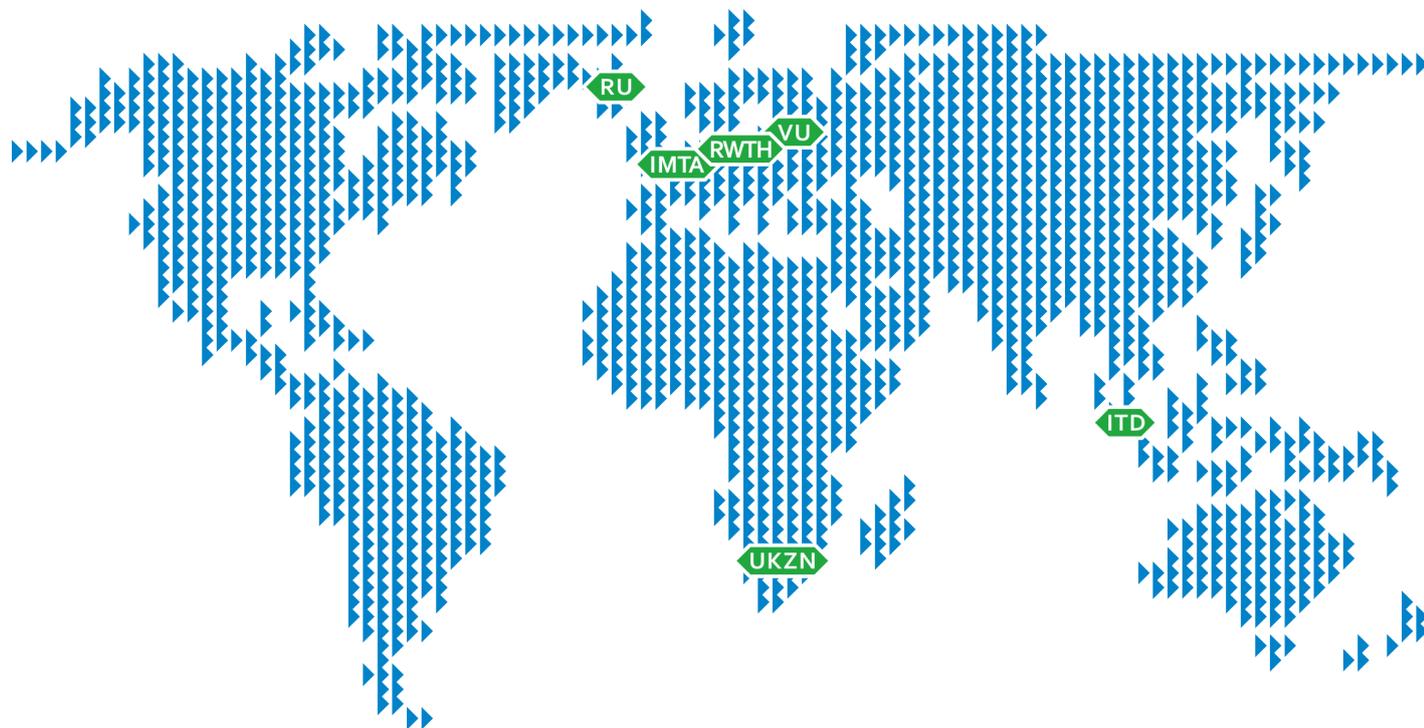


Designing higher Education  
Curricula for Agility, Resilience  
& Transformation

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DECART



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## About DECART

The DECART research and innovation project is an international cooperation partnership initiative funded under the European Commission's ERASMUS+ programme (2022-1-FR01-KA220-HED-000087657). The project unites higher education institutions in France, Iceland, Indonesia, Lithuania, and South Africa. The primary project goal is to provide guidelines to design innovative curricula that leverage the transformative capacities of 21st century education systems in engineering and business. The project will also identify leadership models to help

### Overview of the University of KwaZulu-Natal (UKZN) - South African DECART Partner

Founded on 1 January 2004, the University of KwaZulu-Natal (UKZN) emerged from the visionary merger between the University of Durban-Westville and the University of Natal. Today, UKZN proudly stands as a beacon of academic excellence, embodying the spirit of African Scholarship. Our vision is not merely to be a leading university in Africa but to be the Premier University of African Scholarship—one that excels academically, pioneers innovative research, and remains deeply engaged with the needs and aspirations of society.

Situated in the vibrant, coastal city of Durban—often hailed as the jewel of KwaZulu-Natal—and extending to the historic city of Pietermaritzburg, the proud home of the province's legislature, UKZN is more than just a place of learning; it is a hub of intellectual fervour and cultural diversity. With a student body exceeding 40,000, our university reflects the rich tapestry of cultures, backgrounds, and perspectives that define our region and enrich our academic community.

Our four Colleges—Humanities; Law and Management Studies; Health Sciences; and Agriculture, Engineering and Science—form the cornerstone of our academic offering. These colleges drive UKZN's commitment to nurturing talent and advancing knowledge across diverse fields. This commitment has not gone unnoticed. Consistently ranked among the top universities on the African continent and globally, UKZN has once again earned its place among the world's elite. For instance, in 2024, the Center for World University Rankings placed UKZN within the top 2.4% of 20,966 universities worldwide—a clear indicator of our relentless pursuit of excellence.

At UKZN, we stand at the forefront of high-impact research, innovation, and entrepreneurship, as articulated in our Strategic Plan 2023-2034. Our status as a globally recognised, research-intensive institution is more than a label; it is a mission. We are committed to addressing the pressing societal, economic, and environmental challenges of our time. Our Maritime Law and Maritime Studies Unit is a prime example of this, with its pioneering work in autonomous shipping, smart ports, and marine environmental law, positioning us as leaders in the quest for sustainable maritime futures.

The past five years have seen UKZN produce the highest number of published research outputs in South Africa, a testament to the vitality and dynamism of our research centres and institutes. But we are not resting on our laurels. We are looking ahead, building the infrastructure necessary to propel innovation and entrepreneurship forward. In doing so, we are reaffirming our role as a key player in shaping not only the future of Africa but that of the world.



Images of the UKZN Campuses

## European University Alliances

Sharing curriculum architectures and their components among institutions is a medium for discussion and comparability, as investigated in the DECART project. Deeper cooperation between higher educational institutions to align their curriculum structures and programme outcomes could engender more joint curriculum design and development, and thus favour greater international and interdisciplinary mobility. Based on the highly acclaimed speech of French President Emmanuel Macron at the Sorbonne University in Paris in 2017, the concept of European Universities was developed by EU Member States, higher educational institutions, and student organizations. As a good and large-scale example, in Europe, the 50 European Universities clusters created recently and comprising 430 Universities in total, are experimenting and testing new models of deeper cooperation, in which the linkage, coherence and adequacy of two or more curriculum is primordial. Initial analysis shows that curriculum transformation will be needed. European DECART partners are members of European Universities clusters.

Educational program Interoperability			
<p>IMT Atlantique</p>  <p><b>IMT Atlantique</b> Bretagne - Pays de la Loire École Mines-Télécom</p>	<p>RWTH</p>  <p><b>RWTH AACHEN</b> UNIVERSITY</p>	<p>Vilnius University</p>  <p><b>Vilnius</b> University</p>	<p>Reykjavik University</p>  <p><b>REYKJAVIK</b> UNIVERSITY</p>
<p>EULiST: European Universities Linking Society and Technology</p>  <p><b>EULiST</b></p> <p><a href="http://www.eulist.university">www.eulist.university</a></p>	<p>ENHANCE - The European Universities of Technology Alliance</p>  <p><b>ENHANCE</b> European Universities of Technology Alliance</p> <p><a href="http://www.enhanceuniversity.eu">www.enhanceuniversity.eu</a></p>	<p>ARQUS European University Alliance</p>  <p><b>arQus</b> European University Alliance</p> <p><a href="http://www.arqus-alliance.eu">www.arqus-alliance.eu</a></p>	<p>The European University Association (EUA)</p>  <p><b>eua</b> EUROPEAN UNIVERSITY ASSOCIATION</p> <p><a href="http://www.eua.eu">www.eua.eu</a></p>

The EU Commission is preparing to examine options and necessary steps towards developing a joint European degree and considering the awarding of a European Degree label. 'Building bridges for

effective European HE cooperation' to facilitate deeper transnational cooperation is now an imperative for curriculum adequacy and resilience. Finally, we should point out that complex joint curricula and programme-to-programme often require the ability to combine several styles of curricula.

### Intensive Program for Higher Education (IPHE) at IMT Atlantique in Brest, France

**Learn, to experience and be inspired** was the theme of the workshop at IMT Atlantic in Brest in February 2024. Individuals from France, Iceland, Indonesia, Lithuania and South Africa took active part in the four-day workshop, held February 13-16 2024. **Day one** was devoted to the introduction and an actual application of the DECART curriculum template, with its nine components. **Day two** was spent on designing a nomadic semester on a cruise ship with students from three universities – the design process turned out to be very collaborative and fruitful. **The third day** was on how VUCA like events might affect curricula in higher education and on designing a serious game that would provide insight into how such events might unfold. Actually, the day started out with an outline of such an actual event; a recent cyberattack at Reykjavik University. **On the last day**, before noon, we had an intensive exposure to using dices, cards and photos to discuss curriculum and diverse methods of teaching and learning. Being in France, we really enjoyed experiencing elegant food and fruitful discussions with colleagues from diverse places. This workshop was quite a learning experience.



*All delegates of IPHE-1 after the first day workshop, at Brest, Feb 13-16 2024*

### Project Meeting 4 at IT Del, Indonesia

We held the fourth DECART official meeting hosted by Institut Teknologi Del in Laguboti, Indonesia, on 24<sup>th</sup> – 27<sup>th</sup> June 2024. The higher educators gathered from diverse universities to discuss the DECART project, mainly the work progress of Work Packages 2 and 3. A total of five higher educators from universities abroad, namely Vilnius University (VU), University of KwaZulu-Natal (UKZN), and IMT Atlantique, attended this meeting onsite; meanwhile, the rest of the university partners from Reykjavik University (RU), RWTH Aachen University and two members of UKZN took part online. At this four-day meeting, IT Del also invited lecturers with experience in developing higher education curricula to enrich the perspective of resilience and transformation in designing curricula.



*All participants before starting the first day workshop, at IT Del Campus, June 24<sup>th</sup> 2024*

On the first and second day, the IMT Atlantique team, as the Work Package 2 coordinator, directed all the meeting members to form a group to quickly test a serious game beta version using a collaboration tool, Miro. Each group member had to collaborate on a separate page of Miro to explore how the game runs according to the instructions provided, with different potential VUCA crises to discuss with the group members. This game aims to produce a rationale for the conclusion of how the curriculum is resilient regarding the effects of the crisis. On the last day, the UKZN team, as the Work Package 3 coordinator, led all the meeting members to identify key stakeholders in designing the curriculum and examining how the stakeholders are involved in curriculum transformation.



*All participants showing their DECART T-shirts with all partners' logos at their back, at IT Del Campus, June 24<sup>th</sup> 2024*

Siegfried, Roger and Cecile also presented to IT Del students on 27 June 2024 about the DECART project, providing an overview of the different work packages focusing on curriculum design, resilience, and transformation, as well as an illustration of serious games, and overview of leadership.



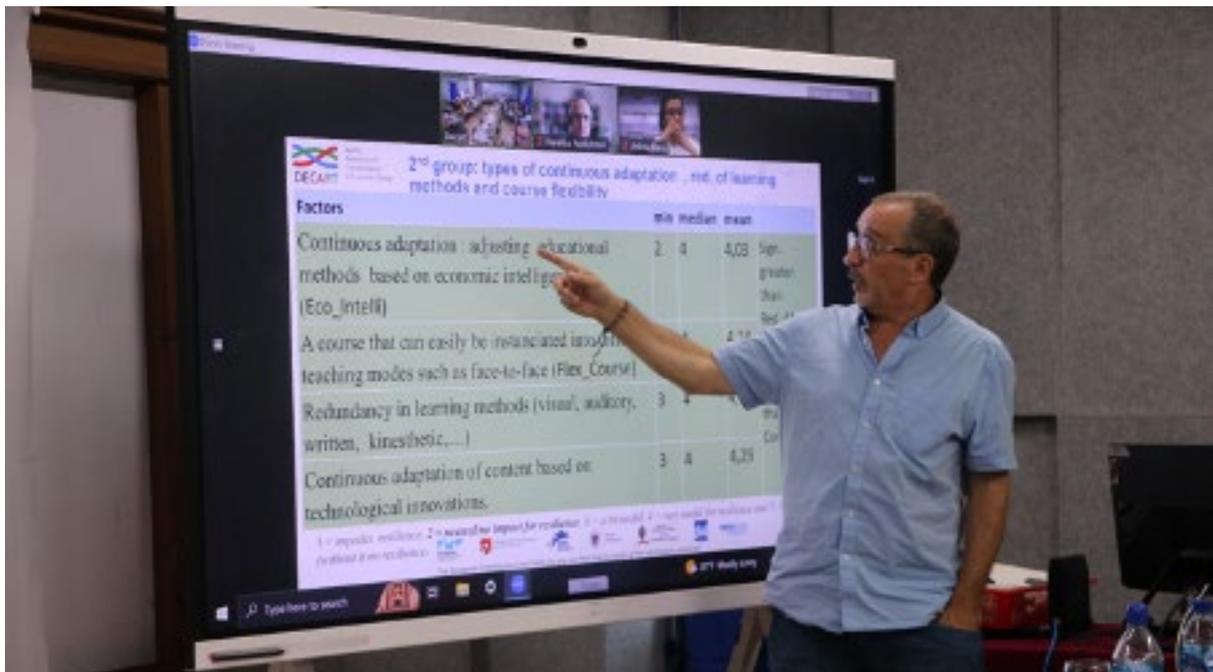
*Presentation to ITD Del students on 27 June 2024*

## **DECART WP2 on Resilient Curriculum led by IMTA**

The objectives of WP2 led by IMT Atlantique is to develop insights and methods for developing resilient curricula. Different activities took place in the first semester of 2024 on two specific objectives of WP2 which are the development of a Body of Knowledge (BoK) showing the dimensions of resilience in a curriculum (called objective O21) and the design of a serious game prototype for the design of a resilient curriculum (called objective O22).

### **Activities on the DECART BoK and properties of a resilient curriculum**

A questionnaire was sent to the DECART university members in April 2024 with the aim to probe and qualify the properties of a resilient curriculum. It consisted of 23 questions, both quantitative and qualitative, with a total number of 35 respondents. Preliminary results of the questionnaire were presented in June 2024 at the Project Meeting 4 held in Indonesia. The questionnaire confirmed that drivers of curriculum resilience found in the literature contribute significantly to resilience and some open questions allowed us to gather additional insights characterizing more precisely the properties of a resilient curriculum.



*Presentation of the preliminary results of DECART Questionnaire 2024 at PM4, 26 June 2024 Indonesia*

### **Activities on the design of a serious game prototype**

A process stage for designing different blocks of the serious game started in November 2023 at the Project Meeting 3 (PM3) held in Rennes, France. The methodology and steps for constructing the serious game were presented in PM3 and the first step of the process was devoted to designing crises events. The design process lasted up to PM4 held in June 2024 in Indonesia, where a first prototype of the serious game could be presented and tested both on site and on-line. In the meantime, four online sessions were organised during the first semester 2024 (9 and 26 January, 17 April and 15 May) with the aim to continue the design and test of different blocks of the serious

game (the blocks “building situational awareness” and “identifying keystones vulnerabilities”). A third year engineering project came in to support the process from February to June 2024. Three IMT Atlantique students, Antoine Judel, Gari Perez, and Yannick Xu participated and animated some of the on-line sessions and made an end-project online presentation on 5 June in the presence of DECART members.

### Several activities on-site that led us to the proposal of a first prototype

Roger Waldeck and Siegfried Rouvrais presented the methodology used for designing a serious game for building resilient curricula at a workshop called “**Systèmes Complexes: futurs, transitions et incertitudes**” in Arles <https://rochebrune.cirad.fr/site> in January 2024. The workshop participants were also invited to test a first block of the serious game called “building situational awareness” consisting of analysing the impact of crises on a higher educational institution curriculum.

The IPHE2 workshop held in Brest in February 2024, in order to smooth the transition and coherency between WP1 and WP2, was also devoted to a short presentation and recap of the complete methodology for constructing the serious game to the DECART members. External participants were also invited. A rapid test was conducted of the first building block in building situational awareness of the game, including student target groups.

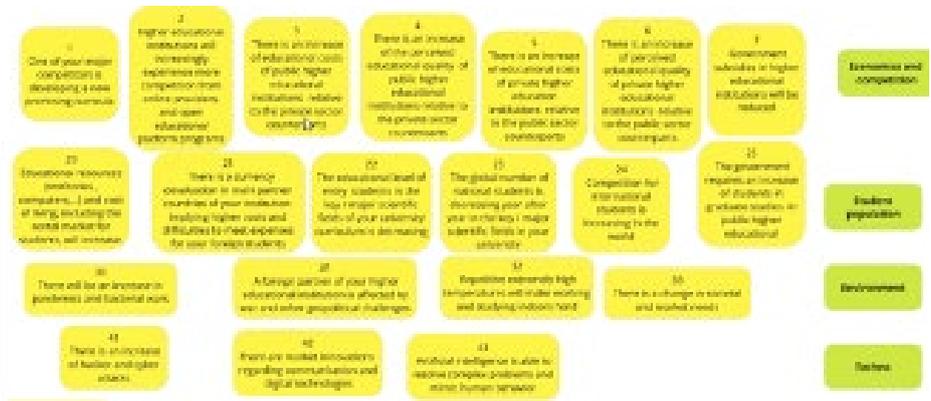


*Participants testing one block of the serious game during IPHE1 in the presence of the IMT Atlantique students, Brest 2024*

The PM4 Indonesia workshop was conducted around two topics, first a presentation of the results on the questionnaire of the DECART Questionnaire 2024 on the properties of resilient curricula and second on presenting a first prototype of the serious game on MIRO consisting of three groups: one panel making a general presentation of the DECART project and its objectives, one panel presenting the resilience principles and associated cards and a last panel dedicated to describing the rules and steps of the serious game.

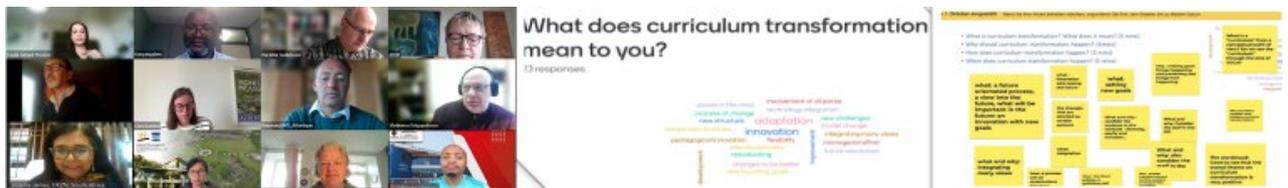
**Principle 1:** Organisational resilience in the context of higher education institutions is understood as their capacity to adapt to external or internal challenging circumstances and to rapidly reconfigure services rendered to students, academic and industrial research partners.

**Trigger events:** (in yellow) represent these challenging circumstances. Each of these events is a scenario for which consequences for the higher education institution must be evaluated.



Screenshot of panel 2 of the MIRO canvas

During PM4, there were approximately 20 participants who played the game in four groups with one group playing on-line. A complete session lasts approximately 3 hours. The discovery of the first prototype of the serious game allowed participants to foster their knowledge about how resilience could be incorporated in a serious game and to provide useful feedback on the design of the serious game.



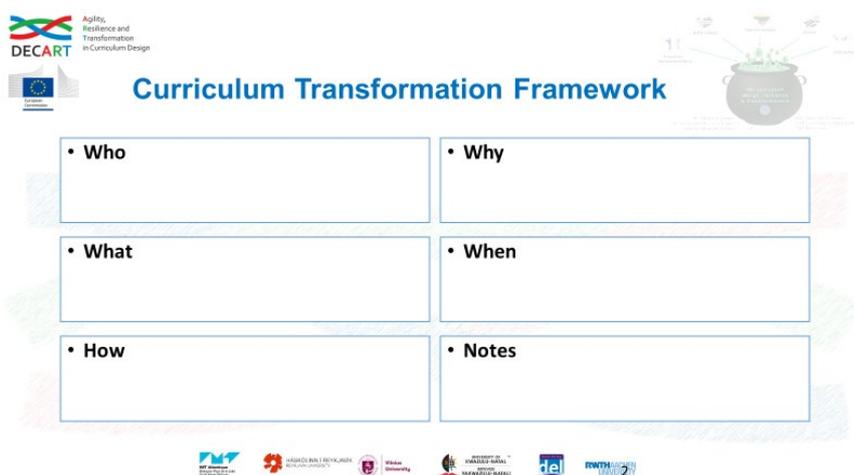
DECART participants playing with the serious game prototype during PM4 meeting  
WP3 Workshop 1 held on 13 May 2024

## Work package 3 on Curriculum Transformation led by UKZN kicks off

The DECART WP3 team led by Cecile Gerwel Proches, Macdonald Kanyangale and Angela James (UKZN, South Africa), held their first virtual workshop on 13 May 2024, to unpack curriculum transformation. The workshop focused on identifying the disruptions experienced by Higher Educational Institutions with respect to curriculum and the main challenges that should be

addressed. According to the participants, these include Artificial Intelligence (AI), new technologies, natural hazards, preparation of students, continuous adaptation of students and staff, and responding to strategy change and direction. The participants then had an opportunity to reflect on what exactly curriculum transformation means. It is evident that there are diverse perspectives on what curriculum transformation entails, and that there are challenges which need to be addressed, in order to facilitate effective curriculum transformation in Higher Educational Institutions. The workshop drew on Mentimeter, Jamboard and Zoom breakout rooms, to facilitate interaction.

The second WP3 workshop was held in hybrid mode at the DE CART PM4 meeting at IT Del in Indonesia, on 27 June 2024. The focus was on identifying the stakeholders involved in curriculum transformation and examining the role that they play. Participants identified diverse stakeholders, including students, lecturers, administration, faculty members, leaders, industry, government, alumni, parents, and accreditation bodies. Participants then drew 'rich pictures' of the various stakeholders and their interests and concerns. A 'rich picture' is a systems thinking tool to facilitate holistic thinking regarding complex problems. The workshop concluded with participants having to develop a framework for curriculum transformation, which focused on the *who, why, what, when and how*, pertaining to curriculum transformation. The framework (see below) for curriculum transformation can be used by diverse stakeholders in Higher Educational Institutions to engage in interactive sessions to stimulate rich discussions.



PM4 held at IT Del, Indonesia, 25-27 June 2024

### DECART at the French Rochebrune workshop, beginning of 2024

In line with the initial WP2 results, Roger Waldeck and Siegfried Rouvrais from IMT Atlantique presented the methodology used for designing a serious game for building resilient curricula at the workshop "Les journées de Rochebrune". "Les journées de Rochebrune" takes place every year and

Rochebrune is the place where researchers question their scientific practices in relation to the complex nature of physical, social, natural or artificial systems.

It is, therefore, a privileged place for interdisciplinary dialogue around a yearly renewed research theme. The subject for year 2024 was on “Systèmes Complexes : futures, transitions et incertitudes. The workshop took place in the city of Arles <https://rochebrune.cirad.fr/site> with approximately 20 participants. One presentation and one activity were performed by the IMT Atlantique team at the workshop: (i) A talk by Roger on “what is VUCA about?” and (ii) A serious game activity by Roger & Siegfried on “resilience or how to better face an uncertain future”. The workshop participants were also invited to test a first block of the serious game called “building situational awareness” consisting of analyzing the impact of crises on a Higher Educational Institution curriculum.



*Participants at the “Rochebrune” workshop working on block 1 of the serious game*

### **Cecile Presented DECART at Universitas Prima, Indonesia, June 2024**

Cecile did a presentation on 4 July 2024 to students and staff at Universitas Prima (UNPRI) in Indonesia. The presentation focused on “*The Future Leaders: Embracing Complexity and Change*”. Before delving into the talk, Cecile introduced the DECART project, which brought her to Indonesia. She elaborated on the goals of the DECART project and provided an overview of the various work packages. The presentation was attended by around 120 people.



*Cecile presenting at Universitas Prima (UNPRI) in Indonesia*

### **DECART at the 20th International CDIO Conference 2024**

In June 2024, the 20<sup>th</sup> International CDIO Conference was hosted by ESPRIT University in Tunis, Tunisia, under the theme "Engineering Education in the Era of AI," which is closely aligned with the DECART project. At the conference, Haraldur presented a paper *Factors that may Impact Curriculum Design in Higher Education in a VUCA World*, co-authored by a DECART team including Haraldur, Asrun, Arlinta, Siegfried, Roger, and Cecile. The paper, based on online surveys conducted as part of WP1 in the DECART project, sparked significant discussion during the Q&A session, particularly around potential VUCA scenarios and the issue of electricity.

Additionally, Haraldur participated in a full-day workshop on the "University of the Future," which is part of a series of workshops on this concept. Cecile and Haraldur had previously engaged in a similar workshop at the 2023 CDIO conference in Trondheim, Norway. The Tunisia workshop focused on envisioning the university of 2050 and the necessary change processes, roadmaps, and potential hurdles to achieve this future. The discussions were dynamic, involving teamwork and presentations, offering valuable insights for the DECART project.



Haraldur attending 20th International CDIO Conference in Tunisia

## Publications

Aligned with its dissemination strategy, DECART members published the progress and result of DECART current progress:

- Waldeck R., "What is VUCA really about?" The Rochebrune days, interdisciplinary meetings on complex, natural and artificial systems, Arles, France, January 2024. In French:  
*VUCA: de quoi parle-t-on ?* Roger Waldeck: les journées de Rochebrune. Rencontres interdisciplinaires sur les systèmes complexes naturels et artificiels, Arles, France, January 2024.
- Waldeck R. & Rouvrais S., Resilience or how to better cope with an uncertain future with a serious game. The Rochebrune days, interdisciplinary meetings on complex, natural and artificial systems, Arles, France, January 2024. In French:  
*La résilience ou comment mieux faire face à un futur incertain.* R. Waldeck & S. Rouvrais. Collaborative Workshop in French 2024 Rencontres interdisciplinaires sur les systèmes complexes naturels et artificiels, theme "futurs, transitions et incertitudes". January 2024, Arles, France. Presentation without formal paper.
- *An Architecture Framework for Higher Education.* S. Rouvrais and S. A. Petersen. In Proceedings of the 26th International Conference on Enterprise Information Systems ([ICEIS](#)). Angers, France, 28-30 April 2024. [[PDF](#)]
- *Factors that may impact Curriculum Design in Higher Education in a VUCA world.* Audunsson H., Matthiasdottir A., Barus A., Rouvrais S., Waldeck R., and Gerwel Proches C. In Proceedings of the 20th International CDIO Conference, Tunis, Tunisia, 10-13 June 2024 [[PDF](#)].
- *Examining Best Practices in Curriculum Design: Insight for Engineering Education.* Matthiasdottir A., Audunsson H., Dagienė V., Rouvrais S., Barus A., and Gerwel Proches C.

The 52nd Annual Conference of the European Society for Engineering Education (SEFI), Lausanne, Switzerland, 2-5 September 2024.

- *Codesigning an Expedition Semester Around Europe for Future Responsible Engineers.* Rouvrais S., Audunsson H., Barus A., and Silalahi S. The 52nd Annual Conference of the European Society for Engineering Education (SEFI), Lausanne, Switzerland, 2-5 September 2024.

We are looking forward to the second Program for Higher Educators in December 2024 hosted by RWTH, with four days of intensive collaboration on Resilient Curriculum and Curriculum Transformation! After that, UKZN will host the Durban PM5 meeting in January 2025.



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