



Innovative D-Skills Training Models for Higher and Vocational Education & Training Students

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Good Decisions at Right Times

Deliverable O2: Innovative D-Skills Training Models for Higher and Vocational Education & Training Students

Version 2.1, 16 April 2020



Preamble

DAhoy project is an Erasmus+ KA2 Strategic Partnership to support Innovation. Its name should be understood as “DecisionShip Ahoy!”, a reference to A. G. Bell, the Scottish-born scientist who patented the first telephone and originally suggested 'Ahoy' as the standard greeting when answering a call.

The project purpose is to investigate, over 3 years (2017-2020), innovative educational ideas around Decision Making, with a view to deeply reinforcing Decision Making skills for renewed and rejuvenated integrative educational programmes in Higher Education (HE) and Vocational Education & Training (VET), for continuous development of HE and VET practices.

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Executive Summary

1 page to be written by all steering partners for mid-October

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Introduction

This report is delivered within the context of the *DecisionShip Ahoy!* Project, 2017-2020. The objectives of DAhoy for this second year were to conceptualize Decision learning outcomes, share and analyse original Teaching & Learning practices on Decision Making in STEM first. In 2019, DAhoy members operated and analysed three Teaching & Learning activities on decision making. They permitted to define and evaluate innovative Teaching and Learning (Teaching & Learning) activities to be integrated in educational frameworks at a systemic level for HE and VET institutions.

The 7 DAhoy partners gained experience in this transnational cooperation and strengthen their capacities. Three intensive 5 day-courses for higher education learners operated in 2019 in three DAhoy institutions permitted to prepare a transversal decision skills learning outcomes framework for the progressive development of students VUCA skills, in line with the evolution of graduate profiles and their expected proficiency levels. The experiences and results presented hereafter are an innovative contribution to the European HE and VET education community and provide a comparative analysis of the implementation of decision skills as curriculum capsules in three leading European HE & VET institutions.

This report is structured as follows: The next section (Chapter 5 - Output 2: Analysis of DAhoy decision making student trainings) proposes an analysis matrix to review the three intensive week-programmes for higher education learners that were operated in 2019, including several VUCA learning activities tested with students from City of Glasgow College, Ecole Navale, IMT Atlantique, and Reykjavik University, including the learning outcomes targeted. Next section (Chapter 6 - Output 2: Innovative Teaching & Learning Activities) presents some innovative courses on decision making, aligned with the decision skills and VUCA level context statements, and proposed by the DAhoy partners for reusability in other contexts. A toolbox is then proposed to select pedagogical styles according to VUCA characteristics. Next section (Chapter 7 - Output 2: Decision Skills and Learning Outcomes) recalls programme outcomes requirements on decision making and echoes in some EU qualification frameworks. Decision Skills for VUCA Situations are then formalized according to level descriptors, including statements. Finally, the last section of this report presents some takeaways, reflection, and DAhoy perspectives for the coming 2019-2020 year, which will focus on a decision making educational framework, including six reference models for transferability, which are to facilitate continuous integration of decision skills in existing HE & VET curricula.

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Context of the 2019 DSkills analysis with DAhoy learners

How to prepare HE and VET students for a VUCA-world and how that can be taken into consideration in HE and VET educational settings? The members of the DAhoy project hope that the work carried out during the project can be useful, in particular to other higher education institutions in the European area, in order to serve the community and that the reflections carried out throughout this project will feed into the activities already existing. Sharing knowledge, feedback on activities implemented and possible learning are among the initial objectives of the DAhoy project. For such, before conceptualisation of a decision skill framework, some tests & analysis were conducted with diverse European students with 7 predetermined learning outcomes termed as VUCA-capabilities, and various pedagogical styles including 4 VUCA characteristics of the learning situations and contexts, termed VUCA-lities.

VUCA-capabilities tested in 2019

Decision Skills were to be tested by using them in the teaching and learning activities and including them in the questionnaires to be used with learners. Questionnaires were devised to be used pre and post activity to gauge the level of achievement or proficiency of these skills. The teaching and learning activities were designed with a first set of 7 decision capabilities. Set of questionnaires were used to obtain feedback, (i) related to measuring the organisation of activities and participants' satisfaction with the focus of the activity, and (ii) with proficiency levels 'à la Bloom' to establish if the participant felt that the 'level' of their skills had increased as a direct consequence of the activities and if the types of skills covered by the statements had been used within the activity.

For the DAhoy tests and analysis, the focus was mainly on Practice (i.e. applied knowledge, skills and understanding) of transversal decision skills, rather than knowledge and understanding, generic cognitive skills or communication, IT and numeracy skills. Nevertheless, autonomy, accountability and working with others were solicited and echoed in some of the 7 decision Capabilities selected. Conforming the definition of Frezza et al. 2018, a "Competency integrates knowledge (e.g. "know-that"), skills (e.g. "know-how"), and dispositions (e.g. "know-why") and is context-situated. These integral components of competency manifest in observable and tangible form within a work context". Accordingly, for DAhoy, decision making "skills are more practical qualities that people develop and learn over time with practice and through interactions with others", VUCA "context represents relevant and authentic situations related to problems/issues and aspects of work in which competencies manifest".

Tab. the 7 decision skills VUCA-capabilities

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Transversal Decision skills capabilities, set as programme outcomes	Sub statements examples as potential course abilities to be mobilized by a DAhoy learner aside knowledge and attitudes.
D1 Recognise and qualify the VUCA-lity of a family of situations “on completion of course activity the DAhoy student should be able to”	D1.1 Ability to observe & discern D1.2 Ability to identify the VUCAlity of a situation D1.3 Ability to understand the situation D1.4 Ability to identify the weak and strong signals (to clarify the situation) D1.5 Ability to process information
D2 Analyse a VUCA situation “on completion of course activity the DAhoy student should be able to”	D2.1 Ability to think globally D2.2 Ability to define priorities and focus points D2.3 Ability to analyse VUCAlity D2.4 Ability to identify risks and key success factors D2.5 Ability to identify external factors
D3 Make judgement in VUCA situations “on completion of course activity the DAhoy student should be able to”	D3.1 Ability to use critical thinking skills D3.2 Ability to assess the level of risks and success factors D3.3 Ability to formulate the framework/model/criteria for the decision
D4 Face complexity of VUCA situations “on completion of course activity the DAhoy student should be able to”	D4.1 Ability to manage priorities and focus points D4.2 Ability to identify a satisfying solution D4.3 Ability to assess and test D4.4 Ability to design possible scenarios
D5 Organize and implement actions in VUCA situations “on completion of course activity the DAhoy student should be able to”	D5.1 Ability to monitor the dynamics of a situation D5.2 Ability to make decisions with uncertainty D5.3 Ability to interact and synchronise with actors D5.4 Ability to organise team work D5.5 Ability to lead a team D5.6 Ability to manage conflicts

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<p>D6 Take responsibilities in the Decision process in VUCA situations “on completion of course activity the DAhoy student should be able to”</p>	<p>D6.1 Ability to decide with time pressure D6.2 Ability to adapt to the situation D6.3 Ability to have the flexible DM process D6.4 Ability to recognise one's limits</p>
<p>D7 Learn from his/her experience of VUCA situations “on completion of course activity the DAhoy student should be able to”</p>	<p>D7.1 Ability to have a reflective process D7.2 Ability to explain how I have learnt D7.3 Ability to recognise cognitive biases D7.4 Ability to give a feedback to the team</p>

It could be suggested that this set of statements could be further developed as a reference point in the design and development of curriculum indicating the types of skills that would need to be developed within a programme of learning and for curriculum teams to use to review existing programmes to identify the content in relation to decision making skills and competences. A similar set of guidance could be developed to indicate the different degrees of VUCA that could be applied and how these affect the level of skills and competences developed/required.

VUCA-lities of the three 2019 teaching & learning experiences

Depending on the level of VUCA, decision skills could be developed at various different levels so for example D5.5 Ability to lead a team – the level of skills and competences needed in this area will vary greatly depending on the level of complexity, the amount of ambiguity, the level of uncertainty involved etc. It is therefore very difficult to correlate these to the first set of statements (comparable levels identified) which are written in language which progresses from less advanced to most advanced in respect to the extent of the demand at each level and indeed difficult to use this second set to allocate a level to a piece of learning or ascertain the level of skills attained by a learner. Before even assigning low, medium, high levels for the 4 VUCA criteria, we provided the definition used for these 4 criteria in order to establish the same basis for analysis for each DAhoy partner. For each criterion, we also worked on different levels (from low, medium to high magnitude) to differentiate the degree of these criteria in relation to the pedagogical activities presented.

Ex: It is therefore possible to have a pedagogical activity that implements a low level of volatility, high levels of complexity and uncertainty and a medium level of ambiguity.

To start with, DAhoyers relied on a VUCAity rubric of experiences and situations (learning situations so as professional or personal situations), as was proposed in the DAhoy O1 report and from the work carried out by Rouvrais, S., Gaultier Le Bris, S., and Stewart M. (2018), presented in the next Table.

	Perturbation Rubric of an experiential situation			
Magnitude variability /	Volatility	Uncertainty	Complexity	Ambiguity
Weak	Low variation of factors, static-ness	Known and formal data/information	Simple sources and organized factors	Plausible interpretation according to a rule or process
Medium	Predictable frequency of variance	Imperfect, incomplete, limited data/information	Several sources and components, high order factors, and lowly organized structure	Distinct but not obvious interpretations thanks to disambiguation
Strong	High dynamic and unpredictability of factors	Unknown data/information	Many components and factors, Disorganization of factors, many cause-and-effect relationships that do not create an established structure	No possible interpretations

Table 1: Rouvrais, S., Gaultier Le Bris, S., and Stewart M. (2018).

To specify the VUCA characteristics of the learning situations experienced by the students to reinforce their decision making skills in a more practical manner, it was necessary to reach agreement on the definition of these criteria, between the various DAhoy partners and for Maths, Social and Career decision making contexts.

For more practicability and simplicity as the semantical issues on these VUCA definitions from various disciplinary perspectives as already discussed in DAhoy report O1 (e.g. maths, business, finance, social, work fields), each statement a revised matrix table (Table titled Matrix) was defined to allow ANY/All activities to be analysed on the same basis.

VUCA statements follow the definitions proposed in “What VUCA really means for you”, January 2014, Harvard business review 92(1/2) by Bennet & Lemoine and are categorized in three levels in DAhoy (Low, Medium, Strong)):

- **Volatility** - a state or situation liable to change rapidly
- **Uncertainty** - a state of limited knowledge where it is difficult to predict a future outcome
- **Complexity** - a state of having many parts/multi variables, being difficult to understand or find the answer to.
- **Ambiguity** - the quality of being open to more than one interpretation and inexactness, more than one possible meaning or doubt

Table. VUCA-lities of situations as Level Context Statements.

Volatility	Uncertainty
Low - Steady changes over a period Medium - Predictable changes over a period Strong - Significant change over a period	Low - Complete and constant data to predict on Medium - Limited data to base prediction on Strong - Absence of complete or inconsistent data to base prediction on
Complexity	Ambiguity
Low - Routine context Medium - Routine with some non-routine aspects Strong - Non-routine context	Low - Familiar context Medium - Familiar but with some unfamiliar Strong - Unfamiliar context

Using the matrix, a pedagogical activity, as learning situations, can then be given a level overall (Low, Medium, Strong) based on most boxes checked. A full worked example for this is given in the last chapter using the Table top rescue exercise which several participants of DAhoy are familiar with.

Chapter 5 - Output 2: Innovative Teaching & Learning Activities

This chapter presents the pedagogical activities related to decision-making with the DAhoy project partners. From these activities, a selection process was carried out to highlight the activities associated with the specific characteristics of the environment that we are studying, which are identified by the 4 VUCA criteria.

This chapter therefore presents the process leading to the emergence of pedagogical activities, the methodology used to select the innovative Teaching and Learning activities (T&L), the presentation of the criteria used in developing the aspects related to VUCA criteria and the associated competences (D-Skills).

Process leading to the innovative T&L activities

The activities that we present in this chapter are the result of a year of preliminary work carried out by the partners of the European DAhoy project to identify all the educational activities organized by the various partners dealing with decision-making.

The pedagogical activities dealing with decision-making are diverse; thus, these themes can be found in scientific training or in other disciplines such as management sciences or in the more operational career management perimeter. It was therefore first necessary to draw up a report on the situation of the training courses dealing with decision-making with partners and to analyze their operating methods (format, duration, nature, resources required to set up these activities, their implementation, their discipline, the evaluation process, etc.). The idea is to highlight the activities that are to be retained to establish a “toolbox” with innovative activities by associating a referential of competences based on the criteria studied within the DAhoy project: the 4 VUCA criteria: Volatility, Uncertainty, Complexity, Ambiguity. Each partner of the DAhoy project has thus identified the list of activities related to the theme of decision-making, whatever the form within each partner institution of the DAhoy project.

Types of T&L activities

These activities are constituted by courses, internships, seminars, project follow-up with students but also coaching sessions for student career or serious games. The range is very wide, it offers the opportunity to provide a variety of activities that constitute a breeding repertory from which innovative T&L can emerge.

The formats of these pedagogical activities are also of a different nature: the duration varies from 2-hour sessions to 4-day seminar activities or even extended over 6 months of workshops on the

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theme of decision-making. The evaluation methods identified are also varied, with more or less important issues depending on the nature of the activity and the importance to partners.

Many identified activities approach decision-making in a very operational way since it is a question for some partners (e.g. IMTA) of following students in the elaboration of their professional integration where the decision they take is very real with personal consequences on the choices that will have been made. Other activities take more theoretical forms, such as courses dedicated to decision-making or the analysis of books on this theme (EN).

The resources mobilized also reveal differences in the modules provided by partners on decision-making. The use of a simulator (CoGC or EN) which represents an investment of at least 1 million (euros) is linked to the training objectives of the institutions and even if they are very good teaching tools, their cost remains an element to be taken into account in the case of the re-use of such methods. Also other sessions conducted with partners have much less significant financial impacts (book purchases from the EN), career guidance or mathematics courses (IMTA).

The objective is also to have a proposal of activities with significant costs or not so that a re appropriation of the activity is possible (especially if a European higher education establishment wishes to be inspired by good practices and the development component of the DAhoy project).

The individual or collective nature of decision-making is also a key variable in the decision-making process: integrating this element into the final portfolio must be taken into account. In year 1 of the DAhoy project, the partners therefore carried out this work of identifying pedagogical activities within each school.

Collection Method

The year 2 of the DAhoy project was the result of the work carried out in year 1; with regard to the identification of pedagogical activities, it was then necessary to identify those that integrated the specific criteria we are studying: environmental decision-making by taking into account criteria of volatility, uncertainty, complexity and ambiguity.

Of course, not all of these activities relating to the decision-making theme identified during the work carried out in year 1 deal with decision-making in VUCA environment or they are not all representative of decision-making in VUCA environment, which is an essential criterion for the DAhoy project: the objective was then to select the activities that most represented decision-making in the VUCA environment, taking into account the transferability of these activities to other European higher education institutions.

Selected activities

Aims of innovative T&L

As the work in year 1 allowed us to have a list of pedagogical activities dedicated to decision-making, the next work was to reflect on the modules that addressed in their content at least one of the 4 VUCA criteria and to propose those that could be re-used by other establishments in an identical form or with differences justified by the nature of the training provided, the objectives targeted and the expected skills. The interest of constituting a portfolio of activities related to the theme we are studying is not so much to highlight the partners' training but above all to be useful for redeployment, particularly to European institutions, of these activities outside the scope of the DAhoy project partners, which has been countered thanks to European funding.

The objective is that the DAhoy project should enable members of European higher education to implement an educational activity that can enhance decision-making in a VUCA environment based on activities that have already been tested so that this work of thoughts, definition of parameters, content and allocation of resources can benefit those who wish to work on the VUCA criteria.

The objective of valorizing this activity is fully in line with the expectations of the DAhoy project. Thinking about subjects of interest to the educational and scientific community, taking part in collective action to benefit the European community, providing avenues for reflection, training tools, being useful, these axes are part of the approach of the members of the DAhoy project. In real terms, this consists in setting up a "toolbox" of innovative educational activities intended for external use by DAhoy project members.

Specification of the DAhoy T&L

Each DAhoy project partner was asked to establish a list of activities that address decision-making issues in any form (in the form of courses, practical workshops, projects...). This work was carried out in year 1 of the DAhoy project. In year 1, we also experimented with activities existing in our institutions that might be interesting for students on the theme of decision-making in VUCA environment. These activities were tested by DAhoy project managers and then proposed to the students of the project's partners. Thus, from the seminars organized by CoGC, IMTA, EN (JSTE), some activities were consolidated and used as a pedagogical basis with feedback for the T&L activities.

These experiential activities conducted with managers made it possible to identify associated skills, in particular expected D-Skills, constraints and identified limits. Then, based on this work of listing the activities dealing with decision-making issues, we wanted in year 2 to propose a list of activities which would be the most representative of decision-making in VUCA environments or

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the most suitable to develop D-Skills among students. Some of these activities were tested in year 1 (T&L) dealing with DM process and using, when possible, the 4 VUCA criteria (with the partners of DAhoy project). They were thus able to link these activities with DM process and to the criteria that they felt suitable among the 4 VUCA criteria. The objective is to associate to each innovative activity a level (low - medium - high) for each of the 4 VUCA criteria and to highlight the D-Skills level associated with the activity.

Table. Analysis Matrix

	D1				D2				D3				D4				D5				D6				D7			
	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A
None																												
Low																												
Medium																												
High																												

The T&L activities proposal has been defined by retaining certain criteria necessary for the implementation of educational activities. Operational objectives, objectives related to decision-making, the way to implement them, the resources required, the associated costs have therefore been taken into account, as described in the following section:

Among the criteria requested in the sheets selected for the innovative T&L were:

- The operational objectives: They consist in identifying for each training which are the objectives that are aimed beyond the aspects related to decision-making. They are of interest because they directly put the content of the training in perspective with the applications that can be identified in the future careers of students, whether they are engineers, sailors, engineers and officers, managers in the field of management or business, disciplines represented among DAhoy partners who offer a sufficiently wide range to interest other publics from higher education institutions.
- The specific objectives associated with the decision making process: Among the criteria for specifying the content of activities are, of course, the specific objectives associated with decision-making processes. Thus, for each activity, the expectations are specified, directly assigned to objectives on decision-making.
- The description of the pedagogical modalities: In order to be able, for a higher education institution, to easily understand what the activity presented consists of, how it can be

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implemented in a very real way, in what format, with what tools, we have identified for each activity those elements that specify in the most exhaustive form possible the associated modalities.

- The audience: The level of training of the audiences who have been targeted to follow the proposed activities is essential and consistent with the pedagogical objectives. They are mainly at levels L3 to M5 with sometimes D targets and in vocational training for executives. Compliance with these guidelines is essential for a right adaptation of training to the public level. If, however, an adaptation of the training to a public of a different level was desired, the referent person at the end of the activity sheet can be a support for a better transfer of the activity.
- The presentation of the resources required to implement this activity: For each activity, the resources have been specified: they sometimes take the simplest form of books to read, films to watch before the screening. They can also be more sophisticated and more expensive. We have chosen on purpose activities that use various resources to have a wide enough choice to propose and value.
- The training agenda: It is each time specified the duration, the sequencing order that is to be used for each activity. As they have already been tested, there is therefore still consistency with the associated pedagogical objectives. Some activities can be very dense in order to put the decision-maker in a position of cognitive saturation or longer to give the opportunity for thinking about one's personal choices for students.
- The assessment mode: The evaluation methods are naturally specified. They have been the subject of reflection, used and readjusted to suit the proposed session according to the targets of the audiences concerned and the associated objectives. nts that are being built.
- The practical details about the staff, the location, duration, costs, number of participants, references: To facilitate the implementation of the activities, practical details have been added: do the activities take place indoors, outdoors? How much do they cost if one institution wants to implement them? For how many participants?
- A reference person in a contact guide is also mentioned.

This work presents the activities selected in the “tool box” come from VUCA criteria and from a definition work about the pedagogical objectives to be achieved according to the decision making in VUCA environment and from the 3 components studied in the project (mathematical models, social decision-making models and career-planning approach).

It is possible to have sequentially a low level for the 4 criteria then medium then high to develop through learning activities an increasing level based on these 4 criteria which will develop the ability to work on a higher level. It may be not so obvious to qualify the level of magnitude for each activity and for partners: the information on the sheets are rather an indication. In practical terms, it is precise on each sheet, the level of magnitude of each VUCA criteria. For reasons of easy use, we have decided that

- the low level be identified in green color

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- the medium level be identified in orange color
- that the high level be identified in red color
- when the criteria is not represented, it is shown in a white color.

This means that on each form in the “tool box”, a table will specify for the activity the associated level for each of the 4 VUCA criteria, allowing an external actor to identify, retain and possibly implement the activity within his establishment. For example, in the table, an activity that is mainly associated with a low level of volatility presents the letter “V” in the green color, if this activity is associated with a medium level of uncertainty and ambiguity, the letters “U” and “A” are registered in the orange color and if the activity is associated with a high level of complexity, the letter “C” is classified in the red color as follows:

VUCA levels :

Non représenté	Low level	Medium level	High level
	V		
		U	
			C
		A	

The selection of innovative T&L activities resulted in the implementation of a skills grid associated with decision-making. The work that has been done focuses on the identification of competencies associated with decision-making: it therefore aims to highlight decision-making skills. This collaborative work between the partners of the DAhoy project, presented in Chapter 5) is the result of iterative sessions between the partners, which were able, thanks to the opportunities of the experiential activities organized in Year 1, to bring out different decision-making levels and their associated skills. The objective is to associate to each activity the most representative D-skill to “help” any training institution that would like to use the content of the innovative T&L toolbox to quickly identify at which D-skill level each activity refers.

Each form in the “tool box”, a table will specify for the activity the associated D-skill, allowing an external actor to identify, retain and possibly implement the activity within his establishment. For example, an activity that is mainly associated with the D3 level (D3 - Make a judgment) will underline this associated D-skill in the sheet of the activity. The sheets selected in the “tool box” will thus provide information on the associated skill level and of the magnitude levels corresponding to the 4 VUCA criteria, allowing each member of the DAhoy project or an institution outside the DAhoy project to have the information for each T&L activity. For example, an activity that is mainly associated with the D3 level (D3 - Make a judgment) will have a low level of volatility, medium uncertainty, high complexity and medium ambiguity will be identified as follows:

Title of the activity:

D-skills: D3

VUCA levels :

Non representat	Low level	Medium level	High level
	V		
		U	
			C
		A	

Overview of the innovative activities

IMTA selected 5 activities:

- The first one is “VUCA Experiential Decision Making Week “Reliability and Decision Making via Inshore Cruising, aka. all in the same Decision Ship”
 - Specific Objectives about Decision-Making: Develop some reflexes, define and apply a procedure to react best during a so-called complex situation (here "man overboard"), formalize rules to improve reliability; Prepare a navigation for a 1-day coastal cruise under environmental constraints of weather, currents and tides, while justifying its strengths and minimizing the risks according to the crew and the material failures (improve reliability); Create an effective team using leadership techniques, crisis management and seamanship. See course description via the website.
 - Associated D-Skills: D1, D5, D6 and D7
 - Level of volatility: High
 - Level of uncertainty: High
 - Level of complexity: Medium
 - Level of ambiguity: Medium
- The second one is entitled “Strategic decision making in VUCA situations”
 - Specific Objectives about Decision-Making: Provide methods to model and analyze strategic decision situation; Making a strategic decision reflecting as much as possible the decision maker’s information, objectives and preferences; Provide methods to analyze the robustness of the decision; Provide and learn methods and tools for modeling complex systems and develop system thinking analysis. See course description via the website.
 - Associated D-Skills: D2

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- Level of volatility: none
 - Level of uncertainty: Low
 - Level of complexity: Medium
 - Level of ambiguity: High
- The 3rd activity is titled “Integration and Orientation Passport”
 - Specific Objectives about Decision-Making: Become more confident in their interests, motivation and strengths, allowing them to better reflect on your orientation; Perform an investment decision for the training program; Evaluate risks, opportunities and take decisions in situations involving risk; Justify choices through reflective work, using the Passport (specific debriefing workshop); to develop conscious awareness to react best in professional situations and in the context of the international labour market; Ability to build a personal action plan; Ability to take decisions with different job scenarios (consulting, expert, management or entrepreneurship families). See course description via the website.
 - Associated D-Skills: D2
 - Level of volatility: Low
 - Level of uncertainty: High
 - Level of complexity: Medium
 - Level of ambiguity: Low
- A 4th activity is titled “Co-orientation : Career coaching with specific guidance and alumni mentoring”
 - Specific Objectives about Decision-Making: Develop confidence in their interests, motivation, strengths in order to think about their orientation; Make an investment decision for the professional project; professional scenarios and what-if analysis tools to solve problems; Evaluate risks, opportunities and take decisions under risk; Understand system-thinking for career development. See course description via the website.
 - Associated D-Skills: D3
 - Level of volatility: Low
 - Level of uncertainty: Medium
 - Level of complexity: Medium
 - Level of ambiguity: High
- A 5th activity is titled “Card Gaming and Job Casino”, The aim is to prepare a fertile ground for the students’ employability as a sustainable, life-long process and develop the skills that are needed for nomadic careers. Quality guidance/coaching fosters loyalty among the would-be graduates, so that they contribute to the promotion of their school. See course description via the website.

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- Specific Objectives about Decision-Making: Develop confidence in their interests, motivation, strengths in order to think about their orientation; Make an investment decision for the professional project; Use professional scenarios and what-if analysis tools to solve problems; Evaluate risks, opportunities and take decisions under risk; Understand system-thinking for career development.
- Associated D-Skills: D3
 - Level of volatility: Low
 - Level of uncertainty: Medium
 - Level of complexity: Medium
 - Level of ambiguity: High

CoGC has selected 3 activities:

- The first one is entitled "Path". It involves students rationalizing 3 options given to them, to 'solve' for the best potential outcome. The situation involves a boat landing with acausality. 3 possible routes are given to a hospital, each route has a time/speed constraint or additional complexities.
 - Specific Objectives about Decision-Making: Express, organize, collate and control information and identify working in order to make a decision.
 - Associated D-Skills, see course description via the website.
- The 2nd activity is titled "Simulation". This activity involves students tackling complex accident and emergency situations using a boat simulator. The simulation involves pre and post activities, and 2 different simulations.
 - Specific Objectives about Decision-Making: Analyse situations & apply rules based decision making in conflicting, unknown and unpredictable situations to anticipate and weigh impacts. To take accountability for a team and be able to reflect and evaluate decisions.
 - Associated D-Skills, see course description via the website.
- A 3rd activity is titled "Rohingya refugee crisis". The activity involves students tackling complex and ambiguous tasks centred around the 2015 Rohingya refugee crisis.
 - Specific Objectives about Decision-Making: Analyse situations & apply rules-based decision making to anticipate and weigh impacts in unfamiliar situations that include a degree of unpredictability.
 - Associated D-Skills, see course description via the website.

EN has selected 3 activities:

- The 1st activity is titled "Leadership trainee": This internship enables civil executives to discover another aspects of leadership that they know and live in their jobs and help them to analyse their own decision-making process through many activities such as theoretical courses, practical exercises and sports activities during a 2,5-day seminar.

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- Specific Objectives about Decision-Making: Analyse a problem. Integrate technical, human and environmental elements into decision-making. Take responsibility for decision at the head of the team, Set priorities, Identify the keys to success, Issue solutions and recommendations from incomplete information? Organize an action plan and decide on the distribution of tasks? Develop a decision by consulting external opinions, Decide under constraints (time, resources), Adapt and take into account changes in the situation? Evaluate and be critical.
- Associated D-Skills: D1 to D7, focus on D7, see course description via the website.
- The second one is entitled “Ethics”: This course called Ethics and literature enables cadets to analyse situations where ethical issues are raised.
 - Specific Objectives about Decision-Making: Integrate human elements into the decision-making process; Detail the decision-making process by reading works on decision topic.
 - Associated D-Skills, see course description via the website.
- A 3rd activity is titled “Command and Convince”: This training enables students to discover the different aspects of leadership and decision-making process through one activity based on theoretical courses.
 - Specific Objectives about Decision-Making: Integrate technical, human and environmental elements into decision-making, Take responsibility for decision at the head of the team, Set priorities, Identify the keys to success, Organize an action plan and decide on the distribution of tasks, Develop a decision by consulting external opinions, Decide under constraints (time, resources), Adapt and take into account changes in the situation
 - Associated D-Skills, see course description via the website.

RU has selected 3 activities:

- The first one is entitled to VMS: deals with the visual management system.
 - Specific Objectives about Decision-Making: The use of VMS to in conjunction with normative methods such as affinity diagrams, influence diagrams, decision trees, pay-off tables, cause and effect analysis, simulation, etc. can enhance the creative and critical part of DA.
 - Associated D-Skills, see course description via the website.
- The 2nd activity is titled Emotional intelligence; It introduces emotional intelligence in stressful and demanding managerial environment to be better equipped to make decisions under stressful and difficult conditions.
 - Specific Objectives about Decision-Making: The participants are more skillful decision maker when resources are sparse. The intentions are to improve social skills with strong bonds to the normative methods of Agile project management.

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- Associated D-Skills, see course description via the website.
- A 3rd activity is titled brainstorming; It is a method of formal brainstorming and selection of one idea.
 - Specific Objectives about Decision-Making: Knowledge: method of formal brainstorming and selection of one idea. Skills: to come up with new idea and select one of many in a group. Interpersonal skills: to become better team contributor and communicator. Competence: to be better equipped to unravel ideas and selecting one of the best ones.
 - Associated D-Skills, see course description via the website.
 -

FUEIB has selected 1 activity:

- see course description via the website. is titled

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Chapter 6 - Output 2: Analysis of DAhoy decision making student trainings

The DAhoy analysis method for the second year was initiated with questions such as: what are the theories of VUCAity? What are the learner's motivational factors? What are the so called *decisionship* learning outcomes? How to characterise the VUCAity of learning situations to continuously reinforce learner proficiency throughout a curriculum?

The main objective of the DAhoy activity 7 is to learn from the teaching & learning activities including students in 3 Intensive programme for higher education learners. The best ideas of the DAhoy 2018 Joint Staff Training Events are capitalized and pedagogically refined to organize three Teaching & Learning activities of five days for the partner HE & VET students (SP-HE-IPL - Intensive programme for higher education learners). As a focus group for DAhoy analysis, a limited number of students were to participate (i.e. <20) in each: DAhoy remains a partnership for Innovation, with intellectual Output. Tools were prepared ahead of the Student training events, to verify and validate the objectives, via qualitative and quantitative measures and approaches (e.g. learning outcomes alignment, motivational factors). In these innovative training activities, students fostered their skills to manage and decide in the context of unforeseen events including complexity, via teamwork, planning and methods of decision making.

For O2, one week innovative course are produced and operated on some HE & VET students via so called T&L events, in 3 partner institutions. Quantitative and qualitative methods are used to validate the outcomes.

1. TL1 was in Lanveoc, next to Brest, organized by Ecole Navale, France, 11-15 February 2019 (No. C5, SP-HE-IPL - Intensive programme for higher education learners);
2. TL2 was in Brest, organized by IMT Atlantique, Brest campus, France, 4-8 March 2019 (No. C6, SP-HE-IPL - Intensive programme for higher education learners);
3. TL3 was in Reykjavik, organized by Reykjavik University, Iceland, 9-13 September 2019 (No. C4, SP-HE-IPL - Intensive programme for higher education learners);

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DAhoy output 2 relates to Training Models for Decision Skills and Competences, including innovative Teaching and Learning resources and Analysis. The O2.3 output, in line with activity 7, relates to assessment of the activities, including proficiency levels, in institutions for HE students and VET are produced, based on:

- formalized learner assessment grids and proficiency levels for learning outcomes which support self-assessment, peer-assessment and formative, so as summative assessment in formal curricula
- conducted experiential activities for partners and TG: we implement & organize some designed activities with students from the partners in line with the unified D-Skills learning outcomes
- TL learning activities analysed with HE and VET students

DAhoy faculty members and chaperons scrutinize the pedagogical styles and modalities in term of motivational factors, analyze the strength and potential weaknesses of the proposed week syllabus and decision learning outcomes, capitalize good practices for DAhoy outputs and learn from them, so as to prepare the DAhoy framework for Year 3.

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Tools for qualitative and quantitative analysis







Logo	Platform	+	-	Alternative s
 Drive	GoogleForms, to create a <i>survey</i> and edit it with others at the same time. ... and <i>Forms</i> will pick just the right colours to complete unique <i>form</i> , or choose from a set of templates. https://www.google.fr/intl/fr/forms/about/	Online with IT, reusability, rapid checking of results in a friendly manner	Risks of IT problems	

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	<p>Kahoot! library with quite a few helpful extras: guides to Kahoot!'ing, game planning templates, professional development resources, and more. https://kahoot.com/</p> <p>hash-tags #DAhoy #decisionship #ahoy #decisions</p>	Online with IT, reusability, rapid checking of results in a friendly manner	Risks of IT problems	Socrative, Survey Monkey.
	<p>Moodle questionnaires enable staff to obtain feedback from students, with an option for the results to be anonymous. To help with consistency and reduce repetitive tasks template questionnaires can be constructed and deployed across any number of modules.</p> <p>https://docs.moodle.org/36/en/Setting_up_a_questionnaire</p>	Online with IT, reusability, rapid checking of results in a friendly manner	Risks of IT problems	Canvas, MySchool.
	<p>Mentimeter permits to quiz audience during presentations, make presentations exciting and increase the energy level with fun, free and interactive quizzes.</p> <p>https://www.mentimeter.com</p>	Online with IT, reusability, rapid checking of results in a friendly manner	Risks of IT problems	
	<p>Sqily, a Platform for school communication and mutual validation of skills, offered by the Swiss Higher Education School.</p> <p>https://www.sqily.com/</p>	Online with IT, reusability, rapid checking of results in a friendly manner	Risks of IT problems	

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	Paper & pencil, as proposed by LEC for DAhoy final questionnaires	Outdoorable, without IT requirements, low ergonomics poor Look & Feel, and low level user friendliness	Asynchronous, risks of losing by postal mail or archivals	
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VUCA Analysis Matrix

When looking at an activity with learners, course managers should try to allocate where the degree of VUCA exists in relation to the seven Decision skills statements. Next Table 3 shows how the matrix should be completed, exemplified for the TableTop Tactics exercise used in DAhoy in 2018 and 2019.

Table. Table Top VUCA Matrix instance.

	D1				D2				D3				D4				D5				D6				D7				
	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	V	U	C	A	
None								x																					
Low	x		x				x		x			x	x	x		x										x	x		
Medium				x	x	x				x	x				x						x	x	x	x				x	
High		x															x	x	x	x								x	

Definitions for VUCA levels stated

It is important that when using this matrix the level of VUCA should be able to be replicated over multiple deliveries of the activity in question. There should be an opportunity for the learner to demonstrate the abilities at the VUCA levels stated. It is an activity which is being analysed,

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assessed and rated here not the individual learners. An activity is to be rated according to the following definitions:

- **D1: Recognise and Qualify**

- **Volatility**

- Does the activity allow a learner to demonstrate that they can recognise and quantify a situation which changes over time?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
- **For example:** if the activity provides the opportunity for the learner to demonstrate that they can recognise and quantify a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area

- **Uncertainty**

- Does the activity allow a learner to demonstrate that they can recognise and quantify a situation which has a degree of uncertainty for the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is uncertain with reference to the statements above
- For example: if the activity provides the opportunity for learner to demonstrate that they can recognise and quantify a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area

- **Complexity**

- Does the activity provide a situation which will allow a learner to demonstrate that they can recognise and quantify a situation which has a degree of complexity for the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
- For example: if the activity provides the opportunity for the learner to demonstrate that they can experience a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area

- **Ambiguity**

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- Does the activity allow a learner to demonstrate that they can recognise and quantify a situation which is open to more than one interpretation by the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
- For example: if the activity provides the opportunity for learner to demonstrate that they can experience a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.
- **D2: Analyse a situation**
 - **Volatility**
 - Does the activity allow a learner to demonstrate that they can analyse a situation which changes over time?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
 - **For example:** if the activity provides the opportunity for the learner to demonstrate that they can analyse a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area
 - **Uncertainty**
 - Does the activity allow a learner to demonstrate that they can analyse a situation which has a degree of uncertainty for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is uncertain with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can analyse a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area
 - **Complexity**
 - Does the activity provide a situation which will allow a learner to demonstrate that they can analyse a situation which has a degree of complexity for the learner?

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- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
- For example: if the activity provides the opportunity for learner to demonstrate that they can analyse a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area
- **Ambiguity**
 - Does the activity allow a learner to demonstrate that they can analyse a situation which is open to more than one interpretation by the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can analyse a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.
- **D3: Make a judgement**
 - **Volatility**
 - Does the activity allow a learner to demonstrate that they can make a judgement about a situation which changes over time?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
 - **For example:** if the activity provides the opportunity for the learner to demonstrate that they can make a decision about a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area
 - **Uncertainty**
 - Does the activity allow a learner to demonstrate that they can make a judgement about a situation which has a degree of uncertainty for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'

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- If **YES** . you should consider the extent to which the situation is uncertain with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can make a judgement about a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area
- **Complexity**
 - Does the activity provide a situation which will allow a learner to demonstrate that they can make a judgement about a situation which has a degree of complexity for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**. you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can make a judgement in a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area
- **Ambiguity**
 - Does the activity allow a learner to demonstrate that they can make a judgement about a situation which is open to more than one interpretation by the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**. you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can make a judgement a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.
- **D4: Face Complexity**
Additional explanatory note: In this case this D- skill examines the ability to manage competing priorities and to model and test solutions.
 - **Volatility**
 - Does the activity allow a learner to demonstrate that they can manage competing priorities and model and test solutions for a situation which changes over time?
 - **YES/NO**

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- If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
- **For example:** if the activity provides the opportunity for the learner to demonstrate that they can manage competing priorities and model and test solutions for a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area
- **Uncertainty**
 - Does the activity allow a learner to demonstrate that they can manage competing priorities and model and test solutions for a situation which has a degree of uncertainty for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is uncertain with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can manage competing priorities and model and test solutions for a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area
- **Complexity**
 - Does the activity provide a situation which will allow a learner to demonstrate that they can manage competing priorities and model and test solutions for a situation which has a degree of complexity for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can manage competing priorities and model and test solutions for a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area
- **Ambiguity**
 - Does the activity allow a learner to demonstrate that they can manage competing priorities and model and test solutions for a situation which is open to more than one interpretation by the learner?

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- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
- For example: if the activity provides the opportunity for the learner to demonstrate that they can manage competing priorities and model and test solutions for a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.
- **D5: Organise and implement actions**
 - **Volatility**
 - Does the activity allow a learner to demonstrate that they can organise and implement actions for a situation which changes over time?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
 - **For example:** if the activity provides the opportunity for the learner to demonstrate that they can organise and implement actions for a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area
 - **Uncertainty**
 - Does the activity allow a learner to demonstrate that they can organise and implement actions for a situation which has a degree of uncertainty for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is uncertain with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can organise and implement actions for a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area
 - **Complexity**
 - Does the activity provide a situation which will allow a learner to demonstrate that they can organise and implement actions for a situation which has a degree of complexity for the learner?
 - **YES/NO**

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- If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can organise and implement actions for a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area
- **Ambiguity**
 - Does the activity allow a learner to demonstrate that they can organise and implement actions for a situation which is open to more than one interpretation by the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can organise and implement actions for a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.
- **D6: Take responsibility in the DM process**
 - **Volatility**
 - Does the activity allow a learner to demonstrate that they can take responsibility and know their limitations in a situation which changes over time?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
 - **For example:** if the activity provides the opportunity for the learner to demonstrate that they can take responsibility and know their limitations in a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area
 - **Uncertainty**

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- Does the activity allow a learner to demonstrate that they can take responsibility and know their limitations in a situation which has a degree of uncertainty for the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is uncertain with reference to the statements above
- For example: if the activity provides the opportunity for the learner to demonstrate that they can take responsibility and know their limitations in a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area
- **Complexity**
 - Does the activity provide a situation which will allow a learner to demonstrate that they can take responsibility and know their limitations in a situation which has a degree of complexity for the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can take responsibility and know their limitations in a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area
- **Ambiguity**
 - Does the activity allow a learner to demonstrate that they can take responsibility and know their limitations in a situation which is open to more than one interpretation by the learner?
 - **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
 - For example: if the activity provides the opportunity for the learner to demonstrate that they can take responsibility and know their limitations in a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.

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- **D7: Learn from experience**

- **Volatility**

- Does the activity allow a learner to demonstrate that they are able to learn from experience through self-reflection for a situation which changes over time?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is volatile with reference to the statements above.
- **For example:** if the activity provides the opportunity for the learner to demonstrate that they are able to learn from experience through self-reflection for a situation that changes steadily over time then you should mark '**low**'; if the changes are not steady but are predictable then you should mark '**medium**'; if changes are not steady and are also significant over the activity then you should mark the activity as '**high**' in this area

- **Uncertainty**

- Does the activity allow learner to demonstrate that they are able to learn from experience through self-reflection for a situation which has a degree of uncertainty for the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the situation is uncertain with reference to the statements above
- For example: if the activity provides the opportunity for the learner to demonstrate that they are able to learn from experience through self-reflection for a situation where they have complete and constant data then you should mark '**low**'; if the data is limited then you should mark '**medium**'; if data is incomplete or inconsistent then you should mark the activity as '**high**' in this area

- **Complexity**

- Does the activity provide a situation which will allow a learner to demonstrate that they are able to learn from experience through self-reflection for a situation which has a degree of complexity for the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the complexity is routine or non-routine with reference to the statements above
- For example: if the activity provides the opportunity for the learner to demonstrate that they are able to learn from experience through self-reflection for a situation which is complex but within a routine context then you should mark '**low**'; if the complexity is mostly in a routine context with some elements which are non-routine then you should mark '**medium**'; if complexity is in a totally non-routine context then you should mark the activity as '**high**' in this area

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○ **Ambiguity**

- Does the activity allow a learner to demonstrate that they are able to learn from experience through self-reflection for a situation which is open to more than one interpretation by the learner?
- **YES/NO**
 - If **NO**, then you should mark in the box 'None'
 - If **YES**, you should consider the extent to which the interpretation of the situation by the learner is familiar or unfamiliar with reference to the statements above
- For example: if the activity provides the opportunity for learner to demonstrate that they are able to learn from experience through self-reflection for a situation which is open to interpretation but within a familiar context then you should mark '**low**'; if the ambiguity is mostly in a familiar context with some elements which are non-familiar then you should mark '**medium**'; if ambiguity is in a totally unfamiliar context then you should mark the activity as '**high**' in this area.

Example of using the VUCA Matrix on Career Decision Making

In Spring 2019, a survey conducted at IMT Atlantique on VUCA characteristics linked to career decision making echoing the 7 decision skills statements got 52 respondents (90% of freshmen French students in engineering at L1 level coming from French Math selective preparatory schools, 10% of L1 students from Universities, inc. Tunisia; 37 males, 12 females (some responses were not compulsory)). According to the question "Before you joined the engineering school, were you taken aware of career plans thanks to your formal curricula?", 63,5% were and 36,5% were not.



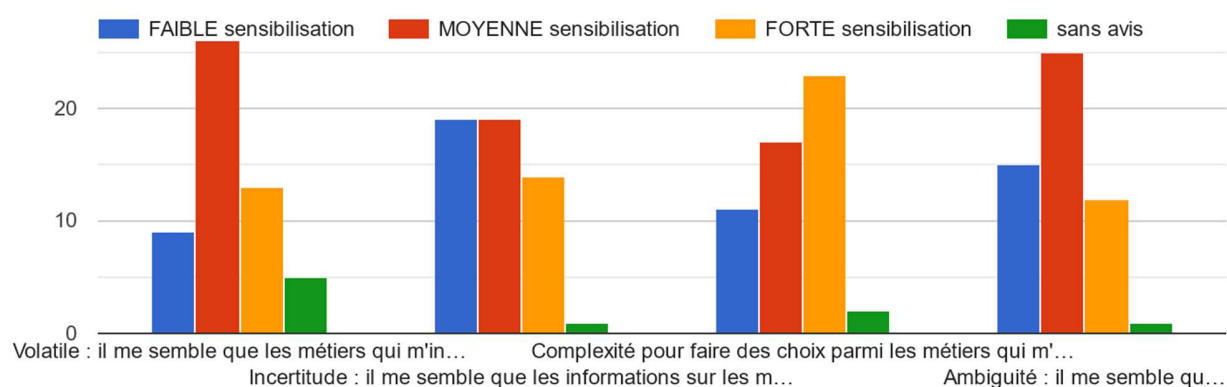
Before the respondents came to school, they understood their career plan through the four VUCA components as:

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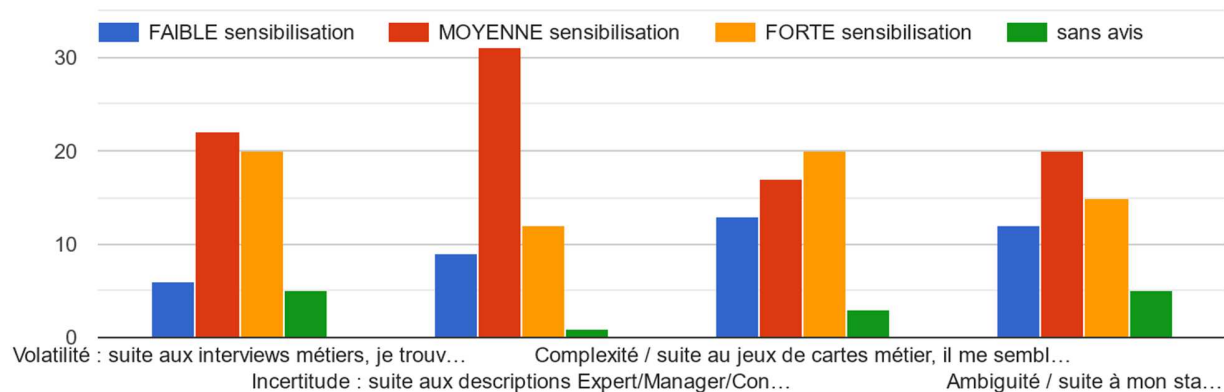
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	FAIBLE sensibilisation	MOYENNE sensibilis...	FORTE sensibilisation	sans avis
Volatile : il me semble...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incertitude : il me sem...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Complexité pour faire ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ambiguïté : il me sem...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



On these 4 VUCA characteristics, thanks to the DAhoy CDM courses offered at IMT Atlantique the first semester, they then considered a potential good to best own-professional project as:



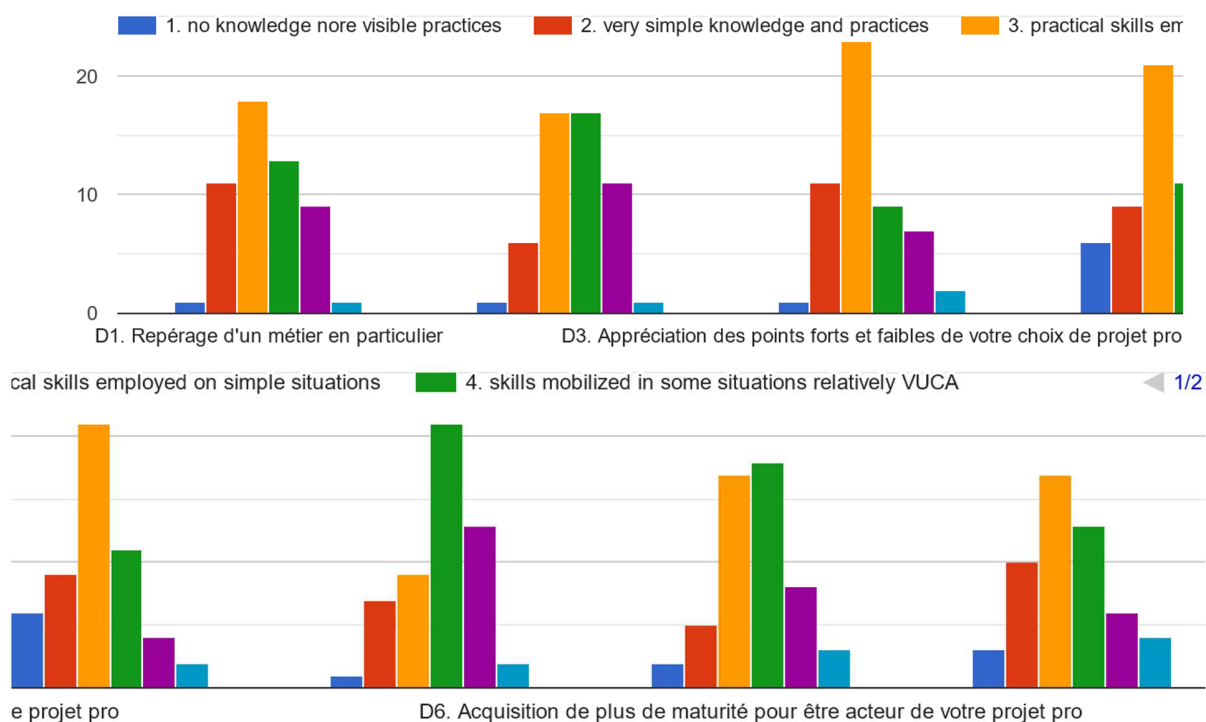
Thanks to the DAhoy CDM courses offered at IMT Atlantique the first semester, they rated they 7 career decision skills on a 5 level-scale as follows:

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	1. no knowled...	2. very simple ...	3. practical ski...	4. skills mobili...	5. proved skill...	sans avis
D1. Repérage ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D2. Analyse de...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D3. Appréciati...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D4. Clarté dev...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D5. Choix facili...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D6. Acquisitio...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D7. Apprentiss...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



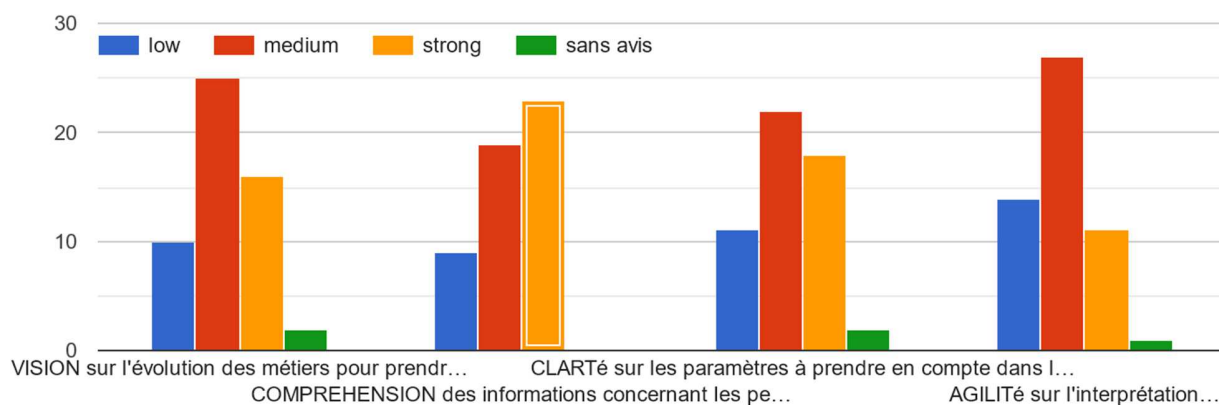
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Au final, pour vous, votre projet professionnel a-t-il gagné en...

	low	medium	strong	sans avis
VISION sur l'évolution ...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
COMPREHENSION de...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CLARTé sur les param...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
AGILITé sur l'interprét...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Overview of 3 DAhoy 2019 Teaching & Learning Activities

The best ideas of the DAhoy 2018 Joint Staff Training Events are capitalized and pedagogically refined to organize three Teaching & Learning activities of five days for the partner HE & VET students (SP-HE-IPL - Intensive programme for higher education learners).

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SP-HE-IPL1: at Ecole Navale

File Report-DAhoy-TL1@EN.pdf available at
<https://www.dropbox.com/s/16mbedwjj7kbnwj/Report-DAhoy-TL1%40EN.pdf?dl=0>

Outline

- Activity 1: Museum (D1 to D4 skills): The activity consists of immersing students in a maritime world in order they can understand the issues, the constraints of this universe. If it consists in a basic activity in terms of objectives and decision-making, the interest is really an immersion from the beginning of the week in a maritime and naval context that will be the thread of the activities of the whole week.
- TL1 Activity 2: Serious game 1 (D1 to D6 skills): Opportunities consist of training students to deal with a VUCA environment but at a low magnitude (for the criteria of complexity and uncertainty); the volatility and ambiguity criteria were not tested on purpose to concentrate the exercise only on 2 VUCA criteria. The interest in having this exercise carried out by EN cadets is to get closer to the age class of students with a similar level of maturity. We thought this would facilitate understanding of an exercise for non-experts. 2 sessions of 60 minutes were played with for session 1: teams of the same nationality - the level of uncertainty was increased after 30 minutes; the level of uncertainty is defined from cards drawn randomly called "action cards". After 30 minutes, the number of action cards has increased. For Session 2, teams of different nationalities were created with a high level of uncertainty (by action cards) and luck cards (influencing the actions taken to create complexity). The teams had 2 vessels: 1 boat and 1 submarine, they could communicate with the commander of the submarine present remotely in another room; they had to interact with the submarine commander.
- TL1 Activity 3: Preparation for a mission (Serious game) (D1 to D3 skills): Teams formed by the referees (historians) briefed the students on the mission they had to prepare by sending documents on the Falklands War (the case study) and elements specifying the composition of the fleet, their detection capacity, radar emissions, missiles capacity,

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presenting the main objectives of the exercise. Student planning was requested 3 hours after the briefing.

- TL1 Activity 4: Serious game 2 (D4 to D6 skills): The referees (historians) briefed the students on the mission they had to prepare by emphasizing the objectives of the mission and restating the composition of the fleet, their target detection capabilities, radar emission, missiles. The mission takes place in 3 halls: one for each team representing the Argentine fleet, one for the team representing the English fleet and a room for referees. The exercise is carried out continuously from 9 am to 4 pm. Each team transmits to an arbiter his attack and defence plan which are integrated on a map and their actions are retained and transmitted to the opposing team which must reconfigure itself according to the decisions made by the opposing side.
- TL1 Activity 5: Seminar (D7 skills) :Students must find the name of famous decision-makers who are associated with known places in Brest according to missions.

Activities analysed

- For Activity 1: Museum (D1 to D4 skills): everyone seem very attentive listen to instructions No mix between groups (Icelanders and Scottish). At the entrance of the museum, the students did not want to take the audioguide. Various level of interest during the museum visit : a group never stayed long in the rooms whereas two Icelandic girls watched a full video on building a boat. We asked students to take turns telling others what they heard in the audioguide. They had difficulties to hold this role and it ceased for want of volunteers. It is not certain that the students have initially felt the interest of immersing themselves in the VUCA situations of maritime conflicts for the rest of the program. Some passed quickly from one room to another. It was necessary to impulse a rhythm otherwise the majority of the students discussed between them without being interested. Nevertheless the students have appreciated this first contact with french history and engaged discussions with coaches
- For TL1 Activity 2: Serious game 1 (D1 to D6 skills): Session 1 and 2 show a progression of the understanding of the rules between the 2 sessions. The team that won had a grouped strategy, unlike the 2nd team. Questions submitted after activity:

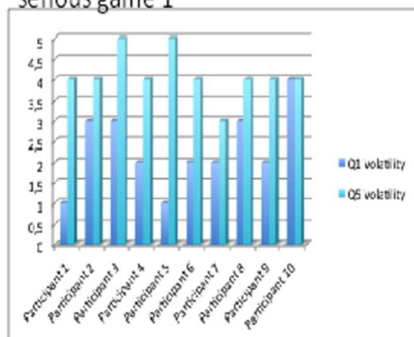
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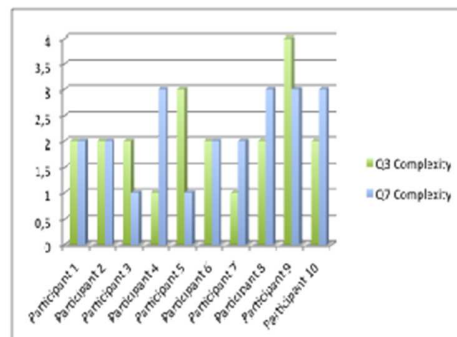
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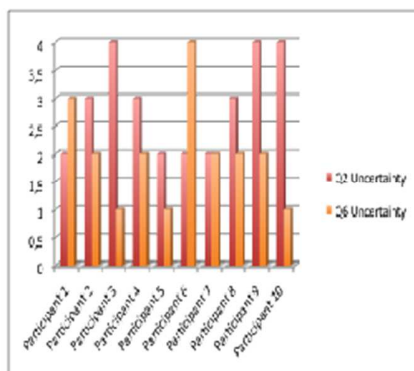
Perceptions of the 4 VUCA criteria by the 10 actors during the 1st and 2nd exercises of serious game 1



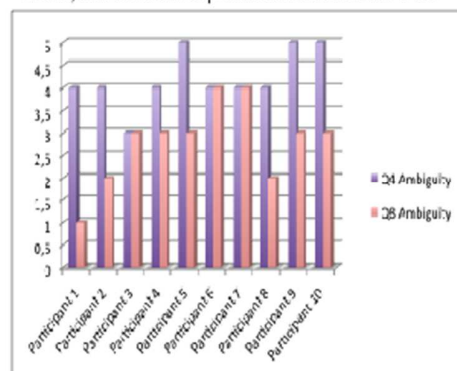
Perception of a growing level of Volatility for all actors between the 2 ex.



Perception of reasonable level of complexity for main actors, but differences perceived between the 2 ex.

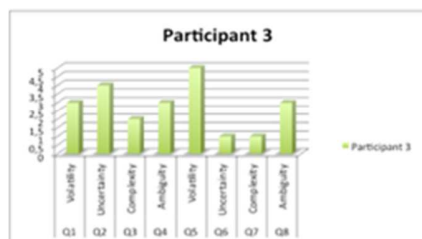
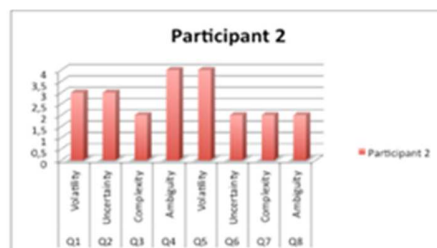
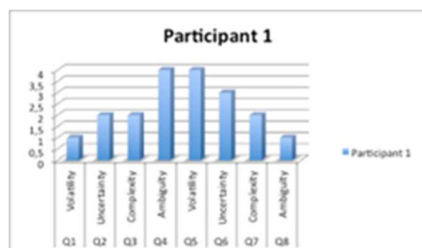


Different perceptions of Uncertainty among actors

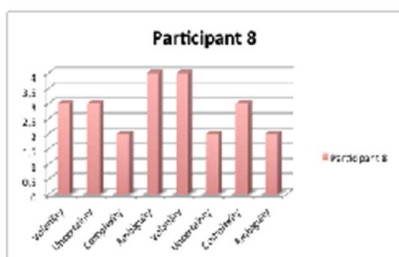
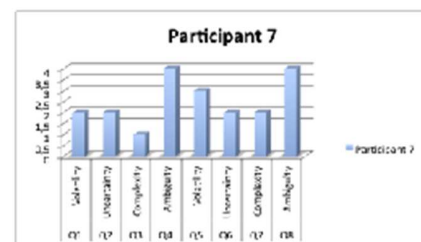
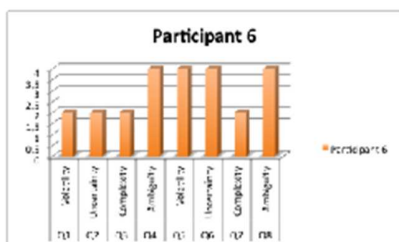
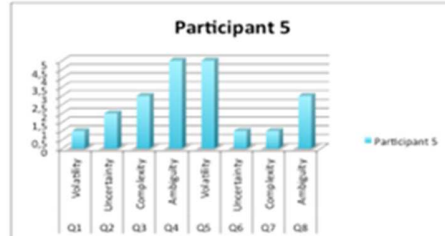


Perception of a higher level of ambiguity compared with the other 3 criteria and differences perceived between the 2 ex.

○



Differences appeared in the perceptions of actors: the Volatility criteria is perceived much higher at the 2nd exercise.



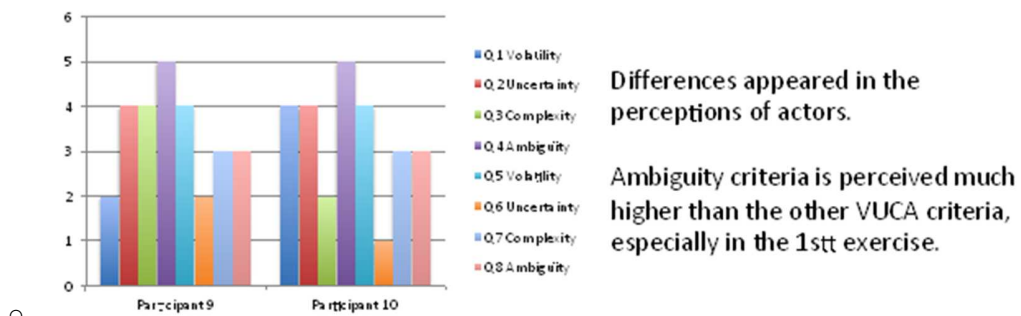
Differences appeared in the perceptions of actors.

Ambiguity criteria is perceived much higher than the other VUCA criteria.

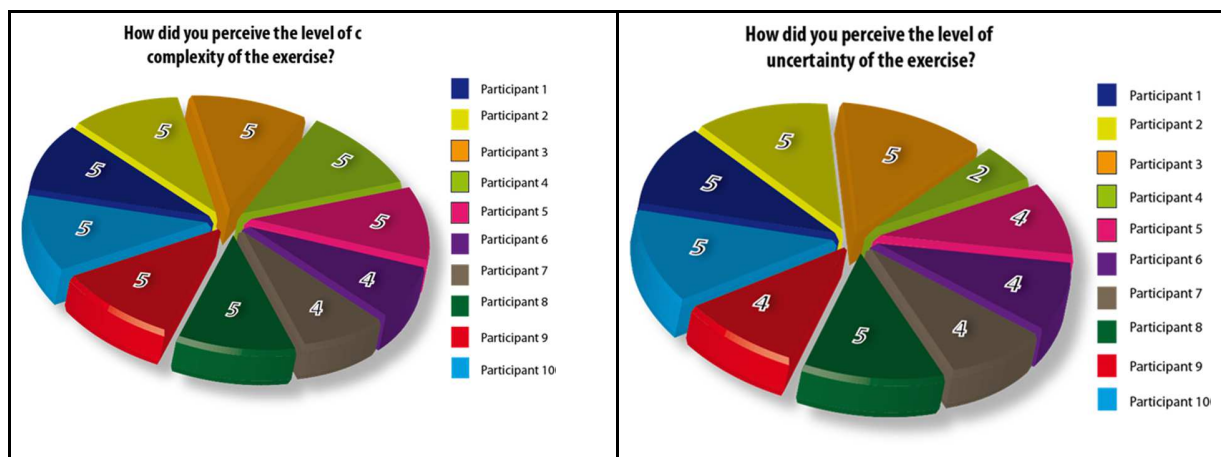
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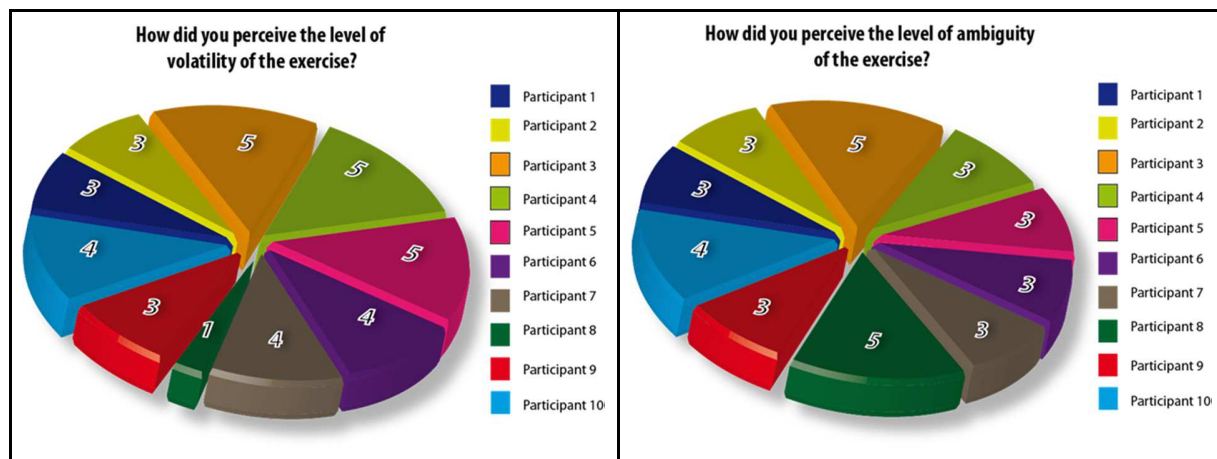
- For TL1 Activity 4: Serious game 2 (D4 to D6 skills): An anonymous feedback has been filled by students on Moodle. Students report that they have control over the activity, enough time (Q8&Q15 too much time) to proceed, that there is a challenge because it is difficult (Q14 they all feel tired at the end) and requires cooperation. The gamification helps motivate the students. According to Viau¹, this activity is rather motivating for students. Unfortunately, the students also pointed to the feeling of being bored (because the rhythm was too slow). This may be an axe of amelioration. Finally, we can reasonably assume that they learned something from it, but not all we would have liked them to learn. The cooperation structure was mainly perceived. About half of them learned something on decision process in group (question 13) and had a reflexive approach on their errors (Q17). In addition, they note at the end of the feedback that they have become aware of the decision-making mechanisms. Nevertheless, reading their responses we note that most of them learned something from their mistakes. Students were asked to propose VUCA levels for this experience.



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- Here is the synthesis of their responses:

1. During the préparation (the day before the wargame) were you :

- eager to play:	1 (11,11 %)
- neutral:	1 (11,11 %)
- unmotivated:	5 (55,56 %)
- worried:	2 (22,22 %)
- stressed:	0

2. Did you feel you had control on this activity ?

- Yes, absolutely:	0
- yes:	5 (55,56 %)
- I don't know:	0
- No:	4 (44,44 %)
- Absolutely no:	0

3. During the activity: How do you feel (excited, tired, curious ...)?

- I felt it went very slowly
- Excited after we got into it
- Very excited
- Bored. Very bored.
- Curious
- Excited, competitive

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Curious

- Overwhelmed

- At first I was a bit nervous because the preparation was a bit unclear and I thought I would not be able to understand the game. After I understood what to do I was excited.

4. Did you perform as usual?

- yes:  8 (88,89 %)

- no:  1 (11,11 %)

5. Did you have to do things you do not like doing?

- No

- No

- No

- No

- No

- No

- Long waits

- No

- Researching the 60 page document. And translating from french to english

6. During the activity how did you feel (excited, tired, curious ...)?

- Excited, competitive

- Tired

- Bored. Very bored

- Excited

- Started indifferent and gradually became more invested.

- Very excited

- At first I was a bit nervous because the preparation was a bit unclear and I thought I would not be able to understand the game. After I understood what to do I was excited.

- Overwhelmed

- Unmotivated at first but then excited

7. During the activity did you perform as usual?

- Yes

- Yes

- Yes

- No

- Yes

- Yes

- Yes

- Yes

- Yes

○ 8. During the activity did you have to do things you do not like doing?

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Long waits

- No
- Long waits
- Waiting for a long time
- No
- No
- No
- Same as above
- No

9. During the activity have you felt the weight of some responsibility?

- Yes
- No
- A little bit
- Yes but not overwhelmingly
- Yes
- No
- Yes, but not heavy
- Yes, although we shared the responsibility there was some responsibility on each of us
- Yes, I was the admiral

10. During the activity did you feel your behavior change as you play?

- Yes. I gradually became more invested in the game and eventually had a desire to win
- Yes as we got more into the game it got more exciting and fun. This changed the attitude a bit.
- Yes i took more decisions as time passed
- Yes
- No
- Yes I did. At first I was not that eager to play but that changed as the game progressed
- Yes I got more competitive and excited
- No
- Slightly. As it progressed I was gradually getting more involved

11. During the activity did you perceive a difference with the previous game (more difficult, more complex, less clear ...) ?

- The game was vastly more complex than the first game with a lot more variables.
- More difficult to understand the rule as they were 44 pages long
- More everything much harder
- Yes this game was much more complex.
- ☐ - More complex, more difficult, more exciting and more fun

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A lot more complex

- Much more complex, instructions less clear
- Massive difference. More difficult
- It was more complex

12. During the activity have you learned anything about decision-making processes (important triggers, stress management ...)?

- Yes, to have a good group can go a long way
- No
- No, I didn't feel much stress just excitement
- Yes planning is very important, along with teamwork and splitting projects between people
- Dont make decisions on what you dont believe just because there is time pressure
- I have learned that there are triggers specific to me which make me want to make an easy decision rather than re-evaluate the scenario.
- Stress management
- I learned a bit about group work
- No

13. During the activity have the elements of uncertainty been difficult to bear?

- No because we could work together to overcome them
- Yes but ive been able to overcome them
- No
- Yes a bit
- Yes at the beginning
- No it started becoming familiar
- No, it was fun
- No
- I found it fun, the fog of war is a fun gimmick

14. During the activity what was your physical state at the end of the game?

- I was a bit tired
- mentally tired
- The same, good, a little tired
- Tired but happy, I could have done it longer
- Tired and satisfied
- The same, a little tired
- Both tired and exited as it was over
- Pretty tired
- - Tired

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Postquestionnaire

???

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SP-HE-IPL2: Reliability and Decision Making via Inshore Cruising at IMT Atlantique

File [BilanTL2-IMTA-MArch2019.pdf](https://www.dropbox.com/s/6pc4rcqtx5dhhbql/BilanTL2-IMTA-MArch2019.pdf?dl=0) available at
<https://www.dropbox.com/s/6pc4rcqtx5dhhbql/BilanTL2-IMTA-MArch2019.pdf?dl=0>

Outline

"Reliability and Decision Making via Inshore Cruising, aka. all in the same Decision Ship" was attended by 9 EU undergrad to PhD from three different countries, with 2 accompanying DAhoy members, over 5 days. It was held at IMT Atlantique, Brest campus, in France. This DAhoy one-week course aims to train students to take decisions and react in unexpected and unpredictable situations (VUCA situations: Volatile, Uncertain, Complex and Ambiguous). The experiential situations reflect real-life nautical scenarios with complexity and time pressure, where specific skills are to be acquired or reinforced: risk and priority management, watchfulness, team management with respectful interactions, collective mind, flexibility, resilience, etc. No sailing or cruising knowledge or skills are required for this course. The students will be out of their comfort zone to practice and reinforce their decision skills, in unknown environments and contexts. These in-context and in-situ experiences are valuable in a career where responsibilities are increasing (e.g. executives and decision-makers face complexity and urgency), especially in uncertain employment contexts.



The real experiential situations during the week were selected to reflect real-life nautical scenarios with increasing level of complexity and time pressure (including Man Over Board exercises). Specific skills were to be acquired or reinforced, such as risk and priority management, watchfulness, team management with respectful interactions, etc. Participants also had to prepare a navigation (weather, equipment, refuelling, practical information), to plan the stages, estimate the navigation times, the possible risks and dangers, prepare the most delicate passages, or

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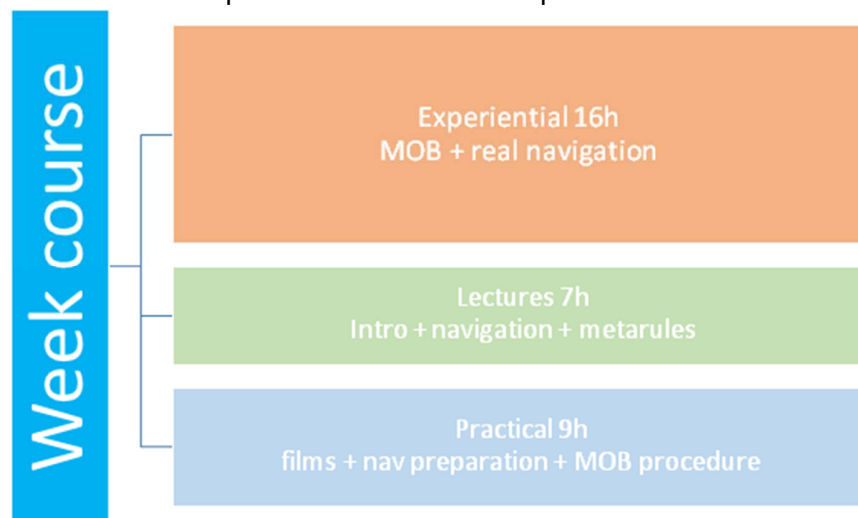
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prepare fall-back solutions and identify success factors. 8 of the CoGC and RU students succeeded with a sufficient proficiency level for 7 decision skills statements D1-D7. The DAhoy certificate was delivered in an unusual context, let's say, reflecting the out in the field course the students had experience.

Pedagogical model

On the pedagogical models, mainly 3 were used with the following ratios:

1. Experiential learning outdoor: 16 hours
 - a. 2 hours Liferaft
 - b. 7 hours MOB
 - c. 7 hours navigation
2. Formal lectures: 7 hours
 - a. 2 hours introduction
 - b. 3 hours navigation theory and tools
 - c. 2 hours meta-rules
3. Collaborative practical: 10 hours
 - a. 2 hour team film analysis
 - b. 5 hours team navigation preparation and presentation
 - c. 3 hours team MOB procedure definition and presentation



Prequestionnaire

At the very beginning of the one week course, the 9 DAhoy students filled a first questionnaire on GoogleForm.

9 responses



SUMMARY

INDIVIDUAL

Accepting responses



In your opinion are you a good decision marker? (Scale 1 low to 5 expert).
Justify your response with relevant examples.

9 responses

- 3 I believe I am a good decision maker as I have worked in high pressure environment where decision have to be thought out. Also with me experience as captain for various sports teams.
- 4 - I believe I am a relatively good decision maker as I've had good appraisals throughout my merchant navy career and have been able to meet the work load required of me in college.
- I would rate myself 3, because I do take reasonable decisions and think they make quite a lot of sense to me, however I have a marketing perspective and think I am always able to improve my own capability and learn more on this technique.
- 3. I have experience taking important design decisions through formula student and other courses at my school. However I am not good at making good decisions quickly and I often take longer time than needed to make the decisions.
- 3. I think I'm an reasonable decision maker. But want to get better. I for example sometimes struggle with choice between between two good decisions and valuating which is best for all parties involved.
- 4
- 4 - machine floor supervisor at old job, decisions for production/downtime
- 3, I sometimes have a hard time to decide things which don't have to be complicated
- 3

How do you approach the task of making a decision?

9 responses

- I will approach the task of decision in a logical process thinking of all possible solutions and selecting the best possible solution. If I were part of a team I would listen to other people views as they may have better ideas that I have not thought of. An agreement between the team should then be decided.
- I try to consider all aspects of the decision I am faced with and choose the best option for either myself or my team.
- If it's an easier decision to make I tend to go with my gut feeling and what feels right each time but if on the other hand I have to take a hard decision I reason the pro's and con's, list them out and discuss with people that are affected by the decision or to people that I can trust to get a second opinion on the matter and then I make the decision.
- Find all the relevant data and knowledge and using that find different methods to approach the task. Compare the methods and maybe consult coworkers/peers before final decision is made.
- Break it down to pros and cons and valuate all sides regarding the decision.
- Try to understand the wider picture and take all factors into consideration.
- Depending on situation - analysis options, pros and cons
- I don't have any particular approach, just follow my instinct I guess

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Have you ever been taught to make decisions? If so, when, where, how?

9 responses

No
Not necessarily, I have learned some of my decision making for being captain of sports teams and being a leader other jobs.
Only through my upbringing and life so far.
As I've said before, I have only learnt the basic steps to justify design decisions which I have learned at school. Bo through the formula student competitions the past 3 years and through courses with project work.
I have taken some courses as part of my cadetship course
Never been taught

What would you define as a good decision? Justify your answer.

9 responses

A good decision is totally dependant on the situation. For example in a marine engineering environment the decision that does the job correctly and involves the least risk is a good decision
Something that brings success to you or your team. If your main goal is to be successful then a good decision must be one that brings success.
A good decision is made thoughtfully, considering all relevant factors and including them in it. It is also consistent with the decision maker's philosophy and values, and can be explained clearly to others.
A decision that is based on data and has been compared to other decisions.
With minimal bad impact on me or parties involved.
The choice which has optimal results
Positive outcome, happy team, work done safely
A decision that leads to a good experience. A decision you would make over and over again.
A decision that permits to solve the problem faced without damages.

Activities analysed

Several activities were analysed all along the week, among others:

- Table Top Tactics
 - For the seaside mission the participants from City of Glasgow College (CoCG) and Reykjavik University were divided into two groups and given a task and were asked to make a decision. In this task the duty officer at the French Lifeboat Institution's rescue centre receives a call that one of the sailors on board a boat is extremely ill. It is not certain when the boat will arrive at the beach. The duty officer has to make a decision of which route should be taken by the ambulance. One option is to take the motorway which is fast but takes a long time. A second option is to go through town which is shorter, however, they can be faced with traffic jams and

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congestion. The third option is to cross a bridge, which is the shortest route, however crossing the bridge is controlled by a gate which automatically opens and closes three times per hour. Each times it opens and closes for a certain period of time. The participants were asked to first take a snap decision within 5 seconds following their instincts, then working in groups the students discuss over 5 minutes with the other participants why they have made their snap decisions and try to justify their choices. After that the students take 15 minutes to discuss in depth the situation and make a final decision as they feel appropriate.

- Kahoot tool was used by students on their smartphones. Upon analysis, this activity has the qualities of a VUCA activity in Uncertain and complex Mathematical decisions around SQA level 7/8 (EQF 5). The students were asked 9 questions after the task was finished and here is a summary of their responses:
 - **In the first question**, 7 students thought the task was challenging, however, 2 of them did not feel challenged.
 - **In the second question**, 7 students felt that they were analysing and evaluating while working on the task, while one student felt that he was analysing and leading the others. On the other hand one student preferred to work independently. From the student answers to Q2, it can be seen that the most common statement is Analyse/Evaluated while working, which matches up with the SQA level 8 (EQF5).
 - **In question 3**, about the level of volatility experienced: 2 students thought it was high, 4 students said it was medium and 3 thought it was low. Volatility - no clear level.(mixed results)
 - **In question 4**, about the level of uncertainty: 3 students said it was high and 6 students thought it was medium. Uncertainty- Medium/High (the students found this elements in the exercise uncertain)
 - **In question 5**, about the complexity of the task: 5 students said it was medium, 3 students said it was high and 1 student though it was low. Complexity- Medium (corresponding to level 8)
 - **In question 6**, about the level of ambiguity: 4 students thought the information was highly ambiguous, 3 students said the information had a medium level of ambiguity, one student thought it had a low level of ambiguity. Ambiguity-no clear level (mixed results)

Question Summary				
Player Number	Q11 felt challenged on this activity? (1-no)	Q2 At what level do you feel made decisions at?	Q3 During the activity, the level of volatility experienced was?	Q4 During the activity, the level of Uncertainty experienced was?
1	4	Analyse/ Work Independently	High	Medium
2	2	Analyse/Evaluated while working	Low	High
3	2	Analyse/Evaluated while working	Medium	Medium
4	1	Analyse/ lead others	Medium	Medium
5	2	Analyse/Evaluated while working	High	High
6	2	Analyse/Evaluated while working	Low	Medium
7	1	Analyse/Evaluated while working	Medium	Medium
8	2	Analyse/Evaluated while working	Low	Medium
9	2	Analyse/Evaluated while working	Medium	High
Q5 During the activity, the level of Complexity experienced was?	Q6 During the activity, the level of Ambiguity experienced was?	Q7 At the end of this activity, I feel that my ability to make mathematical decision has improved	Q8 At the end of this activity, I feel that my ability to make social decision has improved	Q9 At the end of this activity, I feel that my ability to make career decision has improved
Low	High	Yes	Unsure	Yes, only a little
Medium	High	Unsure	Yes	No
High	Medium	No	Yes	Unsure
Medium	Medium	Yes	Yes	Yes , definitely!
Medium	High	Yes	Unsure	Yes, only a little
High	Low	Yes	Unsure	Unsure
Medium	Medium	No	Yes	No
Medium	Low	Unsure	Unsure	Unsure
Medium	High	Yes	Yes	Unsure

- Man Over Boards experiences

- 11 MOB scenarios were experienced, where the complexity and volatility of the tasks increased systematically. These activities put pressure on the groups to organize, prioritize when two objects were in the water, confined with the ambiguity in controlling the boat in an unfamiliar environment. After each scenario there were debriefing organized by Siegfried of group dynamics and decision making. Activity “Who will survive and jump”. After practicing MOB, i.e. plastic box, duck toy, dolls with and without life vest and Oscar, a new scenario was implemented. Each group was asked to select one member of the team that would survive. They were given 15 minutes to discuss and decide on this in secrecy in a separate room. It was asked to students to select one survivor in each team, via a confidential cabin discussion for 15 minutes. As a happy conclusion, the lucky survivor of the team had to put on a dry-suit and jump ... team has thus to have its winner to wear a dry-suit and jump into to the water to save his/her soul ;o) This was an unexpected scenario, and for at least one of the survivor it was a bit stressful to accept the situation.
- Students were first asked to self-assess on the 7 DAhoy skills, individually and collectively, and were formatively assessed by the two chaperons. After each MOB scenario, reflective debriefings took on location in the boat, i.e. in situ. The various sequences provide initial indicators on learning variables to analyse proficiency. Findings, derived from TLA problems anchored in real-world settings, demonstrate the relevance of meta-rules in VUCA environments. Decision-making capacities are transversal and can be enriched by a multiplicity and variety of learning situations. Meta-rules offer encouraging prospects for developing the decision-making capacity of the future decision-maker. This approach has a two-fold merit: it defines a framework of understanding in a very fast way for a non-expert; and it is progressive according to the degree of learner’s maturity. We see in this

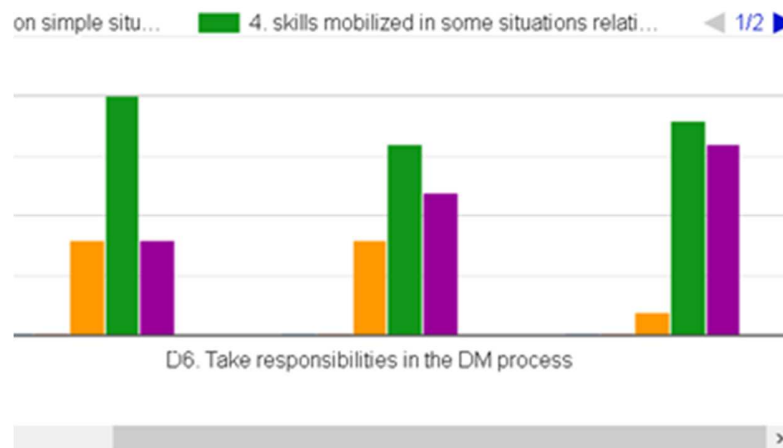
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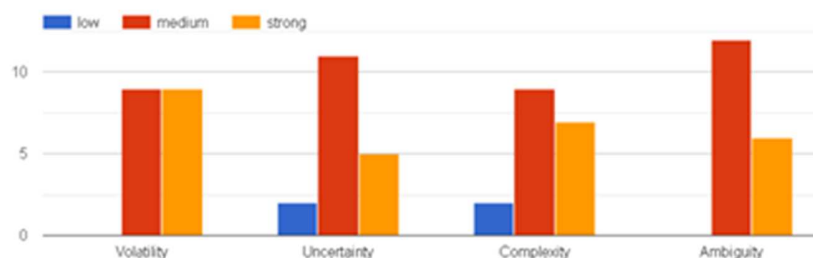
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approach a way to develop a capacity for discernment when facing many procedures, through training with experiential activities in real situations which the engineer may encounter in a professional context. In addition, learners' feedback from the exercise in real situations highlights work on self-confidence and also the difficulty of optimizing solutions for VUCA situations.



What was the magnitude of the situation you observed?



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Postquestionnaire

These are the main answers that the 9 student participants have provided to the 2nd T&L activity organized by IMT Atlantique, the answers are the result of filling a questionnaire proposed on the Web the week after the course.

8 responses



SUMMARY

INDIVIDUAL

Accepting responses

Did you make a good choice to enroll in this 1 week course?

8 responses

Yes

Yes, I learned a lot and have a better understanding of what makes a good decision maker.

Yes because I have learnt a lot (new concepts such as IVUCA, weather forecasting, use a Cras plotter...)

Yes. It was alot of fun.

Yes, because I developed good skills from it.

yes

Yes, I made a good choice. It was both learnful and fun.

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In your opinion are you a good decision marker? (Scale 1-5). Justify your response with relevant examples.

8 responses

4

Yes, I'd say I was around 4.5 on the scale because it's always possible to improve. Our group made a lot of good decisions throughout this course, even though not all of them were perfect, and I think the experience made us stronger both as a team and as individuals. Practicing decision making in Sophie's course, choosing which way to go to save the most time in Sigfried's class, choosing which way to navigate the sailboat, and learning to prioritize through MOB exercises; we were able to complete all of these exercises with good results through decision making.

2

4. I managed the course decisions well and made mostly good decision during the course.

4 - I would say I'm better decision maker now than I was before. I think I make rational and good decisions.

4 made effective decision if vuca situations that were complex and uncertain

3.5. I rarely make decisions that I regret. With that being said, I am not always very confident with my decisions and I often struggle making decisions that are not very important.

On reflection from this experience at IMT Atlantique this full week, how would you now approach the task of decision making?

8 responses

By analyzing the situation, comparing and prioritizing options, consulting with relative parties and take the decision that would yield the most promising result.

I

Analyse - judge - take action - reflect

Depends on if I have time or not to make a decision. If I have to make a split second decision I go with my gut feeling and the first thing that pops into my head. But if I have time I try to calculate every aspect of the decision to find out what is the best decision.

Would approach using logical thought and discussion, panicking get you no where

always consider all options thoroughly

I have definitely learned that it is important to take great consideration of every angle regarding decisions.

Taking a calm, open approach

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After this experience what would you define as a good decision? Justify your answer.

8 responses

A good decision is one that is made deliberately and thoughtfully, considers and includes all relevant factors, is consistent with the individual's philosophy and values, and can be explained clearly to significant others.

X

A decision that yields good results.

That has the least bad impact on a situation.

A good decision is a decision that reaches the goal effectively without putting anybody at risk

one that accomplishes the goal

A rationalised decision that you are sure you would make again under the same circumstances and that you feel sets a good precedent for other people in the same circumstances.

The decision that accomplishes the set objective(s) as effectively and efficiently as possible

What do you feel that you have achieved through this experience?

8 responses

Practice and wisdom to better be able to manage in VUCA situations.

Go beyond my limits.

A understanding of vuca environment and basic knowledge of how to handle them.

Navigation skills. Sailing skills. Making decision under pressure. Evaluating and calculating right decisions.

I have achieved new skills and knowledge

better decision making

I have learned different aspects of decisionship, met new people and had great fun.

Being able to face challenges in dynamic environment

In your opinion, did you have sufficient knowledge or experience to follow this course?

8 responses

Yes

Yes I think so.

My lack of vocabulary in english was the most obvious weakness. Otherwise, I think this course can be followed by novices in sailing or decision making in VUCA situations.

Yes. the course taught us most everything we needed to know.

No, I knew nothing about VUCA or had any sailing experience.

Not sure

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Have you had any difficulty in following training elements this week?

8 responses

No
No.
Yes
I had trouble following the morning lecture on tuesday.
Some lectures I felt were too long. I would have liked a more hands on experience.
Language barrier was sometime difficult
None

In your opinion, what are the 3 top qualities required to be a good decision-maker in an emergency situation or VUCA?

8 responses

Ability to analyze a situation quickly, good reflexes and team-player.
Situation awareness Attitude of wisdom Improvisation
vigilance, determination, rationality
Don't panic. Take control of the situation. Follow protocol / Meta rules.
Calmness, leadership and thoughtfulness
n/a
Rationalization, initiative and preparation
Remaining calm under pressure, being to analyse different factors, having confidence

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Indicate 3 aspects that made it difficult for your group to make decisions during this week experiential activities?

8 responses

Weather, waves, time.
X (bias)
Lack of leadership, fatigue, unclear roles. These aspects didn't affect us that much though.
Different opinions. Bad communication.
Weather, complexity and lack of skills
n/a
Lack of skills (driving a boat/catamaran), lack of experience in VUCA situations, irrationality
N/A

In your opinion, what are the 3 top skills required to be a good decision-maker in an emergency situation or family of VUCA situation?

8 responses

Ability to analyze a situation quickly, good reflexes and team-player.
X
leadership, experience, endurance
Don't panic. Take control of the situation. Follow protocol / Meta rules / instinct.
Calmness, experience and thoughtfulness
n/s
Fair, leader-skills and ambition to do well
Clear and concise communication, being able to analyse situation, being able to implement training/knowledge

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Transferable: what are the capacities or skills you developed and really reinforced during this 1 week course?

8 responses

Ability to analyze a situation quickly, reflexes, teamwork, understanding surroundings, decision-making, leadership, learning from experience, reacting in difficult situations, understanding other people and how the team functions as a whole, sailing, navigating, and more.
Have the reflex to consider the context and its complexity when I face a situation of crisis or emergency, before making a decision.
organising teams quickly in case of emergency
Navigation skills. Sailing skills. Making decision under pressure. Evaluating and calculating right decisions.
Improved communication skills
n/a
making decisions under pressure, learning to take into account unexpected situations
Dealing with challenging tasks in new environment

Which skills could serve you again at the end of your curriculum once back home and / or in your first jobs?

8 responses

All of them.
Teamworking and communication
organising teams quickly in case of emergency
Decision making and making right decisions at right times.
Communication skills
n/a
Leadership, being able to communicate with a group under pressure and understanding of environment
It will help me lead people as an officer

What do you feel about the assessment model used for Decision Skills (eg fair, coherent, ambiguous)?

6 responses

Quite fair but some of them seemed to be very similar to others.
X
It was a bit ambiguous.
ambiguous
Fair
Too many skills

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SP-HE-IPL3: at Reykjavik University

"Disaster Week" is for 16 HE and VET students, and 4 accompanying DAhoy members, over 5 days and to be held at RU. To motivate engineering students and expose them to real-life engineering, RU initiated the "Disaster Week" in the fall semester of 2011. After the third JSTE with some DAhoy members @RU, partner students will have the opportunity to follow a 5 days course will all RU freshmen students, in line with the D-Skills learning outcomes under definition. The European students from the DAhoy partner consortium will work in groups of 6 or so.

This first course for HE and VET learners will permit to calibrate and bench the learning outcomes in line with DAhoy expectations. Teachers want to stimulate and motivate students in order to increase their satisfaction and educational performance. Many of them are constantly looking for and developing teaching methods that can support their aims in different subjects. Rapid changes in technology require students to be prepared for self-learning or self-driven learning, along with other skills such as communication and creative thinking before they graduate. Students have different learning styles and the approach they take in learning is the main factor in determining learning outcomes. It is therefore important to use a variety of teaching styles to reach out to all students. In higher education group work is used to develop student collaboration skills, teach them to adjust to different roles and share responsibility, but also to support peer learning. Group work can also improve responsibility among students as each student's contribution is important for the group's success.

At the conclusion of the course, students are expected to (learning outcomes):

- > have experienced working in a group and understand the importance of team work
- > have been exposed to moral issues in their field of study
- > have been introduced to good practice in engineering working methods
- > be able to acquire, judge and work with data
- > be able to tackle ambiguous data
- > be able to take a well-founded stance in problem solving, suggest feasible solutions and interpret findings, take decisions
- > be able to introduce and present findings in a clear and concise way, and take responsibility on their choices

At RU, the semester is broken up with one week of joint project work, during which engineering students develop an action plan for dealing with an unforeseen event of some complexity, demanding interactive group work, planning and decision making. These events include a natural disaster e.g. near the city of Reykjavik and a potentially devastating epidemic in Iceland. This

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style of learning, i.e. the short time and hence the intensity of the Disaster Week, enforce the importance of teamwork, need to gather information quickly, and one has to make decisions fast based on incomplete information. As an example, Iceland is both tectonically and volcanically active and certain areas in southern Iceland have been especially "lively" in the last few years. On Monday morning of RU's first Disaster Week All students received an announcement that a volcanic eruption had started in Hengill, a volcanically active area close to Reykjavik, the capital of Iceland, and that the lava flow was heading towards the city. This setting is realistic in the sense that a similar event happened some two thousand years ago.

Discussion on the DAhoy T&Ls benefits and limits

Some lessons to learn from the three DAhoy T&Ls, it is that, like in kind of learning mobility, one has to consider the following elements regarding the lifecycle of the mobility:

1. Before: it requires some preparation, not only regarding the logistics – the "hows", but also the "whys" and the "what-for".
2. During: the benefit from the multinational mix is generally evident for today's students, who are more used to travelling (but needs maybe to be checked). The use of -still- non-traditional learning processes, like active learning, experiential learning, multidisciplinary case studies, use of simulators, etc., need to be carefully debriefed so that students who may be not familiar with such processes are able to understand that they effectively learned something, and that they effectively acquired some skills, and which ones (not only content-matter linked skills, but also behavioural and transversal ones). Also, there is a lot of non formal learning that should also be made explicit before participants leave the place.
3. After: the key issue here is about evaluation: evaluation of what participants have learned and how, evaluation of how they can use that in their "usual" curriculum, etc. The key tool here is probably the use of Learning Outcomes and European Credits., together with adapted evaluation processes (self-evaluation, peer-evaluation, etc.).

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Chapter 7 - Output 2: Decision Skills and Learning Outcomes

This chapter aims to identify a set of statements relating to Decision Making skills. In fact, the set of statements used during the three DAhoy teaching & learning activities were less specific and arranged under topic as opposed to level of complexity and difficulty as in an National Qualification Framework (NQF) set of descriptors. This means that some of the sub-statements are at differing levels when comparing them an NQF. The DAhoy project working group identified these in 2018 and 2019 from feedback from all project partners involved in 3 joint staff training events and the development of course descriptions. The suggestions for areas to cover was then examined in conjunction with the SCQF level descriptors. The SCQF is a lifelong learning framework with a single set of descriptors for all learning irrespective of where that learning takes place. The framework includes formal and non-formal learning and covers all education sectors in Scotland.

Most of DAhoy Decision making course activities tested in 2019 relied on active and experiential learning, at various programme levels. Thus an approach which examined the varying levels in a formal qualification framework, ie SCQF, at which decision making skills could be obtained was taken in DAhoy.



Programme outcomes on decision making

We live in times of unprecedented transformation towards a knowledge driven economy as has been stated earlier in this report. This has been named the Cognitive Capitalism. Cognitive Capitalism is the intangible assets of innovation, brand and flexibility that are becoming more and more critical for the long-term success or failure of companies and organizations. This has led to increased interest in enhancing our mental abilities that can contribute to more creative and co-operative work force. Furthermore, modern society, with its fast pace and information overflow, challenges our attention. This trend will be adapted in the DAhoy project so that future training of our students will reflect this enormous transformation.

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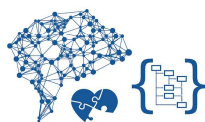
Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility

in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: Future of Jobs Report, World Economic Forum

Professional life environments are more than ever Volatile, Uncertain, Complex, and Ambiguous (VUCA). The notion of VUCA is used more and more in strategic Leadership. Inspired by the Dublin descriptors, the European Qualification Framework, recalls at level 5 “competence to exercise management and supervision in contexts of work or study activities where there is unpredictable change”; and at level 6 “to manage complex technical or professional activities or projects, taking responsibility for DM in unpredictable work or study contexts”. Decision is not only about knowledge, it is also about skills. Skills relate to the “ability to apply *knowledge* to complete tasks and solve problems. Skills can be described as cognitive (use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments)”. The ENAEE, which sets Programme Outcomes for Engineering Education accreditation in EU, introduced in 2015 priority in Decision Making and Judgment abilities. From now on, in Europe, the learning process should enable Master Degree graduates to demonstrate:

- ability to manage complex technical or professional activities or projects that can require new strategic approaches, taking responsibility for DM;
- ability to integrate knowledge and handle complexity, to formulate judgements with incomplete or limited information, that include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgement.

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Aligning with qualification frameworks

The DAhoy project encompasses four countries, each with its own National Qualifications Framework with different aims and structures and at differing stages of development.

Scotland and the SCQF

The SCQF was formally launched in 2001. Since that time, it has become the standard means for describing the level and credit value of all mainstream qualifications and many other qualifications offered in Scotland. The SCQF has 12 levels which provide an indication of the complexity of qualifications and learning programmes. The descriptors provide a set of common reference points and definitions which provide a way of recognising learning that is outcome based and quality assured (cf. SCQF Level Descriptors 2012).

Each level descriptor of the SCQF is described in terms of five characteristics, these being:

1. Knowledge and understanding
2. Practice: applied knowledge, skills and understanding
3. Generic cognitive skills
4. Communication, IT and numeracy skills
5. Autonomy, accountability and working with others

The characteristics of the Level Descriptors are generic in nature and may not all be relevant for every qualification or learning programme so it is not expected that every statement will be covered. The level descriptors are fundamental to the SCQF and they describe in broad terms what learners should be able to do or demonstrate at a particular level. They are always used in determining the levels of qualifications placed on the Framework. The SCQF has been referenced to the 8 levels of the EQF. It is particularly important for this publication to note that in two key places two levels of the SCQF map to a single EQF level (the first two levels of the SCQF do not map to the EQF).

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The body with ultimate responsibility for the SCQF is the SCQF Partnership. Established in 2006, the SCQF Partnership is responsible for ensuring that the quality and integrity of the SCQF is maintained at all times and that the benefits of using the Framework are fully promoted to all stakeholders across Scotland and beyond. Its published aims within this mission are to:

- ensure that, where appropriate, all assessed learning and qualifications in Scotland are included on the Framework;
- extend the recognition of informal and non-formal learning;
- develop and promote the Framework as a Lifelong Learning tool;
- develop relationships with other frameworks internationally, including with the EQF (cf cf. SCQF-EQF Referencing the Scottish Credit & Qualifications Framework (SCQF) to the European Qualifications Framework (EQF) Report 2019).

Tab. EQF: SCQF level to level referencing

EQF Level	SCQF Level
8	12
7	11
6	10
	9
5	8
	7
4	6
3	5
2	4
1	3
No match	2

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No match	1
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France and the RNCP

In France, the RNCP is linked to the validation of non-formal and informal training. All French institutions delivering diplomas, professional branches deliver certifications, professionals for recognition of prior learning. Set up under the French social modernization law n°2002-73 dated 17 January 2002, the national committee for professional certification is placed under the authority of the French minister in charge of vocational training. It contributes to work at an international level on transparency and recognition of qualifications. It is managed by CNCP (French national committee for professional certification, cf. <http://www.rncp.cncp.gouv.fr/grand-public/qualificationsFramework>)

As stated in the October 2013 study visit group report “Qualifications can cross boundaries – the SCQF and links to other European initiatives: Developing strategies for lifelong learning and mobility, Glasgow, Scotland, UK”, (Carla Tønder Jessing group reporter):

The French qualification framework (managed by CNCP) is distinct from EQF but alignments have been made, as SCQF have done. All French national diplomas are defined in the CNCP framework (RNCP entries), the referential including also all professional qualifications managed by branches. RNCP entries have a template for conformance, associated to a 5 scale model. Credits are mainly used in the academic environments rather than for vocational training or RPL processes. RPL processes are defined at IMT Atlantique higher engineering school and aligned in expectations with the learning outcomes of the formal curriculum, potential of the candidate being considered specifically in the two models. Regarding EU Qualification Frameworks, we can notice a difference in spectrum, where in France the NQF is close to the professional branches and as such to not address Doctorate levels which are not so much recognized in the French industries. Lower levels in EQF or even SCQF are closer to specific categories and linked to first academic qualifications. The French lower level RNCP-V tends to start a little higher from a professional perspective than an academic one “ (cf. <http://www.cedefop.europa.eu/en/publications-and-resources/country-reports/france-european-inventory-nqf-2018>)

The French NQF is managed by several stakeholders and the processes are rather long to integrate a new entry (sometimes more than one year). It seems that in Scotland, thanks to an independency of the SQCF between the various stakeholders, coherency and conflict of interests have better flexibility and reactivity. If the NQF is recognized in France, even for careers progression and salaries in many companies, the spectrum remains limited, without uniform descriptors to be shared via the levels. In the context of a European mobility of workers and interoperability of qualifications, some more formalized models have to be defined to limit an

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exhaustive number of MoU between universities or professional branches throughout EU. Models are also to be defined for processes opening to qualifications, eg (i) via universities assessment processes for diploma thanks to Learning Outcomes and Syllabus, or (ii) via RPL processes for diploma or professional qualifications thanks to experience aligned with referentials: “will it be easier to obtain a qualification from a country A thanks to less formal RPL processes, than from a country B, qualification being recognized all around EU”.

It is noted in the Cedefop European Inventory on NQF 2018 for France cf. <http://www.cedefop.europa.eu/en/publications-and-resources/country-reports/france-european-inventory-nqf-2018>

that a new eight-level structure for the NQF was adopted by decree No 2019-14 in January 2019 with a new eight-level structure. This new structure is more closely aligned to the EQF. According to the Inventory reclassification of level I qualifications to the new levels 7 and 8 should be completed by January 2020. Levels in this new structure are defined using 3 categories:

- Complexity of knowledge associated with carrying out the corresponding professional activity
- Level of skills and know-how
- Level of responsibility and autonomy

Tab. EQF: RNCP level to level referencing
(referencing of the original French NQF,
note new level structure adopted in January 2019,
which is not yet formally referenced).

EQF Level	RNCP Level
8	I-Doctorat
7	I-Master
6	II-Grade de Licence
5	III
4	IV
3	V
2	No match

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1	No match
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Iceland and the ISQF

The Icelandic NQF was first presented in 2013 and revised in 2016. Its main aim is to ensure that all formally certificated education and training is given an NQF level. The 2013 version was referenced to the EQF in 2013 and according to the Cedefop European Inventory 2018 (cf. <http://www.cedefop.europa.eu/en/publications-and-resources/country-reports/iceland-european-inventory-nqf-2018>)

an updated referencing report will be presented to the EQF Advisory group during 2019.

The ISQF is a lifelong learning framework and is designed to clarify learning pathways and to increase student mobility. The framework builds on a set of legal acts on education and training based on a learning outcomes approach. The ISQF has 7 levels (Level 1 is referenced to levels 1 and 2 of the EQF). Levels 5 and 6 have two sub-levels each. Each level descriptor is described in terms of:

- Knowledge
- Skills
- Competences

Competences include:

- Expression in the mother tongue and in a foreign language
- Personal responsibility
- Personal relationships
- General respect for fellow human beings
- The environment in a global context
- Democracy, active citizenship and social responsibility

Up until 2017, the Icelandic Centre for Research was in charge of the co-ordination and implementation of the ISQF. Since 2017 the responsibility has rested with the Directorate of Education.

Tab. EQF: ISQF level to level referencing

EQF Level	ISQF Level
8	7
7	6.2

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	6.1
6	5.2
	5.1
5	4
4	3
3	2
2	1
1	No match

Spain and the MECU

The Spanish Qualifications Framework (MECU) is an instrument to promote and improve everyone's access to lifelong learning and participation in it, as well as the recognition and use of qualifications at national and European level. (cf. <http://www.educacionyfp.gob.es/educacion/mc/mecu/presentacion.html>)

The MECU is the national framework of qualifications (degrees, diplomas, certificates) that includes lifelong learning. It is a structure of organization of qualifications by levels that ranges from the most basic learning to the most complex. It includes:

- Qualifications obtained outside the Educational System (through on-the-job training, work activity, collaboration with NGOs ...)
- Qualifications obtained in the Educational System

The MECU contemplates all the qualifications of learning throughout life. It includes all the learning acquired by a person who has improved their theoretical or practical knowledge, their skills and competences independently of the learning contexts (formal, non-formal and informal). Each level of qualification (degree, certificate or diploma) is recognized at a level of the MECU. There are eight levels in the Spanish Qualifications Framework. The eight levels cover all types of qualifications in Spain. The level descriptors are defined in terms of knowledge, skills and competences.

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In the case of general competences, there are usually distinguished instrumental, interpersonal (e.g. Critical and self-critical capacity, Teamwork and Interpersonal competences between others) and systemic competences (e.g. Ability to learn, Capacity for adapting to new situations, Ability to generate new ideas (creativity) or Leadership). The instrumental competences are diverse:

- Capacity for analysis and synthesis.
- Ability to organize and plan.
- Basic general knowledge.
- Basic knowledge of the profession
- Problem resolution

Among the instrumental competences is Decision Making, which has a significant importance as a descriptor and as a competence that must be acquired by students of Higher Education. Presently the Spanish NQF is yet to reference formally to the EQF, it is envisaged that the referencing report will be presented to the EQF Advisory Group towards the end of 2019. The qualifications framework for higher education (*Marco Español de Cualificaciones de Educacion Superior* (MECES)) has been self-certified against the FQ-EHEA (cf. http://www.cedefop.europa.eu/files/spain_-_european_inventory_on_nqf_2018.pdf)

Tab. EQF: MECES level to level referencing
(MECU is not yet referenced to the EQF).

EQF Level	MECES Level
8	Level 4 - Doctor
7	Level 3 - Master
6	Level 2 - Degree
5	Level 1 - Higher Technician

The European Qualification Framework (EQF)

The EQF was formally adopted in 2008 as a common reference framework. It supports lifelong learning and mobility by acting as a translation device, aiding the understanding of qualifications across countries and systems. By April 2018, 35 countries had referenced to the EQF linking their NQFs (cf. <http://www.cedefop.europa.eu/en/events-and-projects/projects/european-qualifications-framework-eqf>). In order to successfully reference member states must outline how their NQF relates to the 10 referencing criteria contained within the EQF Recommendation and

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produce a formal report to the EQF Advisory Group. These reports are then published. Once referenced, member states can add the EQF Level to certificates, supplements and qualifications databases/registers.

The EQF has 8 levels and its level descriptors are described in terms of learning outcomes: knowledge, skills and competences and each level descriptors has 3 characteristics:

- Knowledge
- Skills
- Responsibility & autonomy.

The EQF Recommendation was revised in 2017 and included revised quality assurance principles but has retained the original premise of creating transparency and mutual trust in qualifications across Member States and beyond.

Level Descriptors, Decision Skills, and VUCA Situations

A review of the level descriptors of each NQF within the project group was carried out to see where decision making skills are included. Due to the most common type of qualifications being examined under this project, the working group decided to concentrate at the levels of each NQF that were referenced to EQF 4 – 7

In Scotland

(cf. Annex 1 <https://scqf.org.uk/media/1123/scqf-level-descriptors-web-aug-2015.pdf>)

SCQF Level	VUCA Text	Decision Skills Text
6	<p>Apply knowledge skills and understanding in exercising these in routine contexts that may have some non-routine elements</p> <p>Produce and respond to detailed and relatively complex written and oral communication in both familiar and unfamiliar contexts</p> <p>Uses wide range of numerical and graphical data in routine context which may have non-routine elements</p>	<p>Obtain organise and use factual, theoretical and/or hypothetical information in problem solving</p> <p>Make generalisations and predictions</p> <p>Draw conclusions and suggest solutions</p>

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7	<p>Apply knowledge skills and understanding to practice professional skills, practices in both routine and non-routine contexts</p> <p>Convey complex ideas in well-structured and coherent form</p> <p>Use a range of communication effectively in both familiar and non familiar contexts</p>	<p>Present and evaluate arguments , information and ideas that are routine to a subject/discipline</p> <p>Use a range of approaches to address defined and/or routine problems and issues within familiar contexts</p>
8	<p>Apply knowledge skills and understanding In using a range of professional skills, techniques, practices and /or materials associated with a subject/discipline/sector, a few of which are advanced and/or complex</p> <p>Convey complex information to a range of audiences and for a range of purposes</p>	<p>Undertake critical analysis, evaluation and/or synthesis of ideas, concepts, information and issues that are within the common understandings in a subject/discipline/sector.</p> <p>Use a range of approaches to formulate and critically evaluate evidence-based solutions/responses to defined and/or routine problems and issues</p>
9	<p>Apply knowledge skills and understanding to practice in a range of professional level contexts that include a degree of unpredictability</p> <p>Seeking guidance where appropriate, manage ethical and professional issues in accordance with current professional and/or ethical codes or practices</p>	<p>Undertake critical analysis, evaluation and/or synthesis of ideas, concepts, information and issues in a subject/discipline/sector.</p> <p>Identify and analyse routine professional problems and issues.</p> <p>Draw on a range of sources in making judgements.</p>

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10	<p>Apply knowledge skills and understanding to practice in a range of professional level contexts which include a degree of unpredictability and/or specialism</p> <p>Make judgements where data/information is limited or comes from range of sources</p> <p>Work with others to bring about change, development and/or new thinking</p> <p>Manage complex ethical and professional issues in accordance with current professional and/or ethical codes</p>	<p>Critically identify, define conceptualise and analyse complex/professional problems and issues</p> <p>Offer professional insights, interpretations and solutions to problems and issues</p>
11	<p>Apply knowledge skills and understanding to practice in a wide and often unpredictable variety of professional level contexts</p> <p>Deal with complex issues and make informed judgements in situations in the absence of complete or consistent data/information</p> <p>Manage complex ethical and professional issues and make informed judgements on issues not addressed by current professional and/or ethical codes</p>	<p>Identify, conceptualise and define new and abstract problems and issues</p> <p>Develop original and creative responses to problems and issues</p>

In France

(cf. 2019 version - not yet referenced to EQF - have used levels 4 - 7 of the 8 level framework <http://www.cedefop.europa.eu/en/publications-and-resources/country-reports/france-european-inventory-nqf-2018>)

RNCP Level	VUCA Text	Decision Skills Text
4	<p>Organizing one's work autonomously in generally predictable but potentially changing contexts</p>	<p>Adapting existing solutions to solve specific problems</p>

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5	·	· To develop solutions to new problems
6	· The ability to analyse and solve unforeseen complex problems	·
7	· Carrying out the professional activity in complex professional contexts, as well as to assess the risks and consequences of one's activity	· The ability to develop and implement strategies

In Iceland

(cf. https://www.government.is/media/menntamalaraduneyti-media/media/frettatengt2016/Haefnirammi_A4_enska_anlogo.pdf and the revised level descriptors are used here see footnote 14 – referencing to the EQF expected to be updated during 2019 https://www.cedefop.europa.eu/files/iceland_european_inventory_on_nqf_2018.pdf

ISQF Level	VUCA Text	Decision Skills Text
4	·	·
5.1	·	· Can show initiative and work independently in addition to solving problems as part of a team
5.2	·	· Can apply critical theoretical and/or professional analysis when solving problems

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6.1	.	. Can apply the methods of the relevant field/profession to formulate, develop and solve problems
6.2	. Can understand complex problems	. Evaluate the most suitable approaches

In Spain

MECES only

MECES Level	VUCA Text	Decision Skills Text
Level 1 higher Technician	. Ability to analyse the information necessary to assess and respond to situations foreseen and not foreseen	. Through the search for well-founded, creative and innovative solutions within a field of study
Level 2 Degree	. Their abilities to solve problems in complex or professional and specialised work environments . To be able to cope with complex situations	. Require the development of new solutions . To communicate clearly and accurately to all types of audiences knowledge, methodologies, ideas, problems and solutions

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Level 3 Master	<ul style="list-style-type: none"> Integrate their knowledge, their understanding, their scientific basis and their problem solving abilities in new and imprecisely defined environments To make judgements based on incomplete or limited information To be able to predict and control the evolution of complex situations 	<ul style="list-style-type: none"> Integrate their knowledge, their understanding, their scientific basis and their problem solving abilities in new and imprecisely defined environments To make judgements based on incomplete or limited information
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In Europe

(cf.

[https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017H0615(01)&from=EN)

EQF Level	VUCA Text	Decision Skills Text
4	<ul style="list-style-type: none"> Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change 	<ul style="list-style-type: none"> A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study
5	<ul style="list-style-type: none"> Exercise management and supervision in contexts of work or study activities where there is unpredictable change 	<ul style="list-style-type: none"> A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems
6	<ul style="list-style-type: none"> Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study 	<ul style="list-style-type: none"> Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts

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	<ul style="list-style-type: none"> Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts 	
7	<ul style="list-style-type: none"> Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches 	<ul style="list-style-type: none"> Specialised problem-solving skills

It is useful to note the number of references to VUCA in the existing NQF and EQF Level Descriptors. However, when looking at decision skills statements, most of the text is referring to problem solving and solution finding as opposed to making decisions.

Comparison with the SCQF

NQFs differ in form and nature. Descriptors vary in terms of detail, focus and content. The detail relating to decision skills and to VUCA differs greatly between the NQFs of partners. There are no real references to 'decision making'. Statements tend to refer to problem solving or solution finding.

As SCQF allows for the inclusion of a wide range of qualifications and learning programmes of varying sizes (from 1 SCQF credit point – a notional 10 hours of learning), it was decided that a working group would look at creating a set of decision skills statements which could be compared to the levels of the SCQF and through the formal referencing to the levels of the EQF.

As stated above, due to the most common type of qualifications being examined under this project, the working group decided to concentrate looking at SCQF levels 6 – 11 (EQF 4 – 7) and examined, in detail, the SCQF level descriptors for these levels, identifying where there already may be aspects of decision skills (identified by the project partners) within the characteristics at each level.

In addition the group also referred to the SCQF Employer Levelling Tool which uses the SCQF level descriptors as its base to create a set of person specifications for each level (cf. SCQF Employer Toolkit – <https://scqf.org.uk/media/1117/employer-levelling-tool-web-mar-2017.pdf>). The skills found in Output 1 of this project which are considered to be in the SCQF level descriptors under the existing characteristics are detailed below:

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Ability to:	Broadly comparable benchmarked SCQF Level	Corresponding comparable EQF level
Express	6	4
Collate & control information	6	4
Identify safe ways of working	6	4
Organise	6	4
Develop decisions by consulting external options	7	5
Identify safe ways of working: Working Under guidance	7	5
Analyse	8	5
Identify safe ways of working: Working independently	8	5
Control & analyse	8	5
Delegate tasks	8	5
Analyse situations & apply rules base decision making in conflicting situations: Familiar	8	5
Develop decisions by consulting external options	9	6
Take responsibility for decision as head of team	9	6

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Anticipate and weigh impacts: Familiar	9	6
Analyse situations & apply rules base decision making in conflicting situations: Unfamiliar	9	6
Identify safe ways of working: Leading	9	6
Anticipate and weigh impacts: Unfamiliar	10	6
Analyse situations & apply rules based decision making in conflicting situations: Unknown	10	6
Analyse, reflect and evaluate decisions in work environment	10	6
Identify safe ways of working: Accountability	10	6
Build and implement prospective innovation	11	7
Anticipate and weigh impacts: Unknown	11	7
Analysis with high levels of complexity and time pressure	11	7

The group also identified a set of general abilities to consider and provide context to T&L activities:

- Ability to make decisions
- Ability to design, model & simulate
- Integrate technical, human and environmental elements
- Understand importance of cooperation & diversity in a group
- Appraising or evaluating the impact/consequences of decisions in a wide context (i.e. not only at task level but also at system level).

For a revision of decision skill statements

Drawing from skills identified in Output 1 of DAhoy, noted in Table 1 above, and applying the terminology from the SCQF level descriptors, the group created a set of decision skills statements

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looking at SCQF levels 6 – 11 (EQF 4 – 7). The statements were peer reviewed by a colleague at the University of Strathclyde and comments taken on board and statements reviewed.

<p>Broadly Comparable to SCQF Level 6 (EQF 4)</p> <ul style="list-style-type: none"> Express, organise, collate and control information and identify safe ways of working in order to make a decision.
<p>Broadly Comparable to SCQF Level 7 (EQF 5)</p> <ul style="list-style-type: none"> Develop decisions by consulting external sources and working under guidance, appraise safe ways of working.
<p>Broadly Comparable to SCQF Level 8 (EQF 5)</p> <ul style="list-style-type: none"> Analyse, revise, delegate and control tasks and situations, working independently to apply rules based decision making in familiar, conflicting situations.
<p>Broadly Comparable to SCQF Level 9 (EQF 6)</p> <ul style="list-style-type: none"> Analyse situations & apply rules based decision making to anticipate and weigh impacts in unfamiliar situations that include a degree of unpredictability. Take responsibility for decisions as head of a team through consulting external sources
<p>Broadly Comparable to SCQF Level 10 (EQF 6)</p> <ul style="list-style-type: none"> Analyse situations & apply rules based decision making in conflicting, unknown situations with a degree of unpredictability to anticipate and weigh impacts. To take accountability for a team and be able to reflect and evaluate decisions.
<p>Broadly Comparable to SCQF Level 11 (EQF 7)</p> <ul style="list-style-type: none"> Analyse, apply and implement innovative solutions to Volatile, Uncertain, Complex and Ambiguous (VUCA) situations to make decisions.

Taking these statements as complementary to each framework has a differing outcome as it is clear looking at the analysis above that some of the frameworks refer much more explicitly to VUCA than others. So for example, putting the statements together with the identified text already contained within the SCQF descriptors results in the following matrix/framework.

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Decision Skills Statements	VUCA Text (SCQF)	Decision Making Text (SCQF)
<p>Broadly Comparable to SCQF Level 6 (EQF 4)</p> <p>Express, organise, collate and control information and identify safe ways of working in order to make a decision</p>	<ul style="list-style-type: none"> Apply knowledge skills and understanding in exercising these in routine contexts that may have some non-routine elements Produce and respond to detailed and relatively complex written and oral communication in both familiar and unfamiliar contexts Uses wide range of numerical and graphical data in routine context which may have non-routine elements 	<ul style="list-style-type: none"> Obtain organise and use factual, theoretical and/or hypothetical information in problem solving Make generalisations and predications Draw conclusions and suggest solutions
<p>Broadly Comparable to SCQF Level 7 (EQF 5)</p> <p>Develop decisions by consulting external sources and working under guidance, appraise safe ways of working.</p>	<ul style="list-style-type: none"> Apply knowledge skills and understanding to practice professional skills, practices in both routine and non-routine contexts Convey complex ideas in well-structured and coherent form Use a range of communication effectively in both familiar and non familiar contexts 	<ul style="list-style-type: none"> Present and evaluate arguments , information and ideas that are routine to a subject/discipline Use a range of approaches to address's defined and/or routine problems and issues within familiar contexts

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<p>Broadly Comparable to SCQF Level 8 (EQF 5)</p> <p>Analyse, revise, delegate and control tasks and situations, working independently to apply rules based decision making in familiar, conflicting situations.</p>	<ul style="list-style-type: none"> Apply knowledge skills and understanding In using a range of professional skills, techniques, practices and /or materials associated with a subject/discipline/sector, a few of which are advanced and/or complex Convey complex information to a range of audiences and for a range of purposes 	<ul style="list-style-type: none"> Undertake critical analysis, evaluation and/or synthesis of ideas, concepts, information and issues that are within the common understandings in a subject/discipline/sector. Use a range of approaches to formulate and critically evaluate evidence-based solutions/responses to defined and/or routine problems and issues
<p>Broadly Comparable to SCQF Level 9 (EQF 6)</p> <p>Analyse situations & apply rules based decision making to anticipate and weigh impacts in unfamiliar situations that include a degree of unpredictability. Take responsibility for decisions as head of a team through consulting external sources</p>	<ul style="list-style-type: none"> Apply knowledge skills and understanding to practice in a range of professional level contexts that include a degree of unpredictability Seeking guidance where appropriate, manage ethical and professional issues in accordance with current professional and/or ethical codes or practices 	<ul style="list-style-type: none"> Undertake critical analysis, evaluation and/or synthesis of ideas, concepts, information and issues in a subject/discipline/sector Identify and analyse routine professional problems and issues. Draw on a range of sources in making judgements.

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<p>Broadly Comparable to SCQF Level 10 (EQF 6)</p> <p>Analyse situations & apply rules based decision making in conflicting, unknown situations with a degree of unpredictability to anticipate and weigh impacts.</p> <p>To take accountability for a team and be able to reflect and evaluate decisions</p>	<ul style="list-style-type: none"> Apply knowledge skills and understanding to practice in a range of professional level contexts which include a degree of unpredictability and/or specialism Make judgements where data/information is limited or comes from range of sources Work with others to bring about change, development and/or new thinking Manage complex ethical and professional issues in accordance with current professional and/or ethical codes 	<ul style="list-style-type: none"> Critically identify, define conceptualise and analyse complex/professional problems and issues Offer professional insights, interpretations and solutions to problems and issues
<p>Broadly Comparable to SCQF Level 11 (EQF 7)</p> <p>Analyse, apply and implement innovative solutions to Volatile, Uncertain, Complex and Ambiguous (VUCA) situations to make decisions.</p>	<ul style="list-style-type: none"> Apply knowledge skills and understanding to practice in a wide and often unpredictable variety of professional level contexts Deal with complex issues and make informed judgements in situations in the absence of complete or consistent data/information Manage complex ethical and professional issues and make informed judgements on issues not addressed by current professional and/or ethical codes 	<ul style="list-style-type: none"> Identify, conceptualise and define new and abstract problems and issues Develop original and creative responses to problems and issues

This results in a comprehensive set of descriptors relating to VUCA and Decision Skills by which an SCQF level could be attributed and this could be used as further elaboration for teams carrying out Credit Rating (the formal process in Scotland of allocating level and credit to a qualification). This will be expanded on later in this report.

Discussion

The project team was consulted on the statements. Generally the feedback was positive however there were some of the group commented that whilst these statements may be appropriate to complement the SCQF statements, it was more difficult to see how they could be related to their own NQFs. In addition as there are two SCQF levels referenced to the EQF at two points on the EQF in the list above this means that for other frameworks this results in a significant number of statements for a single level. Consequently, there were some comments that it may be easier to have one single statement for each EQF level. Some of the project group also commented that it was difficult to see how some of these statements could be transformed directly to learning programmes (this may be due to the differing nature of NQFs and different understandings of what constitutes the learning outcomes of a programme of study).

The Decision Skills Statements (which have had comparable levels identified) may also be able to be used as the basis for developing learning programmes and/or qualifications in all partner countries and result in inclusion in the relevant NQF but this will be dependent on the processes and regulations in each partner country.

Decision making as per descriptors (Table Top example)

Below is an example as to how the first set of statements (comparable levels identified) developed within the project together with existing statements in the SCQF can be used to develop unit/course descriptors with clear learning outcomes and evidence requirements.

On completion of this unit the candidate should be able to:

1. Express, organize, collate and control information
2. Identify safe ways of working in order to make a decision.

For knowledge and skills 1 a sample of 3 out of 4 evidence retirements should be met.

For knowledge and skills 2 a sample of 3 out of 4 evidence retirements should be met.

For knowledge and skills 3 a sample of 3 out of 4 evidence retirements should be met.

For knowledge and skills 4 a sample of 1 out of 2 evidence retirements should be met.

Knowledge and/or skills	Evidence requirement
1. Be able to convey in word (written and spoken)	State and define the problem by written word
	State and define the problem orally

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	Explain theories of decision making
	Describe (in own words) the problem/situation
2. Be able to logically/systematically organize	States an awareness of the need to analyse
	Describes and address the situation and adapts
	Evaluates, plans and utilise resources
	Uses standard ICT applications to process
3. Be able to collect and combine (text, information or data) to give results	Evaluates data and presents
	Identify method of problem solving
	States conclusions and suggests solutions
	Shows (via written or oral communication) responsibility where goal is clear
4. Be able to identify safe ways of working.	State safe ways of working
	State improvement which could be made

The table top exercise meets the points as shown below:

Knowledge and/or skills	Evidence requirement	Table top
Be able to convey in word (written and spoken)	State and define the problem by written word	The candidate is required to read the problem and then complete the worksheet
	State and define the problem orally	The candidate is in a team, through oral communication to the group, they must state the accident

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	Describe (in own words) the problem/situation	The candidate should summarise the accident and options in their own words.
Be able to logically/systematically organize	States an awareness of the need to analyse	Through group work the candidate the team analyse and troubleshoot the problem
	Describes and address the situation and adapts	Through group work the candidate the team analyse and troubleshoot the problem, adapting to time constraints.
	Evaluates, plans and utilise resources	Through group work the candidate the team analyse and troubleshoot the problem, make a plan moving forward. Using the limited resources they have.
Be able to collect and combine (text, information or data) to give results	Evaluates data and presents	Candidates are required to summarize data, have a written record of evaluation and present orally to class group.
	States conclusions and suggests solutions	Candidates are required to summarize data, have a written record of solutions.
	Shows (via written or oral communication) responsibility where goal is clear	Students must participate fully in group.
Be able to identify safe ways of working.	State safe ways of working	The candidate must state (oral or written) why certain routes are safe or unsafe.
	State improvement which could be made	The candidate must state (oral or written) additional options for the boat

This format could then form the basis of the body of information which could be submitted for credit rating to an SCQF Credit Rating Body along with assessment instruments, teaching materials etc and would form the basis of the information on which a Credit Rating Team would make a decision as the SCQF level and credit in line with the SCQF Guidelines contained within the SCQF Handbook (cf. https://scqf.org.uk/media/1125/scqf_handbook_web_final_2015.pdf).

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Irrespective of whether partners wish for learning programmes/qualifications to be included on the SCQF this format could be recreated for the activities used within the teaching and learning activities of this project to allow clear learning outcomes, assessment criteria and evidence requirements to be developed. This would then allow learners and tutors/teachers to be clear as to the aims and the requirements of the tasks and what would constitute success for a learner.

Credit Rating

The SCQF does not include standards or statements of standards. The framework contains qualifications and learning programmes each with a level and a credit value. In order to be included on the SCQF, a qualification or learning programmes must meet 4 criteria:

- Written in learning outcomes
- Be at least 10 notional hours (1 SCQF Credit Point) (to convert SCQF Credit Points to ECTS divide the number of SCQF Credit Points by two).
- Be formally assessed
- Be quality assured

This process of allocation of level and credit and inclusion onto the SCQF is known as credit rating. This must be carried out by an approved Credit Rating Body (CRBs) and is subject to a robust quality assurance model managed by the SCQF Partnership. All CRBs are required to establish credit rating processes in accordance with SCQF Principles as contained within the SCQF Handbook and with their own robust quality assurance systems (cf. https://scqf.org.uk/media/1125/scqf_handbook_web_final_2015.pdf).

It is to recognise that for the teaching and learning events/activities carried out in the DAhoy T&L of 2019, it may be that it will be possible to provide learners with other forms of recognition such as ECTS credits, a Europass CV entry, a Europass mobility certificate or a certificate of attendance & competence on top decision skills but without formal credit rating or inclusion into any of the partner countries' NQFs.

As a result, the next stage in this project could be to obtain a formal SCQF level by taking the agreed set of decision skills statements and to use these to create units of learning and/or learning programmes/ qualifications and have these credit rated (cf. Credit rate – the process used to allocate an SCQF level and credit value to a qualification) by an SCQF Credit Rating Body (cf. SCQF Credit Rating Body – an organisation approved to carry out the credit rating process) and included onto the SCQF. This would mean that any learner successfully completing those qualifications once credit rated would receive a certificate with an SCQF level and a number of credit points. City of Glasgow College, one of the project partners, is an SCQF Credit Rating Body and would be able to clarify the credit rating process if partners wished to have this formal credit rating and inclusion on the SCQF.

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If for example If SCQF credit rating for qualifications was to be sought then this would need to go through a formal process and the Decision Skills Statements (which have had comparable levels identified) used in conjunction with the SCQF level descriptors to develop a learning programme with clearly defined learning outcomes, detailed assessments and evidence requirements similar to the SCQF Employer Levelling Tool.

Employer Levelling Tool

Another way to assist industry to understand SCQF levels which has been developed by the SCQF Partnership is the Employer Levelling Tool (cf. <https://scqf.org.uk/media/1117/employer-levelling-tool-web-mar-2017.pdf>). This tool describes the types of responsibilities and tasks that will be present in job roles at particular SCQF levels. This allows employers to understand the knowledge and skills required by that role. *Please note that this is not in any way aligned or related to salaries or pay grades.* Below is an extract from the document for SCQF Level 6 (EQF Level 4). This shows various categories of information that an employer would find useful when creating job descriptions, person specifications, job advertisements etc. This has been developed for SCQF Levels 2 – 12.

Each level contained information about the job role: representative responsibilities; representative tasks and duties; knowledge and skills; qualifications/experience normally required for entry; and competences of job holders:

- scope of work;
- degree of autonomy;
- processes;
- contribution to quality;
- skills;

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- knowledge;
- personal development.

As an alternative format for identifying the decision skills required in a VUCA context it may be possible to produce representative competences in the style of this document by supplementing or adapting what is already included and contextualising the statements. This could be done by looking at the VUCA and decision skills text included across the 4 NQF level descriptors and the broad areas identified in the second set of developed statements may be useful here along with the list of non-levelled abilities and the Decision Skills Statements (which have had comparable levels identified).

Example: Employer Tool Competences for SCQF Level 9 (EQF 6):

SCQF Level 6	
Representative Competences of Job Holders at this level	
Scope of work	Works across an area of professional or technical activity
Degree of autonomy	Works autonomously and uses initiative within professional/ethical codes of practice; manages others and/or is responsible for a range of resources; works under guidance with other specialists; seeks advice on professional and/or ethical issues where appropriate
Processes	Applies and communicates knowledge and understanding of current issues, specialisms, techniques or developments in the sector to deal with foreseen and unforeseen difficulties and achieve planned goals
Contribution to quality	Manages the measurement of progress, improvement in practices and processes; may lead enquiries and/or research activities related to quality and effectiveness of work

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Skills	Uses a range of routine, advanced and specialised professional skills, techniques and practices; undertakes critical analysis; evaluation and/or synthesis of these.
Knowledge	Draws on knowledge of the scope, defining features, main areas and boundaries of the sector; understands developments at the forefront of the sector in some specialist areas
Personal development	Keeps abreast of forefront developments in a specialist area and in professional codes and practices; is aware of own limitations and boundaries and the limitations of professional and ethical codes; demonstrates an awareness of others' roles and responsibilities and their own impact on these

However it is important to note for this to be effective in identifying the level of skills that an individual has achieved it will be necessary to develop a range of these statements to show the levels of increasing complexity/difficulty.

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Takeaways, and DAhoy Perspectives

This DAhoy O2 deliverable provides some innovative Teaching & Learning methods and new learning opportunities that effectively support the relevance and development of students' knowledge and skills in Decision making in three dimensions. A unified D-Skills learning outcomes model for MDM, SDM & CDM, with categorization of these skills through various qualification frameworks, is provided. The Decision Skills Statements (which have had comparable levels identified) are designed to be complementary to the level descriptors of the SCQF. They build on the decision making skills and levels of VUCA already indicated in those SCQF descriptors and provide clear statements of skills and competences at different levels for users of the SCQF. The Decision Skills Statements (which have had comparable levels identified) do not necessarily provide the level of detail or content required by the other NQFs within the project which do not have the same detail within their level descriptors. Other NQFs may require their own tailored set of statements which dovetail into their NQF level descriptors.

As transversal key competences for HE and VET students; more attractive education and training courses are defined and assessed, to be coherently integrated in existing programs of various HE & VET fields. This DAhoy O2 deliverable permit education mutual reinforcement on Decision methods and processes, with surveyed adequate Teaching & Learning approaches, promoting more student-centred and engaging learning approaches; It provides transferable assessment practices and tools (e.g. questionnaires, VUCA matrix).

Limits

This second year DAhoy activities contain limitations:

- The second D-Skills model, with 7 set of statements, is not designed in such a way as to be able to identify the level of skills/competences achieved by a learner as this will differ depending on the VUCA situation. However this list gives the broad abilities which a learner should be able to demonstrate in decision making. It may be that these together with the Decision Skills Statements (which have had comparable levels identified) could be used to develop a set of competency profiles. However this would not be formal inclusion in an NQF.
- The 7 skills, with 4 VUCA criteria and 3 levels of magnitude (inc. 0), provides a 7*4*4 matrix for activity specification, which is too much for usability, whatever the stakeholders
- The TL1 & 2 did not follow the same questionnaires for analysis, pre, during, or post
- Coherence problem: VUCA semantics has been discussed but still some coherence problems remain

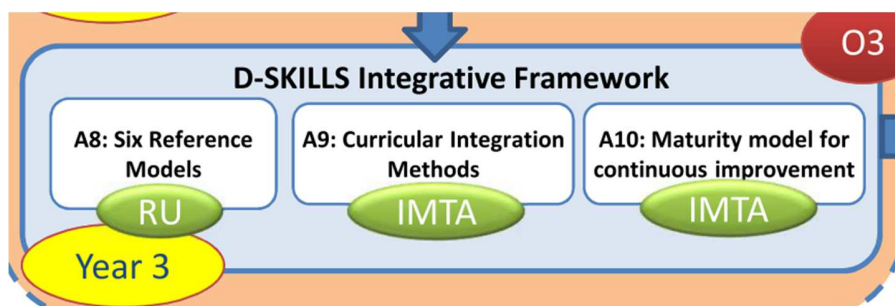
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Towards an integrative D-Skills educational framework



The next steps in DAhoy are at systemic level, to provide the O3 integrative D-Skills educational framework, for a potential transfer of innovative practices at local, regional, national or European level HE & VET organisations. It will result in:

- a systematic integration of the European and accreditation requirements for Decision skills;
- key Decision competences reinforcement in HE and VET training, including reference models and methods for introducing those competences in curricula, as well as for acquiring, delivering and assessing the learning outcomes of those curricula around Decision making with maturity models of processes for programme enhancements, via the D-Skills framework;
- feedback loops to adapt HE and VET provision based on outcomes for *decisionship*, as part of quality assurance systems in line with ENQA and EQAVET recommendation, including institutional-level governance improvements, with continuous quality enhancement approaches.

This Decision Skills Framework for HE and VET students training is to continuously integrative for educational programme renewal or renovation.

6 Reference Models (RM guidelines)

It was shown in the CDIO or QAEMP self-assessment models that various concerns, as reference models, are to investigate to enhance educational programs at a systemic level, even more in the scope of transversal skills for the best of learner development and educational global quality. CDIO specifies a reference which includes 12 standards, with guidelines, rationales, and good practices, for engineering education at BSc. level. These standards range from the missions, the learning outcomes, the pedagogical styles, student workspaces, student assessment, QA, etc. but from a global perspective, not specifically decision skills oriented.

For DAhoy, the CDIO and EFQM reference models are used as a source of inspiration for continuous improvement of VUCA decision skills at programme level. Description, Rationale, and Indicators are formalized. Partners bring relevant experience and knowledge of validation of non-formal and informal learning with case studies of learner progression using recognition of prior

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learning and national qualifications frameworks as the basis for DM. The Reference models, with a systemic perspective, to be proposed in Year 3 are:

- RM1 VUCA D-Skills Programme Vision and Strategy (from A1, A2 & A3)
- RM2 VUCA D-Skills Learning Outcomes (from A5)
- RM3 VUCA D-Skills Learning experiences (from A4 & A6)
- RM4 VUCA D-Skills Learning Assessment (from A7)
- RM5 VUCA D-Skills Enriched Curriculum (from A3, A6, & A7)
- RM6 VUCA D-Skills Teacher competence

Flexible methods for curricular integration of the RMs

In line with D-Skills, are produced an integrated curriculum method which includes DAhoy learning experiences that lead to the acquisition of Decision skills, interwoven with the learning of disciplinary knowledge and its application in professional environments. The teaching & Learning of Decision skills, and should not be considered an addition to an already full HE or VET curriculum, but an integral part of it. Courses are mutually supporting connections among related and supporting content and D-Skills learning outcomes. O.3.2 proposes an explicit plan to identify ways of integration of D-Skills and multidisciplinary connections are made, by mapping the learning outcomes to courses and co-curricular activities that make up the curriculum or VET course offers.

Systemic and iterative instructional methods and processes are followed and proposed at programme level, reinforced by partner institution experience. Some ISO standards are fruitfully capitalized, but in a more flexible manner.

A process measurement framework

Maturity models from quality assurance and quality enhancement processes are followed on their methodological foundations. Capacity and Rubrics are formalized accordingly, with hierarchic scales of maturity. EQAVET are ENQA standards are taken into consideration, with criteria.

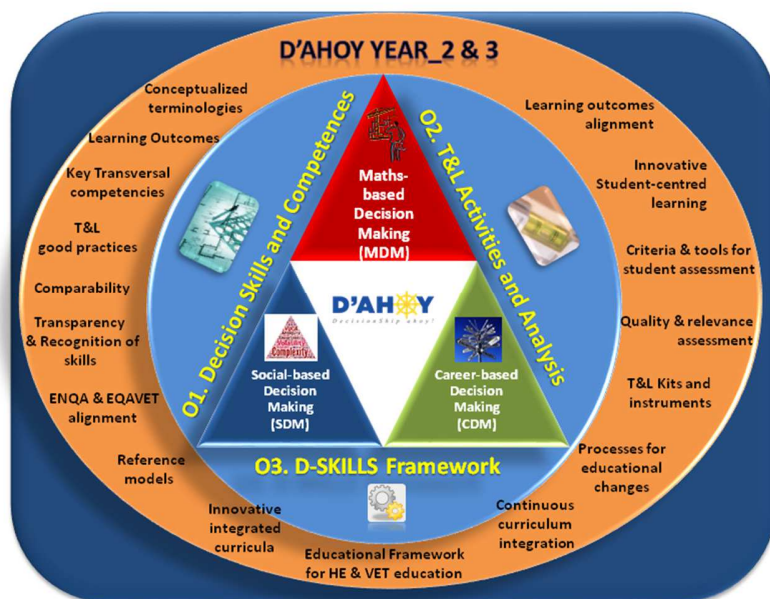
This measurement framework will increase the agility and pace of educational evolution is produced. Different approaches for quality assessment are used in higher education. To support continuous improvements in the HE and VET sectors for transversal Decision skills, standards and criteria are parts of reference models, sometimes associated with measurement models for interpreting the data and showing evidence.

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DAhoy publications, September 2018 - August 2019

- **Interdisciplinarité et VUCA.** Waldeck R., Gaultier Le Bris S. and Rouvrais S. Chapter 5 in ISTE book, "méthodologies pour les sciences sociales" series, "méthodes et interdisciplinarité" theme, pages 91-105, May 2019. *Under English translation by the publisher.* <https://iste-editions.fr/collections/serie-methodologies-de-modelisation-en-sciences-sociales/products/methodes-et-interdisciplinarite>
- **Méthodologie d'apprentissage en situations VUCA.** Gaultier Le Bris S., Rouvrais, S., and Waldeck R. Chapter 6 in ISTE book, "méthodologies pour les sciences sociales" series, "méthodes et interdisciplinarité" theme, pages 107-133, May 2019. *Under English translation by the publisher.* <https://iste-editions.fr/collections/serie-methodologies-de-modelisation-en-sciences-sociales/products/methodes-et-interdisciplinarite>
- **To Embrace Career Decision Making in STEM Education.** N. Chelin, G. Matthiasdottir, Y. Serreau, L. Tudela, S. Rouvrais, and K. Jordan. 11th International Conference on Education and New Learning Technologies. Edited by L. Gómez Chova, A. López Martínez, and I. Candel Torres. Pages 3058-3066. Palma, Mallorca, Spain, 1st-3rd July, 2019. <https://iATED.org/edulearn/>
- **Strategic Management in Uncertain and Complex Environments: Tools and Methods.** Roger Waldeck. Under submission 2019 in Academy of Management Learning & Education, <http://aom.org/Publications/AMLE/Academy-of-Management-Learning---Education.aspx>
- **An alternative risk assessment routine for decision making: Toward a VUCA meter to assess the volatility, uncertainty, complexity and ambiguity of complex projects.** Thordur Vikingur Fridgeirsson, Bara Hlin Kristjansdottir and Helgi Thor Ingason. Under submission 2019 in International Journal of Project Management, IPMA journal, <https://www.journals.elsevier.com/international-journal-of-project-management>

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Annexes

Annex DAhoy partnership course portfolio (cf. Chapter 6)

- File [Annex-02A6-DAhoyInnovativeCourses.zip](https://www.dropbox.com/s/iw5zbe34laein1h/Annex-02A6-DAhoyInnovativeCourses.zip?dl=0) available at <https://www.dropbox.com/s/iw5zbe34laein1h/Annex-02A6-DAhoyInnovativeCourses.zip?dl=0>
 - 13 docx files, June 2019
 - 3 courses by CoGC, 3 courses by EN, 5 courses by IMTA, 3 courses by RU, and 1 course by FUEIB
 -  CCG 1 Rohingya Refugees Fiches et tool box 2019.docx
 -  CCG 2 Developing decisions Fiches et tool box 2019.docx
 -  CCG 3 Choosing the right path Fiches et tool box 2019.docx
 -  EN C&C Fiches et tool box 2019 .docx
 -  EN Ethics & literature Fiches et tool box 2019 .docx
 -  EN Leadership seminar Fiches et tool box 2019 .docx
 -  IMTA-CDM2-SG-NC.docx
 -  IMTA-StrategicDM_RW.docx
 -  IMTA-VUCAexperiential_SR.docx
 -  RU-Brain storming.docx
 -  RU-mindful projects.docx
 -  RU-VMS in decision making.docx
 -  StrategicDM_FUEIB.docx

Annex DAhoy T&L reports (cf. Chapter 7)

1. Report “DAhoy Teaching & Learning Activity 1: War Games”. SP-HE-IPL - Intensive programme for higher education learners. Test of innovative T&L activities and analysis” 11-15 February 2019, Brest, Ecole Navale
 - File [Report-DAhoy-TL1@EN.pdf](https://www.dropbox.com/s/16mbedwlj7kbmwj/Report-DAhoy-TL1%40EN.pdf?dl=0) available at <https://www.dropbox.com/s/16mbedwlj7kbmwj/Report-DAhoy-TL1%40EN.pdf?dl=0>
 - 69 pages, June 2019
 - By Sophie Lebris (EN), Liliane Esnault, and Gilles Jacovetti (IMTA)
2. Report “DAhoy Teaching & Learning Event 2: Reliability and Decision Making via Inshore Cruising”. SP-HE-IPL - Intensive programme for higher education learners. Test of innovative T&L activities and analysis 4-8 March 2019, Brest, IMT Atlantique

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- File [BilanTL2-IMTA-MArch2019.pdf](https://www.dropbox.com/s/6pc4rcqtx5dqbq/BilanTL2-IMTA-MArch2019.pdf?dl=0) available at
<https://www.dropbox.com/s/6pc4rcqtx5dqbq/BilanTL2-IMTA-MArch2019.pdf?dl=0>
 - 104 pages, April 2019
 - By Siegfried Rouvrais (IMTA), Gilles Jacovetti (IMTA), Haraldur Audunsson (RU), Liliane Esnault (LEC), Manhal Alnasser (CoGC), Sophie Lebris (EN), Katie Jordan (CoGC), with the kind checking of Sheila Dunn.
3. Report “DAhoy Teaching & Learning Event 3: Disaster Week & Decision Trees”. SP-HE-IPL - Intensive programme for higher education learners. Test of innovative T&L activities and analysis 9-13 September 2019, Reykjavik University
- File [Report-DAhoy-TL3-Sept2019.pdf](https://www.dropbox.com/s/aa3qwq0w8eq5lqx/ReportTL3-RU-Sept2019.pdf?dl=0) available at
<https://www.dropbox.com/s/aa3qwq0w8eq5lqx/ReportTL3-RU-Sept2019.pdf?dl=0>
 - 92 pages, October 2019
 - By Thordur Friðgeirsson (RU), Nathalie Chelin (IMTA), Liliane Esnault (LEC), Katie Jordan (CoGC), Sophie Le Bris (EN), Greta Matthiasdottir (RU), Hildur Katrin Rafnsdottir (RU), and Siegfried Rouvrais (IMTA) .

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Acknowledgments

The authors of this second report are particularly grateful to the students, faculty, university managers, academic leaders, teaching and learning professionals, and educational researchers who gave their time for fruitful discussion in the partner institutions, during conferences or workshops, during DAhoy activities or training, or even aside other project meetings.



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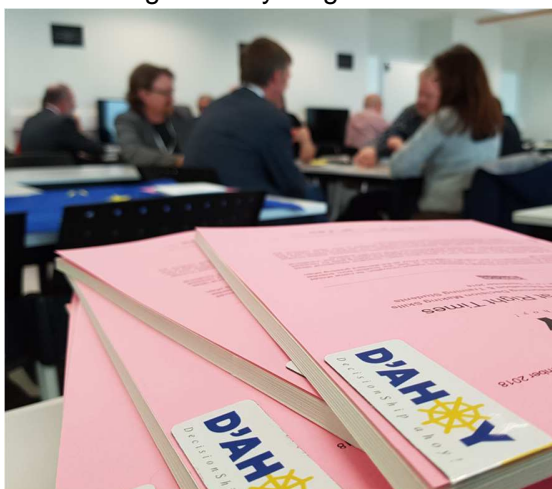
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TL1), James Spanner (CoGC student at TL1), Magdalena Stefl (RU student at TL3), Angus Treadwell (CoGC student at TL3), and Louis Young (CoGC student at TL1).



Are also thanked the >100 participants of the DAhoy 2019 Multiplier events for their fruitful comments on the project approach and results during the following workshops:

- The 1st DAhoy Multiplier event took place in France during the CDIO European meeting held in La Rochelle, 23-25 January 2019, jointly organized by IMT Atlantique and the CESI group. In 2017, the meeting took place at Trinity College Dublin. In 2018, it took place at SkolkovoTech near Moscow (an MIT initiative for Entrepreneur & Innovation Higher Education Russia). The thematic of this 2019 CDIO event was Career Decision Making & Work-based Learning (VET) following an integrated transversal skills focus. 9 DAhoy participants attended (IMTA/3, CoGC/2, RU/4). This DAhoy ME serves as medium for O1 and O4 dissemination, with 39 participants from EU (25 from Finland, UK, Sweden, Norway, Denmark, Netherlands) and 13 from France, mainly programme leaders and programme leaders in STEM education. Aside the DAhoy videos and slides, about 20 printed DAhoy O1 reports were collected by participants. All registered participants got a DAhoy leaflet in their welcome bags. DAhoy magnetic bookmarks were given, around 80.



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A DAhoy issue is the European level of Higher Education. By acting with the CDIO community, DAhoy had impacts with key stakeholders at that level, including accreditation purposes for transversal skills, inc. territory level also. Two half day sessions were dedicated to DAhoy:

- On Thursday 24th morning, the first results and progress of D'Ahoy were showcased in plenary with 22 slides, it permitted to intensify the achievement of the cooperation around Decision Making skills; The DAhoy Youtube video of Robin Karvo, DAhoy advisory board member, was presented as a context. www.tinyurl.com/DAhoychannel. Discussions about How can higher education institutions and engineering educators prepare learners for an unpredictable professional future, reinforce their judgement & career decision making skills were engaged.
- On Thursday 24th afternoon, innovative T&L activities for transversal skills were experienced in sessions, with the animation of Nathalie Chelin (IMT Atlantique, France), Greta Matthíasdóttir (Reykjavik University, Iceland), Siegfried Rouvrais (IMT Atlantique, France) & Yann Serreau (CESI, France). Among others, Card games examples for career decision making were played thanks to Nathalie Chelin, IMT Atlantique & Greta Matthíasdóttir, Reykjavik University.



- Restitution on Friday morning by Aldert Kamp, from 4.TU Engineering Education Center in Netherlands (TU. Delft), permitted to reflect and take some distance on Career Decision Making along European strategies for HE and VET education and industry connections. Open discussion to learn from the participants took place along the 3 days of the conference, e.g. open discussion on pedagogical tools for career decision making, to improve students' ability to actively participate in the construction of a realistic and more secured professional and personal project. First contacts with 'Mind the gap' project moving to 'Bridging the gap' research & pedagogical activity, at U.Twente, Netherlands, were undertaken for potential future E+KA2 collaborations (Strategic Partnerships or Knowledge Alliances).
- <https://intranet.imt-atlantique.fr/2019/03/18/les-chercheurs-et-formateurs-de-lequipe-du-projet-europeen-DAhoy-a-la-rochelle-comment-former-les-futurs-decideurs-a-la-prise-de-decision/>
- <http://www.cdio.cesi.fr>

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- The 2nd DAhoy Multiplier event took place in France during the *Questions de Pédagogies dans l'Enseignement Supérieur* Conference, held in Brest, June 2019, jointly organized by IMT Atlantique, ENSTA Bretagne and UBO University. The DAhoy D-Skills were presented to participants as VUCA rubrics, before using a professional nautical simulator for participants to experience VUCA conditions.



- <https://qpes2019.sciencesconf.org/>

Are also thanked the faculty, university managers, academic leaders, teaching and learning professionals, and educational researchers met during other dissemination mediums, as:

- Edulearn conference 2019 in Spain. A DAhoy exhibit took place during the Edulearn conference (1-3 July, 2019 Palma de Mallorca), where more than 800 leading decision-makers, lecturers, researchers and practitioners in education and research from more than 80 different countries attended the conference. After 11 years, Edulearn has become a reference event to present projects and share knowledge on educational innovations. In addition to the DAhoy presentation, DAhoyers from IMTA (Nathalie Chelin and Siegfried Rouvrais) and RU (Greta Matthiasdottir) were able to listen to thought-provoking speeches delivered by world renowned education experts such as William Rankin. Director of Learning and Research for pi-top (USA), and Richard Gerver, educational speaker, bestselling author and world-renowned thinker (UK). This conference opened networking activities. The attendance of delegates created an international atmosphere where participants could widely discuss and share different ideas and perspectives on Higher

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and VET education. The DAhoy career card game was presented to several participants who recognized its potentialities for transferability in their institutions (e.g. Sofia University "St. Kliment Ohridski", Honk Kong or USA Universities).



<https://iased.org/edulearn/>



DAhoy advisory board members are also warmly thanked for sharing in 2019 their knowledge, experiences, and expertise on this report and project, namely:

- A/Prof. Cecile Gerwel Proches from UKZN, South Africa
- Aldert Kamp, 4.TU Engineering Education Center in Netherlands (TU. Delft)
- Prof. Bernard Remaud from ENAEE, Europe
- A/Prof. Yann Serreau from CESI, InnovENT-E, France

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Contributors

DAhoy project is an inter-institutional collaboration which includes a process in which parties (individuals or institutions) work together to achieve project goals. DAhoy knowledge is shared through regular open discussion during plenary project and skype meetings. All DAhoy partners share the same values and ideologies around the project objectives. This DAhoy report, as project second year deliverable, is a joint authorship: several authors have participated and whose contributions cannot be separated one from the other. The property of this document content is the one of all the corresponding authors.

More precisely, there is generally a 'leader' of the collaboration for this report:

- At IMT Atlantique (in forward IMTA)
 - Siegfried Rouvrais was driving this report writing process, integrated partner activity reporting, as DAhoy project leader;
- At the Scottish Credit and Qualifications Framework Partnership (in forward SCQFP)
 - Sheila Dunn was responsible for the O2/A5 activity, reported in chapter 5: D-Skills Learning Outcomes;
- At Ecole Navale (in forward EN)
 - Sophie Gaultier Lebris was responsible for the O2/A6 activity, reported in chapter 6: Innovative Teaching & Learning Activities;
- At City of Glasgow College (in forward CoGC)
 - Katie Jordan and Matthew Stewart were responsible for the O2/A7 activity, reported in chapter 7: Test and Analyze T&L Activities.

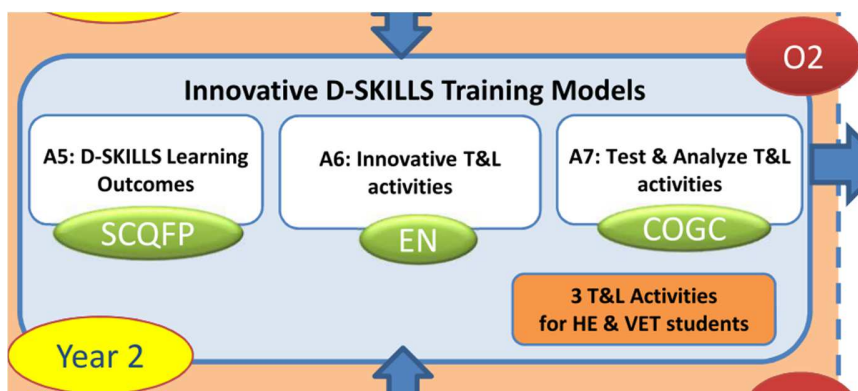


Figure. DAhoy Year-2 activities and leading institutions.

A collaborative project can not exist without the active implication on several stakeholders in the partnership. Several DAhoyers actively collaborated for this second DAhoy report, formally as subsection producers or during informal discussion during project meetings, multiplier or student training events. They include in alphabetical order, per partner institutions:

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- At City of Glasgow College: Manhal Alnasser (CoGC), Katie Jordan (CoGC), Matthew Stewart (CoGC), ;
- At Ecole Navale: Sophie Gaultier Lebris (EN);
- At FREREF: Axel Joder (FREREF);
- At the *Fundació Universitat-Empresa de les Illes Balears* (FUEIB): Mari Agredano (FUEIB), Maria del Mar Socias Camacho (Directora del Departament d'Orientació i Inserció Professional, FUEIB), Lluís Tudela (FUEIB);
- At IMT Atlantique (IMTA): Peggy Bardon (IMTA), Nathalie Chelin (IMTA), Anthony Diaz (IMTA), François Gallée (IMTA), Sarah Ghaffari (IMTA), Gilles Jacovetti (IMTA), Armelle Lannuzel (IMTA), Nathalie Marschal (IMTA), Hervé Retif (retired from IMTA), Siegfried Rouvrais (IMTA), Stéphanie Serrec (IMTA), Matthieu Simonnet (IMTA), Stéphanie Tillement (IMTA), Roger Waldeck (IMTA);
- Liliane Esnault (LE-Consulting);
- At Reykjavík University (RU): Haraldur Auðunsson (RU), Sven Breitenbuecher (RU), Þórður Víkingur Friðgeirsson (RU), Helgi Thor Ingason (RU), Bara Hlin Kristjansdóttir (RU), Gréta Matthíasdóttir (RU), Hildur Katrin Rafnsdóttir (RU);
- At the Scottish Credit and Qualifications Framework Partnership (SCQFP): Sheila Dunn (SCQFP).

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