



CHARM-EU (CHALLENGE-DRIVEN, ACCESSIBLE, RESEARCH-BASED AND MOBILE EUROPEAN UNIVERSITY)

DELIVERABLE D3.1 – CHARM-EU: CURRICULUM DESIGN BLUEPRINT

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Authors (Main Beneficiary)	Trinity College Dublin
Other Contributors	Gemma O’Sullivan (Trinity College Dublin), Sanne van Vugt (Utrecht University), Krisztina Lénárt (Eötvös Loránd University), Éva Major (Eötvös Loránd University), Gilles Subra (University of Montpellier), Olga Pujolràs González (University of Barcelona), Agnes Albert (Eötvös Loránd University), Jake Byrne (Trinity



College Dublin), Silvia Gallagher (Trinity College Dublin), Laura Costa (University of Barcelona), Patricia Cucchi (University of Montpellier), Zoltan Gera (ELTE), Jan Haarhuis (Utrecht University), Krisztina Lenart (Eötvös Loránd University), Csaba Csíkos (Eötvös Loránd University), Eva Major (Eötvös Loránd University), Fedoua Ouchan (Utrecht University), Ferenc Tako (Eötvös Loránd University), Artem Golikov (Trinity College Dublin).



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EXECUTIVE SUMMARY: CURRICULUM DESIGN BLUEPRINT

A core activity of the WP3 work programme is to create the Curriculum Design Blueprint in more detail through a process of identifying existing resources, collaborative and inclusive fora with key stakeholders, and a comprehensive needs analysis.

This document summarizes and integrates all sub-deliverables for 3.1 Curriculum Design Blueprint. The blueprint will inform and guide the design of CHARM-EU programmes in addition to providing guidance for broader European University programmes, and outline the background and rationale of the educational model.



1. INTRODUCTION

The CHARM-EU Curriculum Design Blueprint provides guidelines to inform and support the design of CHARM-EU programmes, in addition to broader European University programmes. It describes key guidelines on how to design a curriculum that balances student self-direction and flexibility with coherent programme level outcomes, while assuring satisfactory progress towards credit accumulation.

The document is structured by:

- Explaining how the blueprint was developed,
- Presenting the blueprint on how to design a CHARM-EU programme,
- Sharing practical examples which have used this blueprint in CHARM-EU.

1.1 Defining curriculum design

Within the context of CHARM-EU, curriculum design is viewed as a high-level process that defines the fundamental educational principles and high-level programme framework that are aligned with CHARM-EU's mission and vision. Section 3.1 defines the fundamental educational principles that serve as the foundation for all programme development within CHARM-EU. They inform the development of programme learning outcomes (PLOs) (3.1.2); programmatic structures (3.1.3); programme content; pedagogical guidelines; teaching and learning strategies; delivery modes; inclusivity guidelines, mobility, and accessibility. The PLO's were reviewed and endorsed by the CHARM-EU Rector's Assembly 10 June 2020¹.

¹ Since their endorsement, minor changes have been made which reflect operational processes implemented during the MSc.



2. CURRICULUM DESIGN BLUEPRINT DEVELOPMENT

CHARM-EU curriculum design has been informed by activities designed and delivered with students, extra academic actors and CHARM-EU staff. These activities included:

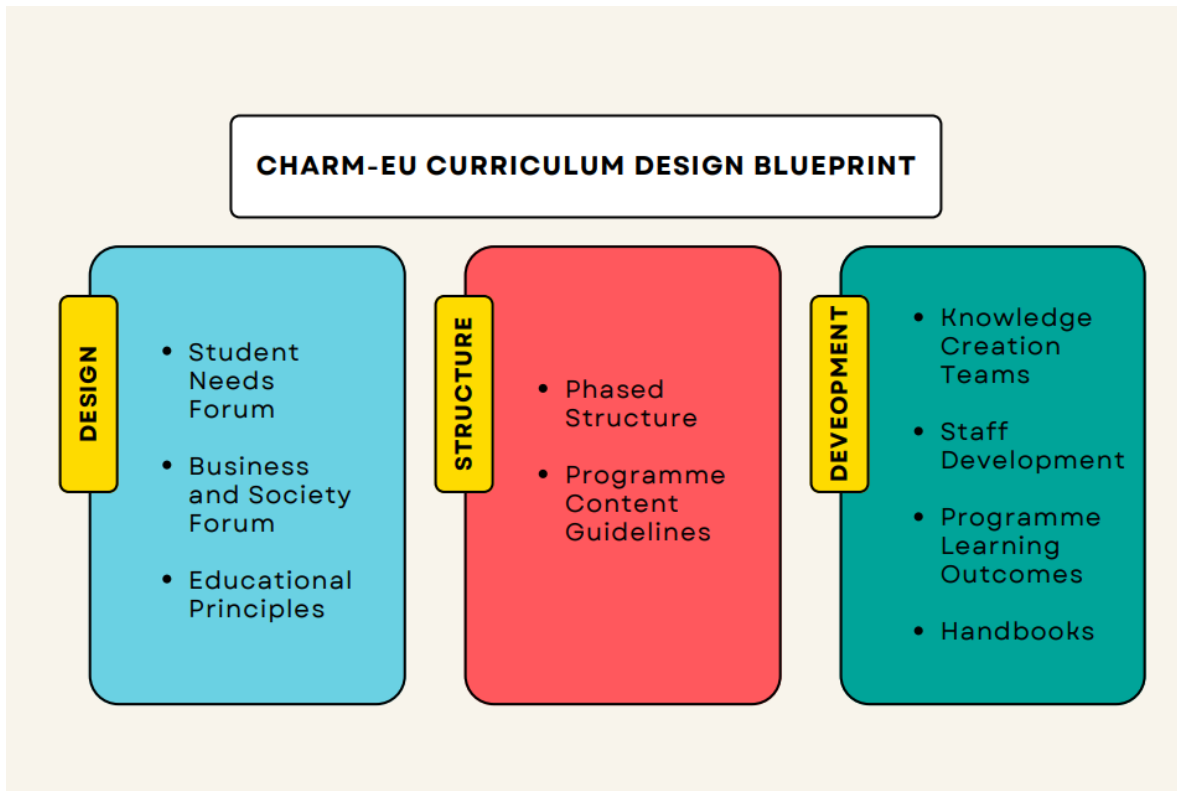
- Desk-based research on curriculum design, pedagogy, and Masters programme content.
- Student needs analysis workshop.
- Workshops and surveys with CHARM-EU partners and internal staff focusing on curriculum design.
- Workshops and surveys with Knowledge Creating Team (KCT) members focusing on curriculum design.
- Workshops and surveys with individuals from business and civil society focusing on curriculum design.
- Curriculum design fora with CHARM-EU partners.

In addition to these activities specifically focussed on curriculum design, input from CHARM-EU experts on inclusivity, governance and mobility were also used to inform the blueprint and ground it in what would be possible within the alliance institutions. Results from these workshops and surveys are available in the appendix in addition to early blueprints of curriculum development.

The curriculum development was structured through six sub-deliverables, resources from which are listed in this document:

- Educational Principles
- Student Needs Analysis and Curriculum Fora
- Programme Guidelines (to include Example Curriculum)
- Best Practice Report: Flexible Credit
- Capstone Handbook
- Staff Development Handbook

Figure 1: Blueprint for developing CHARM-EU curricula



3. BLUEPRINT FOR DEVELOPING CHARM-EU PROGRAMMES

CHARM-EU uses a unique model for developing educational programmes (Figure 1). There are three key considerations for designing a CHARM-EU curriculum;

- How to design modules using CHARM-EU educational principles and philosophy
- How to structure and develop modules within a programme
- How to develop programme content²

The following sections describe the CHARM-EU approach to these considerations.

²This document only includes the structure of developing CHARM-EU programmes. See the Programme Content Guidelines for how the content of such programmes can be developed.



3.1 Designing CHARM-EU educational programmes

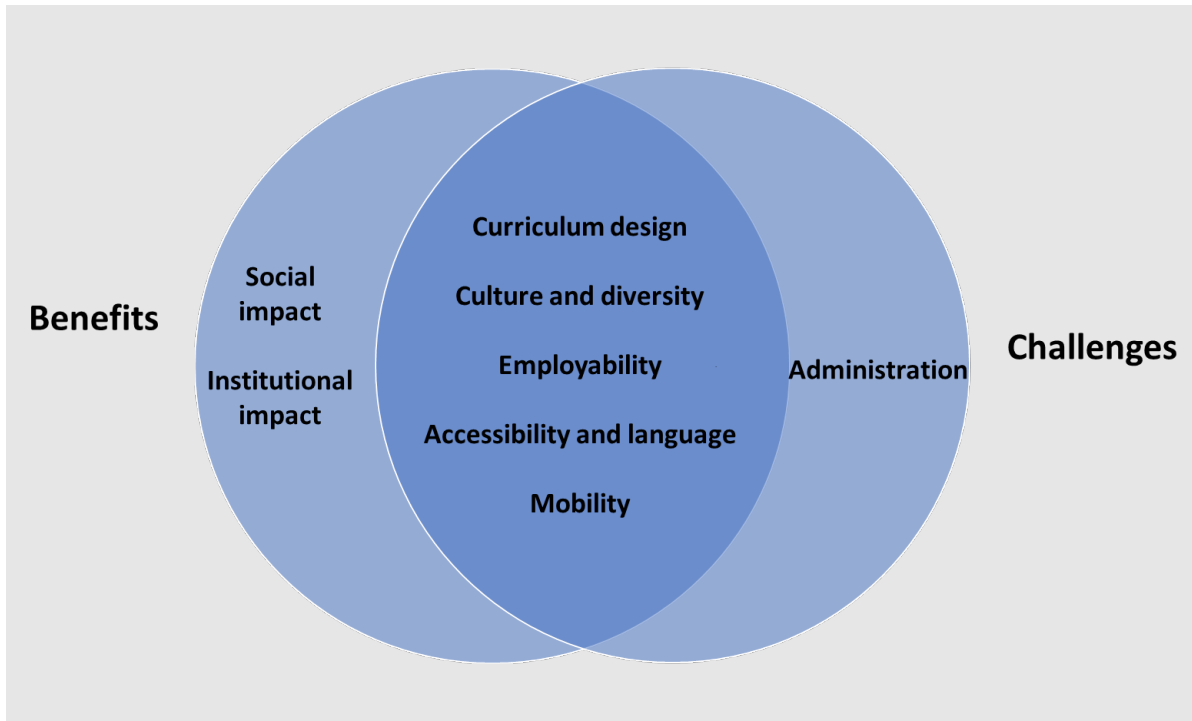
CHARM-EU employs a structured process to designing educational programmes. The pilot CHARM-EU M.Sc. in Global Challenges for Sustainability was used as an initial test of this design process. Key elements to designing a CHARM-EU programme are feedback from students, external stakeholders, and academics. This feedback and consultation ultimately informed the creation of the CHARM Educational Principles.

3.1.1 Student Needs Analysis and Curriculum Fora

At the start of the CHARM-EU curriculum design process, students from each participating university were invited to give feedback at a workshop in the University of Montpellier (October 2019). The aim of the workshop was to gather student perceptions of CHARM-EU curriculum design and teaching and learning strategies. A brief slide presentation was delivered to the students which outlined the basic aspects of the CHARM-EU curriculum design and teaching and learning strategies. They were then asked to answer questions based on perceived benefits and challenges to a CHARM-EU course (see Appendix A for full details).

Figure 2 summarises the analysis of these themes by illustrating which elements of a CHARM-EU course are important from a student's perspective and how they perceive the benefits and challenges related to them. Our analysis also highlights several interrelationships between the key themes.

Figure 2: Key emergent themes from student stakeholders



These themes were used as areas for curriculum design reflection in the latter stages of curriculum design process, in particular when it came to the development of the CHARM-EU educational principles.

3.1.2 Business and Society Forum

On July the 11th 2020, a Business and Society Information Session was held with the aim of strengthening the participation of business and society in the design of a new higher education landscape.

The aims of this session were³:

- To describe the European Universities Initiative and overview of CHARM-EU
- To introduce the Knowledge Creating Teams and external stakeholders
- To provide an overview of CHARM-EU project and pilot Masters

³ Resources from this event are available here <https://www.charm-eu.eu/sites/default/files/2020-08/Final%20Agenda%281%29.pdf> and here https://www.charm-eu.eu/sites/default/files/2020-08/CHARM_EUPresentationsWebinar_22July2020%20_FINAL.pdf

- Question & Answer session
- Gain perceptions of valued skills and competencies by businesses, relevancy of CHARM-EU teaching themes to businesses, and challenges that could be posed to students of importance to businesses.

After the forum, participants were presented with a survey to ask their views on the most valuable skills and competencies for employability and relevancy of certain themes taught in the MSc (e.g. project management, sustainability systems) to their organization.

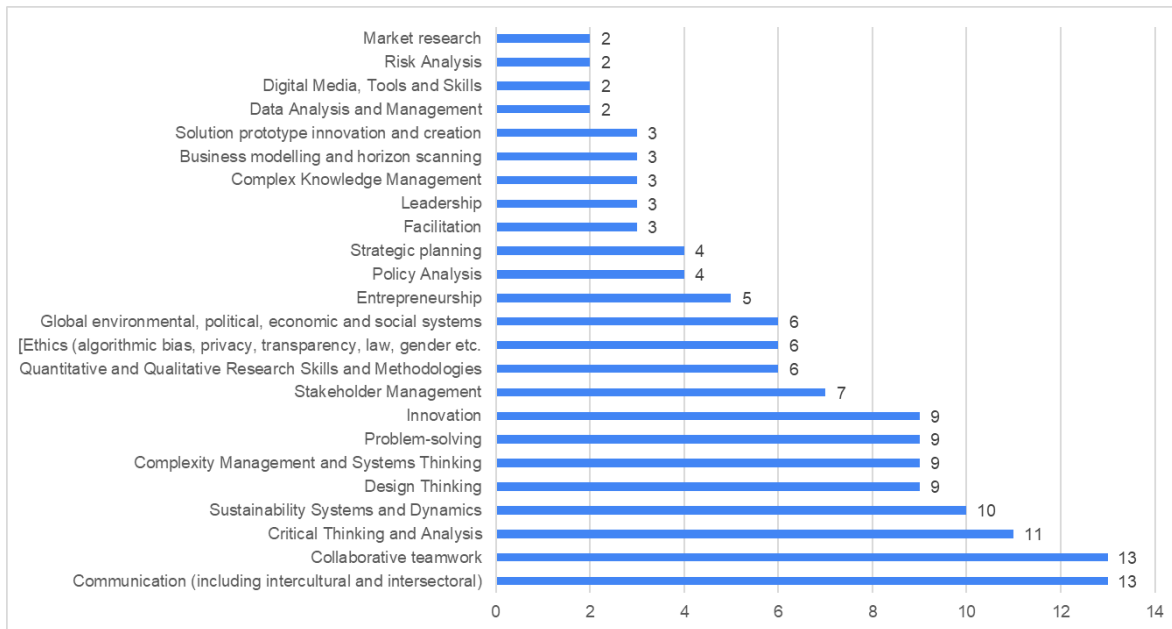
Participants identified that communication, transdisciplinarity, team work, and emotional intelligence were valuable skills for employability.

Figure 3: Valuable skills and competencies for employability in the 21st century as defined by participants



A list of skills which the MSc programme could teach were presented to the participants, and they were asked how relevant these skills would be for them. Communication, critical thinking and analysis, and design thinking as the most relevant skills (see Figure 4). Least relevant skills were identified as market research, risk analysis, digital media, and data analysis. Additional competencies were described by participants including empathy, stakeholder-centered design, coaching, sustainability, and public speaking.

Figure 4: Most relevant skills for businesses taught in the MSc.



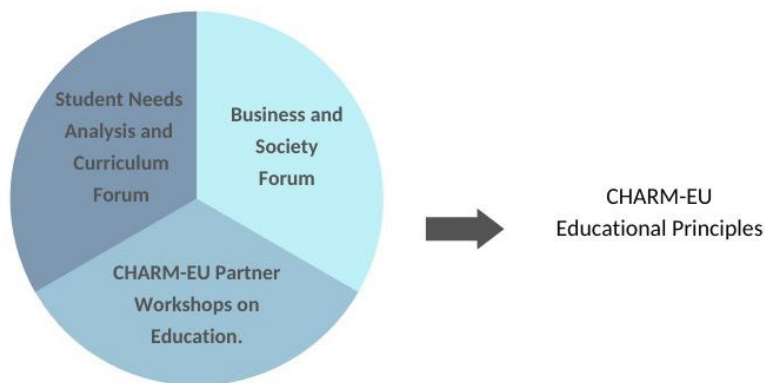
Participants also identified specific challenges related to SDGs which they as a business faced. These included circular economy, waste management, big data, education and food systems.

These responses supported the development of curriculum design and module content.

3.1.3 Educational principles

A series of workshops were held throughout 2019-2020 (Utrecht, June 2019, Budapest, September 2019, and Dublin, February 2020) in which all CHARM-EU partners articulated an educational philosophy, mission, vision and values for CHARM-EU educational programmes. When combined with the feedback provided by students, academic and external actors, ten CHARM-EU Educational Principles were developed that represent the guiding concepts that underpin the design of a CHARM-EU educational experience.

Figure 5: Summary of educational principles development



These principles should be considered and incorporated in every CHARM-EU programme. They were reviewed and revised in March and April 2020 by the Work Package 3 team which included feedback from Work Packages 5 (mobility) and 6 (inclusivity). These principles are presented below along with a brief description.

1. Challenge-driven

The CHARM-EU curriculum is challenge-driven and built on trans-institutional research missions focused on solving global challenges. Students learn through Challenge-Based Learning (CBL), an educational approach that frames learning around global, real-world, authentic challenges. These challenges are co-developed, investigated and acted upon by students and multidisciplinary stakeholders, including academic and extra-academic (social and traditional enterprise) actors.

2. Research-led, research-based

The CHARM-EU curriculum is research-led: it is deeply connected to research strengths and practices of its member research intensive universities. Students are actively engaged with researchers and, through Research-Based Learning (RBL), develop the skills to analyse and interpret information, reach conclusions and, wherever relevant, propose solutions.

3. Sustainability

CHARM-EU educates all stakeholders (students, academic and extra-academic actors) to create solutions “to secure a sustainable, peaceful, prosperous and equitable life on Earth for everyone now and in the future” (UNESCO, 2017). CHARM-EU research and education supports the United



Nations Sustainable Development Goals and key European missions including those in the Horizon Europe Framework Programme and the European Green Deal. Its programmes support the development of UNESCO's Education for Sustainable Development competencies.

4. Technology-enhanced

CHARM-EU explores and implements technology that supports education, didactics, research and pedagogy. This will enhance existing models of learning and develop new models that meaningfully integrate technology in learning. Technology-enhanced learning is not only instructional but paves the way for interaction and knowledge construction through the use of digital technology in education. Technology will be built into the educational experience and used to support flexibility, accessibility and mobility.

5. Student-centred

Students are active partners in independent and collaborative learning and can exercise flexibility in time and location with regards to their learning experience. Students can choose and contribute to challenge pathways as a group or individually to fulfil their professional and educational ambitions and support their personal needs.

6. Situated learning

Students learn through social interaction in authentic, realistic contexts. They participate in networks and/or communities and gradually learn and grow from novices into experts, building their identity throughout their studies. Students learn authentically in close collaboration with partners in a variety of professional environments, for example, research groups and laboratories, enterprise, civic organisations and administrations.

7. Transversal skills

CHARM-EU programmes are designed to provide consistent opportunity for the development of non-specific competences, for example, transversal skills such as critical and innovative thinking, inter- and intra-personal skills, global citizenship, media and information literacy, project management, problem-solving and entrepreneurialism.

8. Transdisciplinarity

Global challenges are complex problems that require input from equally complex networks of individuals and groups to identify and define problems. CHARM-EU is a transdisciplinary university in which all stakeholders – students, academic and extra-academic actors – collaborate equally to



tackle global challenges. Transdisciplinarity develops in students the ability to use theoretical frameworks to analyse complex problems, source and appraise data, assess stakeholder needs, build collaboration and teamwork and create action plans. It is built on the foundation of disciplinary depth, which is central to the CHARM-EU educational mission.

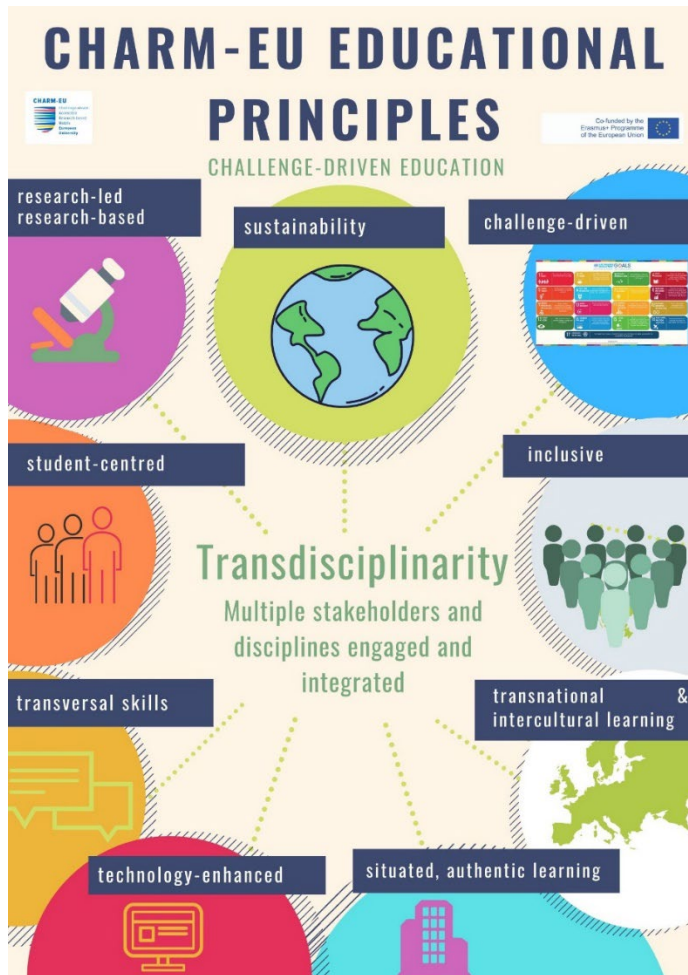
9. Transnational and intercultural learning

CHARM-EU educational programmes provide students as well as academic and non-academic staff with transnational and intercultural learning opportunities through mobility and internationalisation 'at home'.

10. Inclusivity

CHARM-EU educational programmes are designed to respect the diversity of students and are adapted to different students' learning needs and preferences taking into consideration their backgrounds or abilities. They will enable all students to take part in learning and fulfil their potential. Where possible any barriers that prevent students from learning are minimised or removed.

Figure 6: CHARM-EU Educational Principles



3.2 Structuring a CHARM-EU educational programme

Higher educational institutions often deliver undergraduate and postgraduate courses using modules, or self-contained teaching units. Students complete these modules over the period of the award they are seeking to achieve and receive credits on completion (e.g. ECTS). For some courses, modules are organized within a programme structure offering personalized pathways, or using a phased approach. Organizing courses in this way facilitates student autonomy in constructing their own learning pathway, and transforms teaching from supplying students a curriculum, to delivering what they would like to learn. A phased programme structure also emphasises differences in the focus of the modules over time, and facilitates gradual progressive learning.



CHARM-EU uses an innovative three-phased programme structure for teaching and learning; Preparatory, Flexible and Capstone. Each of these phases contain modules designed to align with CHARM-EU educational principles, vision, mission, and values, and programme content guidelines. There can be any number of modules within each phase depending on the nature of the award (i.e. Certificate, Degree or Masters) or availability of modules, but CHARM-EU programmes generally follow this phased approach.

This section describes this structure, the rationale for each phase, and provides examples of modules structured in this way from the CHARM-EU Masters in Global Challenges for Sustainability. Note that this content has been developed via the Programme Content Guidelines⁴.

3.2.1 Rationale for a three phased structure

The rationale for CHARM-EU's three-phased programme structure is based on the following principles:

- **Alignment with educational principles:** CHARM-EU uses ten educational principles to scaffold its teaching and learning; challenge-driven, research-led and research-based, sustainability, technology-enhanced, student-centred, situated learning, transversal skills, transdisciplinarity, transnational and intercultural learning, and inclusivity. The three phased approach supports integration of these educational principles in a structured, continuous, and gradual approach.
- **Gradual acquisition of knowledge, skills and competencies:** Each phase concentrates on competencies, knowledge and skills to support learning outcomes in the subsequent phase. This gradual approach supports student learning across the programme while ensuring alignment with programme learning objectives.
- **Flexibility of choice:** Although modules in the Preparatory and Capstone phases are usually mandatory, the topics and challenges they choose to work on are self selected in order to provide student centred flexibility. In addition, the second Flexible phase allows for students to select modules based on a theme from their own interest and gain depth within a particular problem space (i.e. Water, Food or Life & Health). This supports student centred learning, personalization of learning outcomes, and flexibility.
- **Preparedness for addressing challenges:** By using a phased approach to teaching and learning, students can gradually prepare for the final Capstone phase, where they action

⁴ This document is available on the CHARM-EU toolkit.



knowledge, skills and competencies acquired in the previous phases, to address practical real-life global challenges.

Phase 1: Preparatory

Phase aim: The aim of the preparation phase is to ensure all students receive a common grounding at the beginning of their studies (regardless of location or modality) in key skills and content required for the challenges ahead of them in the programme.

Module focus: Modules in this phase concentrate on transversal skill development to prepare students for a transdisciplinary learning approach in the following phases.

Examples from CHARM-EU pilot Masters in Global Challenges for Sustainability: Modules on Social Innovation, Transdisciplinary Research, and Sustainability are provided for students.

Phase 2: Flexible

Phase aim: The aim of the flexible phase is to provide students with multiple options for learning within CHARM-EU related themes. This allows for self-direction while ensuring programme consistency, disciplinary depth, and coherence. Students are required to select one theme containing multiple modules, and participate in modules within that theme.

Module focus: Modules on the flexible phase are grouped into relevant themes related to CHARM-EU programme content guidelines based on data evidencing research strengths common to or complementing all partners. For example, content related to global challenges or the CHARM-EU vision of reconciling humanity with the planet.

Examples from CHARM-EU pilot Masters in Global Challenges for Sustainability: Three themes, Food, Water, and Life and Health are used in the Masters. These themes contain three modules each, related to these themes. For example, the Food theme contains the modules The Food-Health-Environment Nexus, Food Systems and their Transformations, and Socially Just and Sustainable Food Systems.

Students' progress through these initial two phases, and develop knowledge, skills, aptitudes and competencies required for the authentic final Capstone phase.

Phase 3: Capstone



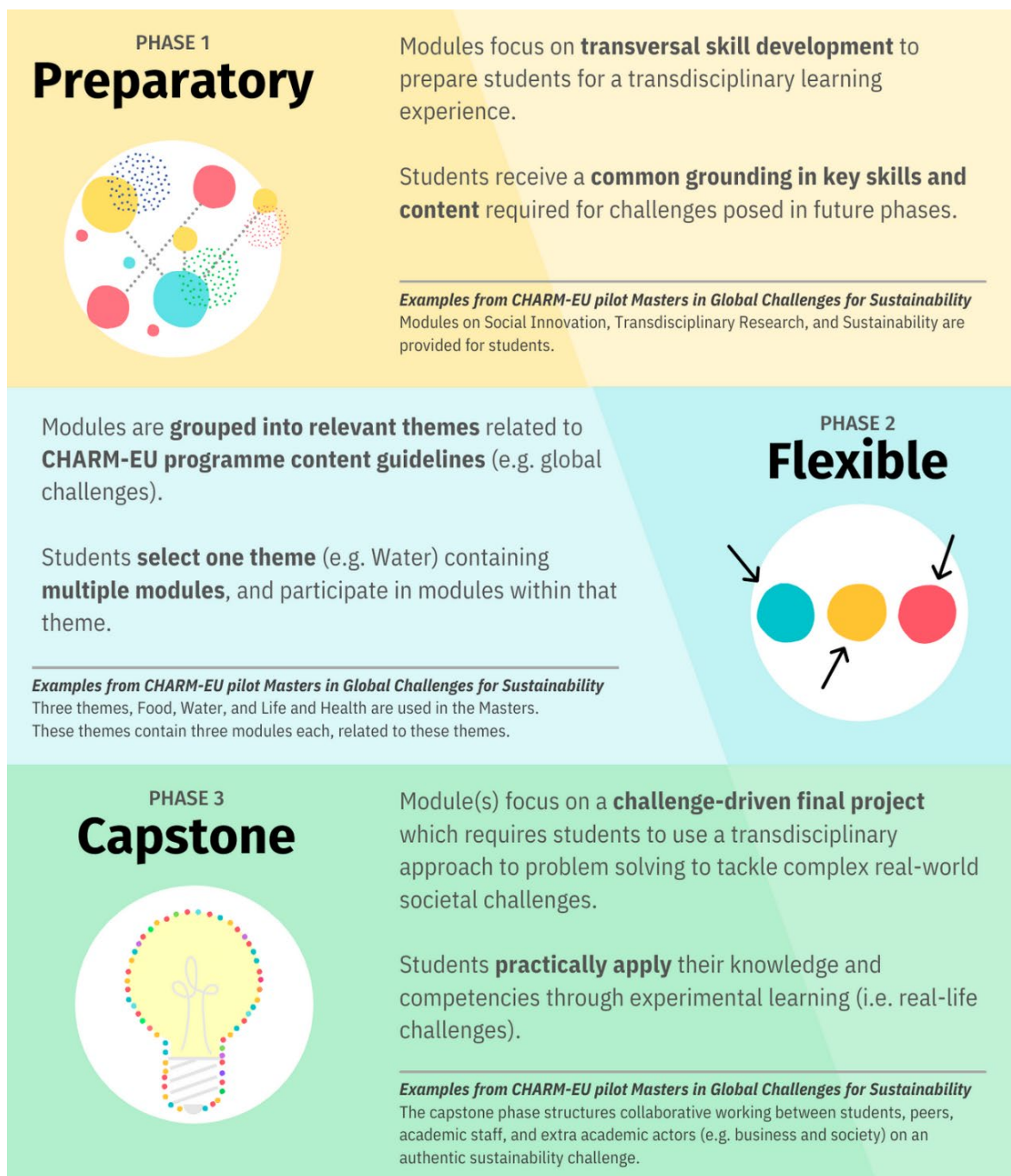
Phase aim: The aims of the Capstone phase include synthesis of prior learning, refinement of skills, development of personal attributes, preparation of students for future careers, facilitation of academic and extra-academic linkages, and quality assurance of graduates via a final challenge-driven project.

Module focus: This phase focuses on a challenge-driven final project which requires students to use a transdisciplinary approach to problem solving to tackle complex real-world societal challenges, while also taking multiple perspectives and stakeholders into account. The students take their previous experiences during the programme a step further by practically applying their knowledge and competencies through experiential learning (i.e. real-life challenges).

Examples from CHARM-EU pilot Masters in Global Challenges for Sustainability: The capstone phase structures collaborative working between students, peers, academic staff, and extra academic actors (e.g. business and society) on an authentic sustainability challenge.



Figure 7: Graphical description of the three phased structure.





3.2.2 Flexible crediting

In the initial scoping of the curriculum design blueprint, flexible crediting was proposed for the pilot MSc programme.

During the Flexible phase, it was anticipated that students could access any module from a selection of modules deemed appropriate by CHARM-EU partners. These modules could be taken at a flexible pace providing inclusion for non-traditional students. Ultimately, these students could accumulate credit from a range of modules, in their own time. Initial research was conducted which identified examples of best practices of flexible crediting in CHARM-EU partner universities including.

- **Master’s at the Graduate School of Life Sciences at Utrecht University**

The Graduate School of Life Sciences at Utrecht University offers two-year research Master’s programmes. These programmes consist of a fixed set of courses (Life Sciences Academy and mandatory theoretical courses per programme), an elective component, and a research part, consisting of two projects and a writing assignment.

When students choose the topic of their research components or when filling their electives, programme coordinators are there to advise and approve the students’ choices. A student can choose virtually any educational component to fill their electives. The electives are used to follow (online) theoretical or (technical) skills-related courses at the UU and outside the UU; to extend research projects or to do an additional small (research) project.

The GSLS Master’s curriculum is designed so that students meet the end terms irrespective of their electives. In other words, the fixed set of courses and the research parts account for all the required end terms. Therefore, students are really free in choosing how they use their elective component.

- **PhD training at the Graduate School of Life Sciences at Utrecht University**

The PhD educational track (20 ECTS) within the GSLS is less intensive and even more free in its design. To help PhD students to choose what courses fit them best the [PhD competence model](#) is developed. Students can do this self-test to define which courses they want to follow. The available courses are categorized in [different types of competences](#). The courses in the course overview are marked in the same categories.

However, during the curriculum design and MSc accreditation process, flexible crediting was deemed out of scope for the pilot MSc. The rationale for this was:

- The accreditation process for the pilot MSc included many diverse and innovative pedagogical and organizational approaches, new to many of the partners as well as a tight



timeline to seek accreditation before the Masters could be implemented and tested. Adding another element of flexible crediting was deemed beyond the scope for the pilot MSc due to time, organizational, quality assurance, national policy, and governance constraints.

- CHARM-EU curriculum design is strongly aligned with its educational principles, an innovative approach to mobility, programmatic assessment, and hybrid teaching methods. Providing a selection of existing partner modules, that could be chosen by students, would require their full redesign to ensure alignment within the CHARM-EU curriculum design (i.e. CHARMification). For stronger integration with key pedagogical needs, it was decided that new modules would be created for the flexible phase, rather than redesigning existing modules.
- Implementing the Challenge Based Educational Principle into the curriculum of the Flexible phase raised the concern of coherency between modules and the consistency of progression of student competencies in terms of the programmatic assessment approach. Therefore flexibility was limited to the selection of themes by the student, where there is internal coherency of both content and assessment across the modules within these themes, avoiding the complexity that would have arisen if students were to select from a larger pool of modules not specifically designed with CHARM Educational Principles at the core.

However, students were provided with flexible choice within the Flexible phase where they could select a theme (containing three modules) within the Water, Food, and Life and Health themes. This allowed for some flexibility of choice by students at a theme level. In the CHARM8 project, WP3 will be identifying Bachelors and MScs modules for potential CHARMification which could potentially be used for flexible crediting.

3.3 Developing CHARM-EU educational programmes

The design and structure of a CHARM-EU programme is used to develop the learning content via Knowledge Creating Teams (KCTs), Programme Learning Objectives (PLOs) and Module Learning Objectives (MLOs).

3.3.1 Knowledge Creating Teams (KCTs)

The unique transdisciplinary nature of CHARM-EU programmes is implemented through KCTs.

A KCT is a collaborative group of academics, educationalists, researchers and extra-academic actors (e.g. traditional and social enterprise, government and community stakeholders) who are engaged to work together within broad societal challenges to create educational content and joint research initiatives. They share a common interest in one of CHARM-EU's thematic areas



(Preparatory, Water, Food, Life and Health, Capstone) and consist of a core team, and an expanded network of industry and community stakeholders.

KCTs analyse and propose problem spaces in which students explore complex societal challenges within a thematic area. They ensure coherency within a phase to demonstrate the three forms of knowledge: 5 target knowledge, systems knowledge, and transformational knowledge. To support their function in educational design, each KCT is supported by an educationalist who ensures that the teams have sufficient pedagogic support to design and deliver programmes that reflect CHARM-EU Educational Principles. In addition, CHARM-EU provides professional development for KCTs in terms of educational principle integration, VLE, assessment and module design.

Members of CHARM-EU KCTs are employed by their home university which resources participation in the KCT Core according to local arrangements.

Aims of a KCT

The aims of a KCT are to

- Build trans-institutional research networks
- Develop and teach transdisciplinary module content, learning activities and assessment methods that deliver on the CHARM-EU Educational Principles and programme learning outcomes.
- Build trans-institutional communities of CHARM-EU stakeholders

Appendix B describes the terms of reference for the CHARM-EU KCTs.

Desired profile of KCT members

Ideally KCT Members are experts within a specific field but also T-shaped generalists⁶ who have the demonstrated or acquired through professional development the competence to negotiate and integrate multiple disciplinary and extra-academic perspectives into research and educational experiences, design and curriculum content.

⁵ <http://www.transdisciplinarity.ch/en/td-net/Transdisziplinarit-t/Zweck-Problemlösen/Drei-Wissensarten.html>

⁶ Guimarães, M. H., Pohl, C., Bina, O. & Varanda, M. "Who is doing inter- and transdisciplinary research, and why? An empirical study of motivations, attitudes, skills, and behaviours." *Futures* 112 (2019): 102441.



They possess the following skills, knowledge and competencies acquired through professional experience and/or through CHARM-EU's Professional Development programme of activities:

- A solid understanding of CHARM-EU Educational Principles
- Sufficient level of proficiency in English and IT skills
- Expertise in innovative delivery, for example, hybrid learning and intercultural classroom dynamics, mentoring, and student facilitation.
- Competency in teamwork and collaboration skills (e.g. open communication, intercultural sensitivity, providing feedback to peers).
- Experience with community-engaged research and teaching.
- Familiarity with implementation science and strategies for maximising research impact.

KCT Staff development

Staff development is a key aspect of ensuring successful implementation of curriculum design. Based on the work of Work Package 3 (Curriculum Design), Work Package 4 (Teaching and Learning) developed and implemented the professional development of CHARM-EU staff. This included formal activities (e.g. workshops), peer learning and feedback (e.g. KCT virtual sharing sessions), community building, resource sharing, and embedding educationalists within the teams⁷.

3.3.2 Developing Programme Learning Outcomes

Programme Learning Outcomes (PLOs) are statements of what CHARM-EU alumni should achieve on successful completion of an educational programme, and are aligned with the educational principles and programme content. These were developed iteratively between Work Package 3 (Curriculum Design), Work Package 4 (Teaching and Learning), Work Package 5 (Mobility), Work Package 6 (Inclusivity) and KCT members for the MSc in Global Challenges for Sustainability as a pilot exercise, and further developed in workshops by academic teachers and extra-academic actors. Designed by CHARM-EU teaching and learning facilitators from the five universities, these

⁷ Research on staff development in CHARM-EU is available in the following publications.

Van Vugt, S.J.H., Gallagher, S.E., van der Riet, A.C. & Haarhuis, J.C.M. (2021) *A Framework for designing Professional Development for Interinstitutional Teaching Programmes in Higher Education: A CHARM European University Case Study* European Association for Practitioner Research on Improving Learning Conference 2021. Online.

Van Vugt, S., Gallagher, S., Riet, A. (2022) *Inter-institutional Professional Development for Academic Teachers in CHARM European University*. European Association for Practitioner Research on Improving Learning Conference. Nijmegen, The Netherlands.

workshops followed best practice in curriculum design for FQ-EHEA Master’s level, national qualifications frameworks, EHEA quality assurance standards, and alignment with the Dublin Descriptors.

- PLO1. Critically analyse and evaluate the concept of sustainability as it is constructed and represented within multiple disciplines and by extra-academic actors. Reflect upon these to understand the relevant ethical issues and the role of active citizenship, in particular within a European context.
- PLO2. In collaboration with extra-academic actors, investigate and evaluate complex societal challenges from diverse stakeholder and intercultural perspectives (including gender) to creatively identify, select and devise robust, adaptable, ethical solutions using a range of methodologies, theoretical frameworks and data analysis tools.
- PLO3. Rigorously assess and integrate different disciplinary and transdisciplinary knowledge and research methodologies to connect research questions, data and findings to their challenges.
- PLO4. Demonstrate expertise in the identification and application of the latest technological tools to source, analyse, handle, use and communicate complex bodies of data ethically.
- PLO5. Formulate an advanced understanding of transdisciplinarity and demonstrate expertise in the facilitative, communicative, reflexive and collaborative skills to support its practice.
- PLO6. Communicate effectively on complex issues that aim for behavioural change, interpreting and connecting complex challenges to diverse stakeholder, disciplinary and intercultural perspectives that encompass global and European citizenship.
- PLO7. Acquire advanced competency within a range of transversal skills such as teamwork, communication, problem solving, creative thinking, entrepreneurialism, innovation, digital skills and a life-long learning disposition.

In addition to the PLOs, PLO domains were also developed to integrate the PLOs into the curriculum, and support assessment of the Master’s programme. A framework for these domains was developed by WP4.6 to help improve integration into teaching. These were finalized by WP4.6 in May 2021.

Figure 8: CHARM-EU PLO Domains



KCTs can indicate which learning activities and assessments are related to specific PLO competencies. These are the backbone for the E-portfolio and assessment procedures to align with the Rules and Regulations.

Table 1: Example of integration of learning activities with PLO domains

Module 1	Learning activity/assessment	PLO Domains		
Week 1 Day 3	Essay	7. Professional and personal development	2. Transdisciplinarity	3. Challenge solving

Week 2 Day 1	Tutorial	1. Sustainability	2. Transdisciplinarity	5. Communication
Week 3-5	Team assignment	4. Collaboration	5. Communication	6. Scholarship
Week 7 Day 2	Lecture	1. Sustainability	2. Transdisciplinarity	8. Digital literacy

The PLO domain framework, containing information about PLOs has been developed to simplify integration. This was as a result of feedback from teaching staff about difficulties in implementing the PLOs. Rubrics have also been developed by WP4 to help align the PLOs to programme content and support assessment.

3.3.3 Developing Module Learning Outcomes (MLOs)

Module Learning Outcomes (MLOs) are detailed descriptions of knowledge, skills and attitudes that students learn in each module. Developing MLOs for the CHARM-EU MSC was a collaborative activity between Work Package 3 (Curriculum Design) and Work Package 4 (Teaching and Learning) involving KCT members and external stakeholders.

The process for developing MLOs was part of a larger process for developing module content by KCT members. This process included:

- Initial templates and roadmap resources to guide KCTs on developing module content, including MLOs, were shared with KCT members from each module. These resources helped KCTs align the MLOs with CHARM-EU vision and mission, PLOs and educational principles.
- Content analysis questionnaires were shared with KCT members to determine critical skills and knowledge required by students. The results from these questionnaires were used to scaffold module design and MLOs.
- Multiple content creation workshops were held where KCTs were facilitated by CHARM-EU educational experts in writing MLOs, and shared their module designs with other KCTs.
- Module design sprints where KCTs refined their module content.
- Draft MLOs were shared with the KCT expanded network, extra-academic actors and students.
- Module advisory boards, composed of CHARM-EU educational experts and internal Work Package teams, to ensure alignment with PLOs and educational principles.



This process was supported by a range of guidance documentation based on the PLOs and educational principles to facilitate MLO development. More information about the MLOs generated for the MSc is available in the CHARM-EU Programme Structure.

4. CONCLUSION

Based on the work of the KCTs, scaffolded via the educational principles, PLOs, MLOs Programme Content Guidelines, and three phased structure, the curriculum design for the MSc in Global Challenges for Sustainability was developed.

An broad overview of the MSc is available in a simplified version here, and a more detailed version here (4.2). A Capstone phase handbook is also available as an example of an output of this curriculum design.



5. APPENDIX A: STUDENT NEEDS ANALYSIS DETAILS

A brief slide presentation was delivered to the students which outlined the basic principles of the CHARM-EU curriculum design and teaching and learning strategies. The students were then broken into groups of about 5 students, one from each institution as far as possible. They were then asked to answer questions based on perceived benefits and challenges to a CHARM-EU course

1. What are the main goals/benefits for students of doing a CHARM-EU course?

In groups please list as many of the student goals or benefits that you can think of:

Why would you want to do a course like this?

What is attractive about it?

How would it benefit you in your future?

2. What are the main worries or issues about doing a CHARM-EU course?

Why would you concern you about doing course like this?

What would need to be in place to reassure you about these courses?

What are the main factors that would influence your decision to apply for a CHARM-EU course?

After each round of presentations, the students were asked to circulate around the groups and informally vote for the goals/benefits and worries/issues that they personally considered most important.

These data were entered into NVivo, where a qualitative analysis was conducted to explore the most common emergent themes.



6. APPENDIX B: KNOWLEDGE CREATING TEAMS TERMS OF REFERENCE

These Terms of Reference are a road map for KCT members and contains clear, specific information on how KCTs are recruited, organised, their role, who their members are, and when and why they meet.

<p>Overview (definition of what is a KCT)</p>	<p>A Knowledge Creating Team (KCT) is a collaborative group of academics, researchers and extra-academic actors (e.g. traditional and social enterprise, government and community stakeholders) who are engaged to work together within broad multi-disciplinary themes to create educational content and joint research initiatives.</p>
<p>Purpose and key deliverables (why the KCT was created) (Describe the requested/required KCT output)</p>	<ul style="list-style-type: none"> ✓ KCTs will work collaboratively to define problem spaces within broad themes that align with the research priorities of CHARM-EU. For the pilot masters for example, it will be one of the following broad themes: Food, Water and Life/Health. ✓ KCTs will co-create inter/transdisciplinary modules to educate students on problem spaces. ✓ KCTs will contribute to the design of programmes. ✓ KCTs will contribute to the design of micro-module pilots. ✓ KCTs will organise annual fora in their thematic, gathering students, extra-academic actors and academics to adjust the content of the modules (opening new/closing old/modifying) and to enrol new experts within upcoming thematic challenges.



<p>Membership</p> <p>(Different types of members; number of members, if relevant; how members are appointed; how facilitators are appointed)</p>	<ul style="list-style-type: none"> ✓ Each KCT comprises a minimum of 10 core members and an undetermined number of members in the Expanded Network. ✓ Each institution will deliver to WP3 a list of experts that fits into the theme of the KCT. ✓ Each institution will determine their own selection methodology for KCT membership. ✓ WP3 members, from the list of experts, will establish the composition of the Core looking out for diversity of profiles (researchers, educationalists, ...) and diversity of skills and fields of knowledge. ✓ KCT Expanded Network includes internal stakeholders (academic and research), extra-academic actors (student, traditional and social enterprise, government and community stakeholders) and other experts proposed by the institutions to the WP3. ✓ The above members can be recruited by other KCT members from their networks.
<p>Roles and responsibilities</p> <p>(what the KCT will do)</p> <p>NB: This is the mission of the KCT as a team. A given KCT member may endorse only some of the following roles, depending on his/her specialty/competences.</p>	<ul style="list-style-type: none"> ✓ Develop and deliver coherent educational programmes where students achieve programme learning outcomes in line with CHARM-EU Educational Principles. ✓ The core KCT should utilize their network to engage internal and external stakeholders to form the expanded KCT. ✓ Teach and assess students once masters and other programmes are established. ✓ Sign-post knowledge for students to support self-directed learning. ✓ In close collaboration with the P1CT, propose integrative theories and frameworks e.g. Systems Theory, Complexity Theory to support challenge-driven inquiry. ✓ Ensure modules are deliver on the program learning outcomes. ✓ Ensure alignment of learning outcomes, competencies, activities/work forms and assessment.



	<ul style="list-style-type: none"> ✓ Take part in the organisation of an annual thematic forums to adjust educational content and research initiatives to new challenges.
<p>Meetings/Operation (what method / approach to working will you adopt (for example a shared learning approach))</p>	<ul style="list-style-type: none"> ✓ Core members will be trained on CHARM-EU Educational Principles and programme structure. ✓ WP3 will facilitate the necessary meetings and connections between the KCT and other WPs. ✓ Core members will meet regularly and organise necessary meetings with other KCT members. ✓ The KCT Facilitator will have meetings with other KCT Facilitators. ✓ WP3 will provide a clear roadmap, timeline and tasks. ✓ KCT members will share documents and resources via a learning space created by WP4. Core members will have editing permissions. ✓ KCTs will contribute to the work of WP7 in piloting materials and exemplar learning experiences.
<p>Facilitator (knowledge broker)</p>	<ul style="list-style-type: none"> ✓ Core KCT members will nominate the Facilitator of the KCT, who will ensure a flat organisational structure within the KCT. ✓ The Facilitator will report to WP3 and WP7 on, and be responsible for, progress and deliverables. ✓ The Facilitator will have administrative support. ✓ Facilitator will keep contact with coordinators of other WP if necessary and with the Facilitator of other KCT.
<p>Reporting (Describe whom the committee will report to, in what format, how often)</p>	<ul style="list-style-type: none"> ✓ KCTs will report to WP3 after each meeting with minutes and actions. ✓ KCTs will write a <i>White Paper</i> on the results of each annual thematic forum and will provide it to the WP3 coordinating team.
<p>Expenses</p>	<ul style="list-style-type: none"> ✓ Each university will decide the available resources for their KCT members.

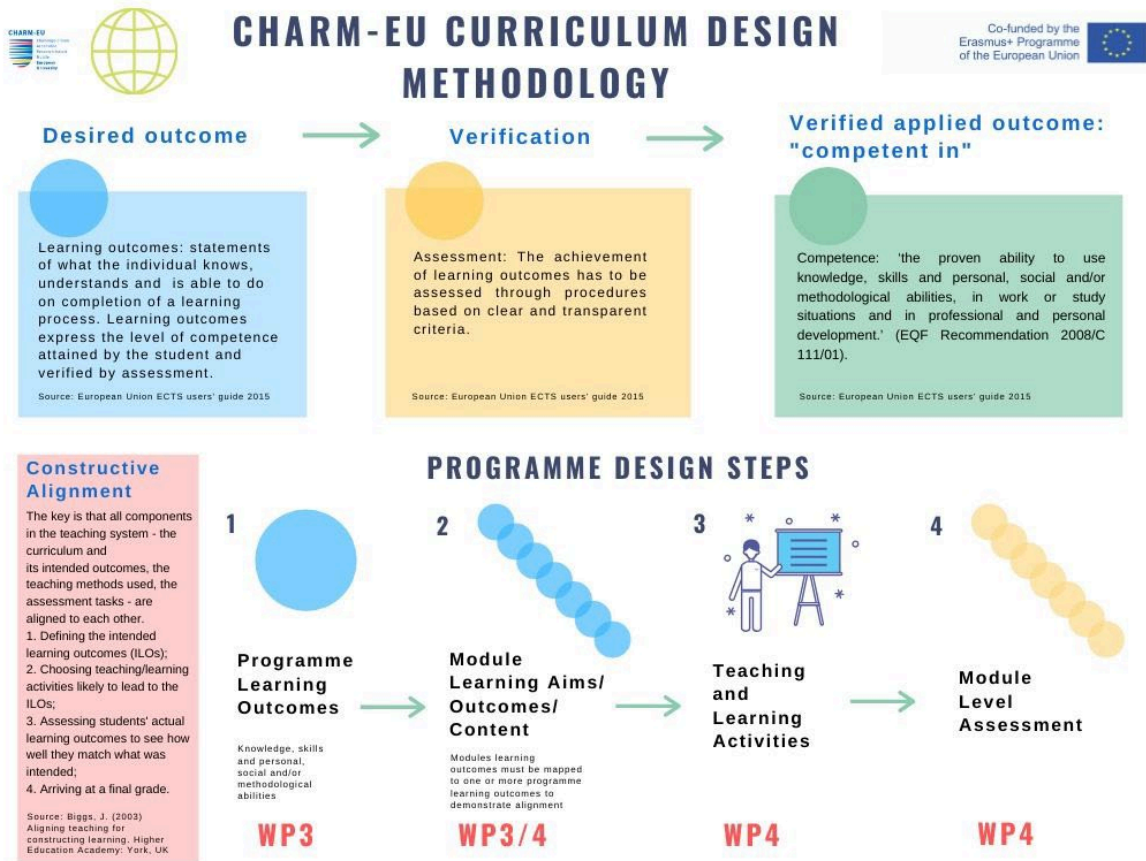


	<p>✓ Costs of the KCTs, if any, are borne by each university.</p>
<p>Term (period of time or start and end date)</p>	<p>For the Masters design:</p> <p>✓ Core and expanded KCT: from May to July 2020</p> <p>For the Master Pilot program (which runs from September 2021 – February 2023).</p>

Final note: Requirements or other circumstances can change over time and it will be necessary to periodically review the KCT ToR by WP3 members. KCTs will perform a bi-annual evaluation of their progress in association with other work packages.



7. APPENDIX C: INITIAL CURRICULUM DEVELOPMENT DESIGNS





CHARM-EU CURRICULUM DESIGN METHODOLOGY: EXAMPLES

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