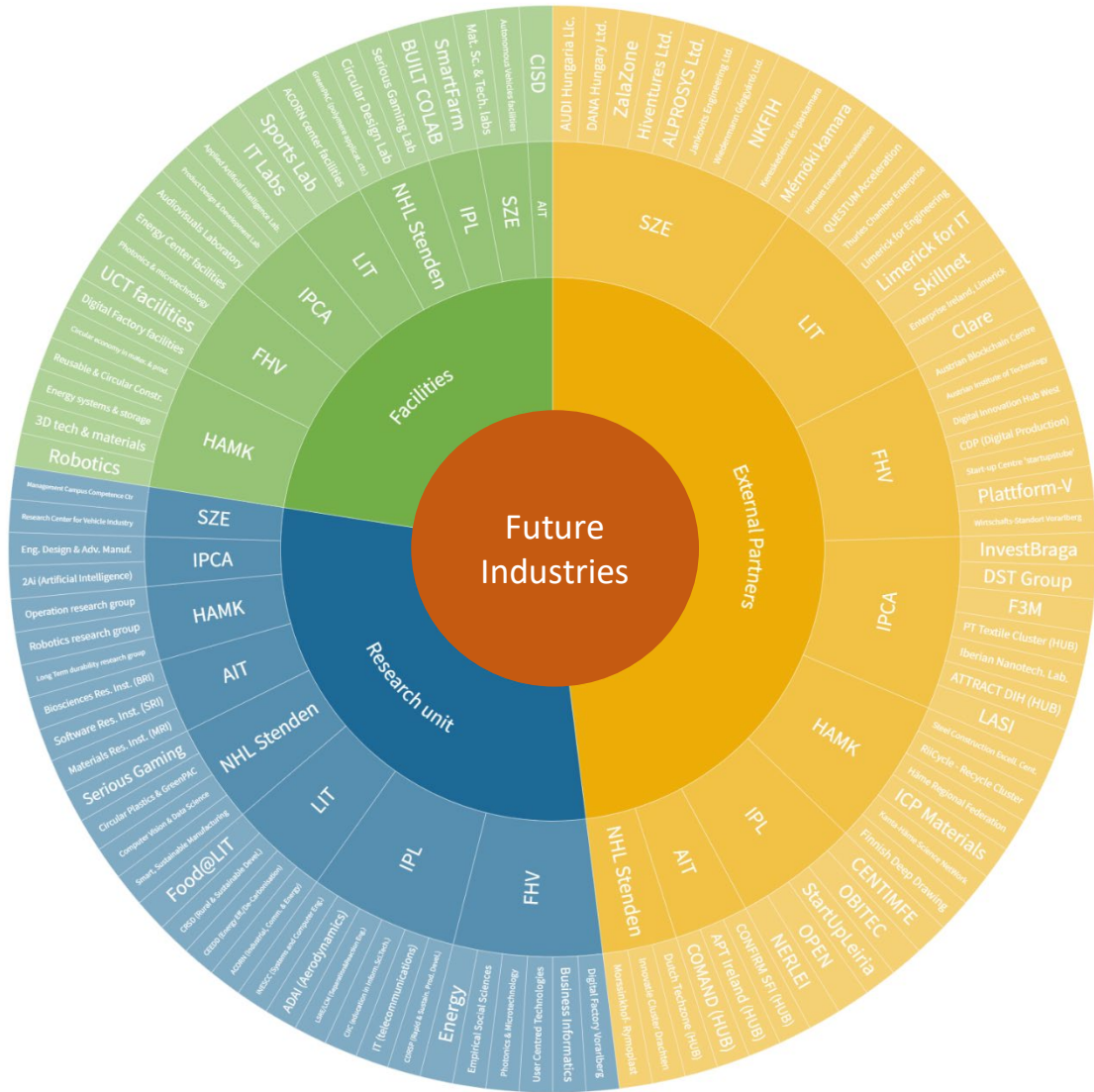
EOSINT M270 direct metal laser sintering equipment,
YXLON MODULAR CT equipment (450 kV, 225kV, digital line scan and flat panel detector)
GOM Atos Core

Accredited material testing laboratory (MSZ EN ISO / IEC 17025: 2018)
INSTRON 5582 (Universal tensile tester)
KB 750 and KB 30 (Hardness (HB, HV, HRC), micro Vickers)
Microscopes (ZEISS Axio Imager A1, ZEISS ZEISS STEREO DISCOVERY V20, NICON
ECLIPSE, ALICONA Infinite Focus)
SEM, EDS (HITACHI 3400),
Preparation equipments for metallography
Charpy Impact tester (both for metals and polymers)
Corrosion and environmental testing (salt spray/ASCOTT CC 1000ip, thermal
shock/ANGELANTONI CST 130/2T LC and resistance to humidity/ANGELANTONI DY110
SP climate chamber)
Spectrometer /chemical composition of metals (WAS Foundry Master)
Injection moulding machine
Twin-screw extruder
MFI tester

Autonomous Vehicles facilities

Dynamics and Control of Autonomous Vehicles meeting the Synergy Demands of
Automated Transport Systems (EFOP-3.6.2-16-2017-00016)

4.4 Visual representation of the current Future Industries Hub players in RUN-EU



5. European Innovation Hub in Bioeconomy

5.1 Research Centres, research groups and faculties working on Bioeconomy

AIT

The Bioscience Research Institute (BRI) at Athlone Institute of Technology is recognised as a Technology Core Facility (Interreg Atlantic Area Sharebiotech 9 <https://keep.eu/projects/440/Sharing-life-science-infrastr-EN/>) for the Irish midlands that encompasses life sciences and Bioeconomy linked to academic providers. The main objective of Sharebiotech was to strengthen the biotechnology sector, through the maximisation of the benefits of life science infrastructures and skills for the development of the Atlantic Area, which has notable areas of excellence (notably in marine science, rich and increasing number of SMEs, policy initiatives), but also weaknesses. This included definition of resources and skillset with nexus between academia and industry. Over the decades, BRI has a grow reputation of supporting enterprise, research, along with community engagement and social enterprises in the Bioeconomy domain. This links to strong background in resource utilisation, novel processing, life cycle assessment, ecotoxicology and so forth that addresses the technological, social and political readiness levels of products and services. This is exemplified by funding on the Just Transition for establishment of first 'Empower Eco Hub' in the peatlands with view to accelerating green innovation that will aid community transitioning to low carbon economy. Regional funded projects are also supplemented with international benchmarking consortium projects including RUN-EU and adjacent Interreg Neptunus, H2020 MSCA RISE IVCHTHYS and H2020 BioICEP projects. BRI is also an active partner and member of the Irish Bioeconomy Foundation (<https://bioeconomyfoundation.com/>) along with partnering with key stakeholders including EPA, Bord Iascaigh Mhara, Teagasc, Enterprise Ireland, IDA and so forth.

BRI has a long standing tradition of delivering research, enterprise for 'circularity'. This has recently culminated in the Establishment of the aforementioned triple-helix multi-actor Hub for Eco-Sustainability (termed 'Empower Eco') ; ths assembles main stakeholders and beneficiaries regionally for developing green innovation (aligned with EU Green Deal and UN Sustainable Development Goals). Carbon sink and energy measurements dually occur at demo/test beds in intended environment. BRI has built scale and capacity in this and offers case study Hub for RUN-EU from an Irish example perspective.

Bioeconomy and related topics under BRI include Eco-sustainability; novel processing and sterilisation; hydroponcs; bio-based solutions; mycology and enzyme catalysis, testing innovation for functionality and impact. Nutraceuticals; Risk Mitigation and Modelling; One Health approach; AMR; Toxicology; resource utilisation Lipid metabolism, Antimicrobials, Microbial biofilms of human and verterinary importance

www.bri.ait.ie

<https://keep.eu/projects/440/Sharing-life-science-infrastr-EN/>

Main researcher(s)' contact(s)

Professor Neil Rowan

nrowan@ait.ie

The Bio Innovation of a Circular Economy for Plastics (BioICEP) consortium led by AIT is a pan European-Chinese collaboration formed to reduce the burden of plastic waste in the environment. The countries have been selected to represent different mixed plastic pollution environments, with specific partners chosen which have the expertise and facilities to carry out the necessary technical innovations. A number of innovative booster technologies are at the core of this solution accentuating, expediting, and augmenting mixed plastics degradation to levels far in excess of those current achievable. Output constituents will be used as a carbon rich feedstock for new biosynthesised bioplastics and bioproducts.

bioicep.eu

Main researcher(s)' contact(s)

Dr Margaret Brennan Fournet, Lead PI of BioICEP

mfournet@ait.ie

FHV

No entity for bioeconomy hub now. Research on bioeconomy in the starting phase.

HAMK

HAMK Bio Research Unit from primary production to biomass refining complemented with knowledge from digitalization and data utilization (HAMK Smart), material science and applications (HAMK Tech) and capacity building (HAMK Edu)

<https://www.hamk.fi/research/hamk-bio/?lang=en>

Main researcher(s)' contact(s)

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Research groups:

Value from Biomass and Circular Economy

Focuses on cultivating biomasses with modern technologies or on utilizing green biomasses and process side streams to new value added products Biomass utilization focuses on industrial use and green products in e.g cosmetics, health products, food, colourants, coatings, construction, biofuels, organic fertilizers etc. Digitalization and data-analytics are used to optimize the production and value chain.

Main researcher(s)' contact(s)

Marika Tossavainen (Marika.tossavainen@hamk.fi)

Carbon Sequestration, soil and biodiversity research area focuses on understanding of soil carbon transformation and sequestration in the forest, fields and cities. Research focuses on sustainable primary production, and biodiversity protection. Research aims to develop mechanism to minimize soil degradation and to promote carbon storage and crop security in the fields. Soil quality and soil hydraulic properties are concerned within this team. Systemic thinking in built environment, sustainable and restorative forestry (incl. controlled burning) and regenerative agriculture are under research. Digital technologies, like imaging, drones, data-analytics etc. are used to see beyond

Main researcher(s)' contact(s)

Jari Hyväluoma (jari.hyvaluoma@hamk.fi)

Digital solutions in the bio- and circular economy -research area applies data analytics, machine learning and the methods and tools of IoT to the digitalisation of different processes in the bioeconomy

Main researcher(s)' contact(s)

livari Kunttu (livari.kunttu@hamk.fi)

Robotics in agriculture research area focuses on robotization of farming tasks where human labour is repetitive and physically demanding, namely harvesting and packaging of berries, fruits and vegetables.

Main researcher(s)' contact(s)

Francois Christophe (francois.christophe@hamk.fi)

IPCA

Research group on "Circular design"

This group focuses on several aspects related to Circular Economy, starting from Circular design in the perspective of creating new sustainable products and redesigning existing products towards improved sustainability (including finding potential new products to close the cycle of existing products), going through technical aspects such as life cycle assessment (LCA) and circularity indicators for industry (including takeback and end-of-life scenarios), and also tackling management and business perspectives of circular economy (such as the financial tradeoffs from different solutions, or existing and upcoming regulatory impositions). Our approach includes co-design, encouraging an active approach by involving people and stakeholders in the generation of information and development, and a holistic view on circular design, along the hierarchy of product/service/system that brings together design + engineering + management.

Main researcher(s)' contact(s)

Ricardo Simões (rsimoes@ipca.pt)

2Ai - Applied Artificial Intelligence Laboratory

Forest Fire Behavior Estimation, supervision and detection of anomalous conditions, providing situational awareness for a broad range of monitoring services. 2Ai-IPCA is also working on theoretical optimization studies to improve the performance, efficiency and energy sustainability of electrochemical energy storage devices applied to portable devices and electric vehicles.

Main researcher(s)' contact(s)

João Vilaça (jvilaca@ipca.pt)

Polytechnic of Leiria

MARE

Focuses its research in the areas of Marine Biotechnology, Marine Biology, Aquaculture and Seafood

The MARE-Polytechnic of Leiria focuses its research and technological development activity on marine sciences, more specifically on emerging sectors of the sea economy, such as Marine Biotechnology, Marine Biology and Aquaculture, and Marine Food Resources. This polo has its headquartered at CETEMARES Building, strategically located in the port of Peniche. This infrastructure is distinct by its fish research facility and laboratories, provided with the most modern equipment in the area of marine biology, aquaculture, biotechnology, chemistry, microbiology and food technology, as well as several spaces dedicated to training and knowledge transfer, making this the only infrastructure in the West Region dedicated exclusively to the Science and Technology of the Sea. Since 2015, from the MARE-Polytechnic of Leiria researcher's activity, resulted a considerable number of projects, many of which have practical application in the industry, in the emerging areas of biotechnology applied to marine resources, the valorization of marine food resources, the monitoring of coastal habitats, evaluation of fishing effort, quality control of fish, aquaculture of new species and new practices, and pathology and immunology advances.

Main researcher(s)' contact(s)

Maria Gil (maria.m.gil@ipleiria.pt)

CARME

Centre of Applied Research in Management and Economics

Study of behavioral and social change at individual and collective levels (from public and private organizations) which are crucial to the transition from a linear to a circular economy and necessary to the decarbonization of the economy. Namely, CARME researchers are interested on businesses behavior changes towards sustainable business models as well the policy instruments to provide the correct incentives. Using multiple research methods (e.g., experimental, and quasi-experimental studies; surveys; action research; case studies) and multidisciplinary teams (from other research centers and with different scientific expertise), analyze social practices and behavioral change processes, namely to identify the main drivers and obstacles to the implementation of more circular and sustainable models. Sharing good practices already in place and developing tools and resources with policy and managerial implications for a more sustainable society is part of CARME researchers' activity. Using and developing participatory methodologies (e.g., bottom-up initiatives), allowing an effective

involvement of the key stakeholders and society in general, and promoting awareness and education that drives the behavioral changes necessary to address Climate Change challenges, is also part of CARME's research areas of expertise.

Main researcher(s)' contact(s)

Maria Eduarda Fernandes (eduarda.fernandes@ipleiria.pt)

LIT

Shannon ABC:

Shannon ABC is a state of the art, research centre and identifies innovative ingredients processing technologies and biological products. Shannon ABC identifies innovative ingredients and biological products from natural resources using novel state of the art processes to obtain lead molecules for applications across a range of sectors including but not limited to food & drink, healthcare, cosmetics, agriculture, marine, nutraceutical, bio/pharma.

Main researcher(s)' contact(s)

Patrick Murray patrick.murray@lit.ie

Dr Siobhan Moane siobhan.moane@lit.ie

CELLS Group

Controlled Environment Laboratory for Life Sciences. Centre of Excellence for the enhancement of bioactive compound production in plants. Technology-enhanced plant growth and development with bespoke applications and solutions for sustainable agriculture. Research activity within the group leverages expertise in controlled environment agriculture (employing hydroculture and soil-based cultivation techniques) for investigation into areas such as crop sustainability and food security, biofortification, impact of naturally-derived biostimulants for food production, and enhancement of nutritional capacity and health-promoting bioactive profiles.

Main researcher(s)' contact(s)

Peter Downey peter.downey@lit.ie

Dr Siobhan Moane siobhan.moane@lit.ie

CHIMERA

Chemical and molecular microbial biotechnology research group. Microbial biotechnology to screen microbes (bacteria, fungi, yeast, microalgae, cyanobacteria etc.) from varied habitats for bioactive compounds with industrially relevant commercial opportunity. The search for novel biologically active compounds which can act as lead compounds for the development is an ongoing process for multinational biotechnological industries.

Main researcher(s)' contact(s)

Catherine Collins catherine.collins@lit.ie

Patrick Murray patrick.murray@lit.ie

FOODS@LIT is a center of excellence in food research, capable of food development and innovation that provides direct positive benefits for both the regional and national economy. Food@LIT is a solution-driven research centre. Consumer Research and Sensory Analysis are key services provided by Food@LIT. Understanding the voice of the consumer and being ahead of the competition are the keys behind each successful product.

Main researcher(s)' contact(s)

Agnes Bouchier-Hayes agnesbouchierhayes@lit.ie

Rural and Sustainable Development (CRSD)- The aim of the Centre for Rural and Sustainable Development (CRSD) is to re-enforce LIT's position as a leading actor in the sustainable development sector, thereby creating opportunities for engagement in research, development and academic activities. Sustainable development refers to the concept of activities that seek to balance social and economic improvement with the need to ensure that the use of scarce non-renewable natural resources is minimised, that the carrying capacity of the environment is not exceeded and that individuals and communities are facilitated in participating to the fullest extent possible in the making of the decisions that affect their lives. Sustainable development also seeks to attain justice between nations, between regions, between communities and between generations.

<https://lit.ie/rdi/development/rural-development>

Main researcher(s)' contact(s)

Dr Seamus Hoyne Seamus.hoyne@lit.ie

NHL Stenden

Center of Expertise Water technology

Leading knowledge and innovation centre for applied research and product development in the field of water technology.

Main researcher(s)' contact(s)

Luewton Agostinho luewton.agostinho@nhlstenden.com

Leeuwarden can proudly call itself the European Capital of Water Technology. Besides plenty of water, our province also boasts plenty of water knowledge provided by the Water Campus Leeuwarden. The Water Technology professorship is the bridge between knowledge and actual practice. Under the expert guidance of professor Luewton L. F. Agostinho, researchers delve into issues related to physics driven water processes and water technologies.

Sustainable plastics (GreenPAC)

In 2011, we implemented the Sustainable Plastics professorship, which centres on developing and researching biodegradable and bio-based plastics. Our research group (and students!) were for instance also involved in this bio-based bridge:

<https://northsearegion.eu/biocas/news/biobased-bicycle-bridge/>

<https://www.greenpac.eu/>

Main researcher(s)' contact(s)

Jan Jager and Rudy Folkersma

jan.jager@nhlstenden.com

rudy.folkersma@nhlstenden.com

Plastic is a hot item nowadays. The term plastic increasingly has negative connotations, whereas plastic is a fantastic material to work with, argue professors Jan Jager and Rudy Folkersma. In fact, a life without plastic is unimaginable in this day and age. The two professors are jointly committed to a circular economy with sustainable plastics.

Professorship Green Logistics

The need to become more sustainable is becoming increasingly urgent and touches more and more elements in the business domain. The world and economy are changing rapidly and for companies it is essential to move with these changes to remain competitive. The Green Logistics chair combines ideals with pragmatism by investigating how the sustainability of processes, products, services and chains can contribute positively to the competitive position of companies and regions. Logistics includes transport, but is also defined more broadly as the organization of the entire chain.

<https://www.nhlstenden.com/onderzoek/green-logistics>

Main researcher(s)' contact(s)

Dr. Matthias Olthaar

Matthias.olthaar@nhlstenden.com

Errors in the production process causing the destruction of brand-new goods; excess stock that spoils; short life cycle products that cannot be repaired. These are all examples of waste that the Green Logistics professorship aims to combat. Working together with companies, Professor Matthias Olthaar aims to seek other forms of efficiency, bearing cost savings as well as waste prevention with respect to materials and energy in mind. The modern form of less is more.

SZE

Department of Animal Science, Department of Food Science, Department of Plant Science- Food process engineering and environmental techniques, animal and plant biotechnology, improvement of nutrition supply for productive livestock, environmental protection, maintaining of ecological systems during agricultural production and precision agriculture. A very important goal of our Faculty is to ensure the proper function of agricultural production, based on efficient and integrated education-research-development system.

<https://mek.sze.hu>

Károly Kacz (kacz.karoly@sze.hu)

NóraGombkötő

gombkoto.nora@sze.hu

Department of Mechatronics and Machine Design, Fire protection and Safety Technology Group- Climate change, numerical methods and simulations, water management, CBRN engineering.

W: <https://uni.sze.hu/>

5.2. External partners with whom HEI's interact in Bioeconomy issues

AIT

Associated Industry / Enterprise Body / Incubation Partners

Enterprise Ireland; Irish Bioeconomy Foundation; Empower Eco CLG Sustainability HUB; Bord lascaigh Mhara; Midlands Just Transition; Seafood and Bioeconomy SME partners (Wild Atlantic Shellfish; Shabra Recycling), Teagasc, IDA, Midland Research and Innovation Centre at AIT.

FHV

No entity for bioeconomy hub now. Research on bioeconomy in the starting phase.

HAMK

Associated Industry / Enterprise Body / Incubation Partners

RiiCycle - Recycle Cluster in Riihimäki Area

Häme Regional Federation of Finnish Enterprises

Industrial Biotechnology Cluster, IBC (National, incl. Companies (St1 Biofuels, Kemira, Roal, Kiilto, Orion), Universities (AaltoUni, UEF, ÅboAcademy) and Research Centers (VTT, Luke)

Kanta-Häme Science NetWork (incl. all important universities and reseach centers nearby)

Regional companies from primary production to refining industry and waste management

Other Hub Entities

Hämeenlinna City - Sustainable Bioeconomy Ecosystem (incl. Public Officers, companies, citizens)

SmartGreen Forssa Region (incl. Public Officers, companies, citizens)

Regional Council of Häme - Green Growth Program

ProAgría - Rural Information Center (Häme Region)

MTK - The Central Union of Agricultural producers, Forest Owners and Rural Entrepreneurs in Finland (Häme region)

Polytechnic of Leiria

Associated Industry / Enterprise Body / Incubation Partners

SMART OCEAN – Parque de Ciência e Tecnologia do Mar (<https://smartoceanpeniche.com/en/>)

SONAE

Fórum Oceano - Associação da Economia do Mar, inovcluster – Associação do Cluster Agroindustrial do Centro, bluebioalliance

Other Hub Entities

Colab +Atlantic (<https://colabatlantic.com/>)

S2 aqua - laboratório colaborativo, associação para uma aquacultura sustentável e inteligente - Association for a sustainable and intelligent aquaculture

Centro Ciência Viva do Alviela – Carsoscópio (<https://alviela.cienciaviva.pt/>)

LIT

Associated Industry / Enterprise Body / Incubation Partners

Irish Bioeconomy Foundation, Hartnett Enterprise Acceleration Centre, Questum Acceleration Centre, Thurles Chamber Enterprise Centre.

Other Hub Entities

Enterprise Ireland, Limerick/ Clare/ Tipperary County Council. Limerick/Clare/Tipperary Local Enterprise Offices (LEO), IDA, Chambers of Commerce

NHL Stenden

Associated Industry / Enterprise Body / Incubation Partners

Chemport

Chemport is an ecosystem in the Northern Netherlands, dedicated to advance the transformation and green growth of the chemical industry. Business, knowledge institutes and government join forces to make this happen. Here, companies with sustainable and ambitious visions for the chemical sector are supported to thrive.

<https://www.chemport.eu/>

Wetsus

The European Centre of Excellence for Sustainable Water Technology.

<https://www.wetsus.nl/>

Other Hub Entities

Universiteit van het Noorden (University of the North)

<https://www.universiteitvanhetnoorden.nl/>

BERNN: Bio Economy Region Northern Netherlands: an ERDF funded network (<https://www.bernn.nl/>) of all Higher Education Institutes in the Northern Netherlands.

SZE

Associated Industry / Enterprise Body / Incubation Partners

Tóth Tamás,

Pannonhalmi Apátság cégek

Kislaföld Mezőgazdasági Zrt.

Bábolna Tetra Kft.

Galen Bio Diagnosztikai és Biotechnológiai Kft. galenbiolabor.hu

Lajtamag Ltd. <https://www.lajtamag.hu/en>

Agrofeed Kft. <https://www.agrofeed.hu/en>

H-Ion Ltd. <https://hion.hu/en/home>

Reanal Laborvegyszer Kft. <http://www.reanallabor.hu/>

Adexgo Kft. <https://adexgo.hu/en/>

Other Hub Entities

NKFIH, Győr-Mosons-Sopron Megyei Agrárkamara

5.3. Facilities available in partner HEIs which may be used in Bioeconomy projects in collaborative innovation with external partners

AIT

Applied Polymer Technology Gateway
Command ICT/Digitization Technology Gateway

This includes polymer processing, bioreactors, advanced imaging (SEM, flow cytometry, confocal, Raman spectroscopy) , bioactive extraction, bio-based materials; novel processing and characterisation; digital twin, ICT, IoT, AI. Polymer and plastic reprocess equipment include:

Polymer Processing

- High Temp. Extruder – PEEK, etc.
- Twin screw compounding using, Leistritz 27mm & Prism 16mm bespoke pharma extruder
- Betol Single Screw Extruder
- Boston Matthews Single Screw Extruder 40mm
- Labtech 250ml Blow Moulding
- 3D Filament extruder (12 spools per hour)
- Lab scale blown film
- Melt Spinning Fibre line (Pilot scale)
- Film sizes up to 200mm, palletisation, strand extrusion, tape extrusion.
- Film, profile, Crosshead & tube extrusion

Injection moulding

- 130 Ton Fanuc
- Whitmann Battenfeld Micromoulder
- 130 Ton Sumitomo Demag
- 60 Ton Arburg (x2)
- 35 Ton Arburg
- 6 Ton Babyplast

Other Processing

- Blow moulding equipment
- Compression moulding: Bucher Guyer 55-167
- Cannon Shelley vacuum forming machine
- Component granulators
- Three roll Calender
- Fluidised Bed
- FDM Additive Manufacturing
- In situ polymerisation
- UV polymerisation
- UV grafting of coatings onto substrates

Rapid Prototyping Equipment
Rapid Prototyping capability

- ARBURG Freeformer
- Large FDM printer
- 3D Scanning system
- CREO 6 - 3D Cad package with advanced simulation including surface modelling and Structural Analyses. This also applies to complex surfaces usually involved with plastic/moulded/composite parts.
- FEA capabilities with ANSYS
- We can carry out complex structural analyses with composites.
- Additive Manufacturing/3D Printing
- Stereolithography (SLA) using a 3D Systems Viper
- Formlabs 2 (x2)
- Prusa MK2
- Sinterit Lisa
- Vacuum Casting facilities using MTT equipment
- Adobe creative suite

Equipment & Facilities – Analytical Equipment

High Pressure Liquid Chromatography (HPLC)

- Routine analysis (quantification and/or comparative identification) of components in mixture
- Cleaning Validation Studies and Trace Analysis
- Purity analysis

Gas Chromatography Mass Spectroscopy (GC-MS)

- Routine analysis of components in mixture
- Cleaning Validation Studies and Trace Analysis
- Purity analysis
- Identification of unknown compounds (e.g. – contaminant materials)
- Volatile materials identification in solid and liquid samples by Headspace GC-MS.

Fourier Transform InfraRed (FTIR) spectroscopy

- Identification of materials.
- Detection of intermolecular bonding
- TGA – IR capability

Gel Permeation Chromatography (GPC)

- High Temp. Gel Permeation Chromatography
- Molecular weight determination of polymers
- Molecular Weight Distribution of Polymers
- Comparative Analysis of loss of molecular weight of polymers through degradation

Moisture Analysis

- Mettler Toledo Halogen Moisture analysis
- % Moisture content of liquid and solid samples by Karl Fischer Coulometer

Differential Scanning Calorimetry (DSC)

- Identification of glass transition temperature, crystalline melting temperature and crystallisation temperature of polymers
- Thermal Stability of materials (e.g. – oxidative induction time (OIT) of materials)
- DSC Identification of materials by their Crystalline Melting Temperature (according to IS EN ISO 3146:2000).

Thermogravimetric Analysis (TGA)

- % Inorganic Content (including % Carbon Black and % CaCO₃) by TGA (based on ISO 11358).

- Material Thermal Stability.
- Moisture and Volatiles Content.
- Composition of Multi-Component Systems.
- Shelf-Life Studies and Decomposition Kinetics.

Dynamic Mechanical Thermal Analysis (DMTA)

- Mechanical-Thermal Properties of materials

Scanning Electron Microscope System with EDX Detector

- SEM can be utilised to take highly detailed images of areas of interest on a sample (e.g. – fracture surfaces, contamination, etc).

- The EDX detector can be utilised to determine the elemental profile of the area under investigation (e.g. – elements present in material to defined steel type)

Mechanical properties – Tensile, Compression, Flexural and Friction analysis

- ISO testing on standard specimens or custom made samples
- Tensile testing to measure material strength and elongation (flexibility).
- Compression testing
- 3-point bend flexural testing to measure flexural strength and modulus (stiffness).
- Weld strength, tear strength and bond strength.
- Friction testing of materials

Impact Resistance

- Pendulum Impact testing to Charpy and Izod notched and un-notched tests
- Falling dart impact testing using instrumented impact tester
- Film impact testing using the ‘staircase method.’
- Testing on ISO standard specimens or custom made samples
- Customised impact tests to simulate end product exposure

Product Shelf Life Testing and Lifespan Estimation

- Oven ageing to determine lifespan of product.
- Oven ageing to verify Product Shelf Life stability of Medical Products.
- Humidity chamber also available for more specific environments.
- UV aging
- Melt Flow Rate Analysis (MFR)
- MFR is the primary polymer property used to determine batch consistency and specification conformity. Directly correlates to the average molecular weight of the polymer.
- Verification of incoming raw material MFR.

Imaging Microscope Systems

- Bright light and fluorescence microscope Imaging Systems
- Confocal microscope
- Application of digital sizing software to determine the dimensions of samples

Rheometry

TA parallel plate rheometer

- Determination of the storage (elastic) modulus, loss modulus, viscosity and shear strength of swollen or molten polymers

X-Ray Diffraction (currently outsourced)

- Non-destructive technique that reveals detailed information about the chemical composition and crystallographic structure of natural and manufactured mater

Other tests

- Shore A and Shore D hardness
- Vicat Softening Point and Heat Deflection Temperature (HDT)

- Optical testing; Colour, light transmission and haze
- Abrasion testing
- Measurement of Chemical Resistance and absorption tests.

FHV

No entity for bioeconomy hub now. Research on bioeconomy in the starting phase.

HAMK

HAMK offers infrastructure for the entire value chain from primary / biomass production to the processing of new products (food, value added products, biofuels etc.). Evo educational and research forests, Mustiala Organic farm with fields and 70 cows, Lepaa garden with greenhouses, vertical farming container, open fields, golf yard and facilities for built environment are authentic research environments for a wide range of activities.

Food and biotechnology laboratory facilities allow for various production and research experiments (bioreactors for biogas, algae, fungi etc., pelleting and pyrolysis equipment for biochar, small brewery etc.) and analyses (HPLC, GC, Extraction, CHNS/O, Kjeldahl-N, etc.). Cultivation experiments (e.g. growing media, fertilizers, carbon farming) are possible in different environments. Besides own agriculture and horticulture campuses, the urban environment is offered from the cities in our region or on the university campus in Hämeenlinna. Infra also enables research in material testing (long term durability, weather testing etc.).

Digitalization is integrated into different systems and equipment to collect data and thus enable data-driven optimization of bioprocesses and systemic phenomena. Modern technologies in the field of bioeconomy are supported also by e.g. robotics - robotics laboratory including multiple collaborative robots, mobile platform, various equipment and accessories

Polytechnic of Leiria

Biotarium of Aquatic Organisms

LIT

Shannon ABC laboratories are customised and future-proofed for wide ranging biotechnological and analytical capabilities including dedicated research bench space, analytical suites, raw material processing, HEPA filtered microbial suite and tissue culture suite, fermentation suite. Equipment: FTIR Equipment, Fluorescence Microscope, Fermentation Suite, TLC & HPTLC Equipment, Bomb Calorimeter, GC-IR Interface for FTIR Spectrometer, HPLC, GC-MS, Bioreactor Suite/SUB/Fermentation Suite, Calorimeter, FTIR & GC-IR, Fluorescence Microscope, HP TLC, ICP MS, Preparative Chromatography, LC/MS/MS, Microalgal Food Grade Suite, Skin Probes & Skin/Cosmetic Suite, Cell Culture Suite, Flow Cytometer, Spray Dryer, Freeze Dryer.

NHL Stenden

Research hall - 900 m2 of surface area, here companies or universities/researchers can hire a space in order to perform experiments with their own setups, also using the technical support from the WAC and some equipment, such as:

- Research infrastructure - (technical) gases, (waste) water and electricity

- Furnished with standard instruments such as process meters, pumps, etc.
- In collaboration with (commercial) laboratories in the vicinity, the WAC offers a total analysis package, so that all components can be measured during the research.

Chemical laboratory:

- Infrastructure with (technical) gases, water and electricity
- Furnished with tables, cupboards, fume cupboards, safety cupboards
- Instruments such as process meters, ICP (metal analysis), TOC, spectrophotometry, liquid chromatography and turbidity

Microbiological laboratory:

- Furnished with tables, cabinets, flow cabinets, safety cabinets
Standard instruments such as RT-PCR, gel electrophoresis, ELISA

Building for biobased material research

<https://exploretheunknown.nhlstenden.com/en/explore-stories/a-tiny-house-made-out-of-bio-based-materials>

5.4 Visual representation of the current Bioeconomy Hub players in RUN-EU

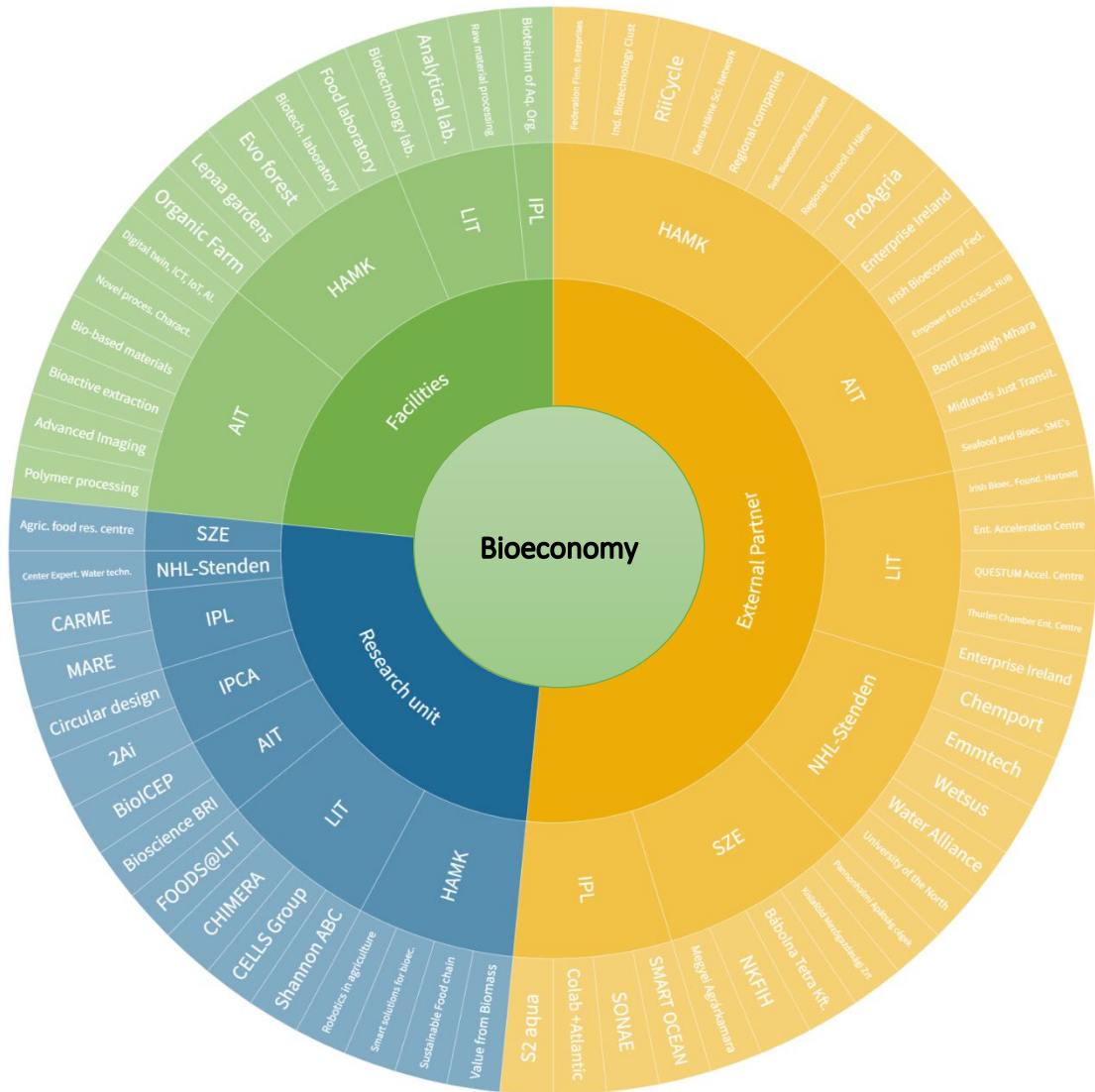


Figure 4 – RUN-EU Bioeconomy Hub – players per type and member

6. European Innovation Hub in Social Innovation

6.1 Research Centres, research groups and faculties working on Social Innovation

Polytechnic of Leiria

LIDA (Design and Arts Research Lab)

It is LIDA's mission to develop applied research activities, experimental development and knowledge transfer in the domains of Design, Arts and Culture. LIDA has a complete and multifaceted team of researchers, with experience in various fields such as product design, environmental design, interaction, multimedia, communication, eco-design, participatory co-design and social engagement.

<https://lida.ipleiria.pt>

Main researcher(s)' contact(s)

Renato Bispo (renato.bispo@ipleiria.pt)

Renato Bispo is PhD in Design, Head of LIDA - Design and Arts Research Lab and Program Coordinator of the Master's degree in Product Design. He explores a humanised design approach, where human diversity assumes a central role in new products development. Over the last 20 years, he has been conducting research in the area of inclusive design, focused on the development of anti stigmatising products related to ageing and disability.

Sandra Neves (sandra.neves@ipleiria.pt)

Sandra Neves holds a Phd in Design related healthcare by the Glasgow School of Art. Over the last ten years, Sandra has been focused on developing and delivering design-related healthcare research to contribute to new forms of good care and living well. She is specialised in co-design, participatory processes and social engagement.

CICS.NOVA

The unit of CICS.NOVA (interdisciplinary centre of social sciences) at Leiria has developed its activity since 2002. It is committed to advancing research in diverse areas of the social sciences, particularly on social trajectories, intercultural mediation, migration, tourism and identities.

<https://www.cics.nova.fcs.unl.pt/polos/cics-nova-ipleiria?lg=uk>

Main researcher(s)' contact(s)

Ana Vieira (ana.vieira@ipleiria.pt)

Her research focuses on Social Education, Social Pedagogy, Intercultural Mediation, Socio-pedagogical Mediation, Sociocultural Mediation, Social Work and Indiscipline.

José Carlos Marques (jose.marques@ipleiria.pt)

Areas of interests are Portuguese migration flows, Portuguese diaspora, migrant's integration, migrants' transnational practices, migration policies, and highly skilled migration. His recent projects are on current Portuguese emigration flows, on discrimination practices in the labour market, on emigrant engagement practices and policies, and on return aspirations and experiences of recent emigrants.

CI&DEI

It is the strategic objective of the Centre for Studies in Education and Innovation to reinforce the proposed research lines with a comprehensive focus on the great contemporary debates of education in terms of pedagogical innovation, education for equity and inclusion, academic success and promotion of citizenship in a lifelong learning context.

<http://cidei.events.ipv.pt/>

Main researcher(s)' contact(s)

Hélia Pinto (helia.pinto@ipleiria.pt)

Hélia Gonçalves Pinto, PhD in Didactics of Mathematics by the Institute of Education of the University of Lisbon, is Adjunct Professor at the School of Education and Social Sciences of the Polytechnic of Leiria. He started his professional activity in 1991, having taught 9 years in Basic Education and the following, to date, in Higher Polytechnic Education and in-service Teacher Training. He coordinates the center of the Center for Studies in Education and Innovation (CI & DEI) of the Polytechnic of Leiria and the Research Working Group (GTI) of the Association of Teachers of Mathematics (APM). Integrated researcher at CI & DEI, she is interested in the areas of Research in Mathematics Education and Teacher Training.

Sandrina Milhano (sandrina.milhano@ipleiria.pt)

Sandrina Milhano is professor and dean of the School of Education and Social Sciences at Polytechnic of Leiria, in Portugal. She holds a PhD in Education from Roehampton University (UK), a master degree in Arts of Music Education (UK), a degree in Musical Sciences and a Pós-Graduate Diploma in Educational Training (FCSH – Universidade Nova de Lisboa) and, a Diploma of Advanced Studies in Music (University of Salamanca, Spain). She is a Specialist in Teacher Training, music domain. She develops her researcher at CI&DEI - Centro de Estudos em Educação e Inovação, Pólo do Politécnico de Leiria and collaborates with the CICS.NOVA Centro Interdisciplinar de Ciências Sociais, Pólo do IPLEiria. Areas of interest: pedagogy; teacher training; music education, sociocultural intervention, project planning and management, the intersection between education & culture, among others.

CIEQV

The mission CIEQV (Life Quality Research Centre) is to contribute to the creation of knowledge and innovative programs promoting the improvement in the quality of life across human beings, mainly through research on Motor behavior, Physical Activity and healthy lifestyle, Education and training and Individual and community health.

<https://www.cieqv.pt/>

Main researcher(s)' contact(s)

Rui Matos (rui.matos@ipleiria.pt)

MSc in Motor Development, PhD in Human Movement Science; vice-coordinator of Life Quality Research Center (CIEQV); creator of a new team sport - Tripela -, in 2008; ex-Dean of School of Education and Social Sciences at Polytechnic Institute of Leiria (IPL). For several years, has participated on Active Ageing Master Course of IPL. He is member of the scientific committees in various conferences and member of the editorial board of in various journals. He has been invited as a speaker for various national and international conferences. He has expertise in motor control, motor learning and visual perception, namely on the role of peripheral vision and on the contribution of constraints and affordances across the life span. Member of the International Motor Development Research Consortium, an international organization of researchers aimed at advancing the field of motor development.

IJP – Leiria

Since 2018, the Polytechnic of Leiria has a research pole of the Portuguese Institute for Legal Research (IJP-Leiria) which is a multidisciplinary R&D Unit founded to develop research, training and service provision in legal area. Focusing on these purposes, researchers of IJP-Leiria integrate multidisciplinary I&D projects, both national and international, for the juridical and social analysis of Leiria region. It holds a team of experts in Private and Public Law and Public Administration, that work in the following areas of expertise commercial and business law; recovery of companies; contract law and consumer law; fiscal right; european law; extrajudicial dispute resolution: mediation and arbitration, human rights and public policies. Some its research projects include the project “INDIJEN: Legal Indicators of Effectiveness of Environmental Law” funded by Chaire Normandie pour la Paix (2019-2022); the Iberoamerican Network of Researchers “100 Reglas de Brasília” about the Access to Justice from Vulnerable People, a project led by the University of Cádiz since 2020 and comprising 33 members, from 19 different Universities located in 13 countries; the Project “Diversity of Enforcement Titles in Cross-border Debt Collection in the EU” - EU-En4s, (Project ID: 831628 - call: JUST-JCOO-AG-2018) coordinated by the University of Maribor - Eslovenia (2019-2021).

<https://ijp.ipleiria.pt/>

Main researcher(s)' contact(s)

Cátia Cebola (catia.cebola@ipleiria.pt)

Cátia Marques Cebola is an Assistant Professor, teaching Alternative Dispute Resolution and Civil Law, at the Polytechnic of Leiria in Portugal.

She carried out her doctoral work at the University of Salamanca, Spain and defended her thesis on the theme Mediation – a complementary way to the Administration of Justice. She has a Graduation and a Master in Civil Law by the University of Coimbra, Portugal. In 2006 she took a Practical Course of Mediation approved by the Portuguese Ministry of Justice and attended the Harvard Mediation Program in 2010.

She participated in several research projects namely in the European Project Diversity of Enforcement Titles in Cross-border Debt Collection in the EU (EU-En4s), financed under the European Commission Justice Programme, Coordinated by the University of Maribor (Slovenia- 2019-2021); research project "La Mediacion de Consumo: hacia una construccion legislativa estatal y autonómica con arquitectura europea", under the reference DER2017-88501-P, financed by the Spanish Ministry of Economy and Industry and coordinated by the University of Granada (Spain), 2018-2021; European Project JUST/2013/JCIV/AG/4689, EMEDEU - Online Mediation in Cross-Border Civil and Commercial Matters in the European Union, Coordinated by the University of Salamanca, with the University of Leicester (UK), University of Urbino (Italy) and the International Business School (France) Marques Cebola is an Assistant Professor, teaching Alternative Dispute Resolution and Civil Law, at the Polytechnic of Leiria in Portugal (2014-2016).

ciTechCare

Centre for Innovative Care and Health Technology is a multidisciplinary research unit dedicated to delivering solutions to improve healthcare and technologies to support early diagnosis and intervention. Organized in 3 main areas, Health Promotion and Care, Nutrition and Food Innovation, and Biomarkers and Clinical Engineering, we combine efforts to simultaneously address diverse research questions from different scientific points of view and accelerate knowledge transfer through our privileged collaboration with several healthcare and local economy partners that act as test tubes for the designed solutions.

<https://citechcare.ipleiria.pt>

Main researcher(s)' contact(s)

Maria Guarino (maria.guarino@ipleiria.pt)

Maria Pedro Guarino (<https://orcid.org/0000-0001-6079-1105>) is an Associate Professor of Physiology at the Polytechnic of Leiria. She is the Coordinator of the FCT R&D Unit – ciTechCare- Center for Innovative Care and Health Technology. Ph.D. in Physiology by NOVA University of Lisbon and post-graduated in Pharmacology and Therapeutics by the University of Manitoba, Canada. Her research is related to Medical and Health Sciences, particularly Basic Medicine, Physiology, and Pathology. As a group leader, she dedicates

to applying the scientific knowledge gathered in the last 15 years in chronic disease biology to developing novel diagnostic and therapeutic approaches for obesity and type 2 diabetes, including nutritional interventions and medical devices. She collaborated with the Pharma industry translating her know-how as a physiologist into practice looking at biomarker profiling of chronic metabolic diseases and its application as distinctive signatures for diagnosis and prognosis purposes. Her research within this field originated two patents and the creation of a spin-off company.

NHL Stenden

Research group Vital Regions

What impact does the closure of a village's last remaining school have on that village? How can we get started on the energy transition in actual practice? Despite the decreasing number of professionals and the growing demand for healthcare, how can we continue to provide excellent care? Within the Vital Regions focus area, we focus on increasing the liveability and resilience of regions. We view the world around us from an economic, social and educational perspective.

The theme People & Society revolves around the inclusiveness of vulnerable people, interdisciplinary professionalism and digital innovation in healthcare and welfare. We also focus on the challenges posed by an ageing population and a lower birth rate in the region.

How do you deal with multilingualism and (low) literacy? Which didactic innovation is required for this and what about identity building in education? These are questions to which we provide answers within the Vital Education theme.

Meaningful and international business is central to the Vital Economy theme. We focus on cyber safety and innovative and sustainable business operations. Our objective is to train value-driven and innovative professionals.

Main researcher(s)' contact(s)

Aleid E. Brouwer (aleid.brouwer@nhlstenden.com)

Professor of Purposeful Entrepreneurship

Professor Aleid Brouwer wants to generate synergy between SME, (ICT) students and knowledge institutions. She cooperates with 6 EU partners in an INTERREG project Futures By Designs, that helps SME's to become futureproof by using data science. The project involves students' projects and is in line with regional policy such as the State funded Regiodeal in the Dutch province Drenthe and supported by JADS Den Bosch. The project focusses now on 4 sectors, but will continue in the future by the MKB werkplaats (SME workshop for Digitization) which is open for SMEs from all sectors. This last project is supported by VNO-NCW-MKB-Noord, Impact Noord and IBDO (three types of SME network organisations) and – hopefully – funded by the Dutch Ministry of Economic Affairs.

Research Group Care and Welfare

Three focal points of the research group are 1) from vulnerability to resilience, 2) innovating with healthcare and welfare professionals and 3) small-scale studies, the so-called n=1 studies, and human centered design research. Research projects focus on design-based interpretation, together with the professional field, of what "positive health" and "social quality" will mean for the provision of care and support. The research group acts as a partner for practice in the field of interprofessional learning and collaboration and supporting innovation processes (for instance www.meelab.nl) . It establishes "ecosystems" in which research, education and practice are better able to find each other and develop appropriate organizational forms and processes for this purpose (for example in innovation labs, workshops). The research group Care and Welfare has several professorships focusing on various social (research) issues with the aim of innovating the social domain and the care domain (elderly care, hospital care, child and youth care, psychiatry, social work, labour force participation for people with disabilities).

Main researcher(s)' contact(s)

Jolanda Tuinstra (jolanda.tuinstra@nhlstenden.com)

Professor Social Quality

People are social creatures. Socialising is good for our health, makes us feel that we matter, reassures us and makes us happy. Furthermore, there is constant reciprocity between people and their social surroundings. Within the Social Quality professorship, Jolanda Tuinstra researches the extent to which people can participate in society in a way that suits them and that does them good.

Job van 't Veer (job.van.t.veer@nhlstenden.com)

Professor Digital Innovation in Healthcare and Welfare

The number of care recipients is growing, whereas the number of care providers is falling. That phenomenon calls for new solutions. Professor Job van 't Veer is utterly convinced that we cannot maintain the quality of healthcare and welfare without digital innovation especially in shrinking regions. He works together with researchers and the professional field to identify successful applications of digital innovation in healthcare and welfare.

European Tourism Futures Institute

The visitor economy (tourism, leisure, events, hospitality) had been growing rapidly and is expected to rebound and recover resiliently after the impacts of COVID-19. Entrepreneurs, governments, and communities are challenged to balance the development of the visitor economy and its impacts so to create a balance between the interest of communities, businesses, and visitors. This is a major management and governance challenge.

Since 2009, the European Tourism Futures Institute (ETFI) is a leader in futures studies and scenario planning for the tourism industry. ETFI was established in response to an increasing

need in the leisure and tourism industry for support with policymaking and strategic planning taking the fast changing world into account.

Up to now, we have supported dozens of industry associations, government authorities, businesses and education with applied and academic research to design strategies, business models and concepts for the future. We have conducted over 100 research projects to make the tourism industry more resilient to the uncertainties posed by today's society.

We are the only expertise centre in Europe that applies scenario planning in tourism research. By means of this powerful approach to strategy and planning, we paint pictures of the future of leisure and tourism. We make actors in the leisure and tourism industry aware of changes the sector is set to undergo. Based on the effects of these changes, we provide advice on how to anticipate such developments by means of innovative visions, policies or strategies. This is essential in such a fast-changing industry with constantly changing trends.

www.etfi.eu

Main researcher(s)' contact(s)

Stefan Hartman

stefan.hartman@nhlstenden.com

As the head of department of ETFI, Stefan leads challenging research projects commissioned by international NGOs, European tourism organisations and Dutch governments. Stefan obtained his PhD at the University of Groningen in the field of Urban and Regional Spatial Planning on the subject of Leisuring Landscapes. Next to his work at the ETFI, Stefan lectures at the NHL Stenden University of Applied Sciences and as assistant professor at the University of Groningen.

IPCA

Research Institute for Design, Media and Culture (ID+) (research centre)

Art and Design - Applied Research and creation of ways of transferring knowledge between scientific and technological disciplines of different origins through Art and Design methodologies and the heuristic potential of creativity in the relation between technology and art.

Design for Health - focuses its scientific activity on the interface between people and health, developing environments, products and services.

<https://idmais.org/>

Main researcher(s)' contact(s)

Paula Tavares (ptavares@ipca.pt)

Paula Tavares is a Professor, Artist and Researcher. She obtained the PhD degree in Fine Arts from the Faculty of Fine arts, University of Vigo in 2006, with the thesis "The

complex relations between art and politics in Western culture. The political art as institutional contradiction.” She is graduated in Drawing at Artistic Superior School of Porto (ESAP) in 1994, and she made her second graduation in Painting at Faculty of Fine Arts of Porto in 1999. From 2007 she has been working as Professor at Polytechnic Institute of Cávado and Ave, Portugal, where she is Associate Professor (since 2015) and the Dean of the Design School (since 2015). In January 2017, she joined the ID+ Research Institute for Design, Media and Culture (<http://www.idmais.org/pt-pt/>), where she is Director at IPCA’s Polo, and she also coordinates the CAOS group Communication, Art, Object and Synergies. Her research interests are focused in: 1. Applied Research in Art and Design; 2. Drawing and Audiovisuals; 3. Gender and Politics in Animation and Illustration. She has been involved in a set of financed projects in the design area, as well in artistic projects with different institutions and entities. She is also the General Chair of CONFIA - International Conference on Illustration and Animation (annual conference since 2012) (<http://www.confia.ipca.pt/>). Has participated in several design competitions - national and international, academic and professional - as a jury. She is represented as an artist in several collections and she has been participating in exhibitions and artistic events since the 1990s.

Demétrio Matos (dmatos@ipca.pt)

Demétrio Matos is a Adjunct Professor at the School of Design of the Polytechnic Institute of Cávado and Ave, director of the Department of Industrial Design and Product since 2017 and director of the undergraduate degree in Industrial Design since 2016.

PhD in Design, by the Faculty of Architecture of the University of Lisbon (Faculdade de Arquitetura da Universidade de Lisboa - FA.UL), in the area of knowledge of Industrial Design, Master in Industrial Design by the Faculty of Engineering of the University of in partnership with the School of Arts and Design of Matosinhos, and graduated in Equipment Design by the School of Arts and Design of Matosinhos (ESAD).

Member of the Research Institute in Design, Media and Culture (ID +), in the research group of the health area. The main areas of interest include industrial design, health design, human enhancement and inclusive design.

Research centre on accounting and taxation (CICF)

CICF develops applied research in the areas of accounting and taxation, being organized in 4 core areas: (1) Public Accounting, (2) Accounting and Social Responsibility, (3) Financial and management accounting and (4) Taxation. Practice research projects are employed in companies and public institutes to promote best practices of accountability, transparency, sustainability reporting, management control and tax planning.

<https://cicf.ipca.pt/en/>

Main researcher(s)’ contact(s)

Sónia Monteiro (smonteiro@ipca.pt)

Sónia Monteiro PhD in Economic and Business Sciences (Accounting) by University of Santiago de Compostela (Spain); Master in Accounting and Auditing by University of Minho (Portugal). Professor of financial accounting at the Management School of IPCA. Director of CICF. Ambassador of the ODS Portugal Alliance, from the of United Nations Global Compact Network in Portugal (UN GCNP), Goal 4- Education. Research interests: CRS and accounting, sustainability/integrated reporting.

Patricia Gomes (pgomes@ipca.pt)

Patrícia Gomes is Vice-President at the Polytechnic Institute of Cávado and Ave (IPCA) for Research and Innovation and Pedagogical Management Affairs. She has a PhD in Accounting and a master degree in accounting and auditing at the University of Minho. She is Associate Professor in the field of Public Accounting in the Department of Accounting and Taxation at the Management School at IPCA where she teaches and supervises students from graduate and postgraduate courses in the fields of accounting, auditing, finance and tax. She is the President of the Scientific Council of the Research Center on Accounting and Taxation (IPCA) evaluated with Very Good by the Portuguese Foundation for Science and Technology. She is also member of the Research Center in Political Science at the University of Minho. She is the coordinator of the postgraduate course in the new Public Sector Accounting system based on IPSAS (International Public Sector Accounting Standards) and the researcher responsible in various projects about public sector accounting (for example the project funded by FEDER - POCI-01-0143-FEDER-106908-that studied the public sector accounting changes toward IPSAS adoption in the Iberian Peninsula). She is the author of several papers published in high quality journals and books in the area of public accounting. She is supervisor of PhD thesis in the area of public accounting and management.

Research group on Marketing

Marketing, consumer behaviour, Digital Marketing

Main researcher(s)' contact(s)

Sérgio Dominique (sdominique@ipca.pt)

Sérgio Dominique-Ferreira is Professor of Marketing at the Polytechnic Institute of Cavado and Ave. He holds a PhD degree in Business and Management Studies - Marketing and Strategy from the Faculty of Economics of Universidade do Porto. Previously, he has been a researcher in the Department of Methodologies of the University of Santiago de Compostela (Spain), as well as researcher in the Department of Business Organizations and Marketing, Faculty of Business, University of Vigo (Spain). Council for Teacher Evaluation (Polytechnic Institute of Cavado and Ave) Pedagogical

council of the School of Management (Polytechnic Institute of Cavado and Ave) Pedagogical council of the School of Hospitality and Tourism (Polytechnic Institute of Cavado and Ave) Scientific Council of the School of Hospitality and Tourism (Polytechnic Institute of Cavado and Ave) Director of the Master's Degree in Marketing (Polytechnic Institute of Cavado and Ave) Current research interests are: Artificial Intelligence and Emotional Intelligence. Other research topics are: price sensitivity, bundling strategies, customer satisfaction and loyalty, brand image and supply chain management.

Alexandra Malheiro (amalheiro@ipca.pt)

Alexandra Pereira Malheiro is Associate Professor of Marketing and Strategy at the Polytechnic Institute of Cávado and Ave (IPCA) since 1998, having assumed the role of director of the Higher School of Hotel and Tourism of this institution in 2017. She holds a PhD in Marketing and Strategy from the Minho since 2012, an area in which he has developed his pedagogical and research activities. He is an integrated member of CITUR - Center for Research, Development and Innovation in Tourism. She is author or co-author of several papers and her research interests include: ethical and responsible consumer behaviour, socially responsible marketing, social marketing, tourism marketing and sustainable tourism.

Research Group in eGovernment

Electronic public procurement; public purchase; platform of public purchase; green public procurement; transparency; best practices; indicators; policy decision and implementation.

Main researcher(s)' contact(s)

Isabel Ferreira (iferreira@ipca.pt)

Isabel Ferreira, Professor of Public Management in the School of Management (ESG/IPCA). She has a PhD in Techonology and Information System at the University of Minho. Research interests: public value; eletronic public procurement; platform of public purshase; green public procurement; transparency. Orcid.org/0000-0002-4988-4105.

LIT

Social Sciences ConneXions

The aim and vision of Social Sciences ConneXions is to promote social inclusion, provide a voice for those who are not heard, and enrich the body of academic knowledge informing social and community practitioners from a variety of disciplines. With this in mind, we are engaged in collaborative efforts with organisations supporting those who are vulnerable through graduate research projects, media appearances, conference and workshop presentations, publications and community research events.

<https://lit.ie/Research-Development/Research/Centres-Groups/About-Social-Sciences-Connexions>

Main researcher(s)' contact(s)

Aoife Prendergast

Aoife Prendergast is a Lecturer and Programme Leader in the Dept of Social Sciences at LIT. Her research areas include Professional Supervision in Early Childhood Education and Care and Social Care, Regulation and Surveillance as well as Practice Education Placement. Aoife has successfully created and managed numerous innovative training and development projects in public health within diverse communities in both the UK and Ireland. In addition, Aoife was selected as Secretary General and Irish representative for FESET (European Social Education Training) 2016 -2020 and as Secretary for the Irish Association of Social Care Educators (IASCE) 2015 -2020. She also received a Graduate Scholar for the International Aging and Society Community in November 2014 and a Community Empowerment Champion for her work in the East of England in 2010. In 2018, she was shortlisted for a Shannon Consortium Teaching Excellent Award for her commitment to teaching and learning at Limerick Institute of Technology.

Sinead McMahon

Sinead is a lecturer in the Department of Applied Social Sciences in LIT where she teaches on modules including Research Methods and Social Policy. She is a professionally qualified Youth Worker she continues to be involved in a variety of youth work spaces. She was first employed as a social researcher in University College Cork in 1998, undertaking a study of early school leavers. Since then she has been involved in numerous applied research projects and evaluations for agencies such as Area Partnership Companies, Regional Youth Services and the HSE. Research Interests: Social policy analysis; qualitative research including interviewing and qualitative data analysis; qualitative evaluation of social and youth services; youth work practice and provision; intersections between social policy and youth work; governmentality perspectives on youth work.

ACADEmy

ACADEmy, the Limerick School of Art and Design centre for research into Art, Creative Education, Applied/Digital Design Enterprise, Media and Innovation was founded in 2013. The foundation of this centre reflects the growing importance of art and design research cited in the LIT Research Strategy as a “Niche Strategic Research Area”. ACADEMY acts as a centre to attract funding to encourage research mobility and also to support and grow creative art and design research collaborations.

<https://lit.ie/Research-Development/Research/Centres-Groups/What-is-ACADEmy>

Main researcher(s)' contact(s)

Susan Halvey (Susan.Halvey@lit.ie)

Susan Halvey is Lecturer in Critical & Contextual Studies at Limerick School of Art & Design. In 1995 she graduated from LSAD with a BA in Fine Art, Painting, before qualifying as an Art and Design Teacher. After spending some time teaching in Valladolid, Spain, she went on to study for a Master's in History of Art 20th Century at Goldsmiths College, University of London. Upon returning to Ireland in 2000, Susan taught in a variety educational sectors before taking up the role of Lecturer in Critical and Contextual Studies at LSAD, where she has taught for over twenty years. Throughout this time, she has also taught in the area of initial teacher education. In 2018, Susan completed a PhD in Education at the University of Limerick. An Interpretative Phenomenological Analysis, the research explored the experiences of the Visual Arts Practice PhD in Ireland from the perspective of candidates, graduates, supervisors and examiners. Susan continues to research in the areas of Art and Design Higher Education; educational leadership; research training for the Visual Arts PhD; Visual Arts Doctoral supervision and examination; and art and design pedagogy and curriculum.

AIT

While no Research Cluster or group currently focuses specifically on Social Innovation in AIT, two new entities currently in the process of being established will have key goals in addressing Social Community Development and Disruptive Innovation.

The Empower Eco Innovation Hub

Empower Eco has a remit for supporting Regional Transformation of the Midlands of Ireland and communities negatively impacted by the loss of a dominant industry as a result of cessation of peat harvesting for energy production. In partnership with National State Agencies responsible for Enterprise development, sustainable business transformation, upskilling of unemployed and rural community development, Empower Eco will become a key player in transitioning these communities from reliance to self-sustaining in their development and employment potential.

Main researcher(s)' contact(s)

Professor Neil Rowan (nrowan@ait.ie)

See section 4 for profile.

The Disruptive Innovation and Entrepreneurship Academy

In development.

Main researcher(s)' contact(s)

Michelle McKeon-Bennett (mmckeonbennett@ait.ie)

See section 4 for profile.

Dr Maire Brophy (mbrophy@ait.ie)

FHV

Research Group Empirical Social Sciences

Analysis of social and organizational resources and utilities; customer and market research, employee surveys, including analysis of attitudes, opinions, motives, behaviour, etc. of various target groups; performance evaluation – supervision, evaluation, impact measurement and development of methods, interventions and projects. Research designs of quantitative and qualitative social research, e.g. standardized surveys on specific target groups, qualitative interviews, focus groups, content analysis of sources, documents and literature. Research fields: demographics and social reporting, social inequality, poverty and homelessness, age, identity, diversity and inclusion, social capital, health and care management, social work, cultural management research, education, psycho-social aspects of work and organizational development. The **Faculty of Health and Social Work** is an organisational unit and competence centre of FH Vorarlberg. The new bachelor's programme on health and nursing care at FH Vorarlberg is the basis and first step of academic education on healthcare in Austria. This faculty works closely with the research centre for social and economic sciences of FH Vorarlberg.

<https://www.fhv.at/en/research/research-group-empirical-social-sciences/>

Main researcher(s)' contact(s)

Fabian A. Rebitzer (fabian.rebitzer@fhv.at)

Fabian A. Rebitzer is head of the Empirical Social Sciences Research Group, the Staff Unit for Diversity and Equal Treatment and the Diversity Committee at Vorarlberg University of Applied Sciences. He is vice-chairman of the Research Ethics Committee at Vorarlberg University of Applied Sciences. He teaches and supervises theses in the faculties of Health and Social Work as well as Business and Management. He is a sociologist specialising in organization and development, diversity and methods of empirical social research. His main research fields are social inequality and diversity, social capital, participation, demographic change, age and health, and cultural management.

Erika Geser-Engleitner (erika.geser-engleitner@fhv.at)

Erika Geser-Engleitner is a lecturer of Sociology and Empirical Social Research at the University of Applied Sciences Vorarlberg in Dornbirn, Austria. Her main research areas are nursing and care systems, family and generations, homelessness, poverty/ wealth research. She is particularly happy to lead and carry out international evaluation and impact measurement projects. She was awarded a science prize from the Austrian Social Forum and a science prize of the University of Linz (Austria) for her scientific work.

HAMK

Smart Solution for wellbeing (research group)

Technological solutions support interaction between people by introducing services based on solutions relying on big data with the help of artificial intelligence, machine learning and data analytics. One our research focus is wearable intelligence. In cooperation with technology companies and various organisations, we support parties that provide wellbeing services, such as health care experts and their customers. Each solution developed by us is tailored to meet the customer's needs.

<https://www.hamk.fi/research/hamk-smart/sustainable-services-for-wellbeing/?lang=en#1613630441241-5102893a-2cee>

Main researcher(s)' contact(s)

Pia Tamminen (pia.tamminen@hamk.fi)

Pia Tamminen is a Principal Research Scientist, a team leader in Sustainable Services for Wellbeing, and a Principal Teacher in master's degree programme Data Leadership and Smart Services. Her research focuses on possibility-driven design, inclusive service development, service design and AI -based solutions for wellbeing. She received her doctoral degree (tech.) in the School of Science of Aalto University in 2016. She has previously acted as a Postdoctoral Researcher in the School of Art, Design and Architecture of Aalto University, and hold various positions in international companies in e.g. consulting, program, service and account management. She completed her master's degree (tech.) and worked in Sweden for several years.

Kimmo Vänni (kimmo.vanni@hamk.fi)

Kimmo Vänni works as a Principal Research Scientist. His research focuses on digital culture, assistive robotics, wearable intelligence and exoskeletons. He is currently developing international Master programme in wearable intelligence. He has worked more than 25 years in academia and a private sector as a lecturer, a RDI manager, a consultant and an entrepreneur. He holds Ph.D. in occupational health, B.Sc and M.Sc degrees in engineering, a M.Sc degree in biomechanics and an EMBA degree in international business. During the last twenty-five years, he has carried out various RDI projects including e.g. innovations, technostress, social robotics, virtual reality, ICT, business and biomechanics. He has worked in Finland, Wales and Japan, and collaborated with numerous organizations and professionals in Finland and elsewhere.

Multisensory environments and assistive technology (research group)

Solutions based on smart technology can overcome cognitive obstacles encountered in everyday activities and learning. On one hand, it is possible to overcome functional limitations by firstly assisting and increasing the person's communicative competence, and secondly, by improving

interaction between the person and their operating environment. The solutions are largely based on the utilisation of multimodal properties. On one hand, this can be done by strengthening the identification and reception of appropriate stimuli, and on the other, by assisting people in the interpretation and operational utilisation of information.

<https://www.hamk.fi/research/hamk-smart/sustainable-services-for-wellbeing/?lang=en#1529036409396-1a690e18-59f145cb-cb1a>

Main researcher(s)' contact(s)

Merja Saarela (merja.saarela@hamk.fi)

Merja Saarela, EdD, is currently a principal research scientist and a Research team leader in Multisensory and Assistive Technology (MATEC) in Research Unit HAMK Smart, at Häme University of Applied Sciences (HAMK). Currently her research focuses on Universal Design for eLearning, accessibility in higher education, user-centered wellbeing, multisensory and multimodality of information. She has interest in socio-neurocognitive learning challenges caused by dyslexia, developmental disabilities, dementia, sensory deficits. Currently she is coordinating the ERASMUS+ project TINEL (2018-2021), participating as a partner to the Horizon project IN2STEMPO (2017-2022) and the national project DigiCampus (2018-2021). She has over 20 years of experience in higher education teaching, researching and administration. She has also strong experience in auditing Quality of Higher Education Institutions.

HAMK	Edu	Research	Unit
<p>The main research areas of HAMK Edu Research Unit are professional competence and development for the future, career counselling and lifelong learning, as well as new learning solutions and digital competence. The research is carried out in various contexts, mainly vocational and higher education, and the world of work. Global education and export of expertise are central areas of the unit's functions. https://www.hamk.fi/research/hamk-edu/?lang=en</p>			

Future work and professional development (research group):
 Future Work Research and Development contributes to HAMK Edu Research Unit with a specific focus and interest on *exploring* transforming work, future skills of professionals and continuous learning. Its goals are to 1) apply educational research and development in close collaboration and dialogue with companies, 2) foster dynamic public-private partnerships with the world of work, and 3) enable new and innovative continuous learning opportunities to professionals at work. <https://www.hamk.fi/research/hamk-edu/future-work-research-and-development/?lang=en>

Main researcher(s)' contact(s)

Essi Ryymin (essi.ryymin@hamk.fi)
 Dr. Ryymin works as a Principal Research Scientist at HAMK Edu Research Unit.

Heta Rintala (heta.rintala@hamk.fi)

Dr. Rintala works as a Principal Research Scientist at HAMK Edu Research Unit and in the area of vocational education and training (VET). Her PhD centered on work-based learning, especially apprenticeships, in VET. Her national and international peer-reviewed journal articles and other publications address topics related to work-based learning and VET systems, and more widely workplace learning and professional development.

Transforming Higher Education (research group)

This research group at HAMK Edu research unit aims to to 1) provide pedagogical solutions for developing higher education through conducting multi-method research, 2) enhance smooth transitions between education and work and support students to become highly skilled agents of the working life, 3) enhance teaching, guidance and supervision to enable individualized and high-quality learning and to 4) improve conditions for continuous learning and wellbeing in higher education. There is a strong emphasis on investigating the interaction between student learning and their psychological well-being. The group offers research-based pedagogical development programmes for higher education teachers. <https://www.hamk.fi/research/hamk-edu/transforming-higher-education/?lang=en>

Main researcher(s) contact(s)

Liisa Postareff (liisa.postareff@hamk.fi)

Dr. Liisa Postareff is a senior research scientist at Häme University of Applied Sciences (HAMK). Her research focuses on higher education learning, teaching and assessment, and on students' and teachers' psychological wellbeing. Her areas of expertise include also research-based development of teaching and learning in national and international contexts. In the RUN-EU network she leads WP3 Future and Advanced Skills Academies.

Researcher, Dr. Anne-Maria Korhonen (HAMK): The research interests are online learning with pedagogical approach, personal learning environments (PLE), ePortfolios, learning in open digital environments along with competence-based learning.

Researcher (HAMK);, Dr. Irma Kunnari, pedagogical and educational innovations, positive organizational behaviour, empowering and student-focused learning methods, inspiring educational leadership, work- and project-based learning, collaborative and team learning, wellbeing in learning, networked expertise and curriculum development work.

SZE

Department of Architecture and Building Construction (Research Group)

The mission of the Department of Architecture and Building Construction is to develop applied research activities, experimental development and knowledge transfer in the domains of Architecture, Building Construction and Design. It has complex team of researchers, with

experience in various fields such as fine arts, co-arts, architectural design, environmental design, participatory co-design and social engagement.

www.eet.sze.hu

Main researcher(s)' contact(s)

Dr. Imre Tolnay (itolnay@gmail.com)

Imre Tolnay is PhD in Architecture, Head of the Department - Architecture and Building Construction

Faculty of Architecture, Civil Engineering and Transport Sciences (Research Group)

Faculty of Transport Sciences has huge experience in transport planning in cities, mainly public transport and sustainable transport system planning and infrastructure design. Within this topic they would like to provide new mobility solutions for citizens in order to change they travel behaviour.

Main researcher(s)' contact(s)

Dr. Balázs Horváth (hbalazs@sze.hu)

Dr. Balázs Horváth PhD is associate professor at the Faculty of Architecture and Transport Sciences. He is the Head of the Transport Department and Dean at the Faculty.

Department of Tourism (Research Group)

The Department of Tourism operates with a total of 12 full-time teachers (7 of them have PhD degree), 5 regularly invited professional lecturers (hotel industry, tourist guiding, local government tourism referrer). Their main areas of research are digital tourism, sustainability issues and health tourism, but they also have experience in regional development. In addition, researchers' other areas of expertise cover all types and characteristics of tourism. (<https://admissions.sze.hu/welcome>, <https://idforg.sze.hu/-kezdoldal>)

Main researcher(s)' contact(s)

Dr. Éva Happ (happ.eva@sze.hu)

Dr. Éva Happ PhD is associate professor at the Faculty of Business and Economics. She is the Head of the Tourism Department and Vice-dean for international relations at the Faculty. She holds a PhD in Management and Organisation Studies.

Doctoral School of Regional- and Business Administration Sciences (Research Group)

Their research area is the mass Higher Education (HE), focused on dropout, student's motivation and student's satisfaction. During the COVID-19 pandemic they analyse the student's characteristics powered by e-readiness. Moreover, they analyse the gained experiences during the COVID-19 pandemic period in order to develop face to face education. They determine the possible e-learning strategies for HE. Besides that, they analyse also the catchment area of University of Győr. (https://rgdi.sze.hu/en_GB/-welcome; https://math.sze.hu/en_GB/home)

Main researcher(s)' contact(s)

Melinda Krankovits (kmelinda@math.sze.hu)

Melinda KRANKOVITS is a teaching assistant at Széchenyi István University (Győr) Department of Mathematics and Computational Sciences, PhD candidate in Regional Studies at Széchenyi István University (Győr). Her research areas are correspondence learning (e-learning, distance learning methods) in Higher Education, dropout, mass education, motivation, e-readiness and e-satisfaction.

Nárcisz KULCSÁR (kulcsar.narcisz@math.sze.hu)

Nárcisz Kulcsár is a teaching assistant at Széchenyi István University (Győr) Department of Mathematics and Computational Sciences, PhD candidate in Education at Eötvös Loránd University (Budapest). Her research areas are previous experiences in learning processes, experience based learning, drop-out, mass education, visualization, motivation, real-life problems and self-efficacy.

Department of Telecommunications, Department of Informatics (Research Group)

The main research focuses of the department are virtual and augmented reality in higher education, e-health, training and assisted technologies (maxwhere.com). The department is in charge of establishing "Digital Development Center" (governmental funded institute for R&D using VR, 5G technology).

Main researcher(s)' contact(s)

György Wersényi (wersenyi@sze.hu)

Dr. Wersényi György Phd. is a professor in electrical engineering and acoustics, dean of the faculty, president of the Digital Development Center

Ádám Csapó (csapo.adam@gmail.com)

Dr. Ádám Csapó Phd. is an associate professor in informatics and cognitive informatics, 3D virtual spaces.

Department of Telecommunications, Department of Informatics (Research Group)

Other very important research area of the department is: Medical image classification based on fuzzy signatures and fuzzy interpolation-based decisions. Colonoscopy and liver CT images are segmented into lesion containing and healthy parts using fuzzy inference or fuzzy signature based on a set of statistical image parameters such as entropies, fuzzy hough transform, wavelet analysis.

Main researcher(s)' contact(s)

Szilvia Nagy (nagysz@sze.hu)

Dr. Szilvia Nagy Phd. is a full professor at the Széchenyi István University, her research interest include wavelet based adaptive differential equation solving and image processing. She is also interested in medical, mechanical and electronical image processing and entropy based methods in these fields.

Dr. Ferenc Lillik (lilikf@sze.hu)

Dr. Ferenc Lilik is a senior research fellow of Széchenyi István University. Beside wired communications technology of access networks he specializes in computational intelligence, particularly in fuzzy logic and fuzzy inferences. He publishes and takes part in various research fields e.g. telecommunications, medical sciences or industry automation.

6.2. External partners with whom HEI's interact in Social Innovation issues

Polytechnic of Leiria

Leiria Social Innovation Hub

Leiria Social Innovation Hub is a branch of StartUp Leiria (incubator and accelerator), together with Polytechnic of Leiria, funded by Portugal Social Innovation (a government initiative aimed at promoting social innovation and stimulating the social investment market in Portugal). It intends to develop conditions for access to knowledge, partnership networks and social investors, in order to enhance the creation and replication of new solutions to the social and environmental challenges that the country faces. The objective will be to make the Leiria region a reference geography, in national terms, for the creation of new innovation and social entrepreneurship initiatives.

<https://startupleiria.com/en/home-en/>

SPEAK

SPEAK promotes the integration of migrant and refugee people in their new cities through a language / cultural exchange program and social events. SPEAK provides an exchange of languages and cultures in language groups and events, with the aim of facilitating the integration of migrants in their new communities. The program generates social impact by breaking the language barrier, bringing people of different backgrounds together and promoting the appreciation of difference and cultural diversity.

<https://www.speak.social/en/>

NHL Stenden

Health Hub Roden

By making our knowledge, facilities and network available, we contribute to innovative health tech, and thus indirectly to the quality of life of all people. We form a "hub": a connecting link between entrepreneurs, knowledge institutions, government and other involved organizations. The Health Hub Roden ecosystem is an environment where issues from the professional field are quickly converted into concepts and products. These are developed, tested and assessed for desirability and (technical and operational) feasibility together with all parties involved. Health Hub Roden = a health tech innovation playground

<https://healthhub-roden.nl/about-us>

FAITH Research

Every day we ask ourselves how we can provide vulnerable people with the best possible care. Together we think about the future of the elderly, people with an intellectual disability or mental illness. And more importantly: we share the knowledge and expertise that we have in-house. FAITH is the learning community that develops and connects knowledge. Within FAITH, a large number of parties bundle their expertise and experiences in the field of frailty. Together we provide more insight, practice-oriented knowledge, evidence-based interventions and we conduct research into their application in a personalized approach with an eye for the possibilities of technology and eHealth.

<https://www.fairesearch.nl/over-faith>

CELTH

The Centre of Expertise Leisure, Tourism and Hospitality (CELTH) is one of the 30 Centres of Expertise in the Netherlands. The initiative to found it was taken by universities of applied sciences, the Ministry of Education, Culture and Science and the Ministry of Economic Affairs & Climate. Its goal is to encourage public-private partnerships between universities of applied sciences and industry partners.

<https://www.celth.nl/en>

IPCA

InvestBraga

InvestBraga, the Agency for the Economic Dynamization of Braga, was created in March 2014, to act as the economic wing of the Municipality, with the mission of promoting the economic development of Braga. InvestBraga works on the attraction of investment and entrepreneurs, making the innovation factor a major competitive advantage.

InvestBraga's activity covers four areas:

Economic dynamization and national and international investment attraction for the Municipality, through the Agency for the Economic Dynamization of Braga.

The development of pre-acceleration, acceleration and incubation programs for startups with global ambition, through Startup Braga, which is an innovation hub designed to support entrepreneurial projects of great potential. Startup Braga works with dedicated and determined teams, who want to reach international markets.

The promotion and organization of fairs, congresses, seminars and events, in Altice Forum Braga, aligned with the strategic positioning of the city in the national and international context.

The most recent business unit, Braga Youth Center, whose mission is to ensure accommodation and work conditions, capable of promoting Non-Formal Education, Human Rights and promoting projects of Creativity, Entrepreneurship, Citizenship and Youth Associations. It will seek to assert itself as a reference equipment for carrying out work with young people, with high quality standards, capable of implementing youth policies from a local and international perspective.

<https://www.investbraga.com/AboutUs/InvestBraga>

LIT

Hartnett Enterprise Acceleration Centre

The Hartnett Enterprise Acceleration Centre is a business acceleration centre serving Ireland's Mid-West region located on campus within Limerick Institute of Technology (LIT). Our mission is to deliver a unique business environment that stimulates innovation, research commercialisation, internationalisation and entrepreneurship.

The Hartnett Centre supports growth companies through programmes of support such as the Enterprise Ireland New Frontiers Programme, the national entrepreneur development programme which following a recent independent evaluation showed a 564% ROI. Additionally, the centre is host to an Entrepreneur in Residence programme where individuals who have been hugely successful in their sector support their nascent entrepreneurs on their start-up journey. Other supports include a mentoring programme, start-up clinics, workshops, network connections, funding opportunities and investor connections.

Through our Hartnett Enterprise Acceleration Centre alone, the entrepreneurs that LIT has supported through its programmes of support have created around 1000 jobs and raised around €70m in investment. The HEAC is also home to the Research Centres Shannon ABC www.shannonabc.ie and the ACORN Research Centre. <http://www.acornresearch.ie/>

The Centre has 18 business incubation units available to promoters of early-stage companies. Each of these units is approximately 25 square metres each and can comfortably accommodate 1 to 4 people. There are several accommodation offerings for start-up business clients. The first

option is to take a unit or units while other options include our 'ready to go shared office solution' or 'hot desks' while virtual incubation services are also available. For companies that are starting to grow some of our offices can open out into a space for 8 - 10 people.

<http://www.hartnettcentre.ie/About.php>

QUESTUM Acceleration Centre

Questum is an LIT innovation centre based in Clonmel Tipperary, with enterprise, education and research at its core. Our enterprise and innovation mission is to turn ideas into innovation and innovation into thriving business, helping to drive economic growth within our region and across Ireland. The centre has a mix of lab, office space, meeting and training rooms. Similar to the Hartnett Centre, Questum has an Entrepreneur in Residence Programme with Tom Brennan co-founder of EirGen Pharma and Trivum Vet amongst other roles. The centre has a high value advisory team who support the start-up companies based in the centre who are all high growth innovative companies. The centre also has an LIT digital lab that is host to funded projects driven by LITs Clonmel campus.

The centre comprises of nearly 2,000sqm of office and lab space and is currently home to 13 innovative growth companies.

<http://www.questum.ie/>

Thurles Chamber Enterprise Centre (TCEC)

TCEC is one of LITs on campus incubators for innovation and growth, driving business start-ups in the Mid-West region of Ireland. TCEC has been running entrepreneur development and start-up support programmes, business development, mentoring and events such as breakfast club and lunch'n'learn since opening in 2012 supporting the creation of around ~250 jobs.

<https://thurleschamber.ie/>

Innovate Limerick

Innovate Limerick was established by Limerick City and County Council to help drive innovation and act as the delivery mechanism for the projects outlined in the Limerick 2030 plan and the Limerick Regeneration implementation plans and others. It is a public-private partnership company whose Board is made up of key partners from the private sector together with elected members and representatives from LEDP, LIT, UL, EI, Tait House, LCETB, Limerick Chamber and Limerick Regeneration. One of Innovate Limerick's core objectives is to work with the key stakeholders to develop Limerick's business ecosystem and position Limerick City and County as one of the most attractive locations to start and grow a business. The company seeks to accelerate innovation in Limerick by providing a supportive environment that will facilitate and encourage higher levels of innovation across the various stakeholders and sectors in Limerick.

<http://innovatelimerick.ie/>

Paul Partnership (People Action Against Unemployment)

PAUL Partnership Limerick is the multi-sectoral partnership company which promotes social inclusion in Limerick City. They are an organisation made up of representatives of communities,

state agencies, social partners, voluntary groups and elected representatives. LIT are a member of the board. They work with local communities and groups of people that have benefited least from economic and social development and aim to improve the quality of life of people living in Limerick City. They were initially set up in 1989, established to address the high levels of long-term unemployment at the time in Limerick City. Since then, their remit has expanded to a broader objective of supporting social inclusion.

AIT

Bord Na Mona <https://www.bordnamona.ie/>

Enterprise Ireland <https://www.enterprise.ie/>

The Shabra Group – Recycling, Reprocessing, Manufacturing <https://www.shabraonline.com/>

Athlone Chamber – <https://www.athlonechamber.ie/>

SZE

Management campus competence centre

The Management Campus Competence Centre offers a continuously evolving portfolio of services which aim at the support of the research and innovation collaboration with industrial partners and local companies, more specifically the development of the international competitiveness and innovation capabilities of local enterprises, primarily those of small and medium-sized companies.

The main activities of the Management Campus are the following:

1. Student Innovation Projects (SIP)
2. Innovation facilitation
3. Management Research
4. Technology transfer and the development of student innovation

It is the Management Campus Competence Centre which is responsible for technology transfer at the university level, including the registration and commercialization of intellectual property (IP), together with the mapping and presenting of the knowledge assets (including research infrastructure and equipment) of the university. A major project, “The development of the innovation ecosystem aiming at the utilization of the knowledge assets at Széchenyi István University” enables the Competence Centre to conduct a range of training programmes on innovation and entrepreneurship for students and faculty members alike. The Management Campus gives room for fruitful cooperation between students and mentors in the field of product development. A “Proof-of-concept” fund is being established, the primary function of which is to support the utilization of the results of university research and the creation of

prototypes as well as business plans, together with the market research for starting spin-off companies. Cooperative partners of the MC are: StartupCampus; Hiventures, Quantumleap, EIT Urban mobility, OXO Labs, Smart project consulting infromatkai Kft.

Contact person: Dr. Dóry Tibor (doryti@sze.hu)

Globalization Competence Centre

The main purpose of establishment of the Globalization Competence Centre was:

Search for solutions to current global problems via an interdisciplinary initiative established by the faculties of Széchenyi István University with the collaboration of external institutional partners; establish international research consortia (for fund-raising purposes); encourage international co-author publishing activity; improve international visibility of Széchenyi István University (lecturers / researchers); make global issues comprehensible at national, regional and local level; communicating national priorities in a global context.

Research Focus Areas are:

1. Globalization: international capital flows; international trade; Global Value Chains (GVCs); international labour flows; the role of the nation-state in the globalizing world economy; changing the role of the European Union in the global economy, regional power relations in the world economy.
2. International Development and Aid: The Belt and Road Initiative (BRI): Research into the activities of the Chinese government's global development strategy created from the integration of the Silk Road Economic Zone and the 21st Century Sea Silk Road initiatives established in 2013 with the involvement of 152 countries and international organisations, and the bank coordinating its infrastructural investments, The Asian Infrastructural Investment Bank (AIIB), and including Hungary's role.
3. Technological development: Research related to this topic examines the spread and economic / social impacts of industry 4.0 technologies, AI, FinTech and Bitcoin both globally and in Hungary.
4. New forms of production, service and consumption: Sharing economy: Impact of globalization on new models of distribution of goods and consumption, changes in peer-to-peer and B2C collaborative distribution. Non-profit collaborative initiatives. The role of urban lifestyle, demographic restructuring and collaborative distribution. The impact of post-materialist thinking and macroeconomic constraints on new forms of consumption.
5. Energy - energy security: Research on this topic addresses the global evolution of hydrocarbons and their substitution with alternative energy sources, as well as related environmental issues and infrastructure investments.
6. Agriculture - Food security: Research related to this topic focuses on trends in global agricultural production and the major global challenges facing agriculture (eg climate change, population growth) and the development of global agribusiness (horizontal and vertical industrial relations related to agricultural production) and the examination of all these aspects in Hungary.
7. Education: Research related to this topic is mainly concerned with the internationalization of higher education institutions (eg student / teacher mobility, cross-border training programmes,

research projects, launching of foreign language taught academic programmes). Special attention will be paid to the position of Hungarian higher education institutions in the internationalization process and how they have benefitted and will benefit from it.

Contact person: Dr. Lukács Eszter (lukacs.eszter@sze.hu)

Mobilis - science centre

It was created with the belief that through this centre many of the visitors, especially kids, can be brought closer to science and to technical professions. The more than 3000 sq meter building is located on the campus of Széchenyi István University. The centre opened in March 2012 and is run by a nonprofit company, owned in majority by the Municipality of Győr, and in minority by Széchenyi István University.

Mobilis has participated in a number of national, EU co-financed and international projects. Two major international projects worth mentioning are: RRI Tools (<http://www.rri-tools.eu/>) and Tinkering EU (<http://www.museoscienza.it/tinkering-eu/>). The project 'Tinkering: Contemporary Education for Innovators of Tomorrow' ('Tinkering EU') aimed to implement tinkering as an innovative pedagogy at European level by creating a Europe-wide community of practitioners and encouraging exchange of expertise and practice between formal and informal learning institutions.

'RRI Tools' was a three year long project (2014-2016) funded under the European Commission (EC) Seventh Framework Programme (FP7 2007-2013) to foster Responsible Research and Innovation (RRI) in Europe with a view to a harmonious and efficient relationship between science and European society.

Contact person: Bernadett Keszthelyi (keszthelyi.bernadett@mobilis-gyor.hu)

6.3. Facilities available in partner HEIs which may be used in Social Innovation projects in collaborative innovation with external partners

Polytechnic of Leiria

LIDA facilities and specific equipment

3D Printing Laboratory; Audiovisual Workshop; Photography Workshop, Digital Workshop; Ceramics and Glass Workshop; Engraving and Serigraphy Workshop; Theatre Workshop; Woodworking Workshop; Metals Workshop; Common Laboratory for Experimentation and Dialogue.

CICS.NOVA facilities and specific equipment

Laboratories Human Motricity, Music, Multimedia, Communication, laboratory of fine arts, Laboratory of Languages and Translation; radio studio; television studio; digital equipment to support people with specific needs with Braille printers.

CIEQV facilities and specific equipment

Human Kinetics Lab: biopack, Minnesota dexterity test, MABC-2, KTK and BOT-2 test kits, UFOV Test

ciTechCare Laboratories and associated facilities in Campus 5 of Polytechnic of Leiria

Disease Biomarkers Lab; Clinical Microneurography Lab and Epidemiology Lab. Simulated practice laboratory.

CRID (Resource center for digital inclusion)

Equipment adapted to citizens with specific needs, aims to be a privileged service to support the community in the area of digital accessibility. Endowed with technological resources and promoted by qualified technicians, this center has the mission of promoting the social inclusion of the population with specific needs through the use of technical aids / support products within the scope of digital accessibility

NHL Stenden

SeGa-Lab

The SeGa-Lab is the Serious Gaming Lab of NHL Stenden University of Applied Sciences. The SeGa-Lab provides training and assessment, carries out applied research and offers facilities in the area of serious gaming.

<https://www.nhlstenden.com/en/research/professorships/i-human-health-care-digital>

MEE lab

There is no self-evident solution for many issues surrounding people with a visible or invisible disability, such as mild intellectual disability (MID), autism spectrum disorder (ASD) or non-congenital brain injury (NAH). They require an innovative view and a design-oriented approach, in order to get off the beaten track towards good, refreshing, but above all suitable solutions. That happens in the MEE lab! By examining the wicked problem through design thinking, we systematically work towards one or more scenarios in the MEE lab: possible solutions for the complex problem we started with. At the start we have no idea what a possible solution or scenario will be. We do know that these are not bite-sized chunks (solutions), but that through design thinking we can look broader, off the beaten track and out-of-the-box to arrive at refreshing, innovative scenarios. These scenarios are the concrete result of a project that is carried out from the MEE lab. <https://meelab.nl/>

Future Design Factory

The Frisian Design Factory is looking for concrete solutions for multidisciplinary problems. We work with real assignments from companies. A lot of companies can innovate in their own sector, but finding cross-sector innovations/solutions turns out to be a challenge. Our approach goes beyond the boundaries of sectors. We are concerned with issues of the future and seek solutions for Rural Design. These solutions we create with teams of students, creative experts, researchers, and research institutions and companies. Our method Design Thinking generates new knowledge and skills, in addition to concrete solutions for these issues. Our approach contributes to regional business, economic strength, and jobs. You will be working in interdisciplinary teams, with students from different educational institutes. You will be working on real assignments and provide the client with different prototypes. We have our own studio in an old prison in the centre of Leeuwarden, the Blokhuispoort. <https://www.nhlstenden.com/en/courses/minors/frisian-design-factory>

Innovation Lab

Innovate in an online Community of Practice: the platform innovationlab.nhl.nl supports innovative projects and courses at and with NHL Stenden University of Applied Sciences. Furthermore the platform facilitates international collaboration for students and staff. The principles of Universal Design for Learning and Design Based Education are leading in the further development of this platform. <https://innovationlab.nhl.nl/>

IPCA

ID+ facilities and specific equipment

ID+: The Design School is equipped with Laboratories to support research. In particular, the Audiovisuals Laboratory and the Product Development Laboratory are privileged facilities for the development of projects. Both fully equipped are also leverage in the relationship with the regional companies with which we have been developing partnerships.

LIT

The Buzz Quarter, LIT Questum Acceleration Centre, Clonmel, Tipperary is a state of the art digital workspace for a team of 4.

AIT

Bord Na Mona Boora – Empower Eco Innovation Hub HQ
Midlands Innovation and Research Centre
The Research Hub

HAMK

Design Factory

Design Factory is an interdisciplinary product and service design and learning platform uniting students, teachers, researchers, and industry. Our goal is to build passion-based learning culture at HAMK. As product and service design platform Design Factory brings HAMKs education facilities and equipment as well as research units' expertise to industry use. In Hämeenlinna the product development laboratory of Degree Program in Design offers design expertise and services for 3D-scanning, modeling and printing (clay&plastic), digital paper and textile printing as well as laser cutting.

<https://www.hamk.fi/design-factory/?lang=en>

SZE

Municipality of Győr
Municipality of Győr-Moson-Sopron County
Municipality of Mosonmagyaróvár

6.4 Current links with external partners in Social Innovation area

6.4.1.Engagement mechanisms - How do we, at your HEIs, already interact with external partners in Social Innovation area?

Polytechnic of Leiria

There are several means through which Polytechnic of Leiria interacts with external partners (local community, third sector organizations, firms, incubators and accelerators) in the social innovation domain. These include: i) innovation projects developed in collaboration with external partners, focused on Social Innovation; ii) knowledge-intensive services provided to firms and third sector organisations; iii) social entrepreneurship support; iii) continuous support provided to the community through the utilisation of specific equipment and collaboration of specialised human resources.

Specific examples are described below, for each of this means of interaction.

i) Innovation projects developed in collaboration with external partners, focused on Social Innovation

Selected example - 100% IN® - Full inclusion of students with specific needs

The heterogeneity and specificity of students in the higher education universe encourage awareness that the education paradigm has changed; that is, it is necessary to know the barriers that each student may have in access to learning, in order to improve the quality of the educational system, taking each and everyone to the limit of their potential. In 2018/2019, the Polytechnic of Leiria decided to find a systemic, organized and sustainable intervention strategy to receive, monitor and ensure that students with specific needs enrol, remain and complete their academic training in higher education. With the support of an external partnership, in this case, from the Padre António Vieira Institute (IPAV) the project 100% In[®] was funded by Portugal Social Innovation (Partnerships for Impact program), together with 12 firms, from diverse sectors, located in the region of Leiria and Oeste. This project aims at an integral approach, which implies that it must consider the person as a whole (360° inclusion), but also because it seeks to involve the entire institution and the surrounding community in this mission.

ii) Knowledge-intensive services provided to firms and third sector organisations

Selected example – Social Impact Assessment

A group of teachers at the School of Education and Social Sciences, has developed expertise in social impact assessment. They have supported third sector organizations with their project applications, assessing the expected social impact of the proposed interventions.

Main contact: Cristovão Margarido cristovao.margarido@ipleiria.pt

iii) Social entrepreneurship support

Selected example – Leiria Social Innovation Hub

Polytechnic of Leiria stimulates new business ideas and new firms through its regular Entrepreneurship contests, including mentorship from the business idea to the business plan and firm creation. Besides, Polytechnic of Leiria is a Social Entrepreneur (meaning co funding and supporting activities) of Leiria Social Innovation Hub. The objective is to make the Leiria region a reference geography, in national terms, for the creation of new innovation and social entrepreneurship initiatives.

iv) Continuous support provided to the community, particularly people with specific needs

Selected example – CRID

With regard to activities aimed at citizens of the external community with some type of specific need, the Resource Center for Digital Inclusion (CRID) is, since 2006, a reference in the academic community of the Polytechnic of Leiria, but also in the region. Indeed, CRID is a catalyst for close relations with people and institutions, in reinforcing the mission for which it was created: facilitating the participation of citizens with disabilities in the information and knowledge society. Around this main objective, the activities developed by CRID include: the assessment and advice on the types of equipment or support products and the respective use strategies,

appropriate to the needs of citizens with disabilities; support and training for professionals from schools, hospitals, associations supporting the disabled, social security, employers and parents, or other educators, in the use of assistive technologies; study of the potential for development, design or adaptation of technologies in the area of assistive technologies, crossing knowledge and experiences from multiple scientific areas.

Main contact: Célia Sousa celia.sousa@ipleiria.pt

NHL-Stenden

Through design thinking it is possible to look broader, off the beaten track and out-of-the-box to arrive at refreshing, innovative scenarios. Our method Design Thinking generates new knowledge and skills, in addition to concrete solutions for these issues. Our approach contributes to regional business, economic strength, and jobs. We work in interdisciplinary teams, with students from different educational institutes. Collaboration is a must, particularly when it comes to solving complex social issues. To this end, it is necessary to find new ways to gain access to knowledge and to connect disciplines that do not normally work alongside one another. Main contact: Peter Joore peter.joore@nhlstenden.com

SZE

Management Campus
Unilnno Kft.

6.4.2 Postgraduate Training linked to Social Innovation

Polytechnic of Leiria

Master Accessible Communication

Main contact: Carla Sofia Costa Freire (carla.freire@ipleiria.pt)

Master Special Education - cognitive-motor domain

Main contact: Maria Antónia Barreto (antonia@ipleiria.pt)

Master Intercultural Mediation and Social Intervention

Main contact: Ricardo Vieira (ricardo.vieira@ipleiria.pt)

Post-Graduate course Management of Social Intervention Organizations

Main contact: Rui Santos (rui.d.santos@ipleiria.pt)

Post-Graduate course Adapted Sports and Physical Activity

Main contact: Raul Antunes (raul.antunes@ipleiria.pt)

NHL-Stenden

Master Health Innovation

Main contact: Job van 't Veer (job.van.t.veer@nhlstenden.com)

Master Design Driven Innovation

Main contact: Peter Joore (peter.joore@nhlstenden.com)

Master Serious Gaming

Main contact: Boudewij Dijkstra (boudewijn.dijkstra@nhlstenden.com)

SZE

Győri Szakképzési Centrum (Adult education)

Győr-Moson-Sopron Megyei Kereskedelmi és Iparkamara (Chamber of Industry);

Győr-Mosons-Sopron Megyei Mérnöki kamara (Chamber of Engineering)

7. AUDIT OUTPUTS AND NEXT STEPS – PREPARATION OF STRATEGIC PLAN FOR EUROPEAN INNOVATION HUB DEVELOPMENT

Summary discussion

This first draft of the RUN-EU partner Cluster Audit has allowed for each organisation to present their activities within the three thematic areas of the future European Innovation Hubs. This database will enable the work-package team to work with these clusters to identify their critical mass for larger cluster formation to target 'low hanging fruit' opportunities based on regional, national and European RDI activities, developments and funding opportunities. Further to this, research groups and centres in early stage development will be partnered with well developed clusters to provide additional expertise and training. Clusters will engage with regional partners and develop a RUN-EU associated partner online network to promote and enable engagement, as detailed within the EIH strategic plan, currently in development.

Interwork-package collaborations will be a main goal to assist and inform on the development of skills needs and training opportunities as they arise through cluster engagement in RDI, and identification of SAPs, structured programmes, FASA linking and mobility programmes.

It is envisioned that this Audit will be a living entity which will be updated as Clusters develop and evolve their activities, partnerships and capabilities.

Next Steps

As part of preparation of the next deliverable of this work-package, the strategic plan, the work-package team will focus on the following key topics from a regional perspective. This is essential to determine which EIH will have greatest impact on what regional area and clusters.

- Social regional context of each RUN-EU region and public policy / strategic documents relevant to key Thematic Areas
- Availability of Human Capital in Core Tech Transfer and Innovation areas
- Track Record of Lead Principal Investigators
- SWOT analysis
- Risk mitigation recommended actions
- Marketing and Information Dissemination Processes

8. ANNEX

Annex 1- Structure of the form distributed by the eight members to receive the first responses

Work Package 2.1: Current RDI Cluster Activities	Work Package 2: Establishment of European Innovation Hubs		
Current Centres / Partnerships / Clusters	Future & Sustainable Industries	Bioeconomy	Social Innovation
Research Centres			
Industry Ecosystem / Partners (Entrepreneurial associations, Firms, Incubators/Accelerators)			
Other Hub Entities (Societal, Regional Promotion entities, Government agencies)			
Please enter details of your reseach centre / partners / other clusters or hubs which you are involved in as part of individual or joint research, development & innovation projects.			
Please enter the particular area of these centres or partnerships which best align to the three strategic development themes for European Innovation Hubs.			



**POLITÉCNICO
DE LEIRIA**



IPCA INSTITUTO
POLITÉCNICO
DO CÁVADO E DO AVE



AIT
Connect & Discover



LIT
LIMERICK INSTITUTE
OF TECHNOLOGY



HAMK
HÄMEEN AMMATTIKORKEAKOULU
HAMME UNIVERSITY OF APPLIED SCIENCES



**SZÉCHENYI
EGYETEM**
UNIVERSITY OF GYŐR



**NHL
STENDEN**
university of
applied sciences



FH Vorarlberg
University of Applied Sciences