

D5.1 Audit and characterization of RUN-EU Alliance RDI units

(M6 April 2021)

*(Limerick Institute of Technology-LIT (WPL
IPCA WPCoL)*

Content

Table of Contents	
1. WP5 RUN-EU Discovery Program	3
1.1. Sustainable Inter-regional Research and Innovation Projects.....	3
2. D5.1 Audit and characterization of RUN-EU Alliance RDI units (M1-M6)	5
2.1. The RUN-EU members perform an internal audit of their research unit skills and infrastructures..	5
2.1. 1. Research Area Future Looking Teams Audits.	10
2.1. 1. 1. Research Area 1: Creative Art, Design and Materials Thinking	10
2.1. 1. 2. Research Area 2: Food & Biotechnology	19
2.1. 1. 3. Research Area 3: Tourism	31
2.1. 1. 4. Research Area 4: IOT & Cybersecurity	40
2.1. 1. 5. Research Area 5: Advanced Manufacturing	51
2.1. 1. 6. Research Area 6: Climate Change Circular- Economy & Decarbonisation	65
2.1. 1. 7. Research Area 7: Education & Social Sciences.....	80
2.1. 1. 8. Research Area 8: Health & Wellbeing.....	93
2.1.2. Research Area Future Looking Teams Audits- Knowledge and existing Intellectual Property/Knowledge know-how and tools.....	106

1. WP5 RUN-EU Discovery Program

1.1. Sustainable Inter-regional Research and Innovation Projects

The RUN-EU partners are fully committed to effecting transformational change, whilst continuing to be champions for academic freedom, quality and excellence. The RUN-EU long term vision places research, innovation and engagement, innovative teaching, learning at the centre of the alliance activities and plots a course to implement the shared, integrated and long-term joint strategy of the ‘European Universities’, as envisaged by the EU, by 2025. Policymakers and funding agencies have emphasised the importance of research that has societal and economic impact. Our consortium is no exception. The traditional research indicators of peer-reviewed publications, international conferences and research income from funding agencies will form part of the quantitative and qualitative metrics we will use to measure our performance. Societally we will measure the impact of research and innovation in developing, supporting and implementing policy, and supporting the uptake of innovative solutions in industry and society to address global challenges. Our impact will create and diffuse high-quality new knowledge, skills, technologies and solutions to global challenges and the economic impact will foster all forms of innovation, including breakthrough innovation, and strengthening market deployment of innovative solutions directly to industry floors of our research partners.

Within WP5, RUN-EU, using a Challenge-based approach, will build European future-looking RDI teams of researchers, research students, academic staff, businesses, regional and social partners to address societal challenges in a multi-disciplinary approach thus delivering innovative solutions adaptable to different regions in Europe.

This WP will focus on the operationalisation of the RDI activities, through strong collaboration among Partners, Regional Innovation Clusters and European Innovation Hubs creating future-looking joint RDI teams and procedures, to increase and embed sustainable Inter-regional research and innovation projects across the RUN-EU alliance during the three years of the project.

On the establishment of the European Innovation Hubs (EIH’S) as part of WP 2, the work of the international RDI teams formed in WP 5 will be progressively updated and integrated in a sustainable manner into the relevant EIH’s through sustainable Inter-regional Research and Innovation Projects.

WP5 will deliver:

- increased international collaborative RDI activities among RUN-EU members, thus strengthening the current individual and joint RDI capabilities;
- create joint future-looking international RDI teams addressing real challenges identified by WP2, related to major societal challenges such as climate change, sustainable and renewable energy, the bio-economy, social innovation and cybersecurity;
- promote social and industrial innovation, including investment in key technologies and activities and the provision of better RDI support to small businesses and public entities.
- ensure that technological and social breakthroughs are transformed into viable products and activities with real commercial and societal potential, built upon partnerships with industry and governments;
- improved the links between teaching, research and innovation, by engaging teachers and research staff in SAP design, as part of WP6.

Investing in research and innovation is investing in Europe's future thus improving the competitiveness of our regions while preserving our unique social model. Throughout the duration of the project, the coordination team of WP5 will identify new areas of expertise and relevant topics for research projects in collaboration by all alliance members, key associate partners and where applicable international experts. RUN-EU WP5 will foster an Open Science approach focused on spreading knowledge as soon as it is available using digital and collaborative technology to maximise societal benefits. RUN-EU will also open the innovation process to people with experience in multiple domains. The inclusion of all stakeholders in the research and innovation process, including the encouragement of their inclusion as members of the RDI teams when applicable, together with relevant mobility programmes will stimulate the transfer of knowledge within the alliance and support the vision to support open and citizen science initiatives. This knowledge can then be used to develop products and services that can stimulate new markets which will benefit the wider RUN-EU regions and ultimately the EU. WP5 will promote research mobility opportunities for research teams, collaboration in online and open learning environments, thus positively impacting on the education of students, the generation of joint programmes and regional as well as interregional development.

2. D5.1 Audit and characterization of RUN-EU Alliance RDI units (M1-M6)

2.1. The RUN-EU members perform an internal audit of their research unit skills and infrastructures.

The ambition of our long-term vision and researcher ecosystem plan in WP5 within RUN-EU is shaped by international policies and initiatives including Horizon Europe which has as its vision a sustainable and prosperous future for people and the planet helping to achieve the sustainable development goals (SDG). 'This ambitious EU research and innovation framework programme (2021-2027) aims to strengthen the EU's scientific and technological bases and the European Research Area (ERA) and to boost Europe's innovation capacity, competitiveness, and jobs to deliver on citizens' priorities and sustain our socioeconomic model and values.

Our vision

A sustainable, fair and **prosperous** future for **people** and **planet** based on European values.

- Tackling **climate change** (35 % budgetary target)
- Helping to achieve **Sustainable Development Goals**
- Boosting the Union's **competitiveness and growth**



Credits: <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

May 2019 | Version 25



Figure 1 Horizon Europe Vision

(https://ec.europa.eu/info/sites/info/files/research_and_innovation/strategy_on_research_and_innovation/presentations/horizon_europe_en_investing_to_shape_our_future.pdf)

Our RUN-EU and WP5 ecosystem vision plans for a scaling of the capability of the technological higher education sector building on regional, national, and international policies, strategies and initiatives. The ‘knowledge square’ of research, innovation, education and society will be the foundation of our knowledge-based research approach in WP5, disseminating knowledge, transforming ideas into businesses, delivering global impact, value and innovative solutions for the economy and for society. Research and innovation activities will help us to remain at the forefront of the disciplines we offer within RUN-EU and to maintain our strong links with industry and community stakeholders. It will facilitate the development of the next generation of research leaders who will contribute regionally and nationally to RUN-EU’s knowledge economy and beyond. Research will directly inform our teaching, and it signifies a key opportunity to step up the academic ladder for our students, a postgraduate opportunity.

Our plan is aimed to ensure a high level of enhanced, sustainable research cooperation across all levels of the organisation and across different areas of research activity that will build on their complementary strengths and where research students and staff are empowered to implement our vision and exceed our goals. This ambition is mirrored in our consortium long-term strategy, by virtue of its immersive inter-regional approach which utilises a ‘quintuple helix’ innovation model. This involves interactions among five key elements of society: academia, industry, government, culture, and the environment. This will ensure the establishment of research links and structures which will facilitate the creation of a true multi-locational university campus embedded in our RUN-EU regions in collaboration with all relevant stakeholders. Our RUN-EU ‘Future and Advanced Skills Academies’ and ‘European Innovation Hubs’ provide a true engine for research and innovation. WP5 members will function as research and innovation ambassadors to consolidate the connection of the ‘University’ with other actors of the ecosystem including, agencies, investors and the wider business community. Engaging all actors within our University to co-design and co-create interdisciplinary research and innovation will be a key focus. Researchers and groups across the discipline areas will come together to form interdisciplinary clusters within our research institutes.



Figure 2 Horizon Europe preliminary structure

An audit template was created and distributed to partners for completion. The audit address three main areas within RUN-EU partner institutions. Our research audit within D5.1 has the expressed intention of creating joint future looking international RDI teams addressing real challenges identified by WP2 and also the six Horizon Europe identified research clusters; **Cluster 1: HEALTH**; **Cluster 2: CREATIVITY and INCLUSIVE SOCIETY**; **Cluster 3: CIVIL SECURITY FOR SOCIETY**; **Cluster 4: DIGITAL INDUSTRY and SPACE**; **Cluster 5: CLIMATE, ENERGY and MOBILITY** and **Cluster 6: FOOD, BIOECONOMY, NATURAL RESOURCES, AGRICULTURE and ENVIRONMENT**. These six clusters are ultimately designed to deliver of the five overarching missions of the Horizon Europe program namely (1) **Adaptation to climate change including societal transformation**; (2) **Cancer**; (3) **Climate-neutral and smart cities**; (4) **Healthy oceans, seas, coastal and inland waters** and (5) **Soil health and food**.



Figure 3 Horizon Europe research cluster areas

Our RUN-EU research clusters will strive to break classical boundaries between disciplines, sectors and policy areas bringing more collaboration and increased societal impact generating new knowledge with transformative power. Research Impact is now an accepted concept in research measurement and a fundamental aspect of all research programs. This will include social and cultural innovation, facilitated through engagement with stakeholder clusters to strengthen academia-business cooperation, sharing of knowledge, identification of specialist skills needs and the valorisation of the entrepreneurial mindset amongst our research community.

D5.1 is gathering information related to technological systems and research infrastructures, both people and equipment, and facilities infrastructures that are available across the RUN-EU alliance, good practice approaches to our activities with a view to developing and identifying complementary collective expertise and knowledge and existing Intellectual Property/Knowledge know-how and tools. During our WP5 meetings in 2020 and 2021, eight research areas of complimentary research expertise were identified which would form the basis for eight indicative future looking research cluster areas of expertise across the consortium. The areas are: **Research Area 1:** Creative Art, Design and Materials Thinking; **Research Area 2:** Food & Biotechnology; **Research Area 3:** Tourism; **Research Area 4:** IOT & Cybersecurity; **Research Area 5:** Advanced Manufacturing; **Research Area 6:** Climate Change – Circular Economy & Decarbonisation; **Research Area 7:** Education & Social Sciences and **Research Area 8:** Health & Wellbeing.



Figure 4 RUN-EU 8 future-looking joint RUN-EU RDI teams indicative research areas

In this process, the connection with the outputs of the European Innovation Hubs (WP2) will be a differentiating factor for assuring the relevance and impact of our RDI work.

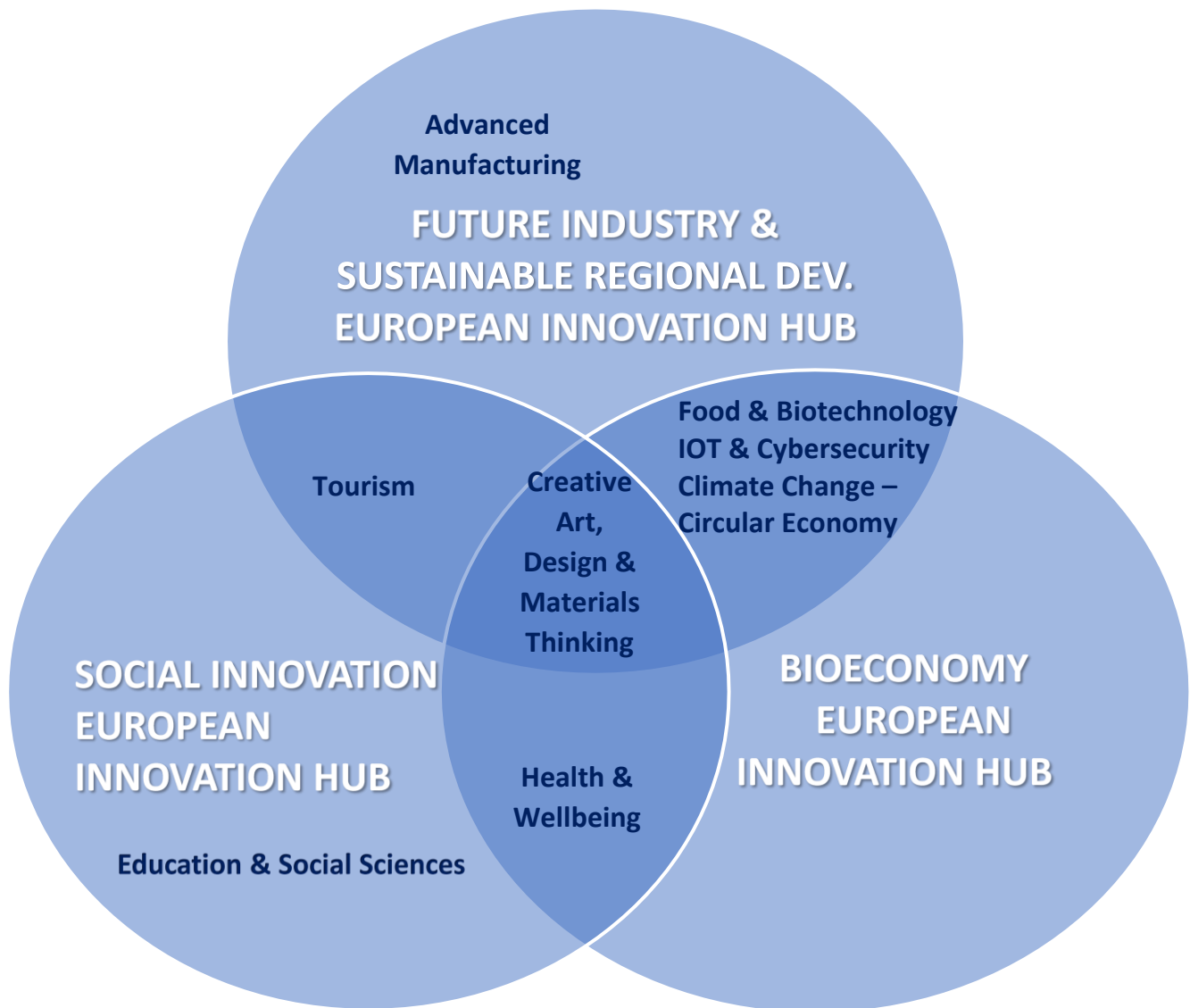


Figure 5 RUN-EU Research Area Clusters and proposed integration in European Innovation Hubs

2.1.1 Research Area Future Looking Teams Audits

2.1.1.1 Research Area 1: Creative Art, Design and Materials Thinking

The EU represents a unique diverse way of combining economic growth with societally impactful development. This model is constantly evolving to deal with the societal challenges as they emerge. Horizon Europe Cluster 2, Culture, Creativity and Inclusive Society aims to foster greater understanding of a culturally and socially rich Europe. Specifically identified within this cluster is 'a need for research and innovation that increases our knowledge about the current developments of European societies and that directly develops solutions for the future'. Further cluster 2 states that in order to develop new solutions driven by innovative new thinking in addressing existing and emerging societal challenges the 'cultural and creative sectors should be integrated in research and innovation processes'. New 'inter-disciplinary, inclusive, cross-sectorial, cross-national' teams should be developed to elaborate new innovative theories and blueprints should combine the social sciences and the humanities with the sciences and technological discipline areas in multi-disciplinary research an innovation team. It is therefore necessary to find new ways to gain access to knowledge and to connect disciplines that do not normally work alongside one another. RUN-EU is aware that single organisations cannot develop all the knowledge necessary to take major steps forward. 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 in Future Design Factory's, Circular Design Labs and Master Design Driven Innovations.

Within Research Area 1 of the RUN-EU discovery program we aim to directly address these assertions. We aim to co-develop applied research and creative activity ways of transferring knowledge between scientific and technological disciplines of different origins through art and design methodologies. The heuristic potential of creativity in the relationship between technology and art will be a central theme within this research area 1 team's mission to develop applied research activities, experimental development and knowledge transfer in the domains of design, materials, creative arts and culture. The audit has identified research capacity that will bring together 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. This will include design for a good digital life where research focuses on user experience and design for emotions, and employs design thinking in research projects and product development including the application

of design thinking for the wearable intelligent to integrate new and intelligent textile, sensors, actuators and software. Similarly gaming technology and VR/AR design thinking which is rapidly on the rise in companies and social organisations to create sustainable impact has been identified in the audit as a specialist research knowledge base within the consortium. ‘Serious gaming is serious business’. Within this area the audit identified human-computer interaction, informatics, and machine learning capability with a focus on modelling and codifying human perceptual systems for applied design frameworks aiming to apply these frameworks to creative-arts applications and technologies, impacting the inherent synergies between the creative arts and computing/informatics.

The design of objects, processes, relations, and situations seeks to open up new ways of thinking and acting sustainably with cognizance to global carbon dioxide mitigation challenges central to the horizon Europe research and innovation program. Sustainable materials design, resource wisdom and sustainability are critical to design and product property. Minimising the use of fossile raw materials, for instance in optimized additive manufacturing designs and utilization of side stream materials with added value will allow truly ecological design of products. Also, the additional design properties, such as color palette created from bio-based colorants will bring new aesthetics to interior design. Similarly, digital simulations research will focus on the finite element simulations of complex structures under various environmental loads. The durability of the modern (small or large) artwork to resist the environmental loads is essential in art design, and digital simulations can be performed to check the strength of the structures and additive manufactured design works in early phase. These crosscutting environmentally conscious research capabilities and interest areas identified within the audit will also become research active pillars within this research area.

Table 1: *Collective Expertise and Knowledge of RUN EU Alliance (Creative Art, Design and Materials Thinking)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	LIDA- 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. W: https://lida.ipleiria.pt	Culture, Creativity and Inclusive Society

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>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.</p> <p>W: https://lit.ie/Research-Development/Research/Centres-Groups/What-is-ACADEmy</p>	Culture, Creativity and Inclusive Society
	<p>Interactive Systems Research Group (ISRG)- The Interactive Systems Research Group (ISRG) was formed in 2014. ISRG’s primary research activities are in the areas of Human-Computer Interaction, Informatics, and Machine Learning, and focus on modelling and codifying human perceptual systems for applied design frameworks. Under the proposed Centre for Creative Informatics, the Group aims to apply these frameworks to creative-arts applications and technologies, impacting the inherent synergies between the creative arts and computing/informatics.</p> <p>W: https://lit.ie/Research-Development/Research/Centres-Groups/What-is-ACADEmy</p>	Culture, Creativity and Inclusive Society
	<p>Digital Arts Lab- The Digital Arts Lab is a research group established in 2016 on the Clonmel campus of LIT and is part of the ACADEMY Research Centre. The group exists to pursue research, scholarship, professional activity and consultancy within the Digital Arts discipline. The group seeks to explore the intersection of art and technology and its relationship with broader society, particularly within the areas of Digital Animation, Game Art & Design, Creative Media & Design and Visual Effects.</p> <p>W: https://lit.ie/Research-Development/Research/Centres-Groups/What-is-ACADEmy</p>	Culture, Creativity and Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	<p>Design for a Good Digital Life -Research area focuses on user experience and design for emotions and employs design thinking in research projects and product development. The research results include new, useful and attractive prototypes for products and services, theoretical models, design tools and indicators. One our</p>	Culture, Creativity and Inclusive Society

	<p>focus area is to apply design thinking for the wearable intelligent to integrate new and intelligent textile, sensors, actuators and software.</p> <p>W:https://www.hamk.fi/research/hamk-smart/design-for-a-good-digital-life/?lang=en</p>	
	<p>Sustainable Materials Design- Resource wisdom and sustainability are an attractive design and product property. Minimising the use of fossile raw materials, for instance in optimized additive manufacturing designs and utilization of side stream materials with added value will allow truly ecological design of products. Also the additional design properties, such as color palette created from bio-based colorants will bring new aesthetics to interior design.</p> <p>W: https://www.hamk.fi/research/hamk-tech/?lang=en</p>	Culture, Creativity and Inclusive Society
	<p>The Digital Simulations research area focuses on the finite element simulations of complex structures under various environmental loads. The durability of the mordern (small or large) artwork to resist the environmental loads is essential in art design, and digital simulations can be performed to check the strength of the structures and additive manufactured design works in the early phase.</p> <p>W: https://www.hamk.fi/research/hamk-tech/test-loading-and-analysis/?lang=en</p>	Culture, Creativity and Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic Institute of Cávado and Ave (IPCA)	<p>ID+ Research Institute for Design, Media and Culture- ID+ works towards the inscription and legitimisation of design and associated disciplines in the Arts and Sciences. It develops this mission primarily in the Northern region of Portugal and other peripheral environments, as well as national and international cooperation networks. ID+ operates contextually by producing, transferring, reverting and communicating the scientific and professional knowledge of art, design, media and culture into environments where it may be of benefit. ID+ focuses on both heritage and contemporaneity: contributing to a longevity of art and design legacies and interpreting the rapid challenges of the disciplines in today's World. ID+ is a multidisciplinary research structure anchored in 3 institutions – IPCA (School of Design); University of Aveiro and University of Porto.</p> <p>W: https://idmais.org/</p>	Culture, Creativity and Inclusive Society
	<p>Design for Health – research line from the School of Design IPCA and ID+, focuses its scientific activity on the interface between people and health, developing environments, products and services. This research line This research line is growing in the ID+IPCA, namely in cooperation with the 2Ai research center.</p>	Culture, Creativity and Inclusive Society

	W: https://idmais.org/	
	<p>Digital Design - research line from the School of Design IPCA and ID+, research and analysis on the constant challenges of digital communication for society, institutions and brands.</p> <p>W: https://idmais.org/</p>	Culture, Creativity and Inclusive Society
	<p>Drawing and Audiovisuals- research line from the Design School of IPCA and ID+, the main outputs of this research area are in Illustration and Animation. We are focused in the contemporary discussion of these areas, which have a long tradition and, at the same time, are pioneers in technological innovation. We explore the multidisciplinary space that includes illustration and the animated image, from the construction of the narrative to character development, from art theory to critical reflection on the objects that populate the market and the industry.</p> <p>W: https://idmais.org/</p>	Culture, Creativity and Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	<p>Professorship 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 professorship of Professor Ivo Wenzler shows that serious gaming is serious business.</p> <p>W: https://www.nhlstenden.com/onderzoek/serious-gaming</p>	Digital Industry & Space
	<p>Professorship Open Innovation- On your own you go faster, but together you can get further. These days a single organisation is not able to develop all the knowledge necessary to take major steps forward. Knowledge, after all, is created ever faster and at different places simultaneously. 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. Examples are: the Future Design Factory, our Circular Design Lab, master Design Driven Innovation. The Open Innovation research group focuses on research on cross-sectoral innovation and aims at connecting the various professorships and institutes of NHL Stenden. The ambition of the research group is to develop knowledge that enables students, teachers and professionals to develop new sustainable products, services and other solutions in a systematic, design-oriented manner. The group specifically focuses on design processes in which different types of actors (multi-stakeholder</p>	Digital Industry & Space

	collaboration) work together to solve complex societal issues in a Living Lab environment. W: https://www.nhlstenden.com/en/research/open-innovation	
	Professorship Circular Design- 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.	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István University (SZE)	Faculty of Architecture, Civil Engineering and Transport Sciences, Department of Architecture and Building Construction- fine arts, connections between fine arts and co-arts, connections between architectural design and fine arts. W: https://eet.sze.hu/start	Culture, Creativity and Inclusive Society
FH Vorarlberg University of Applied Sciences (FHV)	The Faculty of Design is concerned with every aspect of visual communication and design. Designing as we understand it always relates to a certain object. The design of objects, processes, relations, and situations seeks to open up new ways of thinking and acting. Each detail is also an aspect that determines an overarching context. Thus, design also always involves cooperation with others. W: https://www.fhv.at/en/fh-vorarlberg/overview/organisation-fh-vorarlberg/departments/faculty-of-design/	Culture, Creativity and Inclusive Society
Recent Selected RUN EU Partner Projects		
<p><u>IPL</u></p> <ul style="list-style-type: none"> • Forest4Future • SafeTrack - Miniaturized wireless devices for continuous monitoring of patients in emergency settings • LIMO do CAIS: Sustainable exploitation of the endogenous resources of S. Martinho Porto • HomeGreens: Domestic Aquaponia • CP2S: Ceramics, Heritage and Sustainable Product <p><u>LIT</u></p> <ul style="list-style-type: none"> • Creative Europe - Crafting Europe 607498 CREA 1 2019 1 IE - CULT COOP2 • Creative Europe - Fashion & Technology - 607618-CREA-1-2019-1-IE-CULT - COOP1 • Interreg Atlantic Area - 4HCREAT - Quadruple helix to stimulate innovation in the Atlantic Cultural & Creative SMEs • Irish Research Council Postgraduate Scholarship - Public STEAM: Inventing Transdisciplinary Tools and Practices for 'Education for Sustainability' in Irish Adult & Community Education Contexts • Creative Europe - Wom@rts - Women Equal Share Presence in the Arts and Creative Industries <p><u>HAMK</u></p> <ul style="list-style-type: none"> • Wearable intelligence (local project) • FE-SFS numerical analysis and simulation methods in fire design • BioColour (https://biocolour.fi/en/frontpage/) 		

- Bioppo: Bio-based Colour Coated Steel Sheet Products. Busnes Finland funded project

IPCA

- FUSION EU - Creative Europe - Fashion & Technology - 607618-CREA-1-2019-1-IE-CULT - COOP1
- HowMI (How am I?) – Home Wearables and Monitors Integrated
- Thertact - Thermo-tactile sleeve for rehabilitation. "MEDISIS IDEAS" is an initiative integrated into the project "MEDISIS"
- Design Enterprises Innovation DEI <https://web.ipca.pt/dei/>
- Wisdom Transfer - Towards the scientific inscription of individual legacies in contexts of retirement from art and design higher education and research. POCI- 01-0145- FEDER- 029038

NHL Stenden

- Erasmus+ Knowledge Alliance- <http://circulardesignneurope.eu/>
- Reversible Large-scale Energy Storage (RELEASE) - NWO Crossover € 10M: <http://www.nwo-release.nl/>
- SIA Living Labs voor Duurzame Bedrijfsovername (serious game for company take-overs)

SZE

- 2019-2020. EFOP-3.6.1-16-2016-00017 Internationalization project of the university, publishing activity in order to increase the international visibility of the University
- 2017-2019 lecture and official contact with the T. Kosciusko University of Technology in Craców
- 2009 - two-month scholarship - 2016 "Exodus - Terra e Cielo"- exhibition and installation in the Hungarian Academy of Rome, Italy
- 2015 Here and Now - National Salon of Fine Arts, Art Hall (Múcsarnok), Budapest

FHV

- Municipal communication in the 21st century (2017-2019)
- MAPTRANS: Mapping processes for transdisciplinary knowledge transfer
- "Landtag explained" - designing public sector communication to foster democratic awareness
- Artificial Design Symposium
- Mixed reality in the context of didactics of history (in cooperation with the Department of didactics of history/ University of Vienna)

Recent RUN EU Partner Publications

IPL

- Santos, V., Macedo; M., Bispo, R. (2020). MASK: A Visual Study on the Facial Expression Behind the Health Mask. in Martins, N., Brandão, D. (eds.) Advances in Design and Digital Communication - Proceedings of the 4th International Conference on Design and Digital Communication, Digicom 2020. Springer.
- Rosa, S., Bispo, R (2020). Baloço de irmãs: Um baloço inclusivo para cadeiras de rodas. VI Conferência Internacional para a Inclusão - Livro de Resumos. pp. 195-203. Escola Superior de Educação e Ciências Sociais do Politécnico de Leiria.
- Caeiro, M., Folgado, M. (2020). Art Staging the Civic: From Rhetoric to Spaciousness. In Crespi, L. (Ed.) Cultural, Theoretical, and Innovative Approaches to Contemporary Interior Design. IGI Global (pp. 208-236). DOI: 10.4018/978-1-7998-2823-5.ch010.
- Neves, S., Macdonald, A., McLellan, E., Poole, M., Harrison-Dening, K., Tucker, S., Bamford, C. and Robinson, L.: Co-designing a care plan guide app to support early conversations about end-of-life care in dementia. In: Martins N., Brandão, D. (eds) Advances in Design and Digital Communication. Digicom 2020. Springer Series in Design and Innovation, vol 12. DOI: https://doi.org/10.1007/978-3-030-61671-7_31
- Lobo, C. (2020). Ceramic products and their chromatic 'DNA' markers. Cultura E Scienza Del Colore - Color Culture and Science, 12(01), 75-81.

LIT

- Fahey, T (2020) 'Graveyard of the Lost' in Graveyard Smash: Women of Horror 2 (New York: Kandisha Press).
- Fahey, T (2020) 'Dearg-An-Daol' in Fiend in the Furrows II (Nosetouch Press) (ed David and Christine Neal).

- Fahey, T (2020) The Unheimlich Manoeuvre Deluxe Edition. (2020) Single author short story collection. Third edition with additional material. (Bristol: The Sinister Horror Company).
- Cashell, K. (2020). *Photographic Realism: The Art of Richard Billingham* (London: Bloomsbury).
- Garland, K. and Ronan, M., (2020) "Investigating User Preference for Reverberation Plugins," in Audio Engineering Society Convention 148.

HAMK

- Domink Strohmeier, Satu Jumisko-Pyykkö. 2019. Audiovisual Quality. Sensory Evaluation of Sound, Ed. Nick Zacharov. CRC Press.
- Anke van Oosterhout, Miguel Bruns Alonso, and Satu Jumisko-Pyykkö. 2018. Ripple Thermostat: Affecting the Emotional Experience through Interactive Force Feedback and Shape Change. In Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems DOI: <https://dl.acm.org/doi/10.1145/2994310.2994370> , Honorable mention award.
- Van Oosterhout, Anke and Jumisko-Pyykkö, Satu and Alonso, Miguel Bruns. 2016. Counteract or assist?: influence of dynamic force-feedback on emotions. Proceedings of the 15th International Conference on Mobile and Ubiquitous Multimedia.
- Jumisko-Pyykkö, Satu and Pesonen, Emilia and Väättäjä, Heli. 2016. Temporal Dimensions of Affect in User Experience of Digital News in the Field, Proceedings of the 20th International Academic Mindtrek Conference.
- Jumisko-Pyykkö, Satu and Markopoulos, Panos and Hannuksela, Miska M. 2015. Who is Moving – User or Device? Experienced Quality of Mobile 3d Video in Vehicles. Proceedings of the 12th International Conference on Advances in Computer Entertainment Technology. DOI: <https://dl.acm.org/doi/10.1145/2832932.2832948>

IPCA

- Tavares, P.; Silva, A.C.; Pereira, J.B.; Teixeira, P.M.; & Matos, D. 2019. Regional transformation through design. Proceedings of 9th International Conference The Future of Education, Florence. Italy. DOI 10.26352/D627_2384-9509_2019.
- Arruda, L., Calado, A., Boldt, R., Yu, Y., Carvalho, H., Carvalho, M., ... Matos, D. (2020). Design and testing of a textile EMG sensor for prosthetic control. In N. Garcia, I. Pires, & R. Goleva (Eds.), IoT Technologies for HealthCare. HealthyIoT 2019. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering (Vol. 314, pp. 37–51). Cham. <https://doi.org/10.1007/978-3-030-42029-1>
- Silva, V., Soares, F., Esteves, J. S., Pereira, A. P., & Matos, D. (2020). Adequacy of Game Scenarios for an Object with Playware Technology to Promote Emotion Recognition in Children with Autism Spectrum Disorder. In International Conference on Human Systems Engineering and Design: Future Trends and Applications (pp. 293–298). Springer. https://doi.org/10.1007/978-3-030-27928-8_44
- Martins, N., Dominique-Ferreira, S., Pinheiro, C. (2021) "Bridging tourism, architecture, and sustainability: Design and development of an app for contemporary architecture built in Portugal", Journal of Global Scholars of Marketing Science. <https://doi.org/10.1080/21639159.2020.1808853>
- Ronconi, Mattia; Brandão Pereira, Jorge; Tavares, Paula. 2020. Representation and reconstruction of memories on public space a documentary strategy about graffiti writing. CONNECTIONS Exploring Heritage, Architecture, Cities, Art, Media, Kent, 2020.

SZE

- Tolnay Imre: Inhuman places - The Role of the Empty Space in Contemporary Painting / Painting-theory annex of the Art Today Magazine of Hungary, January 2017.
- Tolnay Imre: Intersecting Gaze in Rhine Landscape / About the graphics of Anselm Kiefer in the Albertina, Art Today Magazine of Hungary, 2016/4.
- Tolnay Imre: Houses in the Time / retrospective exhibition of Dezső Ekler in Győr, Art Today Magazine of Hungary, 2015/3.
- Tolnay Imre: A Ladder Leaning against the Ruin /Arte in Memoria, Synagogue of Ostia Antica, Rome - Balkon Art Journal, 2009/4.
- Tolnay Imre: Layers of Contents and Durations / about T. Matsukawa graphics in Museum of Győr, Art Today Magazine, 2006/11.

FHV

- Margarita Köhl: "Bilder als Affektgeneratoren. Eine transkulturelle Studie zur bildlichen Verhandlung von Nähe und Distanz in Social Media Umgebungen " in Vernetzte Bilder. Visuelle Kommunikation in Sozialen Medien, Köln: Halem, 2020: S.64-89.
- Angelika Simma-Wallinger: „Zeigen, nicht erklären“, zukunft.orf.at, Beitrag zur Serie „Texte – öffentlich-rechtliche Qualität im Diskurs“, Heft Nr. 24, „Medienqualität in Zeiten von Corona“, ORF 2020.
- Matt, Hubert (2018): „Designkritik ist zumeist einfach die Geste der Verweigerung oder Ignoranz. Eine erste Annäherung.“ In: Was bedeutet für mich Designkritik? Eine Frage. Zwanzig Antworten. Herausgegeben von Ephraim Ebertshäuser. 1. Auflage. Basel u.a.: Prima, S. 29–32.
- Margarita Köhl (2016): Lifestreaming and the Pressure of Reciprocity: Exploring Practices of Connected Presence among Adolescents from Taiwan and Austria; Acta Univ. Sapientiae, Communicatio, 3, p. 49-55.
- Natasha Doshi (2016): English for intercultural awareness - a practical approach; in Teaching ESP in Higher Education. Examples from evidence-based practice. 8th Austrian AUS Language Instructor's Conference. Conference Proceedings; FH Joanneum Gesellschaft mbH Publishing.

Technological Systems & Infrastructures

IPL

- Audiovisual Workshop
- 3D Printing Laboratory
- Photography Workshop
- Engraving and Serigraphy Workshop
- Common Laboratory for Experimentation and Dialogue

- Digital Workshop
- Ceramics and Glass Workshop
- Theatre Workshop
- Woodworking Workshop
- Metals Workshop

LIT

LSAD Gallery has a capacity of 450 seated audience and has a 6-metre drop-down projector and screen which facilities film and broadcast events. LSAD has striven to accommodate the workshops and studios each discipline requires to deliver the technical elements of their programmes.

- Materials distribution area
- Risograph printer
- Digital fabrication and printing area
- Digital laser cutting unit.
- LSAD Studios - Fashion, Ceramic, Fine Art, Kilns, Drying Press, Digital Art Labs
- CSound (audio programming) Max by Cycling 74 (audio programming)
- Pro Tools (digital audio workstation)
- Audacity (digital audio workstation)
- Reaper (digital audio workstation)
- Jupyter Notebooks and Anaconda Environment (computer programming/code editor)
- MATLAB (computer programming)
- Sublime Text (computer programming/code editor)
- Atom (computer programming/code editor)
- Github (code repository and version control)
- Adobe Premier Pro (Video editing)
- OBS (Screen recorder)

HAMK

Infrastructure for wearable intelligence

IPCA

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.

NHL Stenden

Serious Gaming Lab

The Serious Gaming Lab supports all core activities as a workshop for education and research and in the development and transfer of the SeGa solutions portfolio.

Other educational programs and professorships within NHL Stenden University, as well as external partners, play an important role and can act as owners of core activities, when it concerns education or research with serious gaming.

The SeGa Lab already has a portfolio of serious games that can be integrated into various curricula at NHL Stenden (including the Master serious gaming program) and is responsible for managing, updating and transferring (disseminating) this portfolio. The currently available serious games are mainly aimed at the development of generic competencies such as communication, leadership, teamwork, collaboration, change management and project management.

SZE

3D printers & plotters

FHV

Designlabs for 3D Animation, Audio, Coding & Prototyping, Photography, Post-Digital-Design, Video, Virtual Reality, Macpools

2.1.1.2 Research Area 2: Food & Biotechnology

As identified within the audit this I RUN-EU research area aligns most closely to Horizon Europe cluster 6 Food, bioeconomy, natural resources, agriculture and environment. Human activities driven by growing global population and unsustainable resource utilisation and consumption patterns are placing pressures on life ecosystems and natural resources such as soils, water, air and biodiversity which if not addressed will have catastrophic effects on the planet. The EU has the ambition ‘to lead the transition to a sustainable, climate-neutral, circular and environment-friendly economy in full compliance with the United Nations 2030 Agenda, the Paris Climate Agreement and the Convention on Biological Diversity, as “Clean Planet for All” and “Towards a Sustainable Europe by 2030. Therefore, aligned with the Horizon Europe Cluster 6 targeted impacts this RUN-EU research area will build ‘capacities and develop and demonstrate innovative solutions to accelerate the transition to a sustainable and circular management’ and use of natural resources as well ‘as sustainable development and human well-being, including food and nutrition security, in the EU and globally’.

The concepts and skillsets to produce innovative developments of the circular economy, the bioeconomy, the blue economy and the Food 2030 initiative areas have identified as key available skillsets within the RUN-EU consortium by the audit and will be central to this research cluster providing an opportunity to redress the current unsustainable balances within the environment. A transition to sustainable societally impactful utilization of our planet resources can only be successful if it implies a fair distribution and balanced development of these resources. EU policies and strategies designed to foster the transition to an environmentally, economically and socially balanced future

such as EU environmental legislation and policies targeting biodiversity, water, soil and air, the Common Agricultural Policy, the Common Fisheries Policy, the Maritime Policy, the Circular Economy Package, EU Bioeconomy Strategy, the Blue Growth Strategy, the Food 2030 initiative, and the new Industrial Strategy Policy and the 2030 Climate and Energy Framework will frame the work of this research cluster area within RUN-EU.

The audit has identified that within RUN-EU we are focused on innovative applied food and biotechnology circular economy research area in partnership with industry, supporting international operators as well as indigenous players with research that is focused on existing or emerging areas of expertise within the consortium. We will therefore develop a multi-technological applied research area deriving value from natural resources. Our vision will be to be industry's and society's partner of choice for the provision of innovative biotechnological and scientific solutions. Through our RUN-EU network we will become a gateway to technology in the food and biotechnology sectors, creating market-place advantage and added value for our research partners and stakeholders. We will respond to industry's challenges through the development of new processes and novel products from bio-resources. The audit has identified key skillsets in specific discipline area research fields in which we will develop a knowledge-base of expertise e.g. microbiology, biotechnology, molecular biology, controlled environmental life-sciences, digitalisation, analytical science, fungal biology, food development, nutraceuticals and food for health, cell culture, marine and marine extracts research working with companies from a range of sectors including: food, biotechnology, cosmetics, bio/pharma, environmental, nutraceutical, healthcare and marine sectors to deliver innovative research driven societal impact.

The audit has also identified a number of researchers active in the waste and circular bioeconomy areas. As mentioned earlier global population growth leads to increasing demand for food production. Consequently, food-waste generation also increased from production source, processing industries, retailers, and consumers. Food-waste represents a massive systemic inefficiency, which contributes to several national and global issues like land degradation, declining soil-fertility, unsustainable water use, overfishing, food-deficit, malnutrition, inequality, and greenhouse gas (GHG) emissions. A food challenge theme to find a sustainable solution to reduce food loss and waste across the food supply chain from "farm to fork" by developing potentially disruptive enabling technologies to be used at various levels of food-waste chain and to produce food and value-added commodities within the circular economy concept will form a key concept within cluster 2.

Food process engineering and environmental techniques, water technology, animal and plant biotechnology, improvement of nutrition supply for productive livestock, environmental protection, maintaining of ecological systems during agricultural production and precision agriculture have also been identified as key research specialism strengths during the audit and will also be a central aspect of this research area. We will become a centre of excellence in food research, capable of food development and innovation that provides solutions to specific problems that food producers can encounter. Research activity will also focus on and in research and technological development activity on blue economy and marine sciences, more specifically on emerging sectors of the sea economy, such as marine biotechnology, marine biology and aquaculture, and marine food resources. Our infrastructure includes 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 and the valorisation 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. The Value from biomass research areas identified within RUN-EU partners during the audit will focus on cultivating biomasses for special use or utilizing green biomasses and process side streams for new value-added products. Cultivation is based on modern technologies like bioprocesses, vertical farming, sustainable growing media and methods, organic farming etc. Biomass utilization focuses on green industry or green products in e.g. cosmetics, health products, food, colourants, coating, construction. We will also explore digital solutions in the bioeconomy including data analytics, machine learning and the methods and tools of IoT to the digitalisation of different processes in the bioeconomy. The processes are related to, for example, food production chains, carbon sequestration research, circular economy value chains and logistics and are used to optimize the production and value chain. Further research activity will focus on deep understanding of soil to enable sustainable primary production, and biodiversity protection to avoid soil degradation and to promote carbon storage and crop security in the fields. Organic soil improvers, organic fertilizers, biochar will form testbeds combined with different digital measurement technologies, imaging, sensors, drones etc. used and developed to receive data to understand these processes. Similarly, digitization robotics in our agriculture involving machine vision, sensors, multi-robot communication and paths optimization, and human-robot collaboration will focus on robotization of farming tasks has been identified as a research strength.

Table 2: *Collective Expertise and Knowledge of RUN EU Alliance (Food & Biotechnology)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	<p>The Marine and Environmental Science Centre (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 pole has its headquarters at the CETEMARES Building, strategically located in the port of Peniche. This infrastructure is 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, a considerable number of projects took place, 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.</p> <p>W: https://mare.ipleiria.pt/</p>	Food, Bioeconomy, Natural Resources, Agriculture & Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>Shannon ABC- Shannon Applied Biotechnology (SABC) is a state of the art Technology Gateway with a vision to be a leading centre for the development and application of science and technology to applied settings, in collaboration with external organisations, and based on our own research. The research at Shannon ABC is divided into four ‘themes’: Bioprospecting, Bioprocessing, Food Innovation and Analytical and Research Services. Shannon ABC operates a twin track approach to operation – (1) Working directly with companies to assist them with their scientific challenges and (2) Development of our own research agenda to ultimately achieve commercialisation. In both cases, securing the necessary funding is key and Shannon ABC has had success with a range of National and European funding agencies in this respect. Shannon ABC staff have expertise in: Microbiology, Biotechnology, Molecular Biology, Analytical Science, Fungal Biology, Food</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment

	<p>Development, Cell Culture, Marine Extracts and work with companies from a range of sectors including: Food, Biotechnology, Cosmetics, Bio/pharma, Environmental, Nutraceutical, Healthcare and Marine sectors.</p> <p>W: https://www.shannonabc.ie/</p>	
	<p>CELLS Group- The Controlled Environment Life Science Laboratory-The Controlled Environment Laboratory for Life Sciences (CELLS) Research Group exploits and applies frontier technologies for the manipulation of environmental conditions required to address the growing demand for safe, high-quality, and sustainable food production. The CELLS phytotron employs dedicated enclosed environmental growth chambers for controlled environmental manipulation via regulation of temperature, humidity, carbon dioxide concentration, spectral quality and quantity, and nutrient supply for reliable high-yield plant production and enhancement for targeted outcomes. State-of-the-art LED lighting systems, as well as traditional fluorescent and high-pressure sodium lamps, are utilised to manipulate photosensitive metabolic pathways within plant systems to increase health-promoting, or decrease anti-nutritional, target molecule production. The CELLS Research Group aims to establish a state-of-the-art centre of excellence in sustainable, safe food production with positive contributions to key societal, environmental, health, and economic challenges.</p> <p>W: https://lit.ie/en-ie/research-development/research/centres-groups/cells-research-group</p>	<p>Food, Bioeconomy, Natural Resources, Agriculture and Environment</p>
	<p>CHIMERA- CHIMERA offers a multidisciplinary group of scientists with demonstrated research excellence in all forms of microbial cell factory research including traditional microbial substrates (bacteria, yeast and fungi) but also in microalgal and cyanobacterial as well as tissue culture and mammalian cell culture technologies. The aim of the CHIMERA research group is 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.</p> <p>W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/CHIMERA</p>	<p>Food, Bioeconomy, Natural Resources, Agriculture and Environment</p>
	<p>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</p>	<p>Food, Bioeconomy, Natural Resources, Agriculture and Environment</p>

	<p>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. W: https://www.foodlit.ie/</p>	
	<p>Analytical Methods Research Group- The National Greyhound Laboratory conducts research into methodologies of detection of prohibited substances in racing greyhounds. Such methods are developed from the research phase to application to real samples taken in and out of competition in Ireland. The lab is particularly focused on development of LCMS and GCMS techniques. Both screening and confirmatory methods are developed. W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/Analytical-Methods-Research-Group</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Athlone Institute of Technology (AIT)	<p>BioScience Research Institute BRI- Biotechnology; Eco-sustainability; novel processing and sterilisation; Empower Eco; hydroponics; bio-based solutions; 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 veterinary importance. W: www.bri.ait.ie</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	<p>Digital Solutions in the Bioeconomy- research area applies data analytics, machine learning and the methods and tools of IoT to the digitalisation of different processes in the bioeconomy. The processes are related to, for example, food production chains, carbon sequestration research, circular economy value chains and logistics. By processing and analysing data generated by advanced sensing and measurements, these processes can be better monitored, optimised and developed. W: https://www.hamk.fi/digital-solutions-in-the-bioeconomy-and-circular-economy/?lang=en</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	<p>Value from Biomass research area focuses on cultivating biomasses for special use or utilizing green biomasses and process side streams for new value added products. Cultivation is based on modern technologies like bioprocesses, vertical farming, sustainable growing media and methods, organic farming etc. Biomass utilization focuses on green industry or green products in e.g cosmetics, health products, food, colourants, coating,</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment

	construction, etc. Digitalization and data-analytics are used to optimize the production and value chain. W: https://www.hamk.fi/research/hamk-bio/?lang=en	
	Sustainable Primary Production - Soil research area focuses on deep understanding of soil to enable sustainable primary production, and biodiversity protection. Research aims to avoid soil degradation and to promote carbon storage and crop security in the fields. Soil quality and soil hydraulic properties are concerned within this team. Organic soil improvers, organic fertilizers, biochar are tested and different digital measurement technologies, imaging, sensors, drones etc. are used and developed to receive data to understand these processes.	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	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. Research involves Machine vision, sensors (bio etc.), multi-robot communication and paths optimization, and human-robot collaboration. W: https://www.hamk.fi/research/hamk-tech/robotics/?lang=en	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	The Centre of Expertise Water Technology (CEW) is the Netherlands leading knowledge and innovation centre for applied research and product development in the field of water technology. The CEW brings together expertise from education, research, government and industry. We are your partner in the field of applied research, product development and research facilities. W: https://www.cew.nl/en/	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István University (SZE)	Faculty of Agricultural and Food Sciences- Project idea 1: Evaluation and analysis system supporting food waste measurement; Project idea 2: Measurement and forecasting of livestock's greenhouse gas emissions	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	Faculty of Agricultural and Food Sciences- Characteristics of distance for local products: Question of proximity in SFSCs and farmers' markets	Food, Bioeconomy, Natural Resources, Agriculture and Environment

	Department of Physics and Chemistry- Digital vision, digital image processing, color measurements, optical spectroscopy, photoacoustic spectroscopy, photothermal methods (optothermal window, photopyroelectric method) W: https://fizkem.sze.hu/department-of-physics-and-chemistry-basic-data	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	Department of Telecommunications- 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 fuzzs signature based on a set of statistical image parameters such as entropies, fuzzy hpugh transform, wavelet analysis W: . www.sze.hu	Health
	Faculty of Agricultural and Food Sciences: Department of Animal Science, Department of Food Science, Deapartment 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. W: https://mek.sze.hu	Food, Bioeconomy, Natural Resources, Agriculture and Environment

Recent Selected RUN EU Partner Projects

IPL

- AMALIA – Algae-to-Market Lab Ideas – Adding value to invasive seaweeds of the Iberian northwest. EASME/EMFF/2016/1.2.1.4 - Blue Labs - innovative solutions for maritime challenges
- HP4ALL - Healthy pasta for all. CO-promoção
- Be4AQUAHEALTH – National survey of aquaculture fish diseases: a bet on prevention. 16-02-05-FMP-0013
- COSMOS – Biotechnological valorization of the invasive seaweed Asparagopsis armata off the coast of Peniche. MAR-04.03.01-FEAMP-0370
- Ocean2Oils - Integrated approach for seaweeds application as sustainable source of functional compounds for edible oils stabilization and food processing

LIT

- Horizon 2020 RIA – BioICEP
- H2020 RIA EDEN ISS
- Founding Member of Irish Bioeconomy Foundation
- Coordinator of FP7 KBBE RIA–BAMMBO
- Research Commercialisation Project-Development of commercialisation pipeline of microalgal biofactories
- Innovation Partnership Industry Research - New Product Development Testing Standards for Food & Pharma Sector

AIT

- Just Transition for Empower Eco sustainability HUB
- H2020 MSCA RISE ICTHETHYS (mobility and training)
- Interreg Atlantic Area Neptunus Project
- DAFM Morefish and linked Dairywater Projects

- Health Research Board (HRB) on novel bioactives for Sepsis and Lung Health

HAMK

- Bioeconomy 4.0 and Cabon 4.0: Data driven knowledge creation and utilization in bio processes and in complex carbon ecosystems. Funded by ministry of Finnish Education and Culture
- Digital bale <https://digipaali.fi/en/>
- Business from value added crops in vertical farming- value chain from biomass producer to industry – Arvoliiike
- Developing insect business – HäminCent
- Utilization of solid phase from food industry waste waters – Etsivät
- RoboTS (Collaborative robotics - Next generation of robotics). Won national Robocoast Challenge: Automation for tomato packing in a greenhouse (<https://robocoast.eu/2019/09/04/robocoast-challenge-automate-tomato-packing/>)

NHL Stenden

- Value-added Innovation in Food Chains (VIDA) <https://vidaproject.eu/> / (H2020)
- NeBraWaTech – Netherlands/Brazilian Water Technology solutions for semi-arid regions
- CO2Cap - CO2 from air capturing via a modified Schauburger system
- BioFlame - Biobased flame retardants from waste

SZE

- NKFP3 Jedlik Project: Development and Field Application of Complex Photoacoustic Systems for Monitoring Environmental Conditions
- INCO Copernicus Project: Validation of Photoacoustic, Photothermal and Related Methods for Detection of Early Spoilage, Adulteration and Quality Assessment in Food Industry
- COST action CA17124 DigForASP related project similar methodology in digital forensics
- Improvement of international competitiveness by the local development of a layer chicken hybrid concerning European priorities and with the application of innovative selection methods (National)
- Combined utilization of winery byproducts and horticultural products (National)

Recent RUN EU Partner Publications

IPL

- Pinteus S, Lemos MFL, Alves C, Silva J, Pedrosa R (2021). The marine invasive seaweeds *Asparagopsis armata* and *Sargassum muticum* as targets for greener antifouling solutions. *Science of The Total Environment* 750: 141372: 141372. (doi: <https://doi.org/10.1016/j.scitotenv.2020.141372>)
- Silva, Joana; Alves, Celso; Martins, Alice; Susano, Patrícia; Simões, Marco; Guedes, Miguel; Rehfeldt, Stephanie; et al. "Loliolide, a New Therapeutic Option for Neurological Diseases? In Vitro Neuroprotective and Anti-Inflammatory Activities of a Monoterpenoid Lactone Isolated from *Codium tomentosum*". *International Journal of Molecular Sciences* 22 4 (2021): 1888. <http://dx.doi.org/10.3390/ijms22041888>
- Pereira T., Barroso S., Mendes S., Amaral R.A., Dias J.R., Baptista T., Saraiva J.A., Alves N.M., Gil M.M. 2020. Optimization of phycobiliprotein pigments extraction from red algae *Gracilaria gracilis* for substitution of synthetic food colorants. *Food Chemistry* 321: 126688. <https://doi.org/10.1016/j.foodchem.2020.126688>
- Passos R, Correia AP, Ferreira I, Pires P, Pires D, Gomes E, do Carmo B, Santos P, Simões M, Afonso C, Baptista T (2021). Effect on health status and pathogen resistance of gilthead seabream (*Sparus aurata*) fed with diets supplemented with *Gracilaria gracilis*. *Aquaculture* 531: 735888. (doi: <https://doi.org/10.1016/j.aquaculture.2020.735888>)
- Freitas R, Martins A, Silva J, Alves C, Pinteus S, Alves J, Teodoro F, Ribeiro HM, Gonçalves L, Petrovski Ž, Branco L, Pedrosa R (2020). Highlighting the Biological Potential of the Brown Seaweed *Fucus spiralis* for Skin Applications. *Antioxidants* 9(7): 611. (doi: <https://doi.org/10.3390/antiox9070611>)

LIT

- Saha, S.K.; Ermis, H.; Murray, P. 2020. Marine Microalgae for Potential Lutein Production. *Appl. Sci.*,10, 6457. <https://doi.org/10.3390/app10186457>

- Tsoupras, A.; Lordan, R.; O'Keefe, E.; Shiels, K.; Saha, S.K.; Zabetakis, I. 2020. Structural Elucidation of Irish Ale Bioactive Polar Lipids with Antithrombotic Properties. *Biomolecules*, 10, 1075. <https://doi.org/10.3390/biom10071075>
- ShylajaNaciyar, M.; Karthick, L.; Prakasam, P.A.; Deviram, G.; Uma, L.; Prabakaran, D.; Saha, S.K. 2020. Diversity of glutathione S-transferases (GSTs) in cyanobacteria with reference to their structures, substrate recognition and catalytic functions. *Microorganisms*, 8, 712. <https://www.mdpi.com/2076-2607/8/5/712>
- Shiels, K., Browne, N., Donovan, F., Murray, P. and Saha, S.K. 2019. Molecular Characterization of Twenty-Five Marine Cyanobacteria Isolated from Coastal Regions of Ireland. *Biology*, 8, 59. <https://doi.org/10.3390/biology80300>
- Shiels, K., Murray, P. and Saha, S.K. 2019. Marine cyanobacteria as potential alternative source for GABA production. *Bioresource Technology Reports*, 8, 100342. <https://doi.org/10.1016/j.biteb.2019.100342>

AIT

- Rowan, N.J., Laffey, J.G. 2020. Challenges and solutions for addressing critical shortage of supply chain for personal and protective equipment (PPE) arising from the Coronavirus disease (COVID19) pandemic- case study from the Republic of Ireland. *Science of the Total Environment* 725, 138532.
- Murphy, E.J., Masterson, C., Rezoagli, E., O'Toole, D., Major, I., Stack, G.D., Lynch, M., Laffey, J.G., Rowan, N.J. 2020. β -Glucan extracts from the same edible shiitake mushroom *Lentinus edodes* produce differential in-vitro immunomodulatory and pulmonary cytoprotective effects — Implications for coronavirus disease (COVID-19) immunotherapies. *Science of the Total Environment*. 732, 139330.
- O'Neill, E.A., Stejskal, V., Clifford, E., Rowan, N.J. 2020. Novel use of peatlands as future locations for the sustainable intensification of freshwater aquaculture production – a case study from the Republic of Ireland. *Science of the Total Environment*, 706 <https://doi.org/10.1016/j.scitotenv.2019.136044>
- Galanakis, C.M., Rowan, N. 2021. Innovations and technology disruptions in the food sector within the COVID-19 pandemic and post-lockdown era. *Trends in Food Science and Technology* DOI: 10.1016/j.tifs.2021.02.002
- Rowan, N.J. 2019. Pulsed light as an emerging technology to cause disruption for food and adjacent industries – Quo Vadis? *Trends in Food Science and Technology*, 88, 316-332.

HAMK

- Niemitalo, Olli & Koskinen, Eero & Hyväluoma, Jari & Lientola, Esa & Lindberg, Henrik & Koskela, Olli & Kunttu, Iivari. (2021). A Year Acquiring and Publishing Drone Aerial Images in Research on Agriculture, Forestry, and Private Urban Gardens. *Technology Innovation Management Review*. 11. 5-16. [10.22215/timreview/1418](https://doi.org/10.22215/timreview/1418).
- Hyväluoma, Jari & Rätty, Mari & Kaseva, Janne & Keskinen, Riikka. (2019). Changes over time in near-saturated hydraulic conductivity of peat soil following reclamation for agriculture. *Hydrological Processes*. 34. [10.1002/hyp.13578](https://doi.org/10.1002/hyp.13578).
- Turunen, Mika & Hyväluoma, Jari & Heikkinen, Jaakko & Keskinen, Riikka & Kaseva, Janne & Hannula, Markus & Rasa, Kimmo. (2020). Quantifying the pore structure of different biochars and their impacts on the water retention properties of Sphagnum moss growing media. *Biosystems Engineering*. 191. 96-106. [10.1016/j.biosystemseng.2020.01.006](https://doi.org/10.1016/j.biosystemseng.2020.01.006).
- Soinne, Helena & Keskinen, Riikka & Heikkinen, Jaakko & Hyväluoma, Jari & Uusitalo, Risto & Peltoniemi, Krista & Velmala, Sannakajsa & Pennanen, Taina & Fritze, Hannu & Kaseva, Janne & Hannula, Markus & Rasa, Kimmo. (2020). Are there environmental or agricultural benefits in using forest residue biochar in boreal agricultural clay soil?. *Science of The Total Environment*. 731. 138955. [10.1016/j.scitotenv.2020.138955](https://doi.org/10.1016/j.scitotenv.2020.138955).
- Tossavainen, M., Lahti, K., Edelmann, M., Eskola, R., Lampi, A-M., Piironen, V., Korvonen, P., Ojala, A. & Romantschuk, M. 2018. Integrated utilization of microalgae cultured in aquaculture wastewater: wastewater treatment and production of valuable fatty acids and tocopherols. *Journal of Applied Phycology*. <https://doi.org/10.1007/s10811-018-1689-6>.

NHL Stenden

- Smiech, K. M., Kovacs, T., Wildschut, R. F., Monleon, A. C., de Vries-Onclin, B., Bowen, J. G., & Agostinho, L. L. F. (2020). Thermal disinfection of hospital wastewater in a pilot-scale continuous-flow system. *Applied Water Science*, 10(4), NA-NA.
- Van de Griend, M. V., Agostinho, L. L., Fuchs, E. C., Dyer, N., & Loiskandl, W. (2019). Consequences of the Integration of a Hyperbolic Funnel into a Showerhead for Droplets, Jet Break-Up Lengths, and Physical-Chemical Parameters. *Water*, 11(12), 2446.
- Agostinho, L. L. F., Bos, B., Kamau, A., Brouwer, S. P., Fuchs, E. C., & Marijnissen, J. C. M. (2018). Simple-jet mode electrosprays with water. Description, characterization and application in a single effect evaporation chamber. *Journal of Aerosol Science*, 125, 237-250.
- Śmiech, KM, Tolsma, A., Kovács, T., Dalbosco, V., Yasadi, K., Groendijk, L. & Agostinho, LLF (2018). Comparing Mixed Media and Conventional Slow Sand Filters for the removal of Arsenic from Ground Water. *Water* 2018 , 10 (2): 119.
- Ondimu, OM, Ganesan, VA, Gatari, MJ, Marijnissen, JCM & Agostinho, LLF (2017). Modeling simple-jet mode electrohydrodynamic-atomization droplets' trajectories and spray pattern for a single nozzle system. *Journal of Electrostatics* , 89: 77-87.

SZE

- Nagy Szilvia, Lilik Ferenc, Sziová Brigita, Kovács Melinda, Kóczy László T. On the Applicability of Fuzzy Rule Interpolation and Wavelet Analysis in Colorectal Image Segment Classification In: Marsala, Christophe; Lesot, Marie-Jeanne (szerk.) *Fuzzy Approaches for Soft Computing and Approximate Reasoning: Theories and Applications* Springer International Publishing (2021) pp. 243-255. Paper: Chapter 21, 13 p.
- Greff, B.; Lakatos, E.; Szigeti, J.; Varga, L. (2021): Co-composting with herbal wastes: potential effects of essential oil residues on microbial pathogens during composting. *CRITICAL REVIEWS IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY* 51: 457-511.
- Sik B, Hancz Erika L, Kapcsandi V, Ajtony Z (2020): Conventional and nonconventional extraction techniques for optimal extraction processes of rosmarinic acid from six Lamiaceae plants as determined by HPLC-DAD measurement. *J. Pharm. Biomed. Anal.*, 184 (2020), Article 113173
- Nagy Szilvia, Sziová Brigita, Pipek János On Structural Entropy and Spatial Filling Factor Analysis of Colonoscopy Pictures *ENTROPY* 21: 3 p. 256, 31 p. (2019).
- Fuzzy Hough transformation in aiding computer tomography based liver diagnosis S Nagy, M Kovács, B Sziová, LT Kóczy 2019 IEEE AFRICON, 1-4.

Technological Systems & Infrastructures

IPL

CETEMARES Building (<https://www.youtube.com/watch?v=1UfvkA6qZ5M>) equipped with the following fully equipped laboratories:

- Aquaculture laboratories and bioterium of Aquatic Organisms (with natural seawater supply)
- Ornamental fish laboratory
- Marine organism's pathology laboratory
- Fisheries and Biology Laboratory
- Food technology laboratory
- Toxicology laboratory
- Several Molecular Biology laboratories
- Several Microbiology laboratories
- Biotechnology laboratory
- Chemistry laboratory
- Cell culture laboratory
- Analytical chemistry laboratory (atomic absorption, GCs, HPLCs)
- Meeting and knowledge sharing rooms
- Covid19 diagnostic centre equipped for Sars-Cov-2 RT-qPCR molecular detection

LIT

Shannon ABC laboratories are customised and future-proofed for wide ranging biotechnological

Equipment: FTIR Equipment, Fluorescence Microscope, Fermentation Suite, TLC & HPTLC Equipment, Bomb Calorimeter, GC-IR Interface

and analytical capabilities including dedicated research bench space, analytical suites, raw material processing, HEPA filtered microbial suite and tissue culture suite, fermentation suite.	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
AIT <ul style="list-style-type: none"> • Tissue Dissociator • Cell sorter • Biological Safety Cabinet (x5) • PCR • qPCR Machine • MinION Sequencer • Confocal Microscope • DNA Gel imager • Centrifuges • Flow Cytometer • Incubators • Ovens • Autoclave 	<ul style="list-style-type: none"> • DNA/RNA Quantifier • Water Purification Systems • Waterbaths • Microplate reader • Spectrophotometer • Cell Viability Analyser • MicroBiological Safety Cabinets: • Ice Machine • Bioreactor • Ultralow Freezers • Electronic Balances • Liquid Nitrogen tanks • Fume Hoods • Freshwater Tank
HAMK Infrastructure for whole value chain from biomass production (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 research. Food and biotechnology laboratory facilities allow different production and research pilots (bioreactors for biogas, algae, fungi etc., pelleting and pyrolysis equipment for biochar, small brewery etc.) and analytics (HPLC, GC, Extraction, CHNS/O, Kjeldahl-N, etc.). Cultivation trial tests (e.g. growing media or fertilizers) are possible in different environments. Besides own agriculture and horticulture campuses city environment is provided from the cities in our region or University Campus in Hämeenlinna. Infra allows research also 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 phenomenon. Robotics in agriculture- robotics laboratory including multiple collaborative robots, mobile platform, various equipment and accessories.	
NHL Stenden Water Application Center: https://www.waterapplicatiecentrum.nl/ Research hall - 900 m2 of surface area. 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 Furniture 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

SZE

Reflective colorimeter, home made photoacoustic spectrophotometer, light sources, monochromators, lock-in amplifiers, optothermal window and photopyroelectric sensors, optical spectrophotometer, integrating (Ulbricht) sphere and lux-meter.

2.1.1.3 Research Area 3: Tourism

Businesses of all kinds are increasingly embracing the ‘3 Ps’: People, Profit and Planet. The tourism and hospitality industry is no exception. These businesses recognise the importance of sustainability, while their guests are also becoming increasingly socially aware. One of the central questions identified in the audit in this research area is how hospitality and tourism can be sustained in the future and deliver on the promise to improve people’s quality of life. We will support the hospitality and tourism industry’s commitment to sustainability by designing, deploying, and evaluating behavioural interventions aimed at nudging hosts and guests toward sustainable choices. The RUN-EU Research Area of Tourism is cross cutting across and most closely aligned to the Horizon Europe research cluster areas 1, 5 and 6 of health, climate, energy and mobility and food, bioeconomy, natural resources, agriculture, and environment. Hospitality is about feeling welcome and free to be yourself. Creating a sense of hospitality means people stay longer, feel part of a community, and share their positive experiences and cultures with others. Visitors and residents increasingly want meaningful experiences and connections, even when they are only visiting for a short period of time.

Creating hospitable environments is important for businesses, for local government, for hospitals and care homes and for those delivering hospitality services – our professorship is interested in discovering hospitable moments in unusual places and times as well as where we might expect to find them. The research audit has identified areas where RUN-EU will examine what changes the tourism, hospitality and leisure sectors are set to undergo over the coming period of uncertainty. Our audit identified objectives will be to learn more about the effect these changes will have, as the tourism industry needs this information in order to be able to create policies and design strategies. This is essential in such a fast-changing industry with constantly changing trends amid current and future travel restrictive policies in respect of Covid 19. Both at a national and international level, we want to help market destinations and industry to make choices for conscious sustainable development. We will paint pictures of the

future of leisure and tourism which make industry associations, government authorities, businesses and education more resilient to the uncertainties posed by today's society. By means of applied and academic research we design strategies, business models and concepts for the future.

The audit also identified specific specialisms within the consortium that will allow us to also explore sustainable and digitalized nature tourism. This area focuses on developing sustainable tourism and hiking activities in unique environmentally clean forests and lake-areas. The focus is to increase human's wellbeing in a healthy nature and enhance sustainable business in different nature tourism and e.g. equestrian sports and tourism. One important issue related to sustainable nature tourism is to ensure sustainability in trails, waste management (incl. toilets) etc. Increasing use of parks, forests etc. generates pressure to utilize modern technologies and e.g. digital solutions.

We have also identified a focus area on tourism economics and management and development and capitalization of tourism economics decision support systems for public policy and business planning; efficient management accounting systems; tourism contributions to the circular economy; strategic and operational marketing instruments for business and destination competitiveness. Research aims to improve human resource management and to assess the effects of new technologies on innovation practices and on their relationship with human resources. We have identified e-Tourism as a critical element for our future work including applications for business management and tourist destinations territory and tourism destinations including governance, development policies, destination planning, destination branding and management of tourism products and recreation. We will link tourism, culture, society and language including historical, sociological and anthropological dimensions, with special focus on the ethics and social responsibility in tourism.

Table 3: *Collective Expertise and Knowledge of RUN EU Alliance (Tourism)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	CiTUR- The Research Area of Expertise is Tourism sensu lato, but with focus in 5 main topics, namely: (1) Tourism Economics and Management. It is focused the following deliverables: development and capitalization of tourism economics decision support systems for public policy and business planning; efficient management accounting systems; tourism contributions to the circular economy; strategic and operational marketing instruments for business and destination competitiveness.	Culture, Creativity and Inclusive Society

	<p>(2) Tourism, Hospitality and Restaurants. Research in this topic aims to improve human resource management and to assess the effects of new technologies on innovation practices and on their relationship with human resources.</p> <p>(3) e-Tourism. This includes applications for business management and tourist destinations. More specialised issues are also welcomed, on many different topics such as helping with risk management, local restaurants (e-menu) or local lodging (e-booking).</p> <p>(4) Territory and Tourism Destinations. This is a vast area of research that includes governance, development policies, destination planning, destination branding and management of tourism products and recreation.</p> <p>(5) Tourism, Culture, Society and Language. It includes the cultural, historical, sociological and anthropological dimensions of tourism, with special focus on the ethics and social responsibility in tourism.</p> <p>W: https://citur-tourismresearch.com/</p>	
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>BEST - Business, Event, Sport & Tourism- This research centre was established to actively promote interdisciplinary research in the framework of the social sciences with specific emphasis on Business, Event Sport and Tourism disciplines (BEST). In bridging an identifiable gap in inter-disciplinary collaboration across the Faculty of Business and Humanities, this research centre was formed with the principle aim of making connections between these recognised disciplines in order to investigate and contribute to the generation of new concepts and ideas in the quest for original knowledge</p> <p>W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/BEST-%E2%80%93-Business,-Event,-Sport-and-Tourism</p>	Culture, Creativity and Inclusive Society
	<p>Centre for Creativity, Enterprise, Innovation, Design & Engagement Research (CEIDE)- LIT is focused on providing Active Leadership in Enterprise Development, Knowledge Transfer and Regional Socio-Economic Development. Through its RDI Strategy, LIT has developed Enterprise Incubation Centres across three counties to foster regional enterprise development through engaging and supporting established businesses and business owners throughout the region. The aim of the Centre for Creativity, Enterprise, Innovation, Design & Engagement Research is to leverage academic resources and research output to support this wider socio-economic remit.</p> <p>W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/Centre-for-Creativity,-Enterprise,-Innovation,-Des</p>	Culture, Creativity and Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment

Athlone Institute of Technology (AIT)	<p>Tourism Research Dept of Hotel, Tourism & Leisure- Sustainable Planning, Environmental Impacts, Socio-cultural, Community Engagement, Management and Planning Impacts for Tourism and Events, Local Authority Planning and Tourism Governance, The planning, development and management of Religious, Spiritual, Cultural and Archaeotourism sites as tourist attractions. Analysing visitor experiences, Stakeholder engagement and relationship of these sites. Heritage and sustainable tourism, particularly tourism to sites associated with death and disaster and tourism after conflict.</p> <p>W: https://www.ait.ie/faculties/departments/hospitality-tourism-leisure-studies/</p>	Culture, Creativity & Inclusive Society
	<p>Faculty of Business & Hospitality- Primary area of research includes consumer and employee technology adoption and usage with a particular focus on social media, eWOM and Digital Marketing. Experience in SEM analysis using PLS-SEM (Smart-PLS). Experience in apply these techniques across a range of business sectors including Food and Drink Industry and technology industry. Currently actively researching topics; Social media influencers, brand advocacy, brand strategy, employee brand advocacy, behaviour intention of employee reward systems.</p> <p>W: https://www.ait.ie/faculties/faculty-of-business-and-hospitality</p>	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	<p>Sustainable and Digitalised Nature Tourism- this area focuses on developing sustainable tourism and hiking activities in Finland's unique clean forests and lake-areas. Focus is to increase human's wellbeing in a healthy nature and enhance sustainable business in different nature tourism and e.g. equestrian sports and tourism. One important issue related to sustainable nature tourism is to ensure sustainability in trails, waste management (incl. toilets) etc. Increasing use of parks, forests etc. generates pressure to utilize modern technologies and e.g. digital solutions. Besides nature visits markets for virtual solutions to enjoy nature are increasing thus enabling interesting R&D&I actions. Digital technology and data-analytics is applied to the development of tourism in close co-operation with companies, cities, municipalities.</p>	Climate, Energy and Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic Institute of Cávado and Ave (IPCA)	<p>Research Group on Tourism Planning and Economics- Applied research on Tourism Planning and Economics</p> <p>W: https://www.esec.pt/investigar-transferir/investigacao/citur http://uniag.ipb.pt</p>	Culture, Creativity and Inclusive Society
	<p>Research Group on Tourism Marketing- Applied Research on Tourism Marketing</p> <p>W: http://uniag.ipb.pt</p>	Culture, Creativity and

	https://www.esec.pt/investigar-transferir/investigacao/citur	Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	<p>CELTH is the only Centre of Expertise within the domain of leisure, tourism and hospitality. Our knowledge centre was set up by Breda University of Applied Sciences, NHL Stenden University and HZ University of Applied Sciences. Other institutes and universities outside and inside the hospitality sector are also cooperated with on a project basis. Both at a national and international level, we want to help market parties, destinations and industry to make choices for conscious sustainable development. We do so by linking universities of applied sciences within the domain of leisure, tourism and hospitality. We match the several types of expertise, professors, researchers and students to clients and their development issues. CELTH consists of a team of senior researchers, project managers and programme managers who are deeply involved with the hospitality sector. It is in our DNA to connect parties to make a difference together.</p> <p>W: https://www.celth.nl/en</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	<p>The European Tourism Futures Institute (ETFI) is a leading institute with a unique position in Europe. We paint pictures of the future of leisure and tourism which make industry associations, government authorities, businesses and education more resilient to the uncertainties posed by today's society. By means of applied and academic research we design strategies, business models and concepts for the future.</p> <p>W: https://etfi.nl/en/about/</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	<p>Professorship Scenario Planning- The Scenario Planning Department examines what changes the tourism, hospitality and leisure sectors are set to undergo over the next two decades. Its objective is to learn more about the effect these changes will have, as the tourism industry needs this information in order to be able to create policies and design strategies. This is essential in such a fast-changing industry with constantly changing trends.</p> <p>W: https://www.nhlstenden.com/onderzoek/scenarioplanning</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	<p>Professorship Hospitality Studies-Hospitality is about feeling welcome and free to be yourself. Creating a sense of hospitality means people stay longer, feel part of a community, and share their positive experiences and cultures with others. Visitors and residents increasingly want meaningful experiences and connections, even when they are only visiting for a short period of time. Creating hospitable environments is important for businesses, for local government, for hospitals and care homes and for those delivering hospitality services – our professorship is interested in discovering hospitable moments in unusual places and times as well as where we might expect to find them.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/hospitality-studies</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment

	<p>Professorship Sustainability in Hospitality and Tourism- Businesses of all kinds are increasingly embracing the '3 Ps': People, Profit and Planet. The hospitality industry is no exception. These businesses recognise the importance of sustainability, while their guests are also becoming increasingly socially aware. The professorship Sustainability in Hospitality and Tourism carries out applied research with the objective of improving sustainability in the tourism and hospitality industry. The central question in the professorship's research is how hospitality and tourism can be sustained in the future and deliver on the promise to improve people's quality of life. The main objective of the professorship is to support the hospitality and tourism industry's commitment to sustainability by designing, deploying, and evaluating behavioural interventions aimed at nudging hosts and guests toward sustainable choices. The professorship operates as part of a wider network that includes businesses, non-profit organisations, government institutions, and students. Students enrolling in one of our courses this year and taking an interest in sustainability are welcome to help out with our research. The professorship also coordinates the Stenden Hotel Management School BA minor 'Future-proof Hospitality: the CSR Challenge' and the MA module 'Sustainable Value Creation in Hospitality'</p> <p>W: https://www.nhlstenden.com/en/research/professorships/sustainability-hospitality-and-tourism</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István University (SZE)	<p>Department of Tourism- 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). Our main areas of research are digital tourism, sustainability issues and health tourism, but we also have experience in regional development. In addition, our researchers' other areas of expertise cover all types and characteristics of tourism.</p> <p>W: https://admissions.sze.hu/welcome https://idforg.sze.hu/-kezdooldal</p>	Digital Industry & Space
	<p>Faculty of Architecture, Civil Engineering and Transport Sciences of the Szechenyi Istvan University- The Faculty of Transport Sciences has huge experience in transport planning in cities, mainly public transport system planning and infrastructure design. Within this topic we would like to provide new solutions for cities with waterways explored by shipping, which is competitive with land transport modes.</p> <p>W: www.sze.hu</p>	Climate Energy & Mobility
Recent Selected RUN EU Partner Projects		
<p>IPL</p> <ul style="list-style-type: none"> • OLIVE4ALL – Olive Heritage for Sustainable Development: Raising Community Awareness of Living Heritage 		

- Assessing tourism experience and tourism promotion effectiveness using brain-computer interface devices
- Monitoring System of Tourism for the Centro de Portugal Region
- SPOT: Sustainable Spatial Planning of Tourism Destinations
- CIM: Promoting Creativity and Innovation Management in an innovative blended learning and validation programme at the interface between higher education and business

LIT

- SFI Discover Program - STEM in Sport
- To examine the acute and long term effects of a spinal proprioceptive device on the lifting technique of collegiate athletes.
- Leadership – a matter of culture
- Relative Age Effect in Elite Youth GAA Academies: A Myth or Reality?
- Activity Profiles in U17, U20, and Senior Women's Brazilian and Irish National Soccer Teams During International Competitions. A comparative study

AIT

- 2019: British Council Funding (British Consulate in Ekaterinburg, Russia). Workshop Title: The Need for Strategic Event Management Planning and Public Relations following the hosting of mega-events in Russia's host cities
- 2019: Research Topic: Evaluation of host community perceptions of destination competitiveness in the West Coast of Ireland – A case focus on the European Capital of Culture. LJM QR funded project
- 2014 - Failte Ireland funded research project on Community Engagement in Drive Tourism in the Wild Atlantic Way
- Ireland's Agri-food and Drink Sector: The Correlation Between eWOM Initiatives and Employee Brand Advocacy
- Athlone Chamber of Commerce: Digital Marketing Strategy

IPCA

- HCTourism - Human Capital Profile and Trends in the Tourism Sector 02/SAICT-POL/23622/2016 Fundação para a Ciência e a Tecnologia (Lisboa) 2017-08 to 2019-11|Contract GRANT_NUMBER: SAICT-POL/23622/2016
- The perceptions of residents and tourists of the impact of Guimarães European Capital of Culture 2012, integrated in the N.I.P.E. (Public Policy Research Nucleus, University of Minho), at C.I.C.S. (Center for Research in Social Sciences, University of Minho), and Lab2PT (Laboratory of Landscapes, Heritage and Territory, University of Minho) with the support of Guimarães City
- Residents' perception of the benefits of cultural tourism versus the image of the tourist destination maintained by visitors: the case of Guimarães, integrated in the N.I.P.E. (Public Policy Research Nucleus, University of Minho) and C.I.C.S. (Center for Research in Social Sciences, University of Minho), with the support of the Municipality of Guimarães. October 2009 - December 2012
- MINHO IN: PROJECT P.A.1 Marketing, Communication and Internationalization [Training and Mobilization Program], as member of the Minho In Consortium for the development of tourism in Minho
- MOUNITOUR - Monitoring of the projected image of European tourism destinations by the online media

NHL Stenden

- Interreg VB PROWAD Link
- Circular Hospitality (SIA KIEM)
- Overtourism (with CELTH & UNWTO): <https://www.celth.nl/projects/unwto-handbook-helps-cities-manage-impact-overtourism>
- Impact of COVID-19: <https://www.celth.nl/projects/four-scenarios-future-visitor-economy>
- Food & gastronomy in the World Heritage site of the Wadden Sea

SZE

- EDiSus – Entrepreneurship, Digital Business Models & Sustainability in SME for sustainable domestic Health Tourism (2020)
- Hungarian Tourism Agency: Examination of tourism higher education courses (2020)
- Commissioned by the Digital Welfare Program, preparation of a study on digital services in tourism (2018)
- Hungarian Tourism Agency: Situation analysis of tourism vocational training: Study (2017)
- Nyúl settlement tourism marketing strategy 2018-2026, (2018)
- Project with the identification number TOP-1.21-15- GMI-2016-00015 entitled “Active tourism network development in Szigetköz” on behalf of the Győr-Moson-Sopron County Local Government (2019)

Recent RUN EU Partner Publications

IPL

- CARDOSO, Lucília; Dias, Francisco; ARAÚJO, Arthur; MARQUES, M. Isabel. "A destination imagery processing model: Structural differences between dream and favourite destinations". *Annals of Tourism Research* 74 1 (2019): 81-94.
- ARAÚJO, Arthur; CARDOSO, Lucília; ARAÚJO, Noélia. "Understanding the role of destination imagery in mountain destination choice. Evidence from an exploratory research". *European Journal of Tourism Research* 22 (2019): 151-165.
- CARDOSO, Lucília; ARAÚJO, Noélia; ARAÚJO, Arthur; Dias, Francisco. "Food tourism destinations' imagery processing model". *British Food Journal* 122 6 (2019): 1833-1847.
- DIAS, Francisco; CARDOSO, Lucília. *La imagen y la Promoción de los Destinos Turísticos*. Pamplona, Espanha: Thomson Reuters – Aranzadi. 2018.
- DIAS, Francisco; & CARDOSO, Lucília (2017). How can brand equity for tourism destinations be used to preview tourists' destination choice? An overview from the top of Tower of Babel. *Tourism & Management Studies*, 13(2): 13-23.

LIT

- O'Brien, R. McGarr, O. Lynch, R. (2020) "Exploring students' justifications for studying a master's degree in Business through problem-based learning" *Innovations in Education and Teaching International*. DOI: 10.1080/14703297.2020.1752280.
- Everard, E., Lyons, M. and Harrison, A.J., 2019. An Examination of the Relationship Between the Functional Movement Screen, Landing Error Scoring System, and 3D Kinematic Data During a Drop Jump Task. *Journal of Strength and Conditioning Research*. Published ahead of print.
- O'Brien, R. McGarr, O. Lynch, R. (2019) "Students' perceptions of lecturer power and authority in a higher education PBL business programme" *Teaching in Higher Education*, DOI: 10.1080/13562517.2020.1725881.
- Frawley, T, Fahy, J. (2019) "Need for Speed? Relevance of First Mover Advantage in Emerging Industries: Lessons from the Search Entry Industry", presented at the British Academy of Management 2019, Aston University, Birmingham, 3rd-5th Sept.
- Young, D., Coratella, G., et al. (2019) 'The match-play sprint performance of elite senior hurlers during competitive games', *PLoS ONE*, 14(4), p. e0215156.

AIT

- Maguire, K. and Wise, N. (2021) *A Research Agenda for Event Impacts*. United Kingdom: Edward Elgar Publishing. (In Press).
- Maguire, K. (2021) 'The Environmental Impacts of Events'. In Maguire, K., and Wise, N. *A Research Agenda for Events*. United Kingdom: Edward Elgar Publishing.
- Maguire, K. (2021) 'Local Authority Planning, Sustainability and Event Governance'. In Maguire, K., and Wise, N. *A Research Agenda for Events*. United Kingdom: Edward Elgar Publishing.
- Burnett, M. & Johnston, T. (2020) Brexit anticipated economic shock on Ireland's planning for hospitality and tourism: resilience, volatility and exposure, *Tourism Review*.
- Johnston, T. (2015) *The Geographies of Thanatourism*, *Geography [The Journal of the Geographical Association]*. I received the UK's Geographical Association Award for 'Excellence in Leading Geography' for this article in 2016.

IPCA

- Costa, V. (2020). Tourism and air transport – an economic evaluation of the Oporto Airport expansion project. *Tourism & Management Studies*. Vol. 16 (2), pp. 35-42. DOI: <https://doi.org/10.18089/tms.2020.160204> [Indexed: SCOPUS and Scielo Citation Index (ECI) / Web of Science/ Thomson Reuters].
- Vareiro, L., Sousa, B.B. and Silva, S.S. (2020), "The importance of museums in the tourist development and the motivations of their visitors: an analysis of the Costume Museum in Viana do Castelo", *Journal of Cultural Heritage Management and Sustainable Development*, Vol. 11 No. 1, pp. 39-57. <https://doi.org/10.1108/JCHMSD-05-2020-0065>
- Sousa B., Silva A., Malheiro A. (2020) Differentiation and Market Loyalty: An Approach to Cultural Tourism in Northern Portugal. In: Rocha Á., Abreu A., de Carvalho J., Liberato D., González E., Liberato P. (eds) *Advances in Tourism, Technology and Smart Systems. Smart Innovation, Systems and Technologies*, vol 171. pp. 681-690, Springer, Singapore https://doi.org/10.1007/978-981-15-2024-2_58
- Dominique-Ferreira, S. & Antunes, C. (2020). Estimating the price range and the effect of price bundling strategies: An application to the hotel sector. *European Journal of Management and Business Economics*, 29(2), 166-181. DOI 10.1108/EJMBE-04-2019-0066.

NHL Stenden

- Heslinga, J.H., Groote, P.D. and F. Vanclay (2021). Strengthening governance processes to improve benefit sharing from tourism in protected areas by using stakeholder analysis. In S. Snyman and K. Bricker (Eds.), *Benefit sharing*. Abingdon: Routledge.
- Hartman, S. (2020). Adaptive tourism areas in times of change. *Annals of Tourism Research*
- Hartman, S., Wielenga, B., Heslinga, J. (2020). The future of tourism destination management: building productive coalitions of actor networks for complex destination development. *Journal of Tourism Futures*.
- White Paper on Rail Transport for International Tourism in Europe Towards a shared vision for a more sustainable growth (commissioned by ETC & Eurail): https://etc-corporate.org/uploads/2020/06/ETC-Eurail-White-Paper-on-Rail-Transportation_Web.pdf
- Over tourism (commissioned by European Parliament): [https://www.europarl.europa.eu/RegData/etudes/STUD/2018/629184/IPOL_STU\(2018\)629184_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2018/629184/IPOL_STU(2018)629184_EN.pdf)

SZE

- Happ, É., & Ivancsóné Horváth, Z. (2020). A Study of Digital Marketing Tools Usage Habits among Hungarian Tourists. *GeoJournal of Tourism and Geosites*, 32(4), 1283-1289. <https://doi.org/10.30892/gtg.32414-570>
- Jakab, P., & Happ, É. (2017). Impact Assessment between the City and the Company Reputation. *Economics & Sociology*, 10(1), 279–289. <https://doi.org/10.14254/2071-789x.2017/10-1/20>
- Printz-Markó, E. & Molnar, E. I. (2020): Health Tourism—A New System-Model Based on the Four Basic Elements. In: Fotea, Silvia L.; Fotea, Ioan Ş.; Văduva, Sebastian A. (szerk.) *Challenges and Opportunities to Develop Organizations Through Creativity, Technology and Ethics*. Cham, Svájcz: Springer, pp. 253-267. <https://doi.org/10.1007/978-3-030-43449-6>
- Happ, É. & Husz, A. & Printz-Markó, E. (2011): Specialities in the demand of significant Hungarian tourism product. *International Journal of Management Cases (IJMC)* 14:1 pp. 374-397
- Happ, É. (2014). Fenntartható turizmus és felelősségvállalás. *Gazdaság És Társadalom*, 1, 90–101. <https://doi.org/10.21637/gt.2014.1.07>

Technological Systems & Infrastructures

IPL

One TourismLab, an auditorium and a laboratory of sensorial analysis. In the TourismLab there are some neurosciences devices (EEG and Eye-Tracking systems) and a small network of computers.

LIT

- Training Bar
- Restaurant & Kitchens

- Tendo Power Analyzer
- Speed Gun
- Range of dumbbells and kettlebells

<ul style="list-style-type: none"> • Opto Jump – 5 metres • Vlad Performance Force Decks • Fusion Sport Speed Gates • Witty Speed Gates • 10 Polar Heart Rate monitors • Harpenden Skinfold Callipers • Sit & Reach Box • Hand Grip Dynamometer • Functional Movement Screen Testing kit 	<ul style="list-style-type: none"> • Olympic weightlifting bars and various weighted plates • 8 squat racks • 3 weightlifting platforms • Plyometric boxes (4 different heights) • Weight vest • Back Strength Dynamometer
<p>AIT Online Library Databases- https://library.ait.ie/a-z/, https://library.ait.ie/collections/</p>	
<p>IPCA Research office equipped with computer hardware, portal computers and software needed for research on Hospitality and Tourism, namely reservation and accommodation management software such as Galileo; Open access to databases of scientific journals in the field of Hospitality and Tourism.</p>	
<p>SZE In connection with our research, our infrastructural background includes Microsoft Office 365 special package, SPSS and IBM JMP analysis software, cloud storage, as well as GIS-based mapping software. All our researchers have smart devices (laptops and phones) as well as other IT devices present at the departmental level.</p>	

2.1.1.4 Research Area 4: IOT & Cybersecurity

The latest trends in information & communication technology (ICT), automation and production, collectively referred to as Industry 4.0 and the Internet of things 'IOT' are changing the way global manufacturing is developing. The audit has identified the ever-growing demands for mass customisation and more complex products challenging current manufacturing and logistics models. The need for broad product matrices and even broader component matrices will promote a change from large offshore-based factories and their equally large warehouses into local, smaller and smarter factories, able to produce according to demand is seen as a critical element by RUN-EU researchers. The "fourth industrial revolution" takes advantage of multiple state of the art technologies that have significantly evolved in the last few years, such as additive manufacturing (3-D printing), cloud computing, big data & analytics, autonomous robots, cyber-physical systems and Internet of Things (IoT). These areas have all been identified across the consortium by the audit. This new scenario also promotes changes in the roles of both humans and robots in manufacturing operations: robots are no longer responsible only for repetitive and heavy-duty tasks, instead becoming "intelligent" and collaborative machines that are able to work together with humans. Meanwhile, the operators still need to provide singular human capabilities such as flexibility and decision making, due to their unique creative problem-solving skills which exceed those of machines. The audit has also clearly identified that these advances in manufacturing production strategies are paralleled by the need to have robust reporting systems for quality control and enterprise resource planning (ERP) integrated systems

to manage and automate many of the back-office systems and to comply with customer requirements in quality control. This overlap between engineering and IT is now reaching a critical point where SME's have the possibility to grow into new sectors in high value engineering and to enhance their competitive advantages over emerging economies and to grow production in the regional. Advanced manufacturing techniques are now highly dependent on the ability to programme and manage I(O)T systems with integration of automation, robotics, and Industry 4.0.

'Industry IOT, including manufacturing, processing and construction, makes a significant contribution to the European economy, and provides 36 million jobs, although this has steadily declined. Manufacturing in particular generates EUR 32 billion of added value, a share of around 16% of total added value. While Europe is one of the world largest markets for digital products and services, the contribution of European industry and businesses to the worldwide digital supply chain has shrunk gradually over the past 20 years.' The IOT and cybersecurity research area within RUN-EU as detailed within responses from partners to the audit 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 and electronic security and digital forensics. In particular, audit identified specialisms to create, 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 including the cybersecurity and digital forensic areas. This will involve R&D activities in many areas like digital manufacturing, health supporting technologies, multimedia communications, IoT, embedded systems, development of communications systems, antennas, radio propagation, cybersecurity in mobile computing platforms, focusing on the security requirements of storage and communication among others crosscutting several the RUN-EU research areas and the horizon Europe pillar 2 cluster areas also.

RUN-EU IOT and cyber science expertise will also focus also in those societal areas where security issues around digitization are approached from various fields such as criminology, computer science, law, psychology, philosophy and communication. The starting point in this research program area is that security issues in a digital environment are best studied and understood from a multidisciplinary approach. A multidisciplinary, scientific approach does justice to the complexity of practical issues. The emphasis is mainly on a combination of behavior and digital security, unlike a vast

body of research from a more technical angle concentrating on three thematic priorities: offenders, victims and law enforcement. The areas of study will include business, youth and criminal justice. We will also work with 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. Interdisciplinary and interaction technologies with human assistive and health technologies in particular will also be a key application area.

Table 4: *Collective Expertise and Knowledge of RUN EU Alliance (IOT & Cybersecurity)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	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. W: https://it.pt/	Digital Industry & Space
	Computer Science & Communication Research Centre (CIIC) - CIIC's mission is to implement, conduct and facilitate high quality research, aligned with IPLeiria'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	Digital Industry & Space

	<p>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.</p> <p>W: http://ciic.ipleiria.pt</p>	
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>CaIR Group (Computing and Informatics Research)- 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</p> <p>W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/Computing-and-Informatics-Research-(CaIR)-Group</p>	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Athlone Institute of Technology (AIT)	<p>Software Research Institute- IOT & Cybersecurity - Cybersecurity research on is broadly focused on the area of "Intelligent Adaptive Security" i.e. the capability of a system to detect and respond to security attack based on the use of machine learning and artificial intelligence in the network (including IoT and edge networks) and enterprise domains.</p> <p>W: https://www.ait.ie/research-and-innovation/software-research-institute/</p>	Digital Industry & Space
	<p>Software Research Institute- Machine Learning, AI, Computer Vision- Application of AI, Machine learning and Computer Vision techniques to provide real-time classification of signals in gigabit data streams.</p> <p>W: https://www.ait.ie/research-and-innovation/software-research-institute/</p>	Digital Industry & Space

	<p>Software Research Institute- (SFI Adapt Centre, SFI Confirm Centre)- Human Centred Multimedia Experiences- Conducts research on the design, development and Quality of Experience (QoE) evaluation of Immersive and Interactive multisensory multimedia experiences. Design, develop and evaluate user centred systems in domains of health, education, tourism, the arts, training among many others.</p> <p>Technologies: XR, Multisensory Multimedia, Human Centric AI, Edge AI</p> <p>W: https://www.ait.ie/research-and-innovation/software-research-institute/</p>	Digital Industry & Space
	<p>Faculty of Business & Hospitality- Business Process Analytics- Primary area of research expertise is business process analytics (predictive and prescriptive) with particular emphasis on discrete event simulation. Experience in applying these techniques across a broad range of business sectors including manufacturing, supply chain, healthcare, customer support and financial services. Active research topics include the digitalisation of SMEs in the manufacturing sector.</p> <p>W: https://www.ait.ie/faculties/faculty-of-business-and-hospitality</p>	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	<p>Digital Solutions & Platforms (DISP) focuses on producing technology-driven research and development activities and, above all, implementing solutions for the needs of our own Research Unit, other research taking place at HAMK, the world of business and the public sector. At the moment, we focus on the following themes: Internet of Things (IoT), software development (including mobile and web development), beneficial use of game engines and XR technologies</p> <p>W: https://www.hamk.fi/research/hamk-smart/digital-solutions-platforms/?lang=en</p>	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Cávado and Ave (IPCA)	<p>2Ai - Applied Artificial Intelligence Laboratory- Cybersecurity in mobile computing platforms, focusing on the security requirements of storage and communication necessary to ensure the privacy of data in wearable devices.</p> <p>Distributed and integrated computing platform, based on the Cloud Computing and the Internet of Things patterns, to develop mechanisms and services to improve efficiency in Beekeeping management, monitoring and control.</p>	Digital Industry & Space

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	<p>Cyber Science Center is a national initiative where security issues around digitization are approached from various fields such as criminology, computer science, law, psychology, philosophy and communication. The starting point in the research programme is that security issues in a digital environment are best studied and understood from a multidisciplinary approach. A multidisciplinary, scientific approach does justice to the complexity of practical issues. The emphasis is mainly on a combination of behaviour and digital security, unlike a vast body of research from a more technical angle. The research program comprises three thematic priorities: Offenders, Victims and Law Enforcement, and focuses specifically (but not exclusively) on the following areas: Business, Youth and the Criminal Justice System. Cyber Science Center is a collaboration between NHL Stenden University of Applied Sciences, Dutch Police Academy and Open University. Three specific positions that complement each other and lead to a wide and strong network because of the diversity of knowledge and skills, a variety of practical ability (evaluation, grant acquisition, educational development) and a variety of complementary network inputs.</p> <p>W: https://cybersciencecenter.nl/en/</p>	Civil Security for Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
FH Vorarlberg University of Applied Sciences (FHV)	<p>The Research Center 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.</p> <p>W: https://www.fhv.at/en/research/digital-factory-vorarlberg/</p>	Digital Industry & Space
	<p>The K1-Center ABC–Austrian Blockchain Centre -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.</p> <p>W: https://www.fhv.at/en/research/business-informatics/</p>	Digital Industry & Space

	<p>Dpmt. Business Informatics-Establishing a strategic, regional cooperation platform to increase the transfer potential and the transfer performance of the participating partners. The development of a strategy for the rapid, joint implementation of transfer projects, the Development of new cross-border forms of cooperation and the realisation of 12 transfer projects should increase the transfer and innovation potential of the participating organisations.</p> <p>W: https://www.fhv.at/en/research/business-informatics/</p>	Digital Industry & Space
	<p>Faculty of Engineering -As a center of excellence for innovative and application-oriented technology, the Faculty of Engineering links academic teaching and inter-company research with companies and institutions in the region. In this way, the faculty contributes to strengthening the innovation, attractiveness of employers and competitiveness of the companies in Vorarlberg. The focus is on mechatronics, electrical engineering, computer science, energy systems and environmental technology.</p> <p>Research and development in the area of computer science is application-induced and yet at an academic level. R & D - initiatives are very often together with the existing research centers of Vorarlberg University of Applied Sciences (such as Business Informatics , User Centered Technologies, Digital Factory Vorarlberg) initiated and established. Sustainable, socially integrated development is taken into account. Our faculty sees itself as the engine of innovation in the areas of computer science, mathematics and business informatics in close cooperation with the research centers of the Vorarlberg University of Applied Sciences.</p> <p>W: https://www.fhv.at/en/fh-vorarlberg-overview/organisation-fh-vorarlberg/departments/faculty-of-engineering/</p>	Climate Energy and Mobility
	<p>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.</p> <p>W: https://www.fhv.at/en/research/user-centred-technologies/</p>	Health

Recent Selected RUN EU Partner Projects

IPL

- DRAGON - End-to-End Deep learning based image Compression (<https://www.it.pt/Projects/Index/4697>)
- HLS -Hybrid Log Shielding (<https://www.it.pt/Projects/Index/4627>)
- PlenoISLA - Plenoptic imaging for skin lesion assessment (<https://www.it.pt/Projects/Index/4583>)
- ARoundVision - All aRound panoramic Vision for smart and secure environments (<https://www.it.pt/Projects/Index/4583>)

- RESCUE-TOOL - Radio coverage for emergency communication systems to operate under critical wildfire environments TOOL (<https://www.it.pt/Projects/Index/4620>)

LIT

- 2020 SFI Discover Programme Call- Exploring Digital Citizenship
- Real-time Mixed Martial Arts fight analysis using deep-learning (Artificial Intelligence)
- 2019 SFI Discover Programme Call-Pair Teaching in Coding for Primary School Teachers
- 2018 SFI Discover Programme Call- Exploring Computer Science and Career Choices in IT
- 2017 INCASE (Intelligent Cognitive Assistance System) Enterprise Ireland Innovation Partnership (Cook Medical & Vistamed)

AIT

- Digital Advantage Framework for Growth and Competitiveness in Small and Medium Enterprises
- SME Financial Benchmarking API
- SIM-CONTACT: Simulation- Based Centre Analytics Application
- DREAM: simulation based application Decision support in Real-time for Efficient Agile Manufacturing
- EU H2020 Protective
- SFI SIRG

HAMK

- Vattu - Virtual products for the manufacturing industry
https://www.youtube.com/watch?v=NtgYEyi_JY&t=11s
- Open data <https://www.hamk.fi/projektit/avoinhame/>
- Field observatory <https://www.fieldobservatory.org/>
- Hämeenlinna in pocket (mobile apps to citizen) <https://www.hamk.fi/2019/hamk-kehitti-mobilisovelluksen-hameenlinnan-kaupungille/>
- Digital bale <https://digipaali.fi/en/>

IPCA

- Cybers SeC IP - Strengthening scientific skills and potential for innovation in cybersecurity
- sBee – Smart Beekeeping
- TESTOR - The production and simplification of evidence
- SilkHouse: Development of an intelligent micro-network based on renewable energy sources and a monitoring system for Casa da Seda
- RnHealthTech - Technologies for risk assessment on professional exposure to Radon Gas in Minho Region

NHL Stenden

- Exploring and enhancing data breach reporting behaviour within governmental organisations
- Impact of cybercrime victimization
- Police Detectives on the TOR Network
- Police patrol work and the use of information technology

FHV

- IBH Living Lab AAL (2016-2021): Development and empirical testing of digital innovations to support older people and their carers within the framework of international Living Labs (Fund: Interreg, Budget: 3.921.668).
- Get Ready for Activity (2017-2020): Development and empirical testing of digitally supported treatment procedures for the day structuring of dementia patients (Fund: H2020, Budget: 3.182.979).
- Easy to use professional applications (2014-2018): User centered, iterative development of digital assistance technology in the industrial context of production and logistics (Fund: FFG, Budget: 1.850.921).
- Concept for Machine Learning and Mixed Reality in Digital Twins for Production Machines
- DigitalEnergyTwin – Optimised operation and design of industrial energy systems
- Austrian Blockchain Centre

Recent RUN EU Partner Publications

IPL

- A. Guarda, Nuno M. M. Rodrigues, F. Pereira, Constant Size Point Cloud Clustering: a Compact, Non-Overlapping Solution, IEEE Transactions on Multimedia, Vol. 23, No. 1, pp. 77 - 91, December 2020.
- M. Jordão, D. Belo, Rafael Caldeirinha, A. Oliveira, N.B.C. Carvalho, Over-the-Air Calibration of Active Antenna Arrays Using Multisine, IEEE Transactions on Microwave Theory and Techniques, Vol. 69, No. 1, pp. 431 - 442, January, 2021.
- R. Monteiro, Nuno M. M. Rodrigues, S.M.M. Faria, P. Nunes, Light Field Image Coding Based on Hybrid Data Representation, IEEE Access, Vol. 8, No. -, pp. 115728 - 115744, June 2020.
- Pedro M. M. Pereira, R. Pinto, R. Paiva, P.A. Assunção, L. Távora, L. A. Thomaz, S.M.M. Faria, Dermoscopic skin lesion image segmentation based on Local Binary Pattern Clustering: Comparative study, Biomedical Signal Processing and Control, Vol. 59, No. 101924, pp. 101924 - 101924, May, 2020.
- B. Silva, H. F. Castro, L. B. Bento, M. Barata, P.A. Assunção, User-Experience with Haptic Feedback Technologies and Text Input in Interactive Multimedia Devices, Sensors, Vol. 20, No. 18, pp. 5316 - 5316, September, 2020.

LIT

- Winterburn, M., Houghton, F., Lama, S., Cosgrove, B.. (2019) Leprosy (Hansen's Disease): the WHO, Courage, and the Myth of 'Elimination'. Medicina Internacia Revuo. Vol 28 No 113
<https://interrev.com/mir/index.php/mir/article/view/161/122>
- Corcoran, N. & Duane, A. (2019) Using Social Networks and Communities of Practice to Promote Staff Collaboration in Higher Education, in Fedeli, M. & Bierema, L. (Eds.) Connecting Adult Learning and Knowledge Management, Cham: Springer Nature, pp. 157-174.
- O'Brien K, Humphries J (2019) Object Detection using Convolutional Neural Networks for Smart Manufacturing Vision Systems in the Medical Devices Sector, Procedia Manufacturing (2019) pp. 142-147. DOI information: 10.1016/j.promfg.2020.01.019.
- Holohan, J. and J. McDonagh (2017a). How Information Systems Managers Align Business and Information Systems Strategies in Public Service Organisations: A Practice-Based Taxonomy. 17th European Academy of Management Conference, University of Strathclyde, Glasgow, Scotland.
- Holohan, J. and J. McDonagh (2017b). A Practice-Based Methodology to Enlighten Strategic Alignment Research. In: Themistocleous M., Morabito V. (eds) Information Systems. EMCIS 2017. Lecture Notes in Business Information Processing, vol 299. Springer, Cham.

AIT

- Liston P, Conyngham G, Byrne PJ, Brady M, Winder-Baggot S, Gilligan P. The Boomerang Study: Increased hospital re-admission via the Emergency Department. Irish Medical Journal 2021;114(1).
- Chimello I, Liston P, Byrne PJ. Investigating available supports for the digitalisation of SMEs. In: Mauro C Di, Tate W, Narayanan S, Duray R, editors. Decision Sciences Institute 51st Annual Conference. Virtual Event; 2020.
- Byrne PJ, Byrne J, Liston P, Ivers AM. Complications of Complexity: Discrete Event Simulation in Manufacturing SMEs. In: MacCarthy B, Chutani A, McKenzie R, Zhang G, editors. EDSI 2019 - Decision Sciences in a Connected World. Nottingham, UK: European Decision Sciences Institute; 2019.
- Byrne J, Byrne PJ, Liston P. Contact Centres: Decision Support for Digital Transformation. In: MacCarthy B, Chutani A, McKenzie R, Zhang G, editors. EDSI 2019 - Decision Sciences in a Connected World. Nottingham, UK: European Decision Sciences Institute; 2019.
- Byrne, P. J., C. Heavey, P. Blake, and P. Liston (2013) "A simulation based supply partner selection decision support tool for service provision in Dell," Computers & Industrial Engineering, vol. 64, no. 4, pp. 1033-1044.

HAMK

- Tarkkala, M., Kukkamäki, J., Jussila, J., Kunttu, I., & Heinisuo, J. (2020, July). Open Data Ecosystems in Public Service Development. In International Conference on Applied Human Factors and Ergonomics (pp. 58-64). Springer, Cham.
- Perttula, A., & Kukkamäki, J. 2020. Enabling Rapid Product Development through Improved Verification and Validation Processes. Technology Innovation Management Review, 10(3): 25-36.

- Pulkkinen, J., Partanen, A., Jussila, J., & Ruohomaa, H. (2020, July). Open Ecosystem for Smart Mobility System Operation and Maintenance. In International Conference on Applied Human Factors and Ergonomics (pp. 29-34). Springer, Cham.
- Pulkkinen J., Jussila J., Partanen A., Trotskii I. (2019) Data Strategy Framework in Servitization: Case Study of Service Development for a Vehicle Fleet. In: Visvizi A., Lytras M. (eds) Research & Innovation Forum 2019. RIIFORUM 2019. Springer Proceedings in Complexity. Springer, Cham
- KUKKAMÄKI, Joni; SALMINEN, Vesa; RUOHOMAA, Heikki. DEVELOPMENT OF ICT EDUCATION IN DIGITALIZING BUSINESS ENVIRONMENT. ACTA TECHNICA NAPOCENSIS - Series: APPLIED MATHEMATICS, MECHANICS, and ENGINEERING, [S.l.], v. 61, n. 4, dec. 2018. ISSN 2393-2988.

IPCA

- Mateus-Coelho, N., Cruz-Cunha and M. M., Ferreira, L. (2020). Security in Microservices Architectures. In CENTERIS – International Conference on ENTERprise Information Systems / ProjMAN – International Conference on Project MANagement / HCist – International Conference on Health and Social Care Information Systems and Technologies, CENTERIS/ProjMAN/HCist 2020, Procedia Computer Science.
- Lima B., Ferreira, L. and Mouro, J. M. (2020). Helping to detect legal swimming pools with Deep Learning and Data Visualization. In CENTERIS – International Conference on ENTERprise Information Systems / ProjMAN – International Conference on Project MANagement / HCist – International Conference on Health and Social Care Information Systems and Technologies, CENTERIS/ProjMAN/HCist 2020, Procedia Computer Science.
- Matos M., Duque D., Silva J., Portela I. (2019) The Production and Simplification of Evidence – Enhancing Trust and Costs Reduction on Court. In: Silhavy R., Silhavy P., Prokopova Z. (eds) Intelligent Systems in Cybernetics and Automation Control Theory. CoMeSySo 2018. Advances in Intelligent Systems and Computing, vol 860. Springer, Cham. DOI: https://doi.org/10.1007/978-3-030-00184-1_31
- Portela I, TESTOR - A simplificação e a produção da prova em processo civil, in Direito na Lusofonia, Direito e Novas Tecnologias, Vol 2 Universidade do Minho, Escola de Direito, 2019 ISBN: 978-989-54194-8-7.
- Coelho, N. M., Peixoto, M. & Cruz-Cunha, M. M. (2019). Prototype of a paranoid mobile operating system distribution. 2019 7th International Symposium on Digital Forensics and Security (ISDFS), Barcelos, Portugal, 2019, pp. 1-6. doi: 10.1109/ISDFS.2019.8757551.

NHL Stenden

- Kerstens, J. (2020). Werken in Wijk en Web: naar toekomstbestendig Gebiedsgebonden Politiewerk. Onderzoeksgroep Cybersafety, NHL Stenden: Leeuwarden.
- Schaik, P. van, Renaud, K., Wilson, C., Jansen, J., & Onibokun, J. (2020). Risk as affect: The affect heuristic in cybersecurity. Computers & Security, 90, 101651.
- Leukfeldt, R. & Jansen, J. (2020). Financial cybercrimes and situational crime prevention. In R. Leukfeldt and T. Holt (eds.): The human factor of cybercrime (pp. 216-239). New York: Routledge.
- Groot, R.M. de, H. L. Kaal & W.Ph. Stol (2019) Studying Problematic Online Behavior of Adolescents with Mild Intellectual Disabilities and Borderline Intellectual Functioning: Methodological and Ethical Considerations for Data Collection. International Journal of Qualitative Methods, vol. 18: 1–10, DOI: 10.1177/1609406919857978.
- Jansen, J. & Schaik, P. van (2019). The design and evaluation of a theory-based intervention to promote security behaviour against phishing. International Journal of Human-Computer Studies, 123, 40-55.

FHV

- Meierhofer, J., Dobler, M., Frick, K., & Schweiger, L. (2020, September). Smart service patterns for small manufacturing enterprises. In Spring Servitization Conference "Advanced Services for Sustainability and Growth", Online, 14-16 September 2020 (pp. 88-95). Aston University.
- Dobler, M. Meierhofer, J., & Kugler, P. et al. (2020). Data4KMU: Data Science für KMU leicht gemacht. Aktuelle Erkenntnisse und Lösungen. Internationale Bodenseehochschule Labs. <https://doi.org/10.25924/opus-3505>

- Lortz, J., Simanovski, J., Kuether, T., Kreitschmann-Andermahr, I., Ullrich, G., Steinmetz, M., ... Paldán, K. (2020). Needs and Requirements in the Designing of Mobile Interventions for Patients with Peripheral Arterial Disease: Questionnaire Study. JMIR Formative Research, 4(8), e15669.
- Trommelschläger, K., Künz, A. & Ritter, W. (2019). Developing user centered technological prototypes to maintain physical health. In: F. Piazzolo, G. Kempter, & K. Promberger (eds.), Innovative solutions for an ageing society, S. 81 -92. Lengerich: Pabst Science Publishers.
- M. Dobler, M. Ballandies and V. Holzwarth, "On the extension of digital ecosystems for scm and customs with distributed ledger technologies requirements analysis, innovation assessment, and prototype design for the lake constance region," 2019 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC), Valbonne Sophia-Antipolis, France, 2019, pp. 1-8, doi: 10.1109/ICE.2019.8792646.
- Concept of probabilistic modeling for real-time prediction of product quality and design automation.

Technological Systems & Infrastructures

IPL

- Multimedia Signal Processing Laboratory (Leiria)
- Laboratory of Telecommunications (including an Anecoic Chamber)

LIT

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

AIT

- eXtended Reality Suite
- State of the Art Edge/Cloud Computing Data Centre
- GPU server with 4 Nvidia A100 cards
- GPU server with 4 Nvidia V100 cards
- GPU server with 12 Nvidia T4 cards
- Edge computing systems (including a wide range of edge devices, e.g. Intel NUCs, Nvidia Xavier, Raspberry Pis, Arduinos)
- Networking devices (including OpenFlow enabled Switches)
- Cloud computing systems (over 500 CPU cores)

HAMK

Common infrastructure for AR,VR & game engine testing and demonstration called 5G Mökki with universities like Aalto university and companies like Nokia, Elisa.

IPCA

- Robots: Kuka iiwa and Agilus; KUKA LBR Med, SoloAssist, Universal robot UR3; Automata EVA; 10 Lego EV3 and 5 Lego NXT2 kits; NAO; DJI 1000+; 30+ Parrot AR 2
- Image and surface acquisition systems: GE Vivid 9 (4D US transesophageal probe); scanner Polhemus; Microsoft kinetic I and II; industrial visible light, thermal and multispectral cameras, filters, lenses
- Production support equipment: LKF S103 and D104, laser cutting machine, printers 3D machines (Uprint, Ultimate II, OBJET Eden 260), plastic forming machine, CNC milling machine – VF2 Haas, CNC turning center – TL1 Haas
- Virtual and augmented reality equipment: 15 HTC vive; 4 Oculus Rift; EPSON MOVERIO; Microsoft HoloLens I & II; Oculus Quest; ODG R-7 SmartGlasses
- Motion tracking and haptic feedback: Aurora NDI; Xsense; Tobii EyeX; Data Gloves 5DT; Leap Motion; Kinect; Polhemus Liberty; Force Dimension Omega 7
- Graphical and Computational Power: SuperMicro Server with 4 NVIDIA A100; Render Farm – 4x HP DL380 G82; several graphical workstations; several mobile devices
- Embedded systems and sensors: Rasp pi 3 & 4; Jetson TK1, Xavier DGX; Ti mmWave sensors, Sipeed RISC-V; \weather station; Epoc emotive; wireless communications interfaces; several sensors and GPS receivers.

FHV

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.

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)

2.1.1.5 Research Area 5: Advanced Manufacturing

The Run-EU audit identified advanced manufacturing as very strong area for crosscutting research collaborative activities across the consortium. Advances in manufacturing systems have seen a dramatic enhancement in utilising the capability of existing equipment and also the ability to increase competitiveness, throughput and material utilisation by taking advantage of new digital strategies and techniques. Maintaining that competitive advantage requires ongoing investment in people, equipment, software and the related quality control and management systems. For SME's to successfully address the challenges of digitalisation of manufacturing, they need to integrate and upgrading their existing process, including re-skilling of their workforce. Defined within the digitization and space horizon Europe pillar 2 cluster and identified by RUN-EU members in the research audit is that all sectors of the economy and society are affected and informed by digitisation and technological progress. Research and innovation advancements in these areas transform industrial development and the new products and services they deliver, influencing the way we live, work and learn, and are critical to our sustainable future. Targeting the strategic value chains process will enable production and consumption to respect the sustainability boundaries of our planet and ensure equitable benefits for all societal actors socially, economically and territorially in Europe. Positive reinforcement of these ideals can only come with concurrent technological progress and digital and industrial transformation. 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 to work in tandem to effect societal change.

A key aim of this strategic research cluster area within RUN-EU is to consolidate and reinforce our national and international research as leading in the field of multiscale direct advanced digital manufacturing based on advanced additive manufacturing, moving towards the fully integrated concept of added-value manufacturing. This is

possible due to the multidisciplinary nature RUN-EU Research Team, comprising researchers from different scientific backgrounds. Smart Manufacturing ultimately aims to increase the flexibility and efficiency of the production process by integrating advanced information and production technologies. Research, development and innovation in advanced manufacturing is cross cutting focused on the development of intelligent systems and smart sustainable factories with a key emphasis on Industry 4.0 and the convergence of disciplines which are evident across the RUN-EU consortium such as, electrical and mechanical engineering, water, smart technology, circular economy, manufacturing digitalisation, ICT, human computer interactions, systems validation, bioinspired manufactured materials and resource/energy efficiency. Other research topic specialism areas such as IoT & sensing, data analytics & visualisation, cloud manufacturing, digital twins, additive manufacturing, industrial control, advanced robotics & end of arm tooling, smart industrial control and model-based engineering/reliability & maintenance have also been identified within the audit.

Manufacturing is at its core a multi-stage process in which value is added in order to transform raw materials into products. Smart Manufacturing aims to increase the flexibility and efficiency of this production process by integrating advanced information and production technologies. The quality of a product or service is a critical factor in product manufacture and a game changing area for industry innovation. The audit has identified specialist research in computer vision technologies and vision control machine learning systems technology that can carry out automated visual assessments of the product quality. This contributes to a smart industry in a higher quality, and cheaper, more flexible and/or labour-friendly (production) process. Computer Vision and 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. We also within RUN-EU have strong competence in mathematical and statistical analysis, optimisation, modelling and the application and implementation of machine learning algorithms. With the methods of machine learning and artificial intelligence, the resulting data is used in the creation a computational model for reducing energy consumption aligned with the research work in RUN-EU research area 6. As part of our work, we will also engage in photonics & microtechnology focusing on the development of micro-technical production processes and components of microsystems including development and production of micro systems and processes for micro-technical manufacture, fabrication of prototypes and studies on feasibility using scanning electron microscopy and the analysis of materials. The audit has also identified that the increasing aging of the population and the digital transformation puts a pressure on the

(local) labor market, especially for higher-skilled personnel. It is expected that between 35% and 60% of current, often routine, jobs are threatened by this increasing automation. On the other hand, job growth is foreseen on the bachelor and academic level where more abstract thinking is required. The rapidly changing labor market demands requires a continuous development of knowledge and skills of the working population, so called lifelong learning. Both regional manufacturing industries and educational institutions including RUN-EU researchers can fill this gap by developing learning practices like skills labs/learning factories where students/employees get experienced with state-of-the-art manufacturing practices and where cutting edge applied research can be performed by RUN-EU research teams.

Table 5: *Collective Expertise and Knowledge of RUN EU Alliance (Advanced Manufacturing)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	<p>INESCC - Delegation at Polytechnic of Leiria- 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.</p> <p>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:</p> <ul style="list-style-type: none"> -Industry 4.0 and the Factories of the Future -Industrial Robotics -Automatic Inspection and Maintenance -Educational Robotics -Materials and Technologies -Autonomous Driving <p>W: https://www.uc.pt/en/org/inescc</p>	Digital Industry & Space
	<p>Centre for Rapid & Sustainable Product Development (CDRSP)- 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-IPLLeiria leads scientific and technological research and promotes dissemination, training and consultancy actions in strategic areas of product development.</p>	Digital Industry & Space

	<p>The aim of the strategic research programme is to consolidate and reinforce the national and international position of the CDRSP-IPLeiria 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.</p> <p>W: https://cdrsp.ipleiria.pt/</p>	
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>ACORN- 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.</p> <p>W: http://www.acornresearch.ie/about-us/</p>	Digital Industry & Space
	<p>BETER- Built Environment – Technology and Educational Research is a research focused group which support's built environment higher education through a research process which will develop understanding, engender consensus, promote a diversity of praxis and optimise the resources available to Built Environment higher education. It is intended that the work of BETER will:</p> <ul style="list-style-type: none"> • promote research that informs the development of teaching and learning across the different built environment disciplines • facilitate trans-professional integrative educational research with external partners including built environment professional bodies, industry, governmental agencies, the wider society and other third level establishments <p>W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/(BETER)-Built-Environment-%E2%80%93-Technology-and-Educational</p>	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe

		Pillar 2 Cluster Alignment
Athlone Institute of Technology (AIT)	<p>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.</p> <p>W: http://mri.ait.ie/</p>	Digital Industry & Space
	<p>CONFIRM SFI- 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.</p> <p>W: https://confirm.ie/</p>	Digital Industry & Space
	<p>APT Ireland- 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.</p> <p>W: https://aptireland.ie/</p>	Digital Industry & Space
	<p>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.</p> <p>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.</p> <p>W: http://www.cisd.ie/</p>	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	<p>Intelligent Transport and Logistic- The focus of our research area is to develop and use the latest digital technologies and data-analytics in the intelligent transport and logistics. The research aims to develop solutions for smart mobility and logistics in a customer-oriented manner. The research results support the smooth running of daily life, the competitiveness of business, and the creation of multidisciplinary innovations. We work in the long term strategic cooperation with different companies, universities, municipalities and other communities.</p>	Digital Industry & Space

	W: https://www.hamk.fi/research/hamk-smart/smart-solutions/?lang=en#1529036409396-1a690e18-59f1485d-992e	
	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 reuseability. W: https://www.hamk.fi/research/hamk-tech/robotics/?lang=en	Digital Industry & Space
	Modern 3D Technologies and Materials research area focuses on additive manufacturing and 3D-technologies applied on reverse engineering and quality assurance. Laser processing and welding are also part of research area. Research aims to enable flexible local manufacturing and is carried together with different companies W: https://www.hamk.fi/research/hamk-tech/sheet-metal-forming-and-joining/?lang=en	Digital Industry & Space
	Operation research team has competence in mathematical and statistical analysis, optimisation, modelling and the application and implementation of machine learning algorithms. As an example in industrial applications, we have taken part in developing the production line of KONE and in reducing the consumption of district heating in the City of Tampere. The solution developed for KONE focused on minimising the impact of bottlenecks on the efficiency of a production line. As part of the Smart City project in Tampere, the HVAC systems in Vuores School, amongst other buildings, are monitored. With the methods of machine learning and artificial intelligence, the resulting data is used in the creation a computational model for reducing energy consumption. W: https://www.hamk.fi/research/hamk-smart/data-and-business-analytics/?lang=en	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Cávado and Ave (IPCA)	Research Centre 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 W: https://2ai.ipca.pt	Digital Industry & Space
	Research group on Engineering Design and Advanced Manufacturing- Advanced processing technology for polymers and associated quality control W: www.esd.ipca.pt	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe

		Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	<p>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.</p> <p>W: https://www.nhlstenden.com/onderzoek/lectorat/smart-sustainable-manufacturing</p>	Digital Industry & Space
	<p>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.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/computer-vision</p>	Digital Industry & Space
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István University (SZE)	<p>Department of Mechatronics and Machine Design, Fire protection and Safety Technology Group- fire engineering, mechanical engineering, fire protection, numerical methods and simulations, water management, CBRN engineering.</p> <p>W: https://uni.sze.hu/</p>	Digital Industry & Space
	<p>Department of Materials Science and Technology- The research, development and innovation is focussed on the development of tools by additive manufacturing and thus the quality and efficiency of polymer processing or metal casting. 3D technologies both in manufacturing (DMLS) and material testing (CT and GOM system) and also the complex conventional material testing can serve as a strong basis of researchers work in collaborations with regional, national, and international companies</p>	Digital Industry & Space

	W: https://att.sze.hu/	
	Department of Transport Infrastructure and Water Resources Engineering- Pedestrians' behavioural adaptation to AVs and its effect on road capacity W: https://kep.sze.hu/en_GB	Climate Energy and Mobility
	Department of Transport Infrastructure and Water Resources Engineering- Pedestrian facilities capacity in a connected and autonomous vehicle environment W: https://kep.sze.hu/en_GB	Climate Energy and Mobility
	Department of Transport Infrastructure and Water Resources Engineering- (1) water management and surface water hydrology, (2) unsaturated flow modelling with applications in transportation, geotechnics and ecology, (3) karst flow modelling, (4) hydrodynamic flow modelling. Applying different methods to predict flow at un-gaged watersheds, and study the hydrological behavior and hydraulic mechanisms of small watersheds. Applying measurement methods to develop soil water characteristic curves and evaluating measured data. Describing karst spring flow using statistical methods. Determining the impact of climate change on spring flow. W: www.sze.hu	Climate Energy and Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
FH Vorarlberg University of Applied Sciences (FHV)	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: <ul style="list-style-type: none"> • 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 W: https://www.fhv.at/en/research/microtechnology/	Digital Industry & Space
	The Research Center 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. W: https://www.fhv.at/en/research/digital-factory-vorarlberg/	Digital Industry & Space
	Department of Business Informatics- BIFOCALps - Boosting Innovation Factory of the Future Value Chain in the Alps: The project was tackling a common challenge to many Alpine Space (AS) regions: due to globalisation, many enterprises in manufacturing sector are not as competitive as wished in global markets, resulting in increased levels of unemployment, abandoned facilities and remaining plants that need new products and new processes. W: https://www.fhv.at/en/research/business-informatics/	Digital Industry & Space

	<p>Department of Business Informatics- 4Steps - Towards the application of Industry 4.0 in SME. the project is addressing the main challenge of Industry 4.0 (I4.0) as tool towards a new, digital industrial revolution holding the promise of increased flexibility in manufacturing, mass customisation, increased speed, better quality and improved productivity and its development is supporting the RIS3 in the target regions in the different sectors.</p> <p>W: https://www.fhv.at/en/research/business-informatics/</p>	Digital Industry & Space
	<p>Faculty of Engineering- As a center of excellence for innovative and application-oriented technology, the Faculty of Engineering links academic teaching and inter-company research with companies and institutions in the region. In this way, the faculty contributes to strengthening the innovation, attractiveness of employers and competitiveness of the companies in Vorarlberg. The focus is on mechatronics, electrical engineering, computer science, energy systems and environmental technology. R & D – initiatives are very often together with the existing research centers of Vorarlberg University of Applied Sciences (User Centered Technologies, Digital Factory Vorarlberg) initiated and established.</p> <p>W: https://www.fhv.at/en/fh-vorarlberg-overview/organisation-fh-vorarlberg/departments/faculty-of-engineering/</p>	Climate Energy & Mobility

Recent Selected RUN EU Partner Projects

IPL

- S4Plast – Sustainable Plastics Advanced Solutions.
- AR WARE – Augmented Reality for intelligent WAREhouse management.
- Tooling4G – Advanced Tools for Smart Manufacturing.
- PAMI – Portuguese Additive Manufacturing Initiative (projeto nº22158 – SAICT- AAC nº01/SAICT/2016)
- 2bio4cartilage – Integrated intervention program for prevention and treatment of cartilage lesions (POCI-01-0145-FEDER-023423)

LIT

- Erasmus + Skills Blueprint for the Construction Industry
- Enterprise Ireland - Innovation Partnership - New Product Development of testing standards for the food and pharma sector
- Enterprise Ireland - Innovation Partnership-Design, Modelling and Performance Testing of Bespoke PDC Bearings
- Enterprise Ireland - Innovation Partnership - Development of a Hard Insert for Oilfield Equipment
- Enterprise Ireland - Innovation Partnership - INCASE

AIT

- Curcol interreg
- Confirm Centre for Smart Manufacturing
- Amber centre for advanced material
- Curam centre for medical devices

HAMK

- Vattu - Virtual products for the manufacturing industry
https://www.youtube.com/watch?v=NtgYEyi_JY&t=11s
- RoboTS (Collaborative robotics - Next generation of robotics)
- CEE, Chief Expert in Engineering. 3D design and additive manufacturing in education
- Trafic 4.0 (national project)
- 5GStart (national project)

IPCA

- InjectID4.0 - Automatic insertion of RFID systems in the plastic injection process

- “SAM – Smart Active Mould”. October 2016 – December 2019. POCI-01-0247-FEDER-017620 (Portuguese Agency for Innovation)
- “Ecobond”. August 2016 – July 2019. POCI-01-0247-FEDER-017930 (Portuguese Agency for Innovation)
- Project "TECH-Technology, Environment, Creativity, and Health". Ongoing since 2020. NORTE-01-0145-FEDER-000043
- Intelligent digital twin for hyper-automation deployment in smart factories

NHL Stenden

- Smart Industry Hub Noord-Nederland (ERDF)
- Focus on Vision (SIA RAAK)
- Center of Expertise Smart Sustainable Manufacturing (ERDF)

SZE

- EFOP-3.6.2-16-2017-00016 (Dynamics and control of autonome vehicles, 2017-2020) -
- TÁMOP-4.2.2.A-11/1/KONV-2012-0029 Project (2013-2014) -
- EFOP-3.6.2-16-2017-00016 Project (2017-2020) – “Dynamics and control of autonomous vehicles in synergy with the requirements of automated transport systems”.
- H2020-MSCA-RISE-2017-823981-ActiTox, „Active organotypic models for nanoparticle toxicological screening”, 2019-2022
- H2020-MSCA-RISE-2018-824007-iP-OSTEO, „Induced pluripotent stem cell seeded active osteochondral nanofibrous scaffolds”, 2019-2022

FHV

- Cloud Based Information Systems for Distributed and Optimized Production#
- Concept for Machine Learning and Mixed Reality in Digital Twins for Production Machines
- DigitalEnergyTwin – Optimised operation and design of industrial energy systems
- Center for Digital Production
- BIFOCAlps
- KMUDigital

Recent RUN EU Partner Publications

IPL

- B. Silva, H. Costelha, L.C. Bento, M. Barata and P. Assunção, “User-Experience with Haptic Feedback Technologies and Text Input in Interactive Multimedia Devices”, in Sensors 2020, MDPI, 20(18), 5316, September 17, 2020, doi: 10.3390/s20185316.
- A. Martins, H. Costelha and C. Neves, “Supporting the Design, Commissioning and Supervision of Smart Factory Components through their Digital Twin,” 2020 IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC), Ponta Delgada, Portugal, 2020, pp. 114-119, doi: 10.1109/ICARSC49921.2020.9096072.
- P. F. Martins, H. Costelha, L. C. Bento and C. Neves, “Monocular Camera Calibration for Autonomous Driving — a comparative study,” 2020 IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC), Ponta Delgada, Portugal, 2020, pp. 306-311, doi: 10.1109/ICARSC49921.2020.9096104.
- A. Martins, H. Costelha and C. Neves, “Shop Floor Virtualization and Industry 4.0,” 2019 IEEE International Conference on Autonomous Robot Systems and Competitions (ICARSC), Porto, Portugal, 2019, pp. 1-6, doi: 10.1109/ICARSC.2019.8733657.
- C.Malca, C.Santos, M.Sena, A.Mateus (2018), Development of SLM cellular structures for injection molds manufacturing, Science and Technology of Materials, 30(1), 13-22.

LIT

- Cosgrove J., Doyle F., van den Broek B. (2019) A Case Study Analysis of Energy Savings Achieved Through Behavioural Change and Social Feedback on Manufacturing Machines. In: Ball P., Huaccho Huatuco L., Howlett R., Setchi R. (eds) Sustainable Design and Manufacturing 2019. KES-SDM 2019. Smart Innovation, Systems and Technologies, vol 155. Springer, Singapore.

- O'Brien K, Humphries J (2019) Object Detection using Convolutional Neural Networks for Smart Manufacturing Vision Systems in the Medical Devices Sector, *Procedia Manufacturing* (2019) pp. 142-147. DOI information: 10.1016/j.promfg.2020.01.019.
- T. Burns, F. Doyle, J. Cosgrove. 'A Review of Interoperability Standards for Industry 4.0.' - International Conference in Flexible Automation and Intelligent Manufacturing (FAIM) in Limerick, Ireland, June 24-28, 2019.
- Sullivan, J. and Bennett, S. (2016) The Characterisation of TLC NAND Flash Memory Leading to a Definable Endurance/Retention, Trade-off - A Position Paper, *International Journal of Computer, Electrical, Automation, Control and Information Engineering* Vol:10, No:4, 2016.
- Fitzgerald B., Ryan C., Sullivan J. (2019) An Optimal Machine Learning Classification Model for Flash Memory Bit Error Prediction, in Hassanien A. (eds) *Machine Learning Paradigms: Theory and Application*. Studies in Computational Intelligence, vol 801, Cham: Springer, pp.89-110.

AIT

- Garcia, E.L.; Attallah, O.A.; Mojicevic, M.; Devine, D.M; Brennan Fournet, M. Antimicrobial Active Bioplastics Using Triangular Silver Nanoplate Integrated Polycaprolactone and Polylactic Acid Films. *Materials* 2021, 14, 1132. <https://doi.org/10.3390/ma14051132>
- Venkatesh, C.; Laurenti, M.; Bandeira, M.; Lanzagorta, E.; Lucherini, L.; Cauda, V.; Devine, D.M. Biodegradation and Antimicrobial Properties of Zinc Oxide–Polymer Composite Materials for Urinary Stent Applications. *Coatings* 2020, 10, 1002. <https://doi.org/10.3390/coatings10101002>
- Bandeira, Marina & Possan, André & Pavin, Sandra & Raota, Camila & Vebber, Mario & Giovanela, Marcelo & Roesch-Ely, Mariana & Devine, Declan & Crespo, Janaina. (2020). Mechanism of formation, characterization and cytotoxicity of green synthesized zinc oxide nanoparticles obtained from *Ilex paraguariensis* leaves extract. *Nano-Structures & Nano-Objects*. 24. 100532. 10.1016/j.nanoso.2020.100532.
- Zanjanijam, A.R.; Major, I.; Lyons, J.G.; Lafont, U.; Devine, D.M. Fused Filament Fabrication of PEEK: A Review of Process-Structure-Property Relationships. *Polymers* 2020, 12, 1665. <https://doi.org/10.3390/polym12081665>
- Chen, Yuan & Neff, Martin & McEvoy, Brian & Cao, Zhi & Pezzoli, Romina & Murphy, Alan & Gately, Noel & Jnr, Michael & Rowan, Neil & Devine, Declan. (2019). 3D printed polymers are less stable than injection moulded counterparts when exposed to terminal sterilization processes using novel vaporized hydrogen peroxide and electron beam processes. *Polymer*. 183. 121870. 10.1016/j.polymer.2019.121870.

HAMK

- L. Pan, F. Christophe, T. Mikkonen. 2020. Simulating Spiking Neural Networks with Timed Dataflow Graphs. 2nd IEE International Conference on Artificial Intelligence Circuits and Systems (AICAS).
- E. Kivirasi, H. Piili, K. Minet-Lallemand, J. Kotila. 2020. Detecting spattering phenomena by using high speed imaging in L-PBD of 316 L. 11th CIRP Conference on Photonic Technologies [LANE 2020]. (<https://doi.org/10.1016/j.procir.2020.09.153>)
- J. Pulkkinen, A. Partanen, J. Jussila, and H. Ruohomaa, "Open Ecosystem for Smart Mobility System Operation and Maintenance," *Adv. Hum. Factors, Bus. Manag. Leadership*. AHFE 2020. *Adv. Intell. Syst. Comput.*, vol. 1209 AISC, pp. 29–34, 2020, doi: 10.1007/978-3-030-50791-6_4.
- A. Perttula, J. Kukkamäki, 2020, Enabling Rapid Product Development through Improved Verification and Validation Processes, *Technology Innovation Management Review*, 3: 24-35. <http://doi:10.22215/timreview/1334>
- J. Pulkkinen, J. Jussila, A. Partanen, I. Trotskii, A. Laiho, *Smart Mobility: Services, Platforms and Ecosystems*, 2019, *Technology Innovation Management Review*, 9(9): 15-25. <http://doi.org/10.22215/timreview/1265>

IPCA

- Alves, F., Badikyan, H., Moreira, A.H.J., Azevedo, J., Moreira, P.M., Romero and L., Leitão, P. (2020). Deployment of a Smart and Predictive Maintenance System in an Industrial Case Study. In 2020 IEEE 29th International Symposium on Industrial Electronics (ISIE), Delft, Netherlands.

- Faria, C., Vilaça, J. L., Monteiro, S., Erlhagen, W., & Bicho, E. (2019, October). Automatic Denavit-Hartenberg parameter identification for serial manipulators. In IECON 2019-45th Annual Conference of the IEEE Industrial Electronics Society (Vol. 1, pp. 610-617). IEEE.
- Lopes, N., Putnik, G., Ferreira, L., & Costa, B. (2019). Towards a high performance computing scalable implementation of Cyber Physical Systems. FME Transactions, 47(4), 749-756.
- Putnik, G. D., Shah, V., Putnik, Z., Ferreira, L. (2020). Machine learning in cyber-physical systems and manufacturing singularity – it does not mean total automation, human is still in the centre: Part I – Manufacturing Singularity and an Intelligent Machine Architecture. Journal of Machine Engineering, 161-184. <https://doi.org/10.36897/jme/131000>
- Putnik, G. D., Ferreira, L., Lopes, N., & Putnik, Z. (2019). What is a Cyber-Physical System: Definitions and models spectrum. FME Transactions, 47(4), 663-674.

SZE

- Hatos, I; Fekete, I; Harangozó, D; Hargitai, H: Influence of Local Porosity on the Mechanical Properties of Direct Metal Laser-Sintered 1.2709 Alloy, STROJNISKI VESTNIK-JOURNAL OF MECHANICAL ENGINEERING 66: 6 pp. 351-357., 7 p. (2020).
- Rajmund Kuti, Géza Zólyomi, Orsolya K Kegyes-Brassai: Assessing the impact of positive pressure ventilation on the building fire – a case study, INTERNATIONAL JOURNAL OF GEOMATE 2018: (48) pp. 16-21.
- Kozma, I; Zsoldos, I: CT-based tests and finite element simulation for failure analysis of syntactic foams, ENGINEERING FAILURE ANALYSIS 104 pp. 371-378., 8 p. (2019).
- Horváth Péter, Hajdu Flóra, Kuti Rajmund: Investigation of Swings Caused by Sudden Wind Loads During Operation of an Aerial Ladder, FME TRANSACTIONS 2020: (48) pp. 351-356.
- Hajdu, Flóra ; Molnárka, Győző ; Kuti, Rajmund: One-at-a-Time Sensitivity Study of a Nonlinear Fire Truck Suspension Model, FME TRANSACTIONS 48 : 1 pp. 90-95., 8 p. (2019).

FHV

- Maurer, F., & Schumacher, J. (2019). Evolving towards a smart Factory of the Future within supply chains: Selected cases out of the Alpine Space. Supply Chain Networks vs Platforms: Innovations, Challenges and Opportunities, 766. http://www.isl21.org/wp-content/uploads/2019/07/Full-paper-20_07_2019-Final.pdf
- Maurer, F. (2020). Business Intelligence and Innovation: an European Digital Innovation Hub to increase System Interaction and Value Co-creation within and among Service Systems. Akzeptiert für die ICORES Konferenz 2021 (Wien).
- Dobler, M.; Maurer F.; Schumacher J. (2018). Daten-getriebene Optimierung von Benutzererfahrungen im Industrie 4.0 Umfeld, In: Assistenztechnologien in der Arbeitswelt. Beiträge zum Usability Day XVI. 21. Juni 2018, ISBN: 978-3-95853-405-6.
- Meierhofer, J., Dobler, M., Frick, K., & Schweiger, L. (2020, September). Smart service patterns for small manufacturing enterprises. In Spring Servitization Conference" Advanced Services for Sustainability and Growth", Online, 14-16 September 2020 (pp. 88-95). Aston University.
- A cloud based research and learning factory for industrial production.
- https://digital-library.theiet.org/content/books/10.1049/pbcs077g_ch10

Technological Systems & Infrastructures

IPL

Laboratory of Robotics with 2 Robot arms, several mobile robots, drones, 3D cameras, and multiple other devices for application in projects and education.

The research activities of CDRSP are based on a brand new building at Marinha Grande, the core region of the glass, plastic and mouldmaking industry in Portugal. The research infrastructure was designed to support cross-discipline and multi-disciplinary training, outreach experiments and technology development, including the following laboratories:

- Direct Digital Manufacturing: polymers and composites
- Direct Digital Manufacturing: metals and ceramics
- Biofabrication
- Multiscale modelling

- Manufacturing technologies / Training Factory
- Materials Characterisation
- Multiscale Reverse Engineering
- Structure and Morphology
- Materials Chemistry
- Cell Culture and Tissue Engineering

LIT

‘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

AIT

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:

- ARBURG Freeformer
- Large FDM printer
- 3D Scanning system
- CREO 6 - 3D Cad package with advanced simulation including surface modelling and Structural Analyses.
- FEA capabilities with ANSYS
- Additive Manufacturing/3D Printing
 - Stereolithography (SLA) using a 3D Systems Viper
 - Formlabs 2 (x2)
 - Prusa MK2
 - Sinterit Lisa

HAMK

Robotics for Sustainable Manufacturing:- Robotics laboratory including multiple collaborative robots, mobile platform, various equipments 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

IPCA

- Robots: Kuka iiwa and Agilus; KUKA LBR Med, SoloAssist, Universal robot UR3; Automata EVA; 10 Lego EV3 and 5 Lego NXT2 kits; NAO; DJI 1000+; 30+ Parrot AR 2
- Image and surface acquisition systems: GE Vivid 9 (4D US transesophageal probe); scanner Polhemus; Microsoft kinetic I and II; industrial visible light, thermal and multispectral cameras, filters, lenses
- Production support equipments: LKF S103 and D104, laser cutting machine, printers 3D machines (Uprint, Ultimate II, OBJET Eden 260), plastic forming machine, CNC milling machine – VF2 Haas, CNC turning center – TL1 Haas

- Virtual and augmented reality equipment: 15 HTC vive; 4 Oculus Rift; EPSON MOVERIO; Microsoft HoloLens I & II; Oculus Quest; ODG R-7 SmartGlasses
- Motion tracking and haptic feedback: Aurora NDI; Xsense; Tobii EyeX; Data Gloves 5DT; Leap Motion; Kinect; Polhemus Liberty; Force Dimension Omega 7
- Graphical and Computational Power: SuperMicro Server with 4 NVIDIA A100; Render Farm – 4x HP DL380 G82; several graphical workstations; several mobile devices
- Embedded systems and sensors: Rasp pi 3 & 4; Jetson TK1, Xavier DGX; Ti mmWave sensors, Sipeed RISC-V; \weather station; Epoc emotive; wireless communications interfaces; several sensors and GPS receivers.

NHL Stenden

Equipment for the entire chain of illumination, cameras, optics, setup, vision algorithms, deep learning algorithms and their implementation in existing software systems. Examples are hyperspectral imaging facilities (camera's), drones and a mini-supercomputer (HPC)

SZE

- | | |
|--|---|
| <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • 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 |
|--|---|

FHV

- ISO class 5 clean room with approx. 240 m².
- 150 m² of laboratory floor space with flow boxes.

Lithography:

- EVG 101 resist processing system (lacquer unit, 2 hotplates, spray developer)
- Süss MA6 / BA6 mask and bond aligner with 365 nm and 193 nm light source
- Various ovens and hotplates

Laser Ablation:

- Laser Structuring System: microSTRUCTvario von 3DMICROMAC
- Lambda Physik LPF 220 excimer laser for 193 nm
- Spirit - High Q Laser / Newport femtosecond laser
- 2 Newport xyz precision positioning instruments (100 nm)
- Scanlab scanner
- Vacuum chamber with spectrometer

Sputter units:

- Oerlikon LLS EVO

Etching:

- Adixen AMS 100 DSE plasma etching unit
- Wet etching bench with 4 etching basins

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)
- Thermal Oxidation:**
 - Programmable diffusion oven - model PEO 604 (ATV Technologie GmbH, Germany)
- Analytics:**
 - Scanning Electron Microscope: JEOL JSM-7100F
 - X-ray fluorescence analysis: EDAX TEAM Enhanced
 - White light interferometry: VEECO Wyko NT1100
- Sample preparation:**
 - Manual wet cut-off machine: Struers Labotom-3
 - Automatic hot-mounting press: Struers LaboPress-3
 - Grinding and polishing machine: Struers LaboPol-5
 - Lapping and polishing machine: Logitech PM5
 - Linear precision saw: Buehler Isomet 4000

2.1.1.6 Research Area 6: Climate Change – Circular Economy & Decarbonisation

The universality principle of Agenda 2030 is a call for integrated SDG implementation that addresses environment and development as we move towards a bioeconomy and that implementation is cross and inter-regional and sustainable in all locations. The main objectives as identified within the research audit of this cluster are to fight climate change in developing a better understanding of climate change's causes, evolution, risks, impacts and opportunities. 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. The principal driver is the need to decarbonise our environment advancing the ideals of circular economy and bioeconomy to generate value from that which we would otherwise have considered waste. Ultimately to make our circular economy systems climate- and environment-friendly, smarter, safer, more resilient, inclusive, competitive and efficient.

This research area cluster will re-enforce RUN-EU's participants as a leading actor in the sustainable development sector, thereby creating opportunities for engagement in research, development and academic activities. Value chain optimization by digital technology and data-analytics enhancing the sustainability and enabling smart logistics. Other critical areas for study will include pathways for deep decarbonization, advanced innovative energy management systems including energy efficiency strategies, validation and financing energy generation and storage, energy monitoring and

embedded systems (IoT) and data analytics. We aim to also explore new alternative renewable energy sources through the circular economy ideal for example the utilization of solar alternative energy systems and different biowastes, sludges, manures, green biomasses and process side streams to produce biofuels, bioenergy and other bioproducts, while ensuring the nutrients recycling and enabling carbon sequestration and biodiversity research area will also focus on understanding of soil carbon transformation and sequestration in the forest, fields materials, and cities.

The audit also identified innovation potential of the circular economy in cities by establishing the organizational framework for circular economy quadruple-helix hubs enabling and facilitating circular economy innovation processes raising awareness and knowledge advancements in providing tools, autonomous load management, grid simulation, system dynamics, integration of renewables and alternative water treatment systems. We will aim to facilitate scaling-up the innovation and business potentials of circular economy hubs through joint framework improvement implementation to facilitate the set-up of transnational interregional RUN-EU value chains (CE circles). Our longer-term objective is to increase the competitiveness by decreasing energy loads, rising their energy independency, thus uncoupling energy costs from geopolitical externalities. We will be participative in development of a low carbon and sustainable urban, suburban and transnational mobility including electric vehicles and transport modes by smoothing the way to citizen awareness and engagement, through a better understanding of user demand and conceiving alternative/innovative modalities. We will explore potential for decentralised energy systems and energy storage including small-scale hybrid energy production and storage, energy efficiency optimization and energy management. Another critical research focus area will be related to the circular economy of materials and products focusing on sustainable materials and products including the reuse of building materials such as steel and timber s, finite element simulations of building structures and circular economy in construction advancements and implementation. 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.

We will have also identified a key research expertise focus on biomaterials and biopolymers including plastics and plastic alternatives and reuse. In transitioning to full circularity before 2050 value chains must be completely redefined, prevention and recycling technologies have to be applied on a large scale, and the transition from non-renewable towards renewable and sustainable polymers has to be accelerated. Global production and consumption of plastic has grown exponentially in recent decades. Since the 1950s, approximately 8.3 billion tonnes of the material have been produced – 60%

of which has ended up in landfill or the natural environment. Our overall objective will to demonstrate a seamless sustainable route to a circular economy for plastics and packaging including innovative digital, engineering, chemical and biotechnological solutions to deal with biopolymer plastic waste. How we can separate our waste and reuse plastics more effectively including analysis and optimization of the separation processes by connecting the entire chain of raw materials, production, consumption and waste including investigating the possible further applications of recycled plastics including upcycling used plastics are then reused to form something of greater value. It is therefore imperative that our associate and stakeholder companies within RUN-EU explore the international perspective for growth within circular economy areas both land based and maritime. Many companies, especially small and medium-sized businesses— are struggling with practical everyday challenges when it comes to conducting business outside of their regions sustainably or increasing their international activities. This will be an area for entrepreneurship and innovation research activities which will support our local enterprises develop advantages in their marketplace with novel energy management circular economy advancements. This will in turn lead to increase economic activity and new job creations, the ultimate definition of the successful circular economy concept.

Table 6: *Collective Expertise and Knowledge of RUN EU Alliance (Climate Change - Circular Economy - Decarbonisation)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	LSRE-LCM, Laboratory of Separation and Reaction Engineering - Laboratory of Catalysis and Materials (Polytechnic of Leiria Pole)- 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. W: https://lsre-lcm.fe.up.pt/	Food, Bioeconomy, Natural Resources, Agriculture and Environment

	<p>The Centre of Applied Research in Management and Economics (CARME)- 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.</p> <p>W: https://carme.ipleiria.pt/</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	<p>ADAI / IPLeiria Delegation- The ADAI / IPLeiria 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:</p> <ul style="list-style-type: none"> - Aerodynamics (CFD); - Energy / thermal management of vehicles; - Fuels and emission of pollutants; - Mechanical and electronic engine development. <p>W: www.adai.pt</p>	Climate, Energy & Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>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.</p> <p>W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/CEEDD</p>	Climate Energy & Mobility

	<p>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.</p> <p>W: https://lit.ie/rdi/development/rural-development</p>	Climate Energy & Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Athlone Institute of Technology (AIT)	<p>Materials Research Institute- 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.</p> <p>W: https://bioicep.eu/</p>	Food Bioeconomy Natural Resources Agriculture & Environment
	<p>BioSciences Research Institute- (BRI) - have a long standing tradition of delivering research, enterprise for 'circularity'. This has recently culminated in the Establishment of first triple-helix multi-actor Hub for Eco-Sustainability (termed 'Empower Eco') that has been funded under Just Transition for community, enterprise transition to low carbon economy in the midlands using peatlands as a framework. This assembles main stakeholders and beneficiaries regionally for developing green innovation (aligned with EU Green Deal and UN Sustainable Development Goals). It deploys technology + policy + society readiness levels to support green innovation - 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 for Irish example</p> <p>W: http://bri.ait.ie/</p>	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2

		Cluster Alignment
Häme University of Applied Sciences (HAMK)	Value from Circular BioEconomy -Overall utilization of different biowastes, sludges, manures, green biomasses and process side streams to produce biofuels, bioenergy and other bioproducts, while ensuring the nutrients recycling and enabling carbon sequestration. Value Chain optimization by digital technology and data-analytics enhances the sustainability and enables smart logistics. This group and research area has research and business development activities also in Africa.	Climate Energy & Mobility
	Carbon Sequestration and Biodiversity research area focuses on understanding of soil carbon transformation and sequestration in the forest, fields and cities. Built environment, forestry (incl. controlled burning) and agriculture have an effect on carbon and climate change. Digital technologies, like imaging, drones, data-analytics etc. are used to see beyond	Food, Bioeconomy, Natural Resources, Agriculture and Environment
	Decentralised Energy Systems and Energy Storage research area focuses on regional built environment energy systems. Research applications include small-scale hybrid production and storage, energy efficiency optimization and energy management. Both solar and bioenergy solutions are emphasized. In addition, the research in all these areas includes computational modeling, advanced measurement techniques and on-line monitoring. W: https://www.hamk.fi/research/hamk-tech/energy-efficiency/?lang=en	Climate Energy & Mobility
	Reusable and Circular Constructions research area focuses on the researches in the reuse of steel and timber constructions, finite element simulations of building structures and circular economy in constructions. We also have the competences in fire safety design and simulations of steel and timber building structures. Wide experiences in finite element simulations of product structures as well. W: https://www.hamk.fi/research/hamk-tech/test-loading-and-analysis/?lang=en	Digital Industry & Space
	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. W: https://www.hamk.fi/research/hamk-tech/?lang=en	Food, Bioeconomy, Natural Resources, Agriculture and Environment
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic Institute of Cávado and Ave (IPCA)	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	Climate Energy & Mobility

	electrochemical energy storage devices applied to portable devices and electric vehicles. W: https://2ai.ipca.pt/	
	Research Group on Circular Design- Circular design and life cycle assessment W: www.esd.ipca.pt	Climate Energy & Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	Professorship Green Logistics- 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. W: https://www.nhlstenden.com/onderzoek/green-logistics	Climate Energy & Mobility
	Professorship Circular Plastics- 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. W: https://www.nhlstenden.com/en/research/circular-plastics	Digital Industry & Space
	Professorship Purposeful Entrepreneurship- At the beginning of 2018, Aleid Brouwer was installed as a professor in Purposeful Entrepreneurship. The professorship is located at the Leeuwarden campus, but also regularly works on and with the Emmen campus. The focus of the research within the chair focusses on the development of sustainable, circular, sharing and social entrepreneurship, sustainable employment and the enhancement of entrepreneurial ecosystems. The chair is part of the International Business Administration Academy, research group Vital Economy. Research is done, among others, within a large INTERREG NSR project 'Futures by Design' and the EFRO Human Capital project 'Make IT work in the North'. The research projects within the chair of purposeful Entrepreneurship focus on regional research within small and medium-sized enterprises (SME) and the 'quatro helix	Culture, Creativity & Inclusive Society

	<p>setting'. These are co-creation projects for SME with international partners, as well as (research) projects from the provinces of Fryslan and/or Drenthe.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/purpos-eful-entrepreneurship </p>	
	<p>Professorship Futureproof Entrepreneurship: Professionals with Impact- City farmers, influencers or data architects; these kinds of jobs simply didn't exist a decade ago, but today plenty of improvement managers and disruptors work in well-established companies. Our jobs are changing. How can management anticipate these changes and how can you ensure that your employees will go along with them? That is the central issue that professor Jacqueline Rietveld is tackling.</p> <p>W: https://www.nhlstenden.com/onderzoek/ondernemennu</p>	Culture, Creativity & Inclusive Society
	<p>Professorship International Entrepreneurship- For decades, the world has been subject to increasing globalisation. We see that companies in a country such as the Netherlands are increasingly dependent on trade with other countries. Firstly, but not exclusively, with European trade partners. Considering the more rural areas of the Netherlands, the importance of themes such as international entrepreneurship, conducting business, and import and export are very important. Dutch companies that refrain from exploring international opportunities, in most cases do not have a growth perspective in the long run. It is therefore imperative that companies explore the international perspective or continue growing in this area. This is not a new insight and the awareness among companies in regions such as the provinces of Friesland and Drenthe is present. However, many companies —especially small and medium-sized businesses— are struggling with practical everyday challenges when it comes to conducting business outside of the Netherlands or increasing their international activities. That is why the research focus of this professorship lies on exploring the challenges these Dutch companies face when they (are about to) operate internationally.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/international-entrepreneurship </p>	Climate Energy & Mobility
	<p>Professorship Maritime Law- A ship that sails without a crew? Technologically it is possible. All systems would then be controlled from the shore through ICT. But who is responsible if something were to go wrong on board a ship without a captain? New technology requires new regulations. But the reverse is also true. New regulations for safety and the environment need technological innovations. Maritime technology and law come together in the research field of the Maritime Law (ML) Professorship of Applied sciences of NHL Stenden University.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/maritime-law </p>	Climate Energy & Mobility

	<p>Professorship Maritime Innovation Techniques- The maritime sector is at a crossroads with on the one hand the demand from society for safer and cleaner ships and on the other hand the technological developments regarding sensors, data collection, and data processing. The Maritime Innovation Techniques (MIT) lectorate of the Maritiem Instituut Willem Barentsz (MIWB) conducts practical research with regard to technological innovations in the ship building and shipping industry. Within the lectorate, close cooperation is sought with students, companies and other educational and research institutions – always with safety, knowledge and innovation by applying new technologies as a linking pin.</p> <p>W: https://www.nhlstenden.com/en/research/maritime-innovation-techniques</p>	Climate Energy & Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István University (SZE)	<p>Faculty of Architecture, Civil Engineering and Transport Sciences, Department of Architecture and Building Construction- Building construction, energy and environmental conscious architecture, environmentally friendly building materials, recycling aggregate concrete, building physics</p> <p>W: https://eet.sze.hu/</p>	Climate, Energy & Mobility
	<p>Department of Mechatronics and Machine Design, Fire protection and Safety Technology Group- Climate change, numerical methods and simulations, water management, CBRN engineering.</p> <p>W: https://uni.sze.hu/</p>	Climate, Energy & Mobility
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
FH Vorarlberg University of Applied Sciences (FHV)	<p>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.</p> <p>W: https://www.fhv.at/en/research/energy/</p>	Climate Energy & Mobility
	<p>Department of Business Informatics-</p> <ul style="list-style-type: none"> • Utilizing innovation potential of circular economy in cities by establishing the organizational framework for circular economy in cities - circular economy quadruple-helix hubs, • Enabling and facilitating circular economy innovation processes in cities by raising knowledge and providing tools, • Scaling-up the innovation and business potentials of circular economy hubs through joint framework for RIS3 CE implementation to facilitate the set-up transnational value chains (CE circles). <p>W: https://www.fhv.at/en/research/business-informatics/</p>	Climate Energy & Mobility

	Department of Business Informatics- RESINDUSTRY aims to increase the energy independency of the EU industry sector, by decreasing its energy intensity through a higher integration of RES. The long-term objective is to increase the industry competitiveness by decreasing its energy bill, rising their energy independency, thus uncoupling their energy costs from geopolitical externalities. W: https://www.fhv.at/en/research/business-informatics/	Climate Energy & Mobility
	Department of Business Informatics- Generating a participative development of a low carbon and sustainable urban, suburban and transnational mobility by smoothing the way to citizen awareness and engagement, through a better understanding of user demand and conceiving alternative/innovative modalities. Its general objective is to support policy making on mobility, air quality, territorial development, contributing to EU/local strategies. Melinda implements a social innovation approach aimed at inducing a behavioral change in the mobility. W: https://www.fhv.at/en/research/business-informatics/	Climate Energy & Mobility
	Faculty of Engineering- As a center of excellence for innovative and application-oriented technology, the Faculty of Engineering links academic teaching and inter-company research with companies and institutions in the region. In this way, the faculty contributes to strengthening the innovation, attractiveness of employers and competitiveness of the companies in Vorarlberg. The focus is on mechatronics, electrical engineering, computer science, energy systems and environmental technology. R & D – initiatives are very often together with the existing research centers of Vorarlberg University of Applied Sciences (Energy, User Centered Technologies, Digital Factory Vorarlberg) initiated and established. W: https://www.fhv.at/en/fh-vorarlberg-overview/organisation-fh-vorarlberg/departments/faculty-of-engineering/	Climate Energy & Mobility

Recent Selected RUN EU Partner Projects

IPL

- BIOma - BIOeconomy integrated solutions for Mobilization of the Agrofood chain
- COMPETE2020 - POCI-01-02B7-FEDER-070195 - PureAir @ Automotive - air purification equipment for road passenger vehicles.
- MBStox - Multifunctional biomolecular systems for new methods of decontamination, protection and toxicological assessment
- Valor Natural - Natural Resources through the Extraction of High Added Value Ingredients for Applications in the Food Industry
- FCT - PTDC/AAC-AMB/103866/2008 - Impact of the biomass energy recovery chain on air quality and Portuguese climate policy

LIT

- Erasmus + Key Action 2 (KA2) - Cooperation for innovation and the exchange of good practices (Social Business Educational EcoSystem for Sustainability & Growth)
- Erasmus + Programme Key Action 2: Strategic Partnerships (Fostering Inclusion Through Social Farming)
- Erasmus + Programme Key Action 2 (KA2) (Education for Zero Energy Buildings using Building Modelling Information)
- Carbon Connects: INTEREG, North-West Europe

- ManagEnergy (Support Initiative to Assist Actors Working on Sustainable Energy at the Local and Regional Level)

AIT

- BiolCEP H2020
- Curcol interreg
- EMPOWER ECO
- NEPTUNUS
- ICYTHYS

HAMK

- Carbon 4.0 -Analysis and utilization of biological data in complex carbon ecosystems
- Järkki and Rahi-projects to utilize waste water sludge or digestate from biogas process
- CoCarbon Simulating carbon sequestration in the city by different stakeholders including individual home gardeners
- RANTA, second in Regiostar final (https://ec.europa.eu/regional_policy/en/region-stars-awards/2019/finalist?r=ranta)
- BioColour (<https://biocolour.fi/en/frontpage/>)

IPCA

- "Ecobond". August 2016 – July 2019. POCI-01-0247-FEDER-017930 (Portuguese Agency for Innovation)
- "Katch_e: Training for Circular Economy in the Construction and Furniture Sectors" (2017 - 2020)
- "TECH-Technology, Environment, Creativity, and Health". Ongoing since 2020. NORTE-01-0145-FEDER-000043
- "Greenhealth - Active life strategies, quality and well-being ". Ongoing since 2020. Norte-01-0145-FEDER-000042
- E-print-Advanced Green Printed Batteries For Portable Devices

NHL Stenden

- National funding MKB werkplaats (SME workshop digitalization)
- INTERREG Futures by Design
- Make IT Work (ERDF)
- INTERREG Northsea Wrecks
- Circulaire business modellen in de logistiek (NWO Accelerator)

SZE

- 2021- Szigetköz: an innovative, nature-based research and regional development project
- 2019-2020. EFOP-3.4.3-16-2016-00016 Curriculum development in Moodle and VR based systems
- 2017-2020. EFOP-3.6.1-16-2016-00017 Internationalization project of the university, publishing activity in order to increase the international visibility of the university
- 2018-2019. Leier / Durisol research and development cooperation, industrial networking.
- 2012-2014. MILD HOME project, SEE: South East Europe Transnational Cooperation Program

FHV

- Josef Ressel Center for Intelligent Thermal Energy Systems
- Laboratory for Accelerated Lifetime testing
- Josef Ressel Center for Applied Scientific Computing
- Smart Government Akademie Bodensee
- Digital Energy Twin
- RESINDUSTRY

Recent RUN EU Partner Publications

IPL

- M.J. Lima, C.G. Silva, A.M.T. Silva, J.C.B. Lopes, M.M. Dias, J.L. Faria. "Homogeneous and heterogeneous photo-Fenton degradation of antibiotics using an innovative static mixer photoreactor". Chemical Engineering Journal, 310, 342–351, 2017.

- Gomes, S.F., Jorge, S. and Eugénio, T.P. "Teaching sustainable development in business sciences degrees: evidence from Portugal". Sustainability Accounting, Management and Policy Journal, Vol. ahead-of-print No. ahead-of-print, 2020. <https://doi.org/10.1108/SAMPJ-10-2019-0365>
- Rodrigues, S., Almeida, P. & Almeida, N. "Mapping, Managing, and Crafting Sustainable Business Strategies for the Circular Economy", 2020. PA: IGI Global. DOI:10.4018/978-1-5225-9885-5
- Fernandes, E. & Valente, M. "When Is Green Too Rosy? Evidence from a Laboratory Market Experiment on Green Goods and Externalities". Games 2018, 9(3), 70. <https://doi.org/10.3390/g9030070>
- D. Marques-da-Silva, G. Fraqueza, R. Lagoa, A.A. Vannathan, S.S. Mal, M. Aureliano "Polyoxovanadate inhibition of Escherichia coli growth shows a reverse correlation with Ca²⁺-ATPase inhibition". New Journal of Chemistry, 43, 17577-17587, 2019.

LIT

- Superhomes 2.0 - Best Practice Guide for ASHP Retrofit" Hoyne, S; Hunter, G; O' Reilly, P; O' Shea, M; April 2020.
- "Superhomes 2.0 - Optimisation of Air Source Heat Pump Applications in NZEB Residential Retrofits" Hoyne, S. IEA Task 26 Heat Pump Conference, London, September 2017.
- "Evaluation of the Space Heating Calculations within the Irish Dwelling Energy Assessment Procedure Using Sensor Measurements from Residential Homes" Hunter, W. G; Hoyne, S; Noonan, L. March 2017 Energy Procedia 111:181-194.
- "Creation of an improved residential space heating calculation model for the Irish energy performance assessment tool" Hunter, W. G; Hoyne, S; Noonan, L. June 2015. ECEEE Energy Efficiency Summer School, Toulon, France.
- O'Sullivan, S. & Evans S. (2019) Strategies for Developing Innovative Tools and Resources for Social Enterprise Educators and Learners' Paper delivered to 7th EMES International Research Conference on Social Enterprise, Sheffield Hallam University, UK 24 – 27 June.

AIT

- Wan-Mohtar, Wan Abd Al Qadr Imad & Mohd Taufek, Norhidayah & Puvaneni Thiran, Jaganath & Rahman, Janathu & Yerima, Grema & Subramaniam, Kumeera & Rowan, Neil. (2021). Investigations on the use of exopolysaccharide derived from mycelial extract of Ganoderma lucidum as functional feed ingredient for aquaculture-farmed red hybrid Tilapia (Oreochromis sp.). Future Foods. 3. 100018. 10.1016/j.fufo.2021.100018.
- Galanakis, CM, Rizou, M, Aldawoud, TMS, Ucak, I & Rowan, NJ 2021, 'Innovations and technology disruptions in the food sector within the COVID-19 pandemic and post-lockdown era', Trends in Food Science and Technology, vol. 110. <https://doi.org/10.1016/j.tifs.2021.02.002>
- Tavares, A.O.; Areia, N.P.; Mellett, S.; James, J.; Intrigliolo, D.S.; Couldrick, L.B.; Berthoumieu, J.-F. The European Media Portrayal of Climate Change: Implications for the Social Mobilization towards Climate Action. Sustainability 2020, 12, 8300. <https://doi.org/10.3390/su12208300>
- Murphy EJ, Masterson C, Rezoagli E, O'Toole D, Major I, Stack GD, Lynch M, Laffey JG, Rowan NJ. β-Glucan extracts from the same edible shiitake mushroom Lentinus edodes produce differential in-vitro immunomodulatory and pulmonary cytoprotective effects - Implications for coronavirus disease (COVID-19) immunotherapies. Sci Total Environ. 2020 Aug 25;732:139330. doi: 10.1016/j.scitotenv.2020.139330. Epub 2020 May 11. PMID: 32413619; PMCID: PMC7211630.
- Brennan Fournet M.E., Azaman F.A., Gunbay S., Chen Y.Y., Devine D.M. (2019) Orthopaedic 3D Printing in Orthopaedic Medicine. In: Devine D. (eds) Polymer-Based Additive Manufacturing. Springer, Cham. https://doi.org/10.1007/978-3-030-24532-0_6

HAMK

- O.Koskela, C.Dempers, M.Kymäläinen, J.Nummela. 2021. Simulating a Biorefinery Ecosystem to Manage and Motivate Sustainable Regional Nutrient Circulation. Technology Innovation Management Review.
- Z. Ma, J. Havula, F. Wald, K. Cabova. 2020. Temperature analysis of steel structures protected by intumescent paint with steel claddings in fire. Fire and Materials. (<https://doi.org/10.1002/fam.2890>)

- D. Huynh, S. Nguyen-Ky. 2020. Engaging Building Automation Data Visualisation Using Building Information Modelling and Progressive Web Application. Open Engineering. (<https://doi.org/10.1515/eng-2020-0054>)
- T. Lohtander, S. Arola, P. Laaksonen. 2019. Biomordanting willow bark dye on cellulosic materials. Coloration Technology (<https://doi.org/10.1111/cote.12442>)
- O Tahvonen, M Airaksinen - Land use policy, 2018. Low-density housing in sustainable urban planning–Scaling down to private gardens by using the green infrastructure concept.

IPCA

- Mendes-Felipe, C. , Barbosa, J.C., Gonçalves, R., Miranda, D., Costa, C.M., Vilas-Vilela, J.L., Lanceros-Mendez, S. (2021). Lithium bis(trifluoromethanesulfonyl)imide blended in polyurethane acrylate photocurable solid polymer electrolytes for lithium-ion batteries. Journal of Energy Chemistry. DOI: <https://doi.org/10.1016/j.ijechem.2021.01.030>
- Dios, J. R., Gonzalo, B., Tubio, C. R., Cardoso, J., Gonçalves, S., Miranda, D., Correia, V., Viana, J.C., Costa, P. and Lanceros-Méndez, S. (2020). Functional Piezoresistive Polymer-Composites Based on Polycarbonate and Polylactic Acid for Deformation Sensing Applications. Macromolecular Materials and Engineering. DOI: <https://doi.org/10.1002/mame.202000379>
- Miranda, D., Goren, A., Costa, C.M., Silva M.M., Almeida, A.M., Lanceros-Méndez, S., Theoretical simulation of the optimal relation between active material, binder and conductive additive for lithium-ion battery cathodes, Energy, Energy Journal. (2019) DOI: <https://doi.org/10.1016/j.energy.2019.01.122>
- Miranda D., Almeida A.M., Lanceros-Mendez S., Costa C.M., Effect of the active material type and battery geometry on the thermal behavior of lithium-ion batteries, Energy Journal (2019), Vol. 185, 1250-1262 (2019). DOI: <https://doi.org/10.1016/j.energy.2019.07.099>

NHL Stenden

- Brouwer, A. E. (2020). Ari-Veikko ANTROIKO, Wellness City, Health and Well-Being in Urban Economic Development, Palgrave Pivot, Cham 2018. European Spatial Research and Policy, 27(1), 291-292.
- Koster, S., Brouwer, A., & van Leeuwen, E. (2020). Diversity as the key to success? Urban and rural employment dynamics in the Netherlands. Regional Studies, 54(9), 1187-1199. <https://doi.org/10.1080/00343404.2019.1699652>
- Brouwer, A., & Kohl, T. (2020). Trade Blocs. In A. Kobayashi (Ed.), International Encyclopedia of Human Geography (2 ed., pp. 335-339). Elsevier. <https://doi.org/10.1016/B978-0-08-102295-5.10141-6>
- Brouwer, A., & Delfmann, H. (2019). 'Grey entrepreneurship': a qualitative study toward understanding the motivation to and the effects on wellbeing of after later life entrepreneurship. In M. Backman, C. Karlsson, & O. Kekesi (Eds.), Handbook of Research on Entrepreneurship and Aging (pp. 246-268). Edward Elgar Publishing.

SZE

- Shmlls, Maysam; Bozsaky Dávid; Horváth Tamás: Literature review on steel fibre, silica fume and fly ash: improving methods for recycled and multiple recycled aggregate concretes. In: ACTA TECHNICA JAURINENSIS 14:1 pp. 60-79. 20 p. (2020).
- Bozsaky Dávid; Horváth Tamás: Durisol - Construction with woodcrete. Győr, Hungary: Universitas-Győr Nonprofit Kft. (2019), 106 p.
- Bozsaky Dávid: Thermodynamic Processes in nanostructured Thermocoatings, In: Serrat, Carles; Casa, Joan Ramon; Gilbert, Vicente Current Topics and Trends on Durability of Building Materials and Components : Proceedings of the XV edition of the International Conference on Durability of Building Materials and Components (DBMC 2020) International Center for Numerical Methods in Engineering (CIMNE), (2020) pp. 1127-1134. , 8 p.
- Horváth Tamás: Energetic analysis of complex modernizations of educational buildings. In: Mirosław, J Skibniewski; Hajdu Miklós (editors): Creative Construction Conference 2018 Proceedings. Budapest, Hungary: Diamond Congress Ltd., (2018) pp. 883-890. 8 p.
- Bozsaky Dávid: Nature-Based Thermal Insulation Materials From Renewable Resources – A State-Of-The-Art Review, SLOVAK JOURNAL OF CIVIL ENGINEERING, Vol. 27, No. 1, 2019. pp. 52-59.

FHV

- Micro-computed tomography of growth and decomposition of clathrate hydrates. Dissertation, Stefan Arzbacher, 2020.
- S. Arzbacher, N. Rahmatian, A. Ostermann, T.M. Gasser, T. Lerting, J. Petrasch, Co-Deposition of Gas Hydrates by Pressurized Thermal Evaporation, Physical Chemistry Chemical Physics, February 2020.
- P. Kepplinger, B. Fässler, G. Huber, M.A.S.T Ireshika, K. Rheinberger, M. Preißinger, Autonomes Demand Side Management verteilter Energiespeicher, e&i Elektrotechnik und Informationstechnik, pp. 1-7, Springer. December 2019.
- Suzic, B., Ulmer, A., & Schumacher, J. (2020, June). Complementarities and synergies of quadruple helix innovation design in smart city development. In 2020 Smart City Symposium Prague (SCSP) (pp. 1-7). IEEE.
- Schumacher, J., Suzic, B., & Dobler, M. User-centred innovation design in cities. Collaborative business models. (2018) Special Issue. ICE/IEEE ITMC 2018. Stuttgart 17.06. - 20.06.18. 2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC).

Technological Systems & Infrastructures

IPL

- Automotive Engineering Lab (at ESTG/IPLeiria) - Engine Test Bench, CFD Numeric Codes, Fuel and Pollutant Consumption Equipment, Automotive Diagnostic Systems, 4-Roll Vehicle Testing Bench;
- ADAI Labs - Aerodynamic Tunnel, Climatic Chamber; Air Quality and Thermal Comfort Measurement Equipment, Termomanequim type Pernnile, several equipment for vehicle road tests
- Integrated Multitrophic Systems Laboratory; Smart-Farm Colab.

LIT

‘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

AIT

- | | |
|--|--|
| <ul style="list-style-type: none"> • Cell Sorter • Tissue Dissociator • Biological Safety Cabinet (x5) • PCR • qPCR Machine • MinION Sequencer • Confocal Microscope • DNA Gel imager • Centrifuges • Flow Cytometer • Incubators • Ovens • Autoclave | <ul style="list-style-type: none"> • DNA/RNA Quantifier • Water Purification Systems • Waterbaths • Microplate reader • Spectrophotometer • Cell Viability Analyser • MicroBiological Safety Cabinets: • Ice Machine • Bioreactor • Ultralow Freezers • Electronic Balances • Liquid Nitrogen tanks • Fume Hoods • Freshwater Tank |
|--|--|

HAMK

Infrastructure for whole value chain from biomass production (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 research. Food and biotechnology laboratory facilities allow different production and research pilots (bioreactors for biogas, algae, fungi etc., pelleting and pyrolysis equipment for biochar, small brewery etc.) and analytics (HPLC, GC, Extraction, CHNS/O, Kjeldahl-N, etc.). Cultivation trial tests (e.g. growing media or fertilizers) are possible in different environments. Besides own agriculture and horticulture campuses city environment is provided from the cities in our region or University Campus in Hämeenlinna. Infra allows research also 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 phenomenon.

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

- Robots: Kuka iiwa and Agilus; KUKA LBR Med, SoloAssist, Universal robot UR3; Automata EVA; 10 Lego EV3 and 5 Lego NXT2 kits; NAO; DJI 1000+; 30+ Parrot AR 2
- Image and surface acquisition systems: GE Vivid 9 (4D US transesophageal probe); scanner Polhemus; Microsoft kinetic I and II; industrial visible light, thermal and multispectral cameras, filters, lenses
- Production support equipment: LKF S103 and D104, laser cutting machine, printers 3D machines (Uprint, Ultimate II, OBJET Eden 260), plastic forming machine, CNC milling machine – VF2 Haas, CNC turning center – TL1 Haas
- Virtual and augmented reality equipment: 15 HTC vive; 4 Oculus Rift; EPSON MOVERIO; Microsoft HoloLens I & II; Oculus Quest; ODG R-7 SmartGlasses
- Motion tracking and haptic feedback: Aurora NDI; Xsense; Tobii EyeX; Data Gloves 5DT; Leap Motion; Kinect; Polhemus Liberty; Force Dimension Omega 7
- Graphical and Computational Power: SuperMicro Server with 4 NVIDIA A100; Render Farm – 4x HP DL380 G82; several graphical workstations; several mobile devices
- Embedded systems and sensors: Rasp pi 3 & 4; Jetson TK1, Xavier DGX; Ti mmWave sensors, Sipeed RISC-V; \weather station; Epoc emotive; wireless communications interfaces; several sensors and GPS receivers
- Product Design Laboratory

NHL Stenden

Maritime Institute Willem Barentsz

The Maritime Institute Willem Barentsz (MIWB) consists of a maritime university, providing programmes for masters and chief engineers 'all ships', as well as hydrographic surveyor. A full mission simulator training centre incorporating the national maritime simulation training facilities, available for all Dutch maritime cadets, an own seagoing training and survey vessel.

SZE

- Laboratory of Building Materials
- Building Physics
- Laboratory equipment

FHV

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

2.1.1.7 Research Area 7: Education & Social Sciences

Communications by the European Commission, European Parliament and European Council on Horizon 2020 have identified our community commitment to deepening the position of the social sciences, education and humanities research and innovation activities within Europe's future. 'The EU stands for a unique way of combining economic growth with high levels of social protection and inclusion with the shared values of democracy, human rights, gender equality, and the richness of cultural diversity. Many of the EU's research and innovation funding programs have been concerned with fostering a greater understanding in providing solutions for inclusive, innovative and reflective European societies with a focus on democratic governance, cultural heritage, and social, legal and economic transformations. The horizon Europe research program is committed to the implementation of educational and social science research activities that will contribute to a comprehensive European strategy for societal improvements and ensuring inclusiveness and equity across all levels of our citizenship. Specifically, the RUN-EU education and social science research cluster will support these ideals and engage in multidisciplinary research and innovation activities that deliver inclusive growth and reforms in line with the European Pillar of Social Rights and the EU's policies on smart, inclusive and sustainable growth.

Our research activities identified in the audit will assess the role of cultural, legal educational and creative sectors and the social economy in delivering social and economic transformations and increased social inclusion. We will be involved in the analysis of social and organizational resources through the design of quantitative and qualitative social research within specific target groups and demographics. These studies will report on, social inequality, poverty and homelessness, age, identity, diversity and inclusion, social capital, health and care management, social work, cultural management research, legal, education, psycho-social aspects of work and organizational development. We will pursue collaborative research with communities in the areas of Critical Youth Work, Community Development and Education & Training. This activity will drive strategies for inclusive education, training and lifelong learning for high value-added skills, which can facilitate social mobility and economic growth. Gender equality and other social categories, such as disability, sexual orientation and ethnicity, in all social, political, economic and cultural domains will also a focus. We will 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 will engage in collaborative efforts with organisations supporting those who are vulnerable through graduate research projects, media appearances, conference and workshop presentations, publications, community research events and research and

innovation projects. The audit has also identified research skillsets that will actively contribute to the further development of social work as a subject and profession by participating in various national and international networks and collaborations, as well as by working closely with social organisations in our regions. Our objective is to establish new academic standards within the subject, address social questions, and facilitate and advance social discourse and development.

We will investigate early childhood studies and the ways in which young children develop and what is most essential when it comes to their education and parenting. This will involve applied research on a variety of subjects related to educational theory highlighting all the various forms of early child development without necessarily labelling children’s behavior. No two children are the same, no two students are the same. The call for customised education is becoming louder. Our research skills in pedagogy will help teachers and (training) schools in our regions to transform their traditional classroom into a personalised learning environment centred around the subject pedagogy. We will explore novel and innovative digital solutions in pedagogy producing research-based data on the use of digitalisation in higher education, vocational education, and working life. In the future, technology will play an increasingly important role in teaching and education activities. VR and AR technologies are some of the most important innovations in the field of technology. Our activities aim to develop and study the use of new technologies in education and to assess the development of competence and learning experience through a diverse use of research methods. In all projects, particular emphasis is placed on learning analytics. Moreover, we can analyse the gained experiences during the COVID-19 pandemic period in order to develop including e-learning strategies for HE. We will also address lifelong learning or ‘lifelong development’ on the same and develop programs of research to ensure that professionals can continue to learn and develop including career guidance; university-business collaboration and the development of future skills and work-based learning. We will nurture multi-linguism and linguistic research and embrace the ever-increasing language diversity and internationalism which now epitomize our regions and Europe as a whole.

Table 7: *Collective Expertise and Knowledge of RUN EU Alliance (Education & Social Sciences)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment

Polytechnic of Leiria (IPL)	<p>Interdisciplinary Centre of Social Sciences (CICS.NOVA)- The unit of CICS.NOVA 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.</p> <p>W: https://www.cics.nova.fcsh.unl.pt/polos/cics-nova-ipleiria?lg=uk</p>	Culture, Creativity & Inclusive Society
	<p>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).</p> <p>W: https://ijp.ipleiria.pt/</p>	Civil Security for Society
	<p>Centre for Studies in Education and Innovation- (CI&DEI)- It is the strategic objective of the Center 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.</p> <p>W: http://cidei.events.ipv.pt/</p>	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>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.</p> <p>W: https://lit.ie/Research-Development/Research/Centres-Groups/About-Social-Sciences-Connexions</p>	Culture, Creativity & Inclusive Society

	<p>Genders & Sexualities Research Group (GSRG)- The Genders and Sexualities Research Group investigates a broad range of topics related to the ways in which genders and sexualities impact on people in contemporary society. Genders and Sexualities are described in the plural as an acknowledgement of the many ways in which these aspects of identities can be expressed and defined. W: https://lit.ie/Research-Development/Research/Centres-Groups/About-Social-Sciences-Connexions</p>	Culture, Creativity & Inclusive Society
	<p>ASCEND- The purpose of this group is primarily to look at research areas important to individuals accessing social care services and involve them in data generation. This approach is advocated by the National Children's bureau (UK and NI). ASCEND's research activities are motivated by a rights based approach to research. ASCEND is also committed to exploring non-threatening creative research methods. W: https://lit.ie/Research-Development/Research/Centres-Groups/About-Social-Sciences-Connexions</p>	Culture, Creativity & Inclusive Society
	<p>Engage- The objective of this research group is to pursue collaborative research with communities in the areas of Critical Youth Work, Community Development and Education & Training. The group contributes to the development of new thinking, new paradigms and new ways of measuring progress within the sector. W: https://lit.ie/en-IE/Research-Development/research/Centres-Groups/ENGAGE</p>	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Athlone Institute of Technology (AIT)	<p>Technology Education Research Group (TERG)- Technology and Engineering Research Group Areas of research expertise centre around the use of technology in education and the use of educational design research methodologies to develop innovative solutions in educational settings.</p>	Culture, Creativity & Inclusive Society
	<p>Faculty of Business & Hospitality, Organisational Change- Primary research interests focus on workplace spirituality, personal values and person-organisation fit, comparative HRM, self-transformation, and qualitative research methods. W: https://www.ait.ie/faculties/faculty-of-business-and-hospitality</p>	Culture, Creativity & Inclusive Society
	<p>Entrepreneurship Academy MIRC- Research Areas include:- Strategic Knowledge Management and Competitive Advantage, Change Management impact on Talent and Knowledge Management, New horizons in Work Based Learning and Heutagogy, Action Learning – Entrepreneurship and Entrepreneurial Mindsets, Reflective Practice and Entrepreneurial Skills Development, Growth & Sustainability of SMEs – Professional Development</p>	Culture, Creativity & Inclusive Society
	<p>Faculty of Business & Hospitality- Digital Marketing- Primary area of research includes consumer and employee technology adoption and usage with a particular focus on social media, eWOM and Digital Marketing. Experience in SEM analysis using PLS-SEM (Smart-PLS). Experience in apply these techniques across a range of business sectors including Food and Drink Industry and technology industry. Currently actively researching</p>	Culture, Creativity & Inclusive Society

	topics; Social media influencers, brand advocacy, employee brand advocacy, behaviour intention of employee reward systems. W: https://www.ait.ie/faculties/faculty-of-business-and-hospitality	
	Faculty of Science & Health, Parenting & Family Studies- Parenting, family, social inequality and social change; qualitative research methodologies, design and data analysis; co-production of knowledge and models of best practice through research inquiry.	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	Learning, Teaching and Wellbeing- Learning and wellbeing of higher education students; higher education teachers' wellbeing and pedagogical development of teachers and educational institutions W: https://www.hamk.fi/school-of-wellbeing/?lang=en	Culture, Creativity & Inclusive Society
	Professional Development and Lifelong Learning- learning and development at work and developmentg of expertise; career guidance; university-business collaboration and the development of future skills; work-based learning.	Culture, Creativity & Inclusive Society
	Sustainable agroforestry in Africa by modern education research area focuses on work in Africa. Joint education, research and innovative actions towards new entrepreneurship is enhanced within this group. Activities in this group are to update curricula towards more sustainable education, to enable student from various countries to work together by innovating new business opportunities and to enhance sustainability by learning from new research results. Africa group also wants to increase knowhow and possibilities of African markets to local businesses W: https://www.hamk.fi/hamk-in-africa/?lang=en	Culture, Creativity & Inclusive Society
	Education Systems- characteristics of education systems in higher and vocational education; comparative research of education systems; teacher education preparing teachers to teach in vocational and higher education; effectiveness of teacher education. W: https://www.hamk.fi/global-education/?lang=en	Culture, Creativity & Inclusive Society
	Digital Solutions in Pedagogy produces research-based data on the use of digitalisation in higher education, vocational education, and working life. In the future, technology will play an increasingly important role in teaching and education activities. VR and AR technologies are some of the most important innovations in the field of technology. Our activities aim to develop and study the use of new technologies in education and to assess the development of competence and learning experience through a diverse use of research methods. In all projects, particular emphasis is placed on learning analytics. We carry out research and development in HAMK SMART's and HAMK EDU's joint research group. W: https://www.hamk.fi/research/hamk-smart/digital-solutions-in-pedagogy/?lang=en#1529036409396-1a690e18-59f18dde-4e26	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment

Polytechnic Institute of Cávado and Ave (IPCA)	<p>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. Following one practice and applied approach, research projects are being developed in thematic areas like transparency and accountability in public and private organizations, management accounting and control tools, performance measurement and key performance indicators, international harmonization of accounting and tax, sustainability reporting following the ODS and sustainable policies toward the Europe Agenda 2030.</p> <p>W: https://cicf.ipca.pt/en/</p>	Digital Industry & Space
	<p>Research group in Marketing- Marketing, Consumer Behaviour, Digital Marketing</p> <p>W: http://uniag.ipb.pt; https://www.esec.pt/investigat-transferir/investigacao/citur</p>	Digital Industry & Space
	<p>2Ai - Applied Artificial Intelligence Laboratory- Digital Lexicography. Construction of resources for lexicographers in their work on creating dictionaries and terminologies. Digital Preservation, and Digital Lexicography. Retreading of public-domain dictionaries for the creation of public and free lexical resources.</p> <p>W: https://2ai.ipca.pt/</p>	Culture, Creativity & Inclusive Society
	<p>Research Group in eGovernment in the Management School – this research group develops research in collaboration with the Research Center in Political Science (CICP) of the University of Minho; it develops research on topics like electronic public procurement; public purchase; platform of public purchase; green public procurement; transparency; best practices; indicators; policy decision and implementation.</p> <p>W: http://cicp.eeg.uminho.pt</p>	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	<p>Professorship Vital Subject Pedagogy- No two children are the same, no two students are the same. The call for customised education is becoming louder. But how can teachers realise that? The professorship Vital Subject Pedagogy helps teachers and (training) schools in the region to transform their traditional classroom into a personalised learning environment centred around the subject pedagogy. Teachers who conduct research in their own classes are the key to success.</p> <p>W: https://www.nhlstenden.com/onderzoek/lectoraat/vitale-vakdidactiek</p>	Culture, Creativity & Inclusive Society
	<p>Professorship Vocational Pedagogy- Lifelong Learning: Since its introduction, the term has undergone a number of transformations. Nowadays, senior secondary vocational education uses 'Lifelong Development' on the same footing: how can we ensure that professionals can continue to learn and develop? Associate professor Marco Mazereeuw supports vocational education in this respect by means of the research theme Vocational Pedagogy.</p> <p>W: https://www.nhlstenden.com/onderzoek/marco-mazereeuw</p>	Culture, Creativity & Inclusive Society

	<p>Professorship Early Childhood Studies- The Early Childhood Studies Department is concerned with the various ways in which young children develop and what is most essential when it comes to their education and parenting. The Department carries out applied research on a variety of subjects related to educational theory and then shares this knowledge with others in the professional field. In this way, the Department highlights all the various forms of early child development without necessarily labelling children's behavior.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/early-childhood-studies</p>	Culture, Creativity & Inclusive Society
	<p>Professorship Multilingualism and Literacy- We cannot imagine a world without languages. Approximately seven thousand different languages are spoken worldwide, with about forty thousand dialects besides. Professor Joana Duarte speaks eight languages and is committed to holistic language education, with plenty of room for minority, regional and neighbouring languages in the classroom. Language as the key to participating in society.</p> <p>W: https://www.nhlstenden.com/onderzoek/lector-joana-duarte</p>	Culture, Creativity & Inclusive Society
	<p>Professorship Internationalisation of Higher Education- Dutch society is becoming increasingly international: our country does business in all corners of the world, we are signatories to many international treaties and agreements, and many of us choose to work abroad – while people from overseas end up finding jobs in our economy. This makes internationalisation all the more important for our education system, and specifically our higher education institutions. Those who want to achieve success in our competitive international society will need to start developing a more international outlook and adapt their actions and attitude accordingly. This, in a nutshell, is the research focus of the Department of Internationalisation of Higher Education.</p> <p>W: https://www.nhlstenden.com/en/research/internationalisation-higher-education</p>	Culture, Creativity & Inclusive Society
	<p>Professorship Organizations and Social Media- Twitter, Facebook and YouTube are just a few of the interactive applications that companies have had no choice but to embrace. But what role do social media really play in the organisations of our time? How do they use social media to communicate with colleagues, other organisations, consumers and the public at large? What new forms of corporate communications are emerging, and how has the emergence of social media changed the way organisations operate? These are just some of the questions explored by the Department of Organizations and Social Media. Professorship of Organizations and Social Media has developed an approach that makes the added value of social media usage clearer to organisations, one which produces tangible results. We examine all different types of organisations and users of social media in our research.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/organizations-and-social-media</p>	Culture, Creativity & Inclusive Society
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István	Doctoral School of Regional- and Business Administration Sciences, University of Győr; Department of Mathematics and Computational	Culture, Creativity &

University (SZE)	<p>Sciences, University of Győr; Eötvös Loránd University Faculty of Education and Psychology- The research area is the mass Higher Education (HE), focused on dropout, student's motivation and student's satisfaction. During the COVID-19 pandemic we can analyse the student's characteristics powered by e-readiness. Moreover we can analyse the gained experiences during the COVID-19 pandemic period in order to develop face to face education. We determine the possible e-learning strategies for HE. Besides that we analyse the catchment area of University of Győr.</p> <p>W: https://rgdi.sze.hu/en_GB/-welcome https://www.ppk.elte.hu/en/eduscience https://math.sze.hu/en_GB/home</p>	Inclusive Society
	<p>Department of Telecommunications, Department of Informatics- virtual and augmented reality in higher education, e-health, training and assisted technologies</p> <p>W: https://www.maxwhere.com/</p>	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
FH Vorarlberg University of Applied Sciences (FHV)	<p>Department of Business and Management-The Faculty of Economics is an organisational unit and competence centre of FH Vorarlberg. The responsibilities of this faculty include:</p> <ul style="list-style-type: none"> •teaching for programmes on business economics •collaboration with regional businesses •regional transfer of technical, social, and methodological competencies •application-driven further development of knowledge in business economics <p>Colleagues from the Faculty of Economics engage in a multifaceted transfer of knowledge and experience. As well as a commitment to further education, this includes part-time consulting activities.</p> <p>Key areas of activity include:</p> <ul style="list-style-type: none"> •coaching & mediation •simulation & gaming •accompaniment of participatory development processes •accompaniment of change processes •market research topics •coaching to develop business ideas according to the lean start-up method •presentations, e.g. on the digital transformation, founding businesses •organisation of reflective communications •joint decision-making proc <p>W: https://www.fhv.at/en/fh-vorarlberg-overview/organisation-fh-vorarlberg/departments/faculty-of-business-and-management/</p>	Culture, Creativity & Inclusive Society
	<p>The Faculty of Health and Social Work is an organisational unit and competence centre of FH Vorarlberg. The responsibilities of the faculty include teaching for the generally oriented bachelor's programme on social work, the bachelor's programme on health and nursing care, and the master's programme on social work. The faculty also actively contributes to the further development of social work as a subject and profession by participating in various national and international networks and collaborations, as well as by working closely with social organisations in Vorarlberg. The objective is to establish new academic standards within the</p>	Health

	subject, address social questions, and facilitate and advance social discourse and development. W: https://www.fhv.at/studium/soziales-gesundheit/	
	Department of Business Informatics- Smart Products and Smart Services, together with networking, form a central core topic of digitization. The development and operation of such applications is a major challenge, especially for traditional mechanical and plant engineering. This project aims at the development of novel teaching methods and teaching materials in the field of Data Products and Services development to close the existing knowledge gaps in the industrial environment. The project focuses on the interface between data science, customer-centric and agile product development and industrial applications W: https://www.fhv.at/en/research/business-informatics/	Digital Industry & Space
	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. 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. W: https://www.fhv.at/en/research/research-group-empirical-social-sciences/	Culture, Creativity & Inclusive Society

Recent Selected RUN EU Partner Projects

IPL

- EU-En4s - Diversity of Enforcement Titles in Cross-border Debt Collection in the EU (Project ID: 831628, call: JUST-JCOO-AG-2018) coordinated by the University of Maribor (2019-2021)
- EIO-LAPD - European Investigation Order - Legal Analysis And Practical Dilemmas Of International Cooperation, European Union's Justice Program (2014-2019)
- INDIJEN - Legal Indicators of Environmental Law Effectiveness funded by Chaire Normandie pour la Paix - project leader (2019-2022)
- Ibero-American Network of researchers "100 Rules of Brasilia" on Access to Justice for People in Vulnerable Conditions, a project led by the University of Cadiz since 2020 and which includes 33 members from 19 different universities belonging to 13 countries
- Orienta4EYL (O4YEL) - Supporting educational and social inclusion of early youth leavers and youth at risk of early leaving through mechanisms of orientation and tutorial action

LIT

- IRC -Public STEAM: Inventing Transdisciplinary Tools and Practices for 'Education for Sustainability' in Irish Adult Education Contexts
- IRC New Foundations - Enhancing engaged research partnerships and research translation in the field of gender based abuse
- Charity - A scoping project on sibling bereavement in Ireland
- The Efficacy of Mentoring Programmes for young People in the Care System
- 'Adverse Childhood Experiences; what are the effects of trauma on behaviour and on learning in mainstream educational settings?

AIT

- Ireland's Agri-food and Drink Sector: The Correlation Between eWOM Initiatives and Employee Brand Advocacy
- Motivated Employees and the Correlation Between eWOM Initiatives and Employee Brand Advocacy
- Athlone Chamber of Commerce: Digital Marketing Strategy
- NUIG- Research project Employee Brand Advocacy Vs Social Media Influencers

HAMK

- The Mystery 24/7 project is developing a virtual escape game to support the vocational rehabilitation of young people and young adults.
- The VATTU project, a VR training application has been developed with the help of game engine technology and the 3D CAD models of a customer company.
- EMVITET (empowering Vietnamese teachers for transformation towards education 4.0)
- Strengthening Initial Teacher Education in Kazakhstan, funded by World Bank, in collaboration with the MoE of Kazakhstan
- Continuous Opportunities for Learning at Work (CoOL@Work) examines employees' lifelong, or continuous, learning.
- LearnWell -research investigates the relations between learning and psychological wellbeing, especially in higher education contexts.

IPCA

- Project "Greenhealth - Active life strategies, quality and well-being ". Ongoing since 2020. Norte-01-0145-FEDER-000042
- Project TrivPlat - platform for monitoring, management and evaluation of electronic public procurement, approved and financed by FCT (FCT 031171); started in 2018 and in execution; in partnership with the University of Minho.
- Project Model3P - A Framework for Performance-based and Sustainable Portuguese Public Procurement (PTDC/CPO-ADM/2690/2021) - submission made at 10th march, in partnership with the University of Minho.
- ODS IES: Sustainable Development Goals (SDGs): conceptual reporting framework for Higher Education Institutions (EXPL/EGE-OGE/1566/2021
- Observatory for Accountability and Transparency of local government (PTDC/EGE-ECO/2016/2021), submitted to the Portuguese Foundation for Science and Technology on March 2021.

NHL Stenden

- Media-innovatie Campus (RIF)
- 3M (more with multilingualism) (SIA RAAK pro)
- ADDED VALUE (Erasmus+ KA2 strategic partnership)
- Agile Craftmanship (SIA RAAK pro)

SZE

- URBANSOPE www.urban-scope.eu 2019-1-HU01-KA203-061226_UrbanScope
- HUMATHSIN www.hu-maths-in.hu EFOP-3.6.2-16-2017-00015
- FIEK GINOP-2.3.4-15-20016-00003
- Sound of Vision (H2020 project 2015-2018),
- Establishing "Digital Development Center" (governmental funded institute for R&D using VR, 5G technology)

FHV

- Precarious Income Conditions of the Artists in Vorarlberg
- Sozialroutenplan - A (digital) guide to social problems: The Social Route Plan for Western Austria
- Flexi-Navi-Vocational Education - Orientation System for Making Agile Vocational Education and Training in the D-A-CH Countries More Flexible
- Resilient communities in the Lake Constance model region
- FOCUS - Forward Looking Social Europe Skills
- DATA4DES

Recent RUN EU Partner Publications

IPL

- Góis, P. & Marques, J. C. (2020). Portuguese intra-EU migration. The dynamics of an ongoing migration process. *Ethnic and Racial Studies*. DOI: 10.1080/01419870.2020.1772989.
- Marques, J. C., Candeias, P., Góis, P., & Peixoto, J. (2020). Is the Segmented Skill Divide Perspective Useful in Migration Studies? Evidence from the Portuguese Case. *Journal of International Migration and Integration*. DOI: <https://doi.org/10.1007/s12134-020-00757-2>
- ucas, Eugénio (2020). The need for a Unified Patent Court, *LEXONOMICA*, Vol. 12, No. 1, pp. 1–26.
- Mangas, C., Lopes, S., Milhano, S., Freire, C. (2020). Promover o reingresso de alunos nos cursos profissionais: estratégias de operacionalização e possibilidades para reflexão. In *Investigação Qualitativa em Educação: Avanços e desafios* (pp. 642-657). Portugal: Ludomedia. Doi: 10.36367/ntqr.2.2020.642-657.
- Cebola, Cátia Marques & MONTEIRO, Susana (2020). “A Mediação Eletrónica no Quadro da «Nova» Administração da Justiça”, *El derecho público y privado ante las nuevas tecnologías*, González J., Lozano Á, Rodríguez G., Gonçalves R., & Veiga F. (Eds.), Madrid: Dykinson, S.L., pp. 624-632, eISBN: 978-84-13-24758-8, doi:10.2307/j.ctv153k4rn.69.

LIT

- Jones C. (2021) Personal Growth and Wellbeing in a Prison in Development. Paper presented to Diversity and Research in Critical Times: Power in Polyvocality, Post-graduate Research Conference at Manchester Metropolitan University, UK, 17th March.
- Jones C. (2020) Exploring Wellbeing in an Irish Prison Context. Paper presented to the Psychological Society of Ireland Annual Conference, Dublin, 19-20 November.
- Ryan, M.F. (2020) Undergraduate Reflections of An Arts Student, Chapter in: Ryan, S. & Sheridan, J.P. (2020, p.306-311). *Remember Maynooth: A College Across Four Centuries*. Dublin: Messenger Publications.
- Houghton, F., O'Rourke Scott, L., Houghton, S., O'Doherty, D., McInerney, D., Duncan, B. (2019) 'Room 101: are gender-specific cigarette packets the way forward', *Irish Journal of Medical Science*, 188, 1081, available: Doi: <https://doi.org/10.1007/s11845-019-01971-3>
- Houghton, F., O'Rourke Scott, L., Houghton, S., O'Doherty, D., McInerney, D., Duncan, B. (2019) 'Room 101: are gender-specific cigarette packets the way forward', *Irish Journal of Medical Science*, 188, 1081, available: Doi: <https://doi.org/10.1007/s11845-019-01971-3>

AIT

- Jackson, A. Maybe I Will, Maybe I Won't: Transitioning from Living Together to Marriage in Ryan, S. (2019). *Marriage and the Irish: A Miscellany*. Wordwell.
- “Encouraging Adoption and Usage of eWOM: The Factors Contributing to Employee Brand Advocacy”, 2018 Irish Academy of Management Conference, Cork University Business School, UCC from the 3rd to 5th September 2018.
- “Achieving Employee Brand Advocacy in Ireland’s Food and Drink Industry”, 15th Annual Tourism and Hospitality Research in Ireland Conference, Athlone Institute of Technology 17th – 18th of June 2019.
- “Inspired Employees Encourage eWOM”, The 52nd Academy of Marketing Conference, Regent’s University London in Regent’s Park, 2-4 July 2019.
- “Social Media Marketing Adoption and Usage within the Irish Dairy Sector” at the Academy of Marketing Conference 2015 Northumbria University, Newcastle upon Tyne, UK.

HAMK

- Koivisto, J-M., Rosqvist, K., Buure, T., Engblom, J. & Haavisto, E. 2020 The effectiveness of a simulation game on nursing students’ self-evaluated clinical reasoning skills: A quasi-experimental study. *Hoitotiede*, 32 suppl, 36-45.
- Mäkinen, H., Haavisto, E., Havola, S. & Koivisto J-M. 2020 User experiences of virtual reality technologies for healthcare in learning: An integrative review. *Behaviour & Information Technology*. <http://dx.doi.org/10.1080/0144929X.2020.1788162>
- Alman, K., Vierula, J., Kanerva, A-M., Virkki, O., Koivisto, J-M. & Haavisto, E. 2020 Instruments for assessing reasoning skills in higher education: a scoping review. *Assessment and Evaluation in Higher Education*. <https://doi.org/10.1080/02602938.2020.1776212>

- Havola, S., Koivisto, J-M., Mäkinen, H. & Haavisto, E. 2020 Game elements and instruments for assessing nursing students' experiences in learning clinical reasoning by using simulation games: An integrative review. *Clinical Simulation in Nursing*, 46, 1-14. <https://doi.org/10.1016/j.ecns.2020.04.003>
- Koivisto J-M. 2019 Digital simulations for healthcare education. *Encyclopedia of Education and Information Systems*. Springer, Cham. Online ISBN 978-3-319-60013-0 <https://doi.org/10.1007/978-3-319-60013-0>

IPCA

- Gomes, P., Brusca, I. & Fernandes, M. J. (2019). Implementing the International public sector accounting standards for consolidated financial statements: facilitators, benefits and challenges. *Public Money & Management*, 39(8), 544-552
- Guerreiro, M. S., Rodrigues, L. R., & Craig, R. (2021). Institutional theory and IFRS: An agenda for future research. *Revista Española de Financiación y Contabilidad - Spanish Journal of Finance and Accounting*, 50(1), pp. 65-88. <https://doi.org/10.1080/02102412.2020.1712877>
- T. Martins, V. Carvalho and F. Soares, "Physioland – A Serious Game for Physical Rehabilitation of Patients with Neurological Diseases", *Entertainment Computing*, Vol. 34, May 2020, 100356, <https://doi.org/10.1016/j.entcom.2020.100356>. (Q2) (IF: 1.341).
- Vilaça, J. and Duque, D. (2020). Pre-diagnostic of visual acuity through a serious game. In *IEEE 8th International Conference on Serious Games and Applications for Health (SeGAH 2020)*. DOI: <https://doi.org/10.1109/SeGAH49190.2020.9201725>
- Cunha, S., Ferreira, I., Amaral, L.A. & Camões, P., (2019). Public Procurement Electronic Platforms Assessment: Legal Requirements. *Lecture Notes in Information Systems and Organisation*. 2019|book-chapter DOI: 10.1007/978-3-030-14850-8_6.

NHL Stenden

- Coelen, R., and Gribble C. (2019) *Internationalization and Employability in Higher Education*. Abingdon, UK: Routledge.
- Okken, G.J. and Coelen, R.J. (in print) The Impact of International Mobility in Teacher Education on Professional Practice in Cairns, D. (Ed.) *The Palgrave Handbook of Youth Mobility and Educational Migration*. London: Palgrave Macmillan.
- Merola, R.H., Hofman, W.H.A., Jansen, E.P.W.A., and Coelen, R.J., (in print) Making the Grade: Do International Branch Campuses and their Home Campuses Differ in International Student Satisfaction with the Academic Experience? *Journal of Studies in International Education*.
- Van Werven, I., Jansen, E.P.W.A., Hofman, W.H.A., and Coelen, R.J. (online open access) Global teaching competencies in primary education. *Compare: A Journal of Comparative and International Education*.
- Okken, G., Jansen, E.P.W.A., Hofman, W.H.A., and Coelen, R.J. (in print) The Relationship between Intercultural Teaching Competence and School and Classroom Level Characteristics. *Intercultural Education*.

SZE

- Gyimesi Áron, Szennay Áron, Krankovits Melinda, Nagy-Keglovich Júlia, Rechnitzer János Flood of Resources and a Conceptual Change – A Decade of Changes in Territorial Development with an Outlook to the V4 Countries POLGÁRI SZEMLE: GAZDASÁGI ÉS TÁRSADALMI FOLYÓIRAT 16 : Special Issue pp. 345-367. , 23 p. (2020).
- Krankovits, Melinda: Felvidéki magyar anyanyelvű egyetemi hallgatók oktatási célú migrációja: motivációs felmérés. *TÉR ÉS TÁRSADALOM* 34 : 3 pp. 171-192. , 22 p. (2020).
- Kulcsár, Nárcisz: Mathematics self-efficacy, learning approaches, academic performance in the light of the number of failed attempts In: *Engaging Engineering Education SEFI 48th Annual Conference Proceedings(2020)* pp. 297-307. , 11 p.
- Kulcsár, Nárcisz: Motivation Factors for Generation Z in Higher Education In: Uukkivi, Anne; Brown, Ken; Lopes, Ana Paula; Soares, Filomena (szerk.) *Developing Technology Mediation in Learning Environments Hershey (PA), Amerikai Egyesült Államok : IGI Global (2020)* pp. 206-220. Paper: chapter 12 , 15 p.

- Current use and future perspectives of spatial audio technologies in electronic travel aids S Spagnol, G Wersényi, M Bujacz, O Bălan, M Herrera Martínez, Wireless Communications and Mobile Computing 2018.

FHV

- Du Plessis-Schneider, Sharon et. Al: The social problems of marginalised child asylum seekers, Social work, human rights and intercultural relations. Graca, Andre; Antonela, Jesus (Hrsg.); Palma de Cima, Lisboa: Universidade Catolica Editora, S. 52-74 (2020).
- Kriz, Willy: Simulation & Gaming. An Interdisciplinary Journal of Theory, Practice and Research (2019).
- Kriz et al.: The effects of debriefing on the performance and attitude of Austrian university students and cultural differences to Japanese students (2019).
- Ilg, Markus; Alexander Baumeister: Business-Analytics im Marketing-Controlling (2020).
- Metzler, Thomas et al.: Taktiken für rentables Omni-Channel-Management (2020).
- Wilms, Falko; Meusburger, Magdalena: Praktische Herausforderungen der reflexiven Kommunikation (2019).

Technological Systems & Infrastructures

IPL

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

LIT

- SPSS
- NVivo
- Online Library Databases: Academic Search Ultimate, Emerald Insight, ScienceDirect.

Research Translation Centre (RTC) <https://library.lit.ie/find/databases/>

AIT

Online Library Databases- <https://library.ait.ie/a-z/>, <https://library.ait.ie/collections/>

HAMK

VR development & testing infrastructure

IPCA

- Robots: Kuka iiwa and Agilus; KUKA LBR Med, SoloAssist, Universal robot UR3; Automata EVA; 10 Lego EV3 and 5 Lego NXT2 kits; NAO; DJI 1000+; 30+ Parrot AR 2
- Image and surface acquisition systems: GE Vivid 9 (4D US transesophageal probe); scanner Polhemus; Microsoft kinetic I and II; industrial visible light, thermal and multispectral cameras, filters, lenses
- Production support equipments: LKF S103 and D104, laser cutting machine, printers 3D machines (Uprint, Ultimate II, OBJET Eden 260), plastic forming machine, CNC milling machine – VF2 Haas, CNC turning center – TL1 Haas
- Virtual and augmented reality equipment: 15 HTC vive; 4 Oculus Rift; EPSON MOVERIO; Microsoft HoloLens I & II; Oculus Quest; ODG R-7 SmartGlasses
- Motion tracking and haptic feedback: Aurora NDI; Xsense; Tobii EyeX; Data Gloves 5DT; Leap Motion; Kinect; Polhemus Liberty; Force Dimension Omega 7
- Graphical and Computational Power: SuperMicro Server with 4 NVIDIA A100; Render Farm – 4x HP DL380 G82; several graphical workstations; several mobile devices
- Embedded systems and sensors: Rasp pi 3 & 4; Jetson TK1, Xavier DGX; Ti mmWave sensors, Sipeed RISC-V; \weather station; Epoc emotive; wireless communications interfaces; several sensors and GPS receivers
- Research office equipped with hardware, mobile and softwares needed for research on e-government; access to national databases and open access to journals and e-books in the field
- Access to databases on national statistics, softwares for data analytics and for econometric analysis.
- Portatil computers, laboratory with space for researchers, for fellowships, invited researchers and technical management projects; access to journals and e-books in the fields of social sciences
- Laboratory on business simulation and creation of business models

NHL Stenden

The Innovation Lab 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. The lab offers insight in future learning such as ‘flipping the classroom’, blended learning, digital education and international cooperation between students.

SZE

Literature analysis, empirical methodology, SPSS data analysis knowledge, maxwhere, headsets for virtual reality (headphones), mobile devices

FHV

As part of the course, extensive practical training and exercise sequences take place in specially equipped training centers and simulation laboratories with EKG, askulationsimulators, and medical dolls for trainingsequences. Serious Games Laboratory is also used.

2.1.1.8 Research Area 8: Health & Wellbeing

‘The health and well-being of its people is a central aim of the European Union providing high level of human health protection towards a direction of a fairer, inclusive and more social Europe for all European citizens based on a European social model. Our mission in this research cluster is to contribute to the creation of knowledge and innovative programs promoting the improvement in the quality of life across human beings, including research on motor behavior, physical activity and healthy lifestyle, education and training and Individual and community health, health promotion and care, biomarkers and clinical engineering, nutrition and food for health innovation. People’s health and well-being needs are different, depending on their age, stage of life and social conditions. Many factors influenced by their individual situation and the broader societal context can impact the physical and mental health and well-being. Moreover, people’s health can be impacted by a rapidly changing society and societal factors as we have most recently and continuing with the onset of the Covid-19 pandemic. These factors make it extremely challenging to maintain good health and well-being in our citizens and clearly demonstrates the need for new innovative technological tools and societal changes in order to reduce health inequalities and to support healthy and active lives for all It is therefore crucial that research and innovation activities design cross-cutting multidisciplinary tailor-made solutions for all people irrespective of their physical or special needs.

We will within this research cluster address the identified needs defined with pillar 2 health research cluster of the horizon Europe program. Our aim is to develop interdisciplinary projects and themes which support the wellbeing of our citizens in addition to developing community engagement project ideas which support our local community’s and the development of their people and economy. The outcomes of this community will be ideas which can be transformed into projects and programmes delivered by RUN-EU’s health research cluster. We will deliver research activity aimed

at unlocking the full potential of new tools, technologies and digital solutions for a healthy society assisting in tackling disease and/or reducing disease burden. We will promote a healthy living and working environment and contributing to a more sustainable and innovative healthy society encompassing the eight dimensions of health and wellness; emotional; occupational; environmental; physical; intellectual; social; financial and spiritual. Health and wellness are broad terms which embrace the active process of becoming aware of and making choices toward a healthy and fulfilling life "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity" (The World Health Organization) but also "a conscious, self-directed and evolving process of achieving full potential" (The National Wellness Institute, USA). Wellness is more than being free from illness, it is a dynamic process of change and growth and will form a definitive philosophy within the research area.

Our vision is to create a community of academic excellence as identified in the audit in themes associated with health and wellness which draws on Run-EU's expertise in the practice of health and science, social care, food, sports strength and conditioning and food for health technologies and biotechnologies. This will include 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 design will include quantitative and qualitative social research in the specific fields of 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. We will also be active in technologically driven areas of health applied artificial intelligence, computer-assisted diagnosis, smart minimally invasive interventions and personalized medicine bridging the gaps between the societal and the technological in delivering health and well-being advancements. We will also address research aims to gain knowledge on effects of nature and environment and their direct relationship to improving human health. Topics included will be effects of soil, forest animals, microbes etc. to humans physical and mental health. The effects of built environment and the role of green in the cities to human health.

We have identified research activity in the RUN-EU research audit which will investigate multisensory environments and assistive technology and innovative health 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. This can be done by strengthening the identification and reception of appropriate stimuli and by assisting people in the interpretation and operational utilisation of information. We will investigate smart technological solutions for wellbeing: supporting 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 of our research focus areas will be on wearable health technology and intelligence in tandem with the work of the RUN-EU research area 1 cohort. We will also address and support creative social science research in the areas of grief and loss across the lifespan within our regional communities around the less traditional research area topics such as death, bereavement, mourning, and suicide, and also focus on how human beings experience non-death related losses with a particular emphasis on increasing public awareness of the effects of loss and community-based interventions that encourage the effective emotional understanding and management of grief.

Table 8: *Collective Expertise and Knowledge of RUN EU Alliance (Health & Wellbeing)*

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic of Leiria (IPL)	The Life Quality Research Centre (CIEQV) - The mission of CIEQV 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. W: https://www.cieqv.pt/	Health
	Center for Innovative Care and Health Technology-(ciTechCare) mission is to ascertain the development of state-of-the-art technologies to excel health promotion and care and to empower patients and caregivers with incremental life quality tools, in a broad preventive perspective of what healthcare should be. To accomplish its mission, ciTechCare establishes a network team of a non-medical academic institution, a central hospital, and a regional Directorate of primary healthcare centers from Central Portugal, combining expertise from a diverse range of health and non-health related disciplines. ciTechCare is organized in 3 main research areas of expertise: Health Promotion and Care; Biomarkers and Clinical Engineering and Nutrition and Food Innovation working collaboratively to create a microenvironment that harvests optimal conditions to promote bench-to-market R&D, clinical trials in the areas of medical devices and nutrition, and care of excellence in chronic diseases. W: https://citechcare.ipleiria.p	Health

RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Limerick Institute of Technology (LIT)	<p>Loss and Grief Research Group- The aim is to support and encourage creative social sciences research in the areas of grief and loss across the lifespan in Ireland and internationally. We support and promote research around traditional topics such as death, bereavement, mourning, and suicide, but would also focus on how human beings experience non-death related losses. The group provides support, assistance, and opportunities for collaboration and reflection on current research practice and approaches, with a particular emphasis on increasing public awareness of the effects of loss and community-based interventions that encourage the effective emotional understanding and management of grief. Inspired by the disciplines of thanatology and bereavement intervention, the group takes a unique multidisciplinary approach towards the examination of grief and loss in Ireland as it is encountered in various life events.</p> <p>W: https://lit.ie/Research-Development/Research/Centres-Groups/About-Social-Sciences-Connexions</p>	Health
	<p>Health, Education & Social Research Group (HEALR)- The HEALR Research Group was formed in 2014 as part of a concerted drive to develop a more visible, active and diverse research base in Limerick Institute of Technology. HEALR is one of three research groups that replaced the more generically oriented Irish Centre for Research in Applied Social Studies (ICRASS), which was established in LIT in 2006. These three research groups, the Loss & Grief Research Group, the Genders & Sexualities Research Group & the HEALR Research Group, developed a more specialised focus to reflect the growth of interest, specialisation and expertise in these topic areas. The three research groups continue to work closely together and often come together under the umbrella of Social Sciences Connexions.</p> <p>W: https://lit.ie/Research-Development/Research/Centres-Groups/About-Social-Sciences-Connexions</p>	Health
	<p>Health & Wellness Community-The LIT Health & Wellness Community group is a cross-disciplinary Community of Practice led by LIT's Department of Social Science, Department of Sport and Finance, Department of Applied Science and Department of Flexible Learning which collaborates with all discipline areas of LIT including the Department of Food and Tourism, the School of Art and Design and the Faculty of Applied Science, Engineering and IT. Communities of Practice are described as groups of individuals linked together by their enthusiasm for sharing and expanding their knowledge, typically in informal settings and arrangements. The aim of this community is to facilitate knowledge and idea sharing and collaboration amongst LIT staff across departments, functions and campuses, facilitated through the use of enterprise social networking tools.</p> <p>W:https://lit.ie/en-IE/Research-Development/research/Centres-Groups/Health-Wellness-Community</p>	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe

		Pillar 2 Cluster Alignment
Athlone Institute of Technology (AIT)	Nursing and Healthcare research: has an interdisciplinary focus with many students working across disciplines with supervisors from other research institutes such as software and materials. The translational/applied nature of our research means that many co-supervisors and advisors are clinically based, which enhances the quality of student learning and engagement with clinical partners and stakeholders. Our research ensures impact for our work through dissemination and applications of findings clinically.	Health
	Biosciences Research Institute- AIT has developed enhanced infrastructure and supervisory expertise in the fields of enzymatic kinetic resolution and stereoselective synthesis, structure-activity relationship evaluation, and surface recognition on the synthetic side, and this has complemented analytical activities in encapsulation and phase solubility, ultra-trace analysis and formulation development. These activities are integrated with approaches to improving the decision-making process in structural modification of drug candidates so as to enhance the pharmacophore while reducing toxicity. W: http://bri.ait.ie/	Health
	SHE Research Group- The SHE Research Group aims to bridge the gender data gap in sport, health and exercise science research. The group has three pillars; (i) Sports Performance, (ii) Exercise and Health and, (iii) Nutrition and Health. The focus of the group is to prioritise research on women and girls and to ensure equal representation of women and girls in mixed gender studies. W: www.sheresearch.ie	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Häme University of Applied Sciences (HAMK)	To be established: Nature for Wellbeing. New joint MSc program is planned for social care and bioeconomy. Research group around the topic will be built to support the degree program. Research aims to gain knowledge on effects of Nature to human health. Topics included could be e.g the following: - Effects of soil, forest etc. microbes to humans health. - Effects of built environment and the role of green in the cities to human health. - Effect of nature and outdoor activities on mental health. - Effects of animals (horses, dogs) on wellbeing	Health
	Multisensory Environments and Assistive Technology- 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	Health

	appropriate stimuli, and on the other, by assisting people in the interpretation and operational utilisation of information. W: https://www.hamk.fi/research/hamk-smart/sustainable-services-for-wellbeing/?lang=en#1529036409396-1a690e18-59f145cb-cb1a	
	Smart Solution for Wellbeing- 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. W: https://www.hamk.fi/research/hamk-smart/sustainable-services-for-wellbeing/?lang=en#1613630441241-5102893a-2cee	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Polytechnic Institute of Cávado and Ave (IPCA)	2Ai - Applied Artificial Intelligence Laboratory- Health, Artificial Intelligence, Computer-assisted diagnosis, Smart minimally-invasive interventions, Personalized medicine W: https://2ai.ipca.pt/	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
NHL Stenden University of Applied Sciences (NHL Stenden)	Talma Professorship of Living, Well-being and Old-age Care- The life expectancy in the Netherlands is rising, but not all senior citizens are enjoying good health in their old age. Furthermore, we are experiencing a growing number of elderly people with complex care needs, just when the number of healthcare professionals is declining. Evelyn Finnema and Geke Dijkstra are delving into these combined issues together with researchers within the Talma Professorship of Living, Well-being and Old-age Care. W: https://www.nhlstenden.com/onderzoek/talmalectoraat	Health
	Professorship Child and Youth Care- A carefree childhood. That's something we all want for our children, and if something isn't going so well, good support and guidance can help. But what is 'good'? That's the question the Youth Care professorship of applied sciences strives to answer. The professorship carries out research into effective methods and improvements in the training and skills of professionals in the youth sector. Research into effective working and the quality of youth care is of great importance. This is because youth care is developing rapidly, partly due to the fact that since the introduction of the Youth Act, municipalities have become responsible for youth care. In addition, we place greater emphasis on adolescents' own strengths and the problem-solving abilities of families and their surroundings. These changes require innovative solutions and new working methods for professionals who are active in the youth sector. The Youth Care professorship aims to	Health

	<p>improve the skills and training of professionals in the youth sector and to enhance the quality of youth care. We want to achieve this in collaboration with the professionals, by resolving issues to do with quality and effectiveness in providing assistance to adolescents and families. We want to safeguard knowledge and make it accessible together with professionals, the Welfare and Nursing departments and the IAG knowledge centre.</p> <p>W: https://www.nhlstenden.com/en/research/Youth-Care</p>	
	<p>Professorship Small n-designs- The healthcare and welfare sector has always been the domain of people who zealously roll up their sleeves. However, with the rising cost of our healthcare system, there is an increasing need to investigate the efficacy of treatments. Within the Small n-Designs professorship, professor Marinus Spreen and his research group conduct research into the usefulness of low-threshold and easily conducted small-scale studies, the so-called n=1 studies, for the purpose of demonstrating the effectiveness of a treatment or method.</p> <p>W: https://www.nhlstenden.com/onderzoek/small-n-designs</p>	Health
	<p>Professorship Healthcare & Innovation in Psychiatry- Are you crazy? No one calls you crazy anymore if you have a psychiatric disorder. Although your illness doesn't define who you are, a psychiatric disorder can often have a huge impact on your life. That's why mental healthcare currently focuses more on the consequences of psychiatric disorders on day-to-day life than on the clinical picture. The Healthcare & Innovation in Psychiatry professorship of applied sciences aims to improve care for people who are vulnerable mentally or have a psychiatric disorder. The ever-growing demand for innovation and effective care, and limited healthcare budgets mean that healthcare requires modernization. The most important focus areas within the professorship are early identification of people with an increased risk of developing a psychiatric disorder, and offering healthcare which supports recovery and self-management. This latter focus point also requires professionals in psychiatric healthcare to have different competences.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/healthcare-innovation-psychiatry</p>	Health
	<p>Professorship Nursing Leadership and Identity- Due to an initiative of the Medical Centre Leeuwarden nursing leadership and nursing identity are focus themes of a new research group which started in February 2018 at NHL Stenden. The group of researchers is being formed at the moment. The research program's aim is to empower and enhance leadership and professionalism of nurses throughout nursing care during integrated patient's pathways. Also the development of nursing research programs in order to support evidence based nursing care is an issue of importance. Research will focus on bachelor nurses as well as on nurses with vocational and other educational backgrounds, but will seek for a clear distinction in what specific groups of nurses need in their professional development. The main concepts leadership and identity will need to be developed and operationalized further within the program in the next coming years. For now leadership is being understood as proactive nursing behavior while the concept of nursing identity contains aspects such as compassion, advocacy and nursing agency.</p>	Health

	W: https://www.nhlstenden.com/en/research/nursing-leadership-and-identity	
	<p>Professorship 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.</p> <p>W: https://www.nhlstenden.com/onderzoek/sociale-kwaliteit</p>	Health
	<p>Professorship 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.</p> <p>W: https://www.nhlstenden.com/en/research/professorships/ihuman-health-care-digital</p>	Health
	<p>Professorship Resilience- Labour force participation became a hot topic in 2015 when agreements were made regarding participation jobs. Municipalities were required to create jobs for people with disabilities, with the aim of taking a major step forward towards an inclusive society that allows everyone to participate. The big question is, however: does this approach work? Professor Piet Geert Nicolay has devoted years of study to this issue.</p> <p>W: https://www.nhlstenden.com/onderzoek/weerbaarheid</p>	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
Széchenyi István University (SZE)	Department of Telecommunications- 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 fuzzs signature based on a set of statistical image parameters such as entropies, fuzzy hpugh transform, wavelet analysis.	Health
RUN EU Partner	Faculty/Department/Research Institute / Centre/ Group & Area of Expertise	Horizon Europe Pillar 2 Cluster Alignment
FH Vorarlberg	The Faculty of Health and Social Work is an organisational unit and competence center of FH Vorarlberg. The new bachelor's programme	Health

University of Applied Sciences (FHV)	on health and nursing care at FH Vorarlberg is the basis and first step of academic education on healthcare in Austria. The faculty works closely with the research centre for social and economic sciences of FH Vorarlberg. W: https://www.fhv.at/studium/soziales-gesundheit/	
	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. 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. W: https://www.fhv.at/en/research/research-group-empirical-social-sciences/	Health

Recent Selected RUN EU Partner Projects

IPL

- 2ARTs -Accessing Autonomic Control in Cardiac Rehabilitation
- A Randomized Controlled Trial to evaluate the effects of the Mediterranean Diet as an adjuvant in the treatment of Major Depressive Disorder
- On Time to Rethink ACTivity Knowledge: A personalized mHealth coaching platform to tackle physical inactivity in COPD
- Celiact - Profilling Celiac Disease in Portugal towards remission
- Help2care- Help to care for dependent person and caregivers

LIT

- IRC - New Foundations Leprosy in Nepal: Re-emerging threat
- The impact on the dynamics of the blended family when a stepfamily member dies
- A Content & Thematic Analysis of a Pro-Suicide Website
- What are the key impediments and challenges hampering the implementation of the Housing First approach in the Irish housing-homelessness sector?

AIT

- 2016 to 2017: Project Title: To improve the quality of service and care to individuals undergoing surgical male circumcision in the Nurture Africa Clinic, Uganda. Funded by the Irish Research Council
- 2014 to 2016: Project Title: To evaluate the impact of the case manager in the coordination of care services for children and young adults who have complex care needs, from the perspectives of families, health and social care professionals.
- 2014 to 2016: Project Title: Evaluating LauraLynn @ Home: a pilot hospice at home programme
- President's Doctoral scholarship AIT (May 2019) for project titled 'Use of Laccase enzymes for Oxidation reactions'
- Department of Agriculture/ Veterinary laboratory funded research project (2019) on the 'Development of ICP-OES methods for multielement analysis animals used to determine the health of bovine animals.

HAMK

- Speducult <https://www.hamk.fi/projects/speducult/?lang=en>
- Tinel <https://www.hamk.fi/projects/tinel/?lang=en>
- In2Stempo Horizon 2020 project https://projects.shift2rail.org/s2r_ip3_n.aspx?p=IN2stempo
- DigiCampus <https://info.digicampus.fi/projects/digicampus-accessibility-subproject-esa/?lang=en>

- Eräs project (National project)

IPCA

- SmartHealth - Artificial Intelligence for Personalized Lifelong Health Care
- SmartOrthosis - Personalized cranial intelligent orthosis for deformational plagiocephaly
- HowMi - Home Wearables and Monitor Integrated
- Sono ao Volante 2.0
- GreenHealth - Digital and biological asset-based strategies to improve well-being and promote green health

NHL Stenden

- SoVaTass - social skills for ASS (SIA RAAK)
- FAITH (SIA SPRONG) <https://www.faithresearch.nl/>
- Werkplaats sociaal domein (national funding)
- Leernetwerken verward gedrag (ZonMw)
- Werkplaats Jeugd Friesland + Drenthe (ZonMw)

SZE

- COST action CA17124 DigForASP related project similar methodology in digital forensics

FHV

- Violence in care
- MAGISTER - Mental health professionals' Academy – internationally design continuous training program for practitioners working with people affected by mental disorders
- Monitoring the quality of life of clients of Lebenshilfe Vorarlberg
- Analysis of Care Management in Vorarlberg
- Living in old age

Recent RUN EU Partner Publications

IPL

- Silva, C. J., Cruz, C., Torres, D. F., Munuzuri, A. P., Carballosa, A., Area, I., & Mira, J. (2021). Optimal control of the COVID-19 pandemic: controlled sanitary deconfinement in Portugal. *Scientific reports*, 11(1), 1-15.
- Brito, C., Bertotti, T., Primitivo, M. J., Neves, M., Pires, C. L., Cruz, P. F., & Ribeiro, V. S. (2021). Corema album spp: Edible wild crowberries with a high content in minerals and organic acids. *Food Chemistry*, 345, 128732.
- Rodrigues, J., Borrego, C.C., Ruivo, P., Sobreiro, P., Catela, D., Amendoeira, J., & Matos, R. (2020). Conceptual Framework for the Research on Quality of Life. *Sustainability*, 12(12):4911. doi:10.3390/su12124911.
- Matos, R., Amaro, N., & Pollard, R. (2020). How best to quantify home advantage in team sports: an investigation involving male senior handball leagues in Portugal and Spain. *RICYDE. Revista Internacional de Ciencias del Deporte*, 16(59), 12-23. <https://doi.org/10.5232/ricyde2020.05902>
- Antunes, R., Frontini, R., Amaro, N., Salvador, R., Matos, R., Morouço, P., & Rebelo-Gonçalves, R. (2020). Exploring Lifestyle Habits, Physical Activity, Anxiety and Basic Psychological Needs in a Sample of Portuguese Adults During COVID-19. *International Journal of Environmental Research and Public Health*, 17 (4360), doi:10.3390/ijerph17124360.

LIT

- Houghton, F., Winterburn, M. (2020). Leprosy in Nepal: a re-emerging threat. *J Public Health Pol.* <https://doi.org/10.1057/s41271-020-00260-z>
- Houghton, F., O'Doherty, D., Duncan, B., McInerney, D. (2019) 'Combatting the Big Tobacco Hydra in Sport: Another Case of Alibi Marketing through False Flag Advertising', *Medicina Internacia Revuo*, 28(113), available: <https://interrev.com/mir/index.php/mir/article/view/155>
- Houghton, F., Duncan, B., Houghton, S., O'Doherty, D., McInerney, D. (2019) 'Responding to health inequities in New Zealand: the potential of dissuasive cigarettes', *Journal of Primary Health Care*, 11(4), 311-314, available: <https://doi.org/10.1071/HC19013>
- Houghton, F., O'Doherty, D., Houghton, B. (2020) 'Teeth or no teeth: exploring punitive measures for adults smoking in cars containing children in Aotearoa / New Zealand', *New Zealand Medical*

Journal, 133(1508), 118-122, available: <https://www.nzma.org.nz/journal/read-the-journal/all-issues/2010-2019/2020/vol-133-no-1508-17-january-2020/8097>.

- Houghton, F., Moran Stritch, M., O'Doherty, D., McInerney, D. (2020) 'EU tobacco controls and the importance of gender: Time to ban slim and superslim cigarettes', Malta Journal of Health Sciences, DOI: 10.14614/TOBACCOGENDER/6/20, available: <https://www.um.edu.mt/library/oar/bitstream/123456789/59088/1/MJHS7%281%29A4.pdf>

AIT

- Beattie F., Kerr L., Larkin J. and Cawley D. (2021) The components of personal passports for people living with dementia in an acute healthcare setting: An integrative review. Journal of Clinical Nursing. Article DOI: 10.1111/jocn.15702.
- Kerr, L., Macaskill, A. (2020) From nurse to advanced nurse practitioner: applying concepts of role transitioning. BJN 29(10), 561-565. <https://doi.org/10.12968/bjon.2020.29.10.561>
- Kerr, L., Macaskill, A. (2020) Advanced Nurse Practitioners' (Emergency) perceptions of their role, positionality and professional identity: A narrative inquiry. J Adv Nurs, 2020;00:1-10. <https://doi.org/10.1111/jan.14314>
- Kerr, L., Macaskill, A. (2020) Advanced Nurse Practitioners' (Emergency) perceptions of their role, positionality and professional identity: A narrative inquiry. J Adv Nurs, 2020;00:1-10. <https://doi.org/10.1111/jan.14314>
- Carolan CG, Dillon GP, Khan D, Ryder SA, Gaynor JM, Reidy S, Marquez JF, Jones M, Holland V, Gilmer JF., 'Isosorbide-2-benzyl carbamate-5-salicylate, a peripheral anionic site binding sub-nanomolar selective butyrylcholinesterase inhibitor', Journal of Medicinal Chemistry, 53, (3), 2010, p1190 – 1199 [Impact Factor of J. Med. Chem. - 6.25].

HAMK

- Saarela, M. (2020). Universal Design for Learning (UDL). https://unlimited.hamk.fi/universal-design-for-learning-udl/#.YFxTQq_7Q2z
- Saarela, M., Efring, H., Petrie, H., Torkildsby, A. B., & Ladonlahti, T. (2019). Improving Accessibility of eLearning in Higher Education from Universal Design for Learning Perspective. <http://urn.fi/URN:NBN:fi-fe2020051127200>
- Saarela M., Ilveskoski O, Kekki T., Kivi M., Majamaa J., Pirttimaa I. ja Pasi I. (2018). Erityisryhmien älykäs paloturvallisuus. <http://urn.fi/URN:ISBN:978-951-784-797-1>
- Kivi M., Pirttimaa I. & Saarela M. (2018). Moniaististen poistumisratkaisujen kehittäminen. <http://urn.fi/URN:ISBN:978-951-784-797-1>
- Saarela M., Tamminen T., Aalto A., Pirttimaa I., Kivi M., Huttunen R., Hirn H. (2018). Näkövammaisia henkilöitä palvelevan moniaistisen suunnistamismenetelmän ja opastejärjestelmän kehittämishanke. Menetelmän testaus joukkoliikenteen terminaaleissa Tikkurilassa ja Itäkeskuksessa. <http://urn.fi/URN:978-952-317-510-5>

IPCA

- Torres, H.R., Morais, P., Fritz, A., Oliveira, B., Veloso, F., Fonseca, J.C. and Vilaça J.L.. (2020). Anthropometric Landmark Detection in 3D Head Surfaces using a Deep Learning Approach. IEEE J. Biomed. Heal. Informatics. DOI: <https://doi.org/10.1109/JBHI.2020.3035888>
- Silva, E., Aguiar, J., Reis, L.P., Sá J. O., Gonçalves, J. and Carvalho, V. (2020). Stress among Portuguese Medical Students: the EuStress Solution. Journal of Medical Systems. DOI: <https://doi.org/10.1007/s10916-019-1520-1>
- Correia, B., Dias, N., Costa, P., and Pêgo, J. M. (2020). Validation of a Wireless Bluetooth Photoplethysmography Sensor Used on the Earlobe for Monitoring Heart Rate Variability Features during a Stress-Inducing Mental Task in Healthy Individuals. Sensors. DOI: <https://doi.org/10.3390/s20143905>
- Leão P., Ribeiro A., Vilaça JL and Sousa N (2020), Laser Pointer device for use in a laparoscopic surgery procedure. Pub. No: WO/2020/225792 <https://patentscope.wipo.int/search/en/detail.jsf?docid=WO2020225792>
- Ferraz A., Carvalho V., Device and method for blood analysis by image processing, Pub. No.: US 2019/0272637 A1, Sep. 5, 2019.

- Oliveira B, Morais P, Veloso F, Moreira A, Batista A, Fonseca J, Vilaça J, Provisional Patent – PP 20191000048483 – Device and operating method thereof for laser treatment of veins.
- Vilaça JL, Rodrigues P, Correia-Pinto J, Fonseca J, Lima E, Provisional Patent – PP 20181000026390 – GUIDANCE SYSTEM, METHOD AND DEVICES THEREOF.
- Oliveira B, Queirós S, Morais P, Torres HR, Gomes-Fonseca J, Fonseca JC, Vilaça JL, A novel multi-atlas strategy with dense motion reconstruction for abdominal and thoracic multi-organ segmentation from computed tomography. Medical Image Analysis (2018). DOI: <https://doi.org/10.1016/j.media.2018.02.001>
- Lima E., Rodrigues PL, Mota P, Carvalho N, Dias E, Correia-Pinto J, Autorino R, Vilaça JL, Ureterscopy-assisted Percutaneous Kidney Access Made Easy: First Clinical Experience with a Novel Navigation System Using Electromagnetic Guidance (IDEAL Stage 1), European Urology, Vol. 72, Issue 4, 610–616 (2017) DOI: <http://dx.doi.org/10.1016/j.eururo.2017.03.011>

NHL Stenden

- M.D.J. Bakker, N. Boonstra, T.C.W. Nijboer, M.S. Holstege, W.P. Achterberg, N.H. Chavannes, The design choices for the development of an Augmented Reality game for people with visuospatial neglect, Clinical eHealth, Volume 3, 2020, Pages 82-88.
- Otto, L.K.M., Hofstra, J., Mullen, M.G., Malenczak, D., Boonstra, N., van der Meer, L., Veling, W., Boerhout, C., van Rijsbergen, G.D., de Vries, J., van der Pol, B., Pijnenborg, G.H.M., Korevaar, L. (2020) A cognitive remediation training for young adults with psychotic disorders to support their participation in education - study protocol for a pilot randomized controlled trial. Pilot Feasibility Study. 2020 Apr 27;6:54. doi: 10.1186/s40814-020-00579-0. eCollection 2020.
- Beukema, L., Reijneveld, S.A., Metselaar, J., & De Winter, A. (2020). The role of functional health literacy in long-term treatment outcomes in psychosocial care for adolescents. European Child & Adolescent Psychiatry, 29, 1547–1554.
- Aalbers, S., Spreen, M., Pattiselanno, K., Verboon, P., Vink, A. & van Hooren, S. (2020). Efficacy of emotion-regulating improvisational music therapy to reduce depressive symptoms in young adult students: A multiple-case study design. The Arts in Psychotherapy, 71, November 2020. <https://doi.org/10.1016/j.aip.2020.101720>
- Schweizer, C., Knorth, E. J., Van Yperen, T. A., & Spreen, M. (2020). Evaluation of ‘Images of Self’, an art therapy program for children diagnosed with ASD, Children and Youth Services Review, 116, <https://doi.org/10.1016/j.childyouth.2020.105207>

SZE

- Nagy Szilvia, Lilik Ferenc, Sziová Brigita, Kovács Melinda, Kóczy László T. On the Applicability of Fuzzy Rule Interpolation and Wavelet Analysis in Colorectal Image Segment Classification In: Marsala, Christophe; Lesot, Marie-Jeanne (szerk.) Fuzzy Approaches for Soft Computing and Approximate Reasoning: Theories and Applications Springer International Publishing (2021) pp. 243-255. Paper: Chapter 21, 13 p.
- Nagy Szilvia, Sziová Brigita, Solecki Levente The effect of background and outlier subtraction on the structural entropy of two-dimensional measured data INTERNATIONAL JOURNAL OF REASONING-BASED INTELLIGENT SYSTEMS 12: 3 p. 200 (2020).
- Sziova Brigita, Ismail Raneem, Lilik Ferenc, Koczy Laszlo T., Nagy Szilvia Fuzzy rulebase parameter determination for stabilized KH interpolation based detection of colorectal polyps on colonoscopy images In: IEEE (szerk.) 2020 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE) Piscataway (NJ), Amerikai Egyesült Államok : IEEE (2020) pp. 1-6. , 6 p.
- Nagy Szilvia, Sziová Brigita, Pipek János On Structural Entropy and Spatial Filling Factor Analysis of Colonoscopy Pictures ENTROPY 21 : 3 p. 256 , 31 p. (2019).
- Fuzzy Hough transformation in aiding computer tomography based liver diagnosis S Nagy, M Kovács, B Sziová, LT Kóczy 2019 IEEE AFRICON, 1-4.

FHV

- Devecchi, Lineo Umberto; Hassheider, Eva-Maria (Hrsg.) (2020): Resiliente Gemeinden in der Modellregion Bodensee: Robust und agil durch Partizipation. Online-Publikation, DOI 10.5281/zenodo.3563721, verfügbar unter <https://zenodo.org/record/3563721#.YFxfqg9KiHs> . Contains chapters by Rebitzer, Fabian.

- Bergé, Laurent; Carayol, Nicolas; Roux Pascale (2018): How do inventor networks affect urban invention? In: Regional Science and Urban Economics, Volume 71, p. 137-162.
- Fredersdorf, Frederic; Jüster, Markus; Rebitzer, Fabian; Schiemenz, Cathrin (2017): Altersmigration und Gesundheitstourismus als Treiber regionalen Strukturwandels (AlGeTrei). Göttingen, Cuvillier Verlag.
- Geser-Engleitner, Erika (2016): Bettelnde Notreisende in Vorarlberg. Bregenz, Amt der Vorarlberger Landesregierung.
- Fredersdorf, Frederic (Hrsg.) (2015): Anwendungsorientierte Sozial- und Sozialarbeitsforschung in Vorarlberg: Kooperationen mit gesellschaftlicher Wirkung (Forschung und Entwicklung in der Sozial(arbeits)wissenschaft). Wiesbaden, Springer VS. Contains several articles by members of the research group: Hefel, Johanna; Rebitzer, Fabian; Roux, Pascale.

Technological Systems & Infrastructures

IPL

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

- ciTechCare Laboratories are being currently assembled at the recently established Health Innovation Hub of Polytechnic of Leiria. In 2021 three fully operational labs will be available: Disease Biomarkers Lab; Clinical Microneurography Lab and Epidemiology Lab.

LIT

- SPSS
- NVivo
- Online Library Databases: Academic Search Ultimate, Emerald Insight, ScienceDirect.
- Sports Labs <https://library.lit.ie/find/databases/>

AIT

- Laser/tens/electrotherapy machines
- Reflex hammers
- Goniometers
- Inclinometers
- HP Cosmos Quasar treadmill
- Moark Egomedic 894E
- Ergometer Ergoselect 100P
- 100m sprint track
- Stethoscopes

- Plinths
- portable massage couches
- Spinal Boards/Pins and Straps
- Olympic bar
- Training bar
- Squat racks
- Bench Plyometric boxes
- Indoor 200m athletics arena
- Tanita bodyfat analyser

IPCA

- Robots: Kuka iiwa and Agilus; KUKA LBR Med, SoloAssist, Universal robot UR3; 10 Lego EV3 and 5 Lego NXT2 kits; NAO; DJI 1000+; 30+ Parrot AR 2
- Image and surface acquisition systems: GE Vivid 9 (4D US transesophageal probe); scanner Polhemus;
- Microsoft kinetic I and II; industrial visible light, thermal and multispectral cameras, filters, lenses
- Production support equipment: LKF s1003 and D104, laser cutting machine, printers 3D machines (Uprint, Ultimate II, OBJET Eden 260), plastic forming machine, CNC milling machine – VF2 Haas, CNC turning center – TL1 Haas
- Virtual and augmented reality equipment: 15 HTC vive; 4 Oculus Rift; EPSON MOVERIO; Microsoft HoloLens; ODG R-7 SmartGlasses
- Motion tracking and haptic feedback: Aurora NDI; Xsense; Tobii EyeX; Data Gloves 5DT; Leap Motion; Kinect; Polhemus Liberty; Force Dimension Omega 7
- Graphical and Computational Power: SuperMicro Server with 4 NVIDIA A100; Render Farm – 4x HP DL380 G82; several graphical workstations; several mobile devices
- Embedded systems and sensors: Rasp pi 3; Jetson TK1; weather station; Epoc emotive; wireless communications interfaces; several sensors and GPS receivers

NHL Stenden

The MEE Lab is a laboratory where various issues and ideas can be submitted for further investigation and/or development. The focus is on innovation needs within the social domain, primarily for the target groups of MEE Noord. This concerns the target group of vulnerable people with a disability in the field of Light Mental Disability, Autism Spectrum Disorders and/or Non-Beneficial Brain Injury. The MEE Lab wants to offer a structural stimulus to an innovative climate within the social domain, and thereby give a positive impulse to, improve and strengthen the support of people with a vulnerability.

SZE

3D printer and audiovisual equipment, medical applications

2.1.2 Research Area Future Looking Teams Audits- Knowledge and existing Intellectual Property/Knowledge know-how and tools.

We will focus on excellence in research that is strategically orientated, market led and impact focused. Through innovative partnerships between RUN-EU researchers and industry partners and other stakeholders, our aim is to remove traditional obstacles to innovation and revolutionise the way the public and private sector works together to bring research developments and advancements to the marketplace for societal benefit. RUN-EU will provide a physical, intellectual, social and cultural environment which is conducive to the successful pursuit of independent academic research. Research activity is a defining hallmark of higher education, informing teaching and learning, and adding to the global body of knowledge. It enhances the reputation of the researchers and RUN-EU and research activity within RUN-EU shall be conducted in accordance with relevant best national and international best practices. Research integrity relates to the performance of research at LIT to the highest standards, and to the accuracy and integrity of the research record in publications and elsewhere. RUN-EU is committed to providing an environment where research integrity prevails through the promotion of good research practices, together with the use of fair and transparent procedures to address research misconduct. The European Code of Conduct for Research Integrity commits European research performing organisations to the highest standards of integrity in carrying out their research, so that partners and other stakeholders, and the international research community have full confidence in the Irish research system. The 'European Code' specifies eight basic principles of research integrity and good practice in carrying out research that all researchers within RUN-EU must observe and promote in performing their research.

These principles are:

- **Honesty** in communication of research goals, research methods and procedures, and in valid interpretations with respect to possible applications of research results.
- **Reliability** in performing research and in full and unbiased communication of the results.
- **Objectivity** in the collection and presentation of verifiable research data and results. **Impartiality** and independence of the research results.
- **Openness** and accessibility in contributing to public knowledge through publication of the findings with due cognisance to data and potential IP protection.
- **Duty of care** for participants in and the subjects of research with due cognisance of relevant ethical procedures.
- **Fairness** in providing references and giving credit to collaborators and contributors to research; and
- **Responsibility** for the scientists and researchers of the future.

These principles of Research Integrity together with good research and knowledge sharing an Intellectual property practices are essential for promoting and safeguarding a culture of research integrity at RUN-EU. The objectives of this part of the research audit are to identify current knowledge and existing Intellectual Property/Knowledge know-how and tools in use within the RUN-EU network. We will aim to develop principles that be adopted within RUN-EU regarding the creation, ownership, transfer and commercialisation of Intellectual Property which is created by staff and students of RUN-EU during the course of any funded Research. Our ultimate goal will be to agree on policy and documentary frameworks that reflect the overall objectives of RUN-EU and are aligned with the International best practices.

Research Policies & Procedures across RUN EU Alliance

IPL Regulation for Scientific Research Scholarships and application platform

https://www.ipleiria.pt/wp-content/uploads/2021/02/Regulamento-n.-152.2021_Regulamento-de-Bolsas-de-Investigação-Científica.pdf (in Portuguese)

IPL Rules of affiliation

https://www.ipleiria.pt/wp-content/uploads/2020/09/Despacho_228_2020_REGRAS-AFILIACAO_signed.pdf (in Portuguese)

IPL Post-Doctoral Studies Regulation

https://www.ipleiria.pt/wp-content/uploads/2020/10/Regulamento-938.2020_Prog.-Pós-Dtr.pdf (in Portuguese)

IPL R&D+I awards

<https://www.ipleiria.pt/blog/polytechnic-of-leiria-2019-rdi-awards-final-results/>

IPL Ethics commission

<https://www.ipleiria.pt/ipleiria/avaliacao-e-qualidade/> (in Portuguese)

General Data Protection Regulation (GDPR)

<https://www.ipleiria.pt/ipleiria-en/quality-and-evaluation/>

LIT Research Degree Programme Regulations

[https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20\(4\)%20Ac%20Regs_Policies_Procedures/\(24\)-LIT-Research-Degree-Prog-Regs-2019_2021.pdf](https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20(4)%20Ac%20Regs_Policies_Procedures/(24)-LIT-Research-Degree-Prog-Regs-2019_2021.pdf)

LIT Research Integrity Policy

[https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20\(4\)%20Ac%20Regs_Policies_Procedures/\(28\)-LIT-Research-Integrity-Policy-2019-2022.pdf](https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20(4)%20Ac%20Regs_Policies_Procedures/(28)-LIT-Research-Integrity-Policy-2019-2022.pdf)

LIT Research Publications Policy

[https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20\(4\)%20Ac%20Regs_Policies_Procedures/\(29\)-LIT-Research-Publication-Policy-2019-2022.pdf](https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20(4)%20Ac%20Regs_Policies_Procedures/(29)-LIT-Research-Publication-Policy-2019-2022.pdf)

LIT Ethics Policy for Researchers

[https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20\(4\)%20Ac%20Regs_Policies_Procedures/\(27\)-LIT-Ethics-Policy-for-Researchers.pdf](https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20(4)%20Ac%20Regs_Policies_Procedures/(27)-LIT-Ethics-Policy-for-Researchers.pdf)

LIT Intellectual Property for Research Policy

[https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20\(4\)%20Ac%20Regs_Policies_Procedures/\(26\)-LIT-IP-Policy-for-Research-2019-2022\(17-6-19\).pdf](https://lit.ie/admin/LIT/media/LIT/Quality/Quality%20Handbook%202019_2020/Volume%20(4)%20Ac%20Regs_Policies_Procedures/(26)-LIT-IP-Policy-for-Research-2019-2022(17-6-19).pdf)

LIT Data Protection Policy

https://lit.ie/getmedia/ce5748cc-cd7f-4f99-85d45ef9bb97b9be/LIT_Data_Protection_Policy.pdf

AIT Intellectual Property Policy

<https://www.ait.ie/uploads/downloads/AITIPPoly19Jun19.pdf>

AIT Research Ethics Committee Guidance Notes

<https://www.ait.ie/contact/staff/quality/research-ethics>

AIT Research Governance

https://www.ait.ie/uploads/downloads/Research_Governance2.pdf

The European Code of Conduct for Research Integrity

<https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf>

Guidelines of the Finnish Advisory Board on Research Integrity 2012

https://tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

Finnish National Board on Research Integrity TENK guidelines 2019

<https://tenk.fi/en/advice-and-materials/guidelines-ethical-review-human-sciences>

IPCA Research Fellowship Regulation

<https://ipca.pt/wp-content/uploads/2020/10/Regulamento-de-Bolsas-de-Investigação-do-IPCA.pdf>

IPCA Intellectual Property Regulation (in Portuguese)

<https://ipca.pt/wp-content/uploads/2021/03/Regulamento-Propriedade-Intelectual-IPCA.pdf>

IPCA National Code for Industrial Property (in Portuguese)

<https://ipca.pt/wp-content/uploads/2021/03/Codigo-Propriedade-Industrial.pdf>

IPCA National Copyright Code and Related Rights (in Portuguese)

<https://ipca.pt/wp-content/uploads/2021/03/Codigo-Diretos-de-Autor.pdf>

IPCA National Policy for Ethical issues on research applied to Health (in Portuguese)

<https://2ai.ipca.pt/wp-content/uploads/2020/12/Dec-Lei-80-2018-0496504970.pdf>

IPCA Ethics Committee Information of 2Ai

<https://2ai.ipca.pt/ethics-committee/>

National Policy on Scientific Integrity 2018 (In Dutch)

https://www.nwo.nl/sites/nwo/files/documents/Nederlandse%2Bgedragcode%2Bwetenschappelijke%2Bintegriteit_2018_NL.pdf

National Protocol on Quality Regulation 2016 (In Dutch)

https://www.verenighogescholen.nl/system/knowledge_base/attachments/files/000/000/489/original/BKO_2016-2021_-_okt_2015_%2812-1-2016_definitief%29.pdf?1452598575

SZE Intellectual Property (IP) Policy (In Hungarian)

<https://mc.sze.hu/images/A%20Széchenyi%20István%20Egyetem%20Szellemitulajdon-kezelési%20Szabályzata.pdf>

FHV National Policy of FTI Strategy 2030

<https://www.fhv.at/forschung/>

FHV IP Policy

<https://www.fhv.at/forschung/>

FHV Land Vorarlberg Wissenschafts- & Forschungsstrategie 2020+

<https://www.fhv.at/forschung/>

RUN EU Partner Research Audits

The supporting research audit documentation for each RUN EU partner is available on the Work Package 5 Microsoft Teams platform.



The content of this publication represents the views of the author only and is his/her sole responsibility. The European Commission and the Agency do not accept any responsibility for use that may be made of the information it contains. Grant Agreement Number: 101004068.