Inclusive education on low-tech for a sustainable future

June 20th, 2023

low tech +
sustainability

LEARNING IN LOW-TECH TO PROMOTE SUSTAINABILITY

Table of contents

1.Partners and Erasmus

- **Erasmus + KA220 HE**

- **Duration : 2021 - 2024**

- **Partners**

2. Objectives of the project

Main objective : raise awareness on low-tech among a large panel of European students through widely open hackathons

- Improve students' awareness about the **Low-Tech ecosystem fostering** a cultural and social dialogue that promotes **cross-fertilization, inclusiveness** and places the question of **needs** at the heart of their future occupation.
- to provide the students willing to go further the capacity to undertake **entrepreneurial** adventures on convivial, sustainable and useful solutions
- design, test and validate an innovative and highly **replicable hackathon**
- improve **inclusiveness** in the process of appropriation and design of technology by the population with higher participation and awareness among women, high school students/schoolchildren in the countryside or the general public.

2. Our definition of Low-Tech

"**A value system** to develop a **paradigm** focused on creating **appropriate and accessible** solutions that reflect, critique and generate new approaches to use **less resources** while responding to local needs (in a simple way) to create a more **sustainable and inclusive reality**."
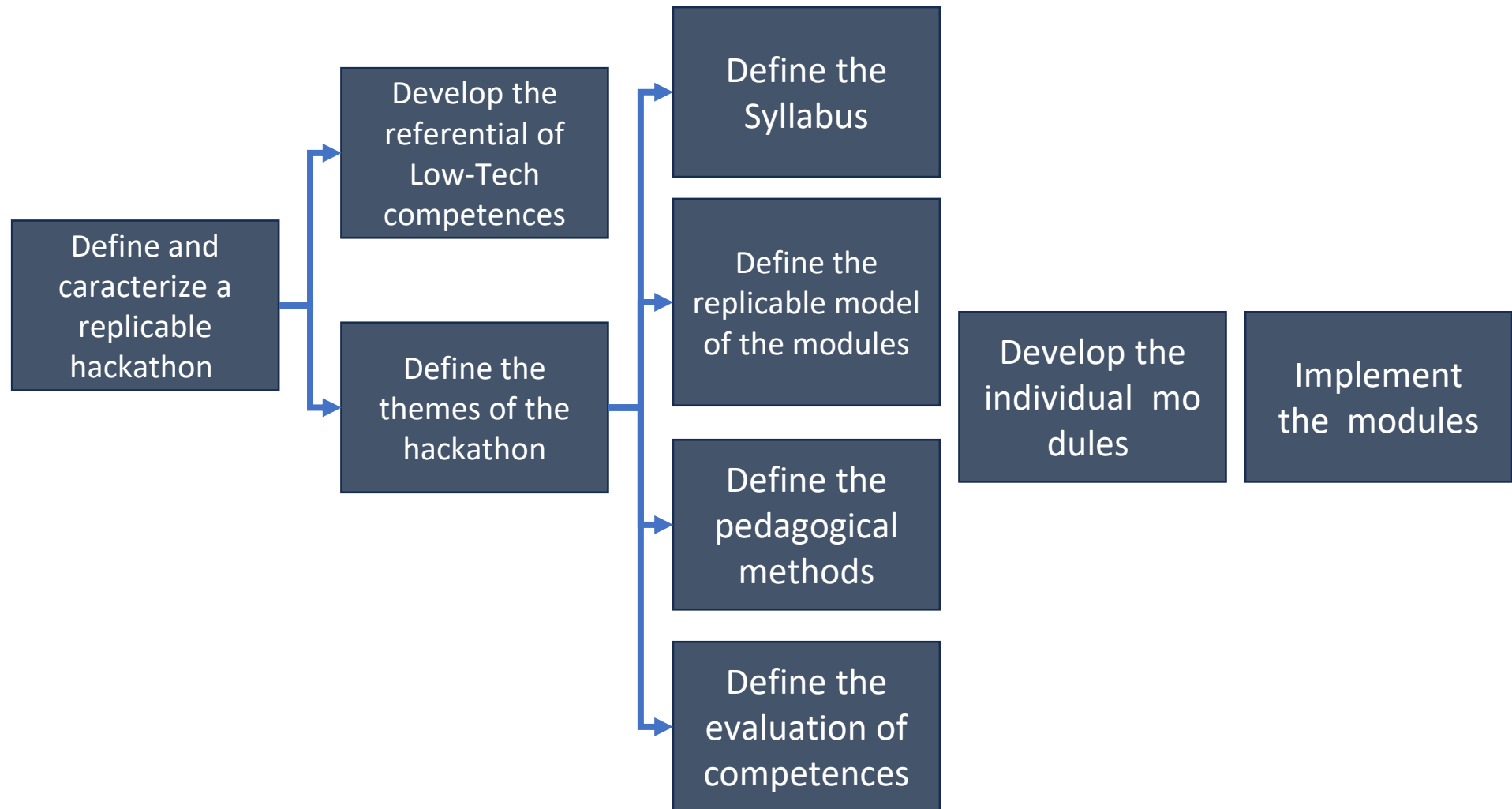
2. Objectives of the project

Work Plan	Leader	Start	End
End-users requirements analysis	ENSE3	1	9
Analysis of the requirements of teachers and students for Low-Tech courses in Higher Education	ENSE3	1	3
Analysis of the needs of the professional sector	UTT	1	3
Benchmarking of existing Low-Techs pedagogical material and identification of gaps	ENSE3	1	9
Identification of external participants to be included in the construction of the methodology	LTLG	1	9
Replicable pedagogical methodology for low-tech education	UMONS	3	36
Pedagogical methodology specifications and definition	UMONS	3	4
Creation of the pedagogical methodology	UMONS	4	18
Project methodology improvement and validation (based on feedback from implementation)	ALDV	19	36
Development of the Hackathon course modules	UTT	3	15
Development of the Course on Low-Tech entre/intrapreneurship	UTT	3	18
External evaluation of the contents	LTLG	17	19
Project course content improvement and validation (based on feedback from implementation)	TU Dublin	20	36
First implementation in partner universities and feedback	ALDV	16	36
Demonstration of the hackathon and course on low-tech	ALDV	16	30
Organisation of the final common event with all partners	UTT	30	33
Analysis of the feedback from students and pedagogical team	ENSE3	31	34
Edition of guidelines and recommendations for future implementations	TU Dublin	33	36
Sharing and promotion	LTLG	1	36
Dissemination of the project results (website, knowledge dissemination platforms and events)	LTLG	1	36
Exploitation and follow-up after project life	UMONS	24	36
Cooperation and networking activities with European universities and associations	TU Dublin	1	36
Project Management	UTT	1	36
Administrative and Financial management	UTT	1	36
Day-to-day management	UTT	1	36
Quality assurance and data management	UTT	1	36

2. Objectives of the project

- **Results (Deliverables) :**
  - D1. End-users requirements analysis
  - D2. Replicable pedagogical methodology for low-tech education
  - D3. Tailored higher education pedagogical material on low-techs, all the LT4SUSTAIN pedagogical content for the low-tech hackathon and low-tech course
  - D4. Implementation of the courses in partner Higher Education Institutions

20/06/2023

3. Replicable pedagogical methodology for LT education

Define and caracterize a replicable hackathon

Develop the referential of Low-Tech competences

Define the themes of the hackathon

Define the Syllabus

Define the replicable model of the modules

Define the pedagogical methods

Define the evaluation of competences

Develop the individual modules

Implement the modules

3. Syllabus

- **S1 : Introduction to Sustainability**
- **S2 : The art of simplicity**
- **S3: Open Design (Openness, Accessibility, Inclusion)**
- **S4 : The 3R's (Reliability, Repairability, Resilience)**
- **S5 : Trade-offs between design objectives – Effectiveness- Efficiency - Sobriety**
- **S6 : The Imperative of Responsability**
- **S7 : Entrepreneurship**
- *S8 : Territorial diagnosis*

Introduction to sustainability

Santiago PEREZ and Tatiana REYES, UTT

20th of June 2023

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LEARNING IN LOW-TECH TO PROMOTE SUSTAINABILITY

Module objectives

- The module focuses on the following main aspects:
- (i) the definition of sustainability and the most relevant social and environmental sustainability assessment methods/tools.
- (ii) system thinking approach applied to current socio-ecological issues.
- (iii) reflection on the history and evolution of "Technology" and "Technique" and their role in developing low-tech(s).
- (iv) the role of today's geo-political aspects (stakeholders, economic interests, institutional agendas...) affecting the development of sustainable practices.
- (v) ethical aspects and societal values in the context of sustainability.

Learning outcomes

- **LO 1.** Using a multi-criteria and systemic perspective, the participant should be able to understand and explain the causes and consequences of the current socio-ecological crisis.

- **LO 2.** Understand the fundamentals of the Design for Sustainability (DfS) framework.

- **LO 3.** Using the DfS framework, the participants should be able to generate scenarios for Low-Tech development.

- **LO 4.** Develop a critical approach of technology to identify the most relevant ethical and responsible engineering practices to develop sustainability strategies for the development of Low-Tech.

- **LO 5.** Take a reflective look at the history and evolution of "technology" and "techniques".

- **LO 6.** Understand the Planetary boundaries and the Doughnut Economics approaches and reflect on their relationship with the development of low-tech.

- **LO 7.** Understand and use the most relevant social and environmental sustainability assessment methods/tools.

Indicative syllabus

- **ST 1.** Why is sustainability a wicked issue? What are the planetary boundaries and the Doughnut Economics, and how can we use them to understand sustainable practices?

- **ST 2.** What are the social (economic?) and environmental sustainability assessment tools we can use today? How do we choose the most relevant one(s) according to the context?

- **ST 3.** What is the relationship between sustainability and low-tech development? Can one contribute to the other?

- **ST 4.** What is the Design for Sustainability (DfS) framework? How can we use the DfS for developing low-tech sustainable solutions?

- **ST 5.** Using the most relevant sustainability frameworks, what types of low-tech scenarios can we propose?

- **ST 6.** How do we communicate assertively the complexity of the relationship between sustainability and low-tech?

Learning and teaching methods

Learners will engage with this module in different ways:

- Lectures on the topic: different experts on the subject will intervene as speakers in a series of lectures throughout the duration of the module.

- Practice based methods: workshops related to the topics, developed and taught by experts. Exercises fir putting in practice the theory learnt.

- Self-directed work: homework and preparation for presentations and quizzes. Material from the lectures and workshops will be available through a virtual platform.

The Art of Simplicity

John Walsh, TU Dublin

20th of June 2023

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LEARNING IN LOW-TECH TO PROMOTE SUSTAINABILITY

Aims & Objectives

01.
Provide learners with a broad understanding of the concept of Low Tech and its application in the context of sustainability.

02.
Equip students with the knowledge & understanding required in order to assess Low Tech solutions and evaluate their appropriateness in a given context.

The Art of Simplicity

03.

The module further aims to develop the learner's appreciation of Low Tech solutions from an aesthetic and philosophical context.

The Art of Simplicity

Learning Outcomes

01.

The Bigger Picture:

Understand the meaning of Low Tech in the broader context of Sustainability

The Art of Simplicity

Learning Outcomes

Retro
Technology

DIY

Ease of
Recyclability

Hand Made

Design for
Longevity

Passive
Design

Minimalism

Slow Tech

Traditional
methods

The Art of Simplicity

02.

How Can Low Tech Help?

Understand the value that Low Tech solutions can offer to ecological problems

The Art of Simplicity

The Art of Simplicity

03.

What is Low Tech?

Question and understand the spectrum of what can be considered as Low Tech

The Art of Simplicity

The Art of Simplicity
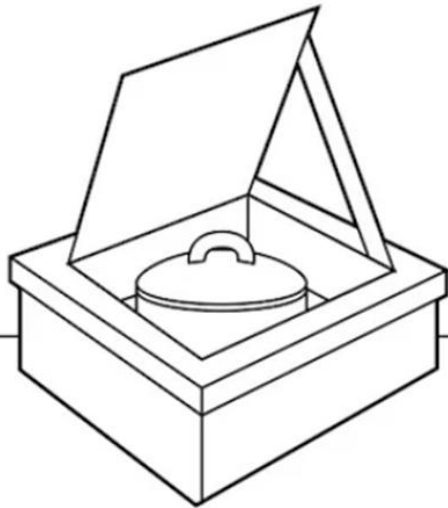
Learning Outcomes

The Art of Simplicity

04.

Is Low Tech Always Best?
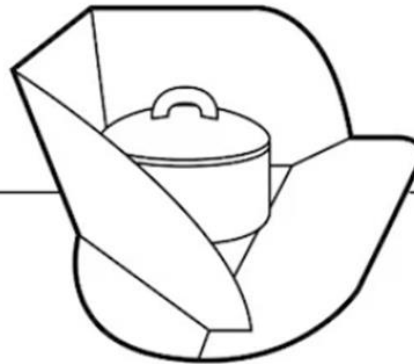
Critically evaluate the appropriateness of
Low Tech solutions to a particular problem

Learning Outcomes

Solar Oven

Panel Cooker
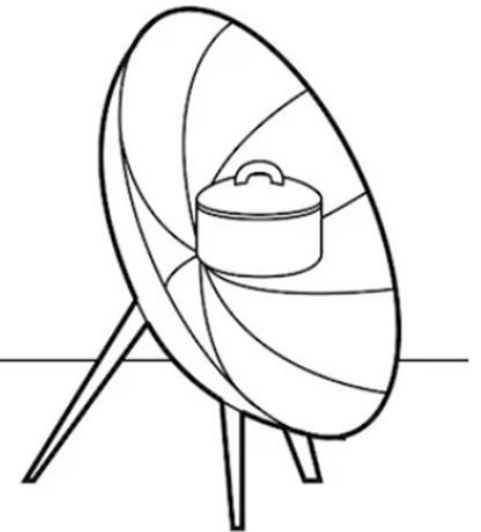
Parabolic Solar Cooker

05.

The Art of Simplicity

Understand the value of Low Tech solutions from an aesthetic and usability perspective

Learning Outcomes

Good Design is as little design as possible

The Art of Simplicity

The Art of Simplicity

06.
Analyse & Critique
Engage in critical discourse around the topic of Low Tech

07.

Ideate Solutions:
Use the knowledge acquired to conceptualise low tech solutions to a given problem

Indicative syllabus

ST 1. What is Low Tech? Different definitions, applications and contexts of Low Tech.

ST 2. What can Low Tech Do? What are the ways that Low Tech can contribute to a more sustainable living?

ST 3. Can High Tech be Low Tech? What are the different contexts for defining a solution as low tech?

ST 4. Is it really useful? How do we evaluate Low Tech solutions to ensure that they are contributing to a more sustainable world?

ST 5. Less is more, Good Design is as little design as possible. How can we develop appreciation for the value of simplicity.

ST 6. Using what we know. How can the concept of Low Tech be applied to real world problems

Learning methods

- **LEARNING AND TEACHING METHODS**

- **Asynchronous- Students will be able to access some materials and resources to work at their own pace**

- **Synchronous- Students will learn in real-time with classes/ lecturers delivered online or in person**

- **Practice-Based Workshops- Students work in teams to apply, practice and develop the skills and knowledge**

- **LEARNING HOURS**

- **20 hrs, online lecture content**
- **35 hrs Product Case Study**

- **10 hrs online assessment**
- **35 hrs Hackathon Project work**

- **REQUISITES**

- **Low Tech Sustainability Module**

Open Design
Openness, accessibility, inclusion

Sacha Hodencq – Low-Tech Lab Grenoble

20th of June 2023

low tech + sustainability

LEARNING IN LOW-TECH TO PROMOTE SUSTAINABILITY

Module objectives

- **Introduce an open design approach as a design open for:**
  - **studying**
  - **modifying,**
  - **replicating**
  - **repairing.**

- **It can be applied to an item, a system or an organisation.**

- **The learner will engage with the course contents through theoretical inputs as well as putting in practice documentation, dissemination and community governance.**

Learning outcomes

LO 1. Choose a relevant **open licence** and a relevant dissemination process

LO 2. Understand the accessibility in terms of knowledge, skills, tools, finance of a project/system and the concepts of **Universal & Inclusive Design**.

LO 3. **Understand** the interests and practices of open documentation

LO 4. **Select** relevant open practices and justify this choice

LO 6. **Criticize** existing practices of openness and governance

LO 6. Write a relevant and complete **documentation** for studying, using, modifying, replicating and repairing a solution.

LO 7. Provide accessible **dissemination** contents

LO 8. Understand community held knowledge systems and how to **share and promote** knowledge for collaboration.

LO 9. Understand the concept and practices of the "**Commons**".

Open Basics

Documentation and dissemination

Community governance

Learning methods

Activity Type	Activity Description	Hours
Lecture	Introducing lectures about context and stakes, and domain specific inputs	8h
Debate	Debate about the interest and limits of openness	2h
Project	Actual project documentation as well as governance and dissemination set up, partly self-directed	10h
Workshop	Debriefing session with a popular education method helping students to adopt multiple points of view	3h

Assesment & requisites

- **Assesment**

Documentation contents

Individual interview
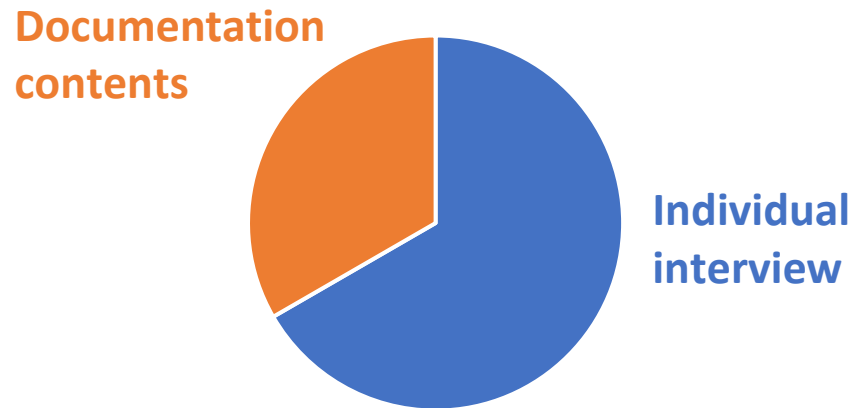
- **Requisites:**
    - Computing basics,
    - Ongoing project,
    - Communication and trust framework.

The Three R's

Ceri Almrott, TU Dublin

20th of June 2023

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LEARNING IN LOW-TECH TO PROMOTE SUSTAINABILITY

Module objectives

- **This module aims to provide learners with a broad understanding of the sustainability concepts of Reliability, Repairability and Resilience within the context of low-tech development.**

- **It will equip students with the knowledge required to understand, analyse and assess low-tech projects and engage with theoretical models of the Three R's.**

- **Learners will be able to apply this theory to their project work to prove their understanding and improve their low-tech practice.**

- **The module content will consist of teaching material and resources that educators can use in a blended format as described above and modified to suit the needs of the student cohort.**

Learning outcomes

Reliability

- **LO 1.** Describe material properties in terms of their appropriateness for longevity.
- **LO 2.** Understand the relationship between durability and material efficiency
- **LO 3.** Understand the concept of Design for Reliability within the low-tech context

Repairability

- **LO 4.** Understand the concept of design for repair and how it can be applied in Low   Tech projects
- **LO 5.** Explain the benefits of the right to repair and its integration within Low-Tech development
- **LO 6.** Develop an applicable design for repairability.

Resilience

- **LO 7.** Understand and explain the concept of Emotionally Durable design
- **LO 8.** Develop solutions which can continue to function after abnormal events & uses
- **LO 9.** Undertake a user analysis and explain the core functions of a designed system to identify opportunities to improve its resilience.

Indicative syllabus

- **ST 1. What is reliability? How is it defined and how do we prioritise it?**

- **ST 2. Strategies for designing reliable low-tech solutions**

- **ST 3. Design for repairability, strategies to consider in low-tech solutions**

- **ST 4. The Right to repair and how to design products that enable it**

- **ST 5. How to understand the system and use this to develop resilient solutions.**

- **ST 6. Emotionally Durable Design**

- **ST 7. Material choices and their role in reliable and resilient design solutions**

Learning methods

- ## LEARNING AND TEACHING METHODS

  - **Asynchronous- Students will be able to access some materials and resources to work at their own pace**

  - **Synchronous- Students will learn in real-time with classes/ lecturers delivered online or in person**

  - **Practice-Based Workshops- Students work in teams to apply, practice and develop the skills and knowledge**

- ## LEARNING HOURS

  - **20 hrs, online lecture content** • **35 hrs Product Case Study**

  - **10 hrs online assessment** • **35 hrs Hackathon Project work**

- ## REQUISITES

  - **Low Tech Sustainability Module**

Trade-offs between design objectives - Effectiveness - Efficiency - Sobriety

Benoit Delinchant, Sarah Manciot, Jean François Béteau, Laurent Jossic, Tarik Larja, Céline Bourgeois, Nicolas Manteaux
Grenoble INP - ENSE3

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LEARNING IN LOW-TECH TO PROMOTE SUSTAINABILITY

Module objectives

- **We are addressing 3 complementary aspects :**
  - **effectiveness** : doing the right things
  - **efficiency** : doing things the right way
  - **sobriety** : consuming ~~impacting~~ as few as possible (for essential things)
- **Based on use cases**, student will learn why it is required to balance between these 3 dimensions
- They will learn methods to adopt a **user oriented approach,** especially to question user needs and to model their preferences.
- They will learn how to conduct a **critical assessment** based on **qualitative and quantitative criteria**
- They will develop a choice strategy based on **multicritera decising making**

Learning outcomes

- **define and understand interaction between efficiency, effectiveness and sobriety criteria**

- **define the user needs and satisfaction levels**

- **conduct a critical evaluation based on qualitative and/or quantitative criteria**

- **understand and experiment the strategies to improve criteria**

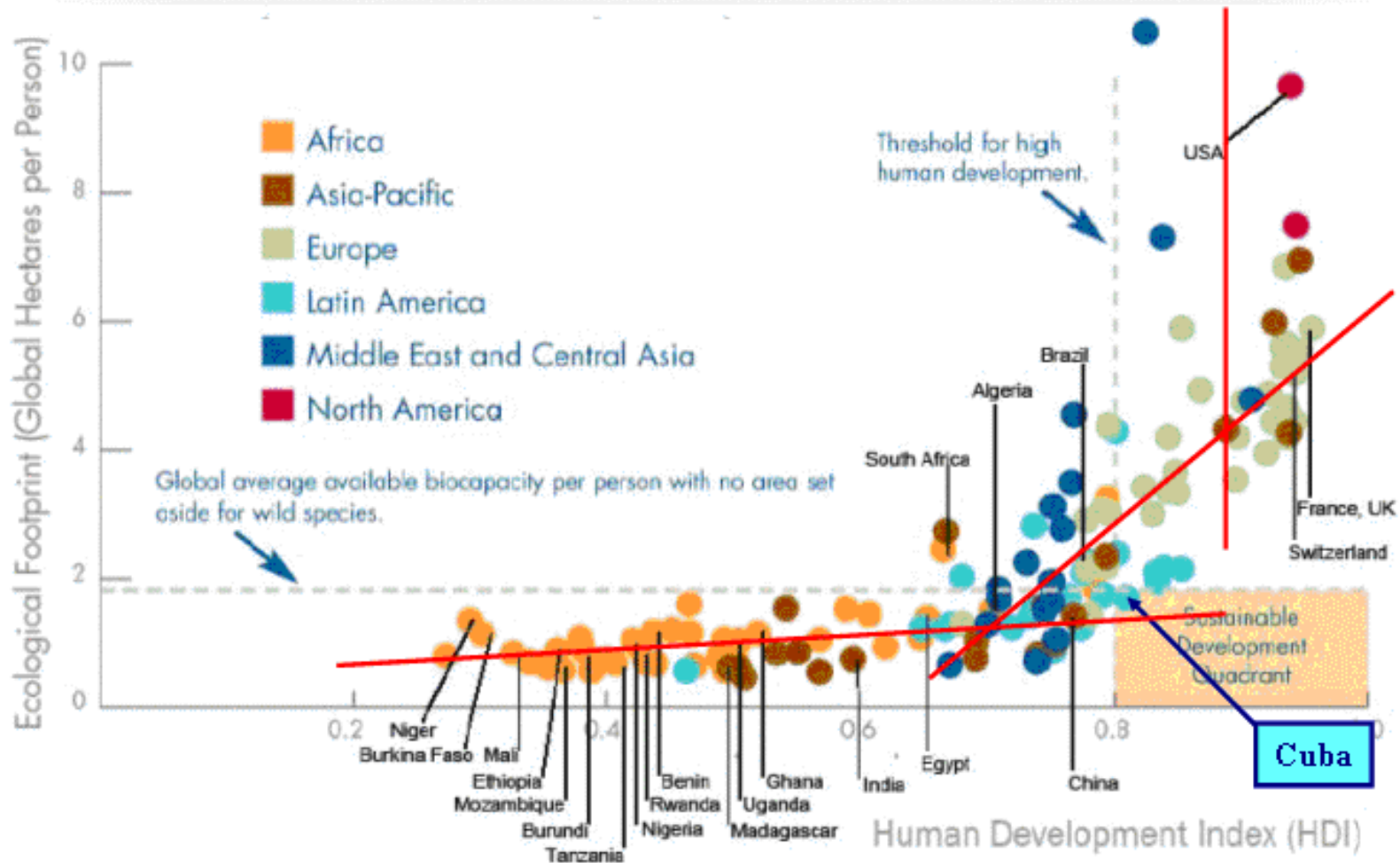# Find and understand design criteria and designer constraints

- **Fixie bike**

- **Full carbon bike**

https://maxfitnessplus.com/cheap-fixie-bikes-top-reviews/

https://www.mensbestguide.com/2018/10/15/5-high-tech-bikes-kill/

trade-offs and minimum requirements

51

Indicative syllabus

ST 1.	**Understanding criteria** • **Effectiveness** : Planned outputs have been implemented. The effects obtained are consistent with the objectives and expected effects • **Efficiency**: what resources (material, human, financial, etc.) were effectively mobilized? Are the effects obtained in adequacy with all the means mobilized? Could the same results have been achieved at a lower cost? • **Sobriety**: Questionning the needs. Lambert Energy Index / Human Development index VS Energy consumption
ST 2.	**Analysis of case studies** Based on bicycle analysis (ball bearing efficiency. Car VS Bike… Counter-efficiency (Illitch radical monopole). Other the rebound effect study cases (Jevons' paradox).
ST 3.	**User oriented approach** 1. How to questioning the need / define a level of satisfaction 2. Preference modelling. Performance expressions.

Footprint of 200 people

traveling by private car, bus, tram or bicycle

200 people in 177 cars

200 people on their bikes

200 people on three buses

200 people on one light rail train

Indicative syllabus

ST 4.	**Qualitative & quantitative critical assessment methods** 1. Definition of the main performance measurement criteria (impact, effects, measure…) 2. Evaluation of impacts. Life Cycle Assessment
ST 5.	**Multicritera decising making** **The Art of Compromise** : describe a deal in which at least something is gained. Methodologies to define, quantify and make choice : Preference rankings, utility theory, fuzzy sets approach … **1. Decision problems**: choice, ordering and sorting; preferences and cognitive biases; orders and mathematical structures **2. Multi-criteria decision**: criteria aggregation or satisfaction procedures, additive utility function model Decision under uncertainty: decision trees, expected value, expected value of information (partial or complete)
ST 6.	**Understand and experiment the strategies to improve criteria** 1. understand the dynamic of behavioral change and conduct it. transtheoretical model of change => individual psychology / collective psychology (Intrinsic and extrinsic motivation => Nudge) 2. strategies to improve through the user, the product, the norms, incentives... 3. transform a product into a service when needed (mutualization, shared car, upgrading : modular design)

Learning methods

- **LEARNING AND TEACHING METHODS**
  - **Blind Kahoot** : sparking curiosity about the new topic.
  - **Case Method Teaching** : Cases are real or invented stories that include "an educational message" or recount events, problems, dilemmas, theoretical or conceptual issue that requires analysis and/or decision-making
  - **Lecture for methods**.
  - **Problem Solving / Role Playing**: Based on a team, each group will try to analyse and improve an existing product
- **REQUISITES**
  - Sustainability (boundary limits)
  - Art of simplicity

Hours & assessment

- ## LEARNING HOURS

Activity Type	Activity Description	Hours
Blind Kahoot	ST1	1
Case Method Teaching	ST2	3
Lecture / Directed work	ST3 – ST6	8
Self-Directed	ST7	12

- ## ASSESSMENT

ASSESSMENT TYPE	ASSESSMENT DESCRIPTION	% OF TOTAL GRADE
Diagnostic of initial situation	Awareness about the 3 dimensions based on Blind Kahoot	0%
In class activity	Teacher feedback	10%
Practical work	Project report	50%
Final exam	Evaluation of knowledge acquired	40%

The Imperative of Responsibility

Presentation : Philippe Fortemps (UMONS)
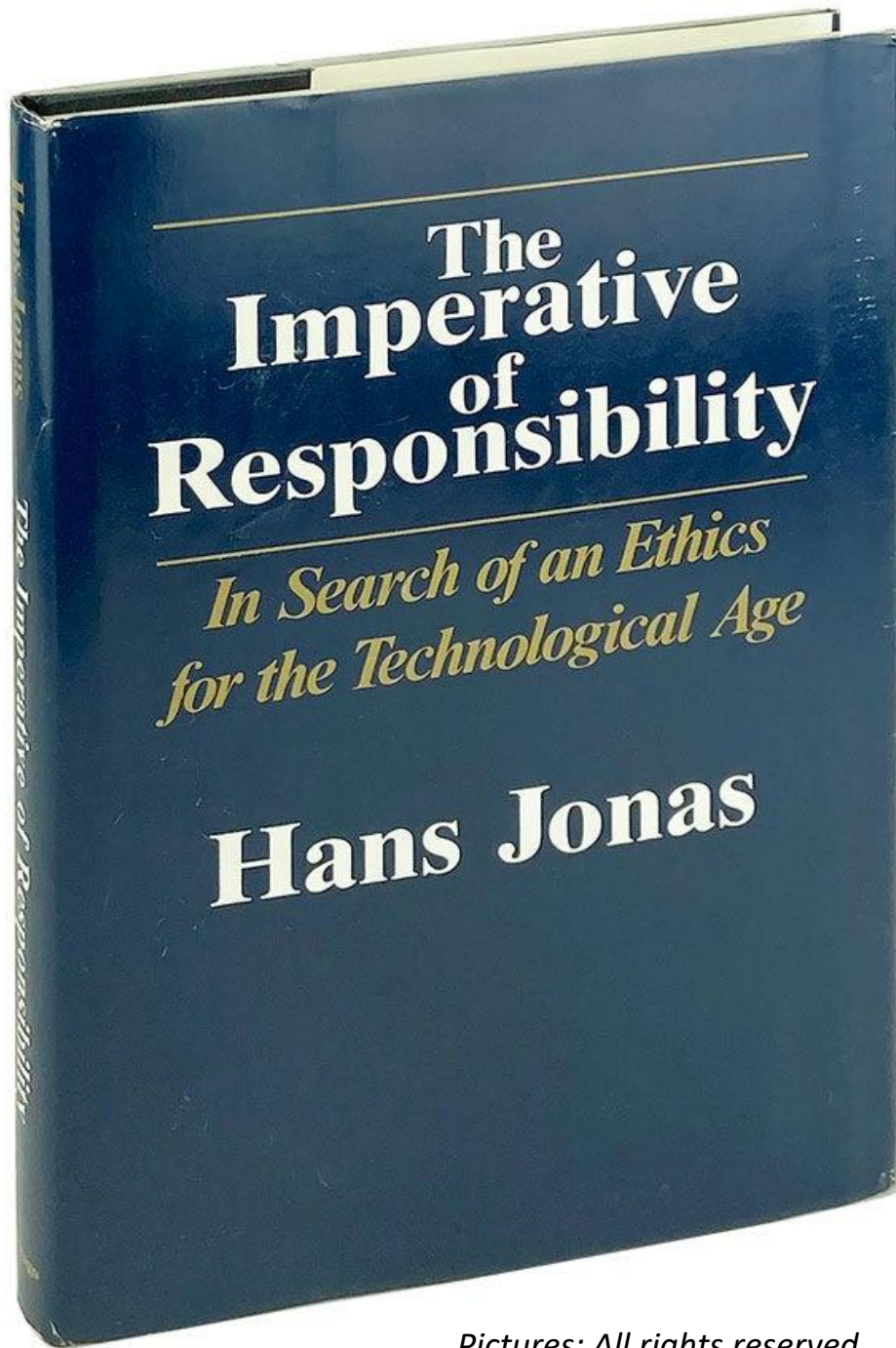
Review : William Bernaud

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The Imperative of Responsibility

In Search of an Ethics for the Technological Age

Hans Jonas

- Act so that the effects of your actions are compatible with the permanence of genuine human life on Earth.

  Hans Jonas (1903-1993)

Module objectives

- This module aims to provide learners with a broad understanding of the ethical reasons of the current emergence of low-tech approaches. It aims to equip students with the knowledge and understanding of fundamentals in ethics in order to **ethically assess and recommend low-tech solutions in a given context**. This module further aims to develop students' self-reflective thinking about their personal behaviour, team management and involvement in design processes.

- The module content will consist of teaching materials and resources that educators can use in a blended format as described above and modified to suit the needs of their students.

Learning outcomes

- **LO 1.** Define and understand the great classical and contemporary approaches in ethics

- **LO 2. Deliberate to make and argue a contemporary ethical judgment** on a proposed solution in an identified situation

- **LO 3.** Understand the current **emergence and emergency of low-tech approaches**

- **LO 4.** Critically evaluate the low-tech approaches with respect to contemporary ethical issues

- **LO 5. Be a responsible actor**, in their personal life, in teams and in design processes

Indicative syllabus

- **ST 1.** What is ethics? What is free will? **What is a human being?**

- **ST 2.** What are the **classical ethical approaches** (consequentialism – utilitarianism, deontologism – Kant's ethics, virtues)?

- **ST 3.** What are the **contemporary ethical approaches** (Human rights, responsibility, care, ubuntu)?

- **ST 4.** How to realise an ethical analysis, an **ethical debate**, an ethical report?

- **ST 5.** How to be an **ethical actor** (personal and organizational behaviour, team leading, design process managing)?

- **ST 6.** What does the history of technical and technological choices tell us? How to understand **technophile** (techno-push) **and technophobic** mindsets?

- **ST 7.** What are the contemporary risks and challenges (Social, societal, economic, environmental…)? **What is our (prospective) responsibility?**

- **ST 8.** What are the **motivations of the initiators of low-tech** and similar spirits? How can this be used to guide an ethical reflection?

Learning methods

- **LEARNING AND TEACHING METHODS**
  Learners will engage with the subject matter in a number of ways:
  - Asynchronous- Students will be able to access some materials and resources to work at their own pace
  - Synchronous- Students will learn in real time with classes/ lecturers delivered online or on-site
  - Practice Based Workshops- Students work in teams to apply, practice and develop the skills and knowledge
- **LEARNING HOURS**
  - Lecture (online or on-site) : 40 h
  - Self-directed (online debates on kialo-edu.com, case studies) : 60h
- **REQUISITES**
  - None

kialo-edu.com : online debates

Reading list

- Bihouix, P. (2020) *The age of low tech the age of low tech*. Bristol, England: Bristol University Press.

- Dimmock, M. and Fisher, A. (2021), *Ethics.* LibreTexts (online)

- Hinman, L. M. (2011) *Ethics: A pluralistic approach to moral theory.* 5th edn. Belmont, CA: Wadsworth Publishing.

- Illich, I. (2001) Tools for Conviviality. London, England: Marion Boyars.

- Jonas, H. (1985) *The imperative of responsibility*. Chicago, IL: University of Chicago Press.

- Kormelink, J. G. (2019) Responsible innovation: Ethics and risks of new technologies. TU Delft Open (online)

- van de Poel, I. and Royakkers, L. (2011) *Ethics, Technology, and Engineering*. Chichester, England: Wiley-Blackwell.

Presentation on syllabus and Hackathon

Christophe Rodrigues

Zhe YUAN

Jingshu DU

Description du module

Code module :	MDMSDM5A1122	Domaine :	NR
Libellé module :	MBA - Entrepreneurship & New Venture creation	Responsable module :	DU Jingshu
Libellé court :	Entrep. & New Venture creation	Enseignant référent :	NR
Libellé international :	NR	Dernière mise à jour :	13/02/2023 à 11h45 par Philippe WAGNER

École	Programme	Cursus	Track	Terme	Unité d'enseignement	Coeff/ECTS
EMLV	MBA	EMLV MBA	Core Track	AN	Strategic vision II	2.00

Module description

- This module enables learners to transfer management fundamentals (Strategy, marketing, finance, and human resources) into the conceptualization and creation of new businesses or entrepreneurial ventures for low-tech. The course encourages learners to consider how low-technology-based solutions can solve economic and socially oriented-problems.
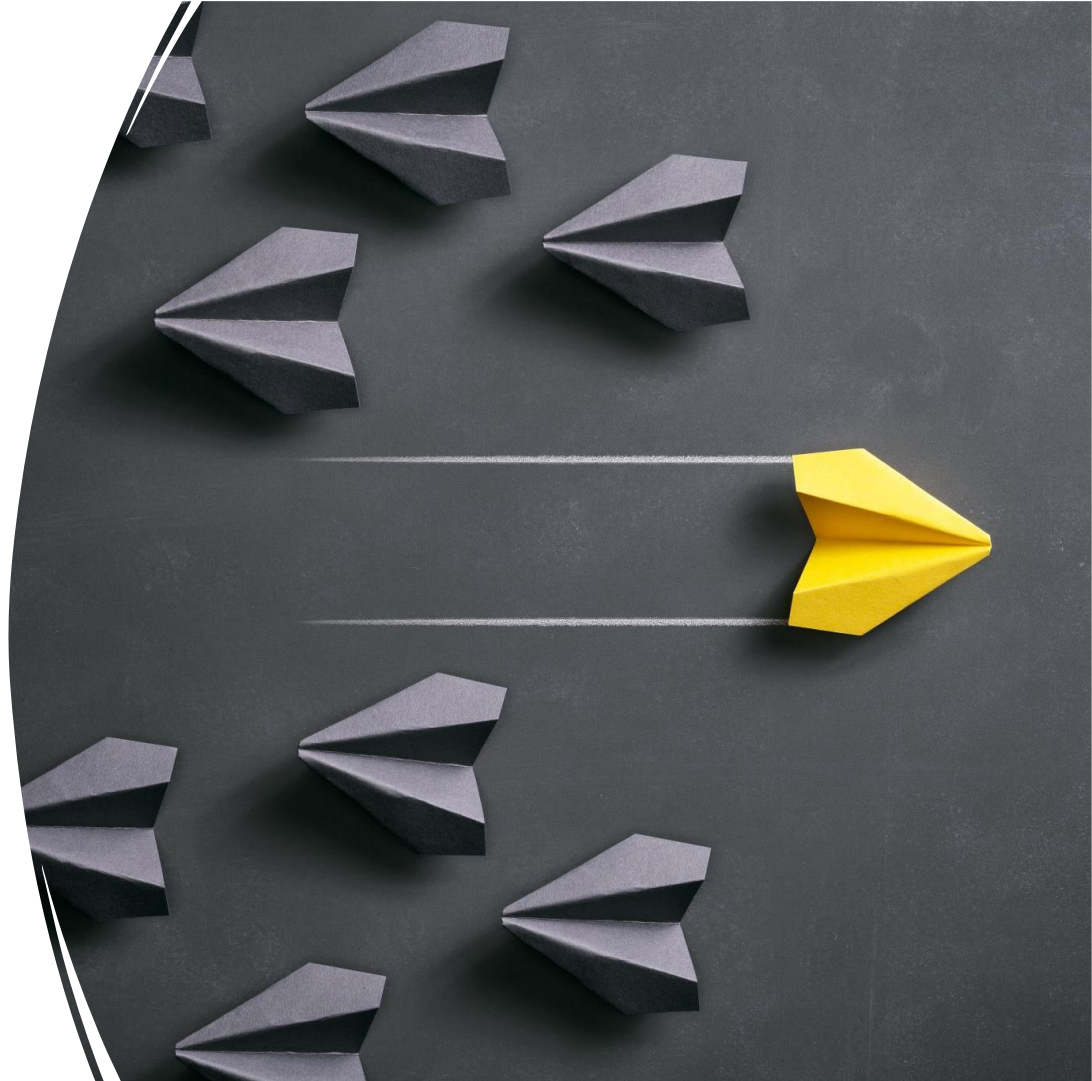
Learning outcomes

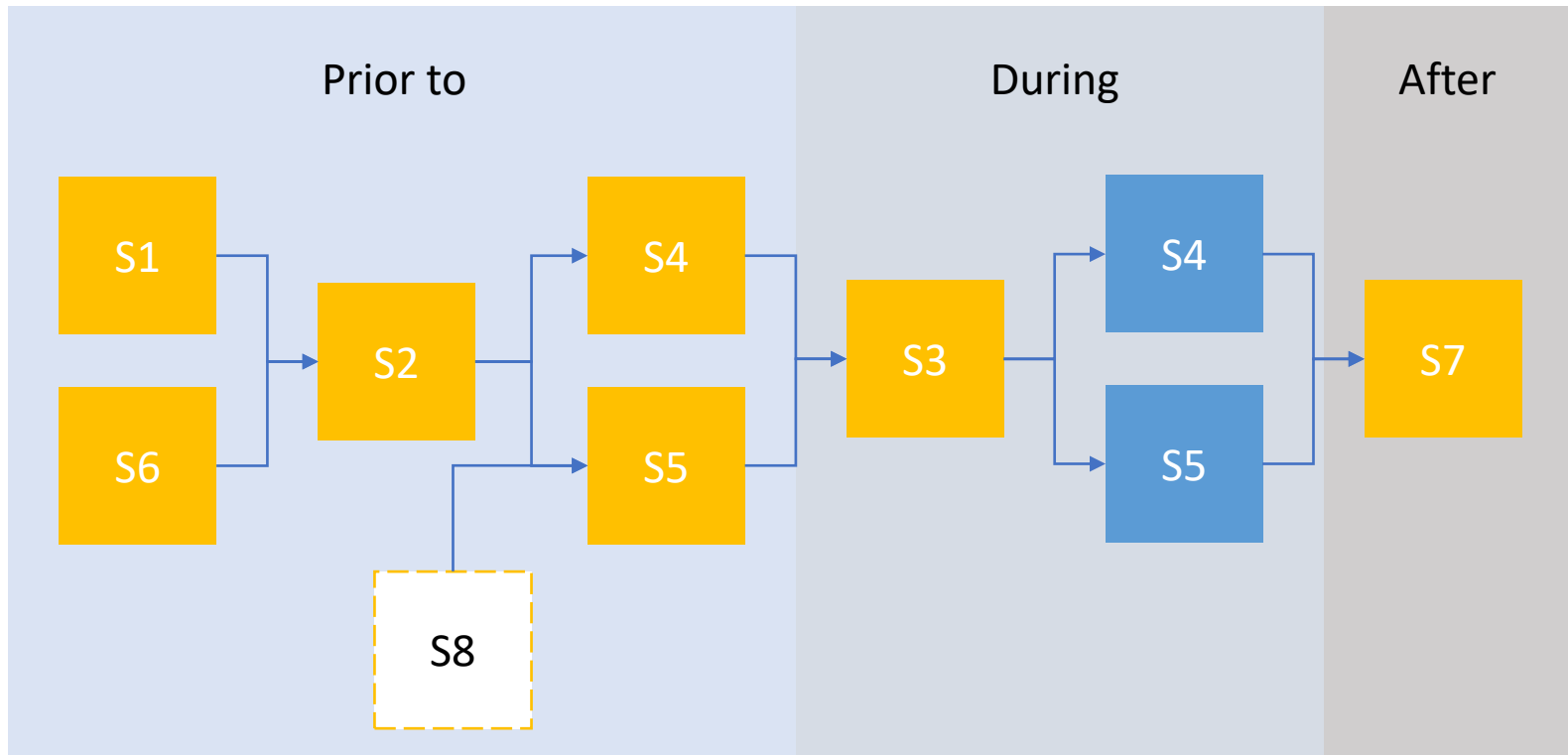| **LEARNING OUTCOMES**	
Upon successful completion of this module the learner will be able to:	
LO 1.	Learn the essential component of planning a new start-up
LO 2.	Recognizing viable market opportunities
LO 3.	Customer discovery via primary market research
LO 4.	Creating a business model
LO 5.	Developing financial strategy
LO 6.	Identify today's social challenges involving ethics, social Responsibility and sustainability
LO 7.	Integrate creative business strategies with engineering and effectively work in multi-disciplinary teams
LO 8.	Make decisions in low tech, highly uncertain and unstructured environments, and take in feedback from a large variety of sources that use it to improve their business plans, or help them to 'pivot' and find alternative ideas or approaches.

18 hours lecture

+ 3 hours decision thinking on low-tech Entrepreneurship

INDICATIVE SYLLABUS	
During the module the learner will cover the following topics:	
ST 1.	Introduction to Low-tech Entrepreneurship
ST 2.	Creativity and Business Models
ST 3.	Entrepreneurship Simulation: The Startup Game on low tech
ST 4.	Value proposition and funding
ST 5.	Market research for entrepreneurs
ST 6.	Lean Start-up
ST 7.	Entrepreneurial soft skills & presentation

Assessment

- Individual Assignment (2 individual essays): 50%

- Group Assignment & Final Presentation: 50%

Today's work

- Model 1

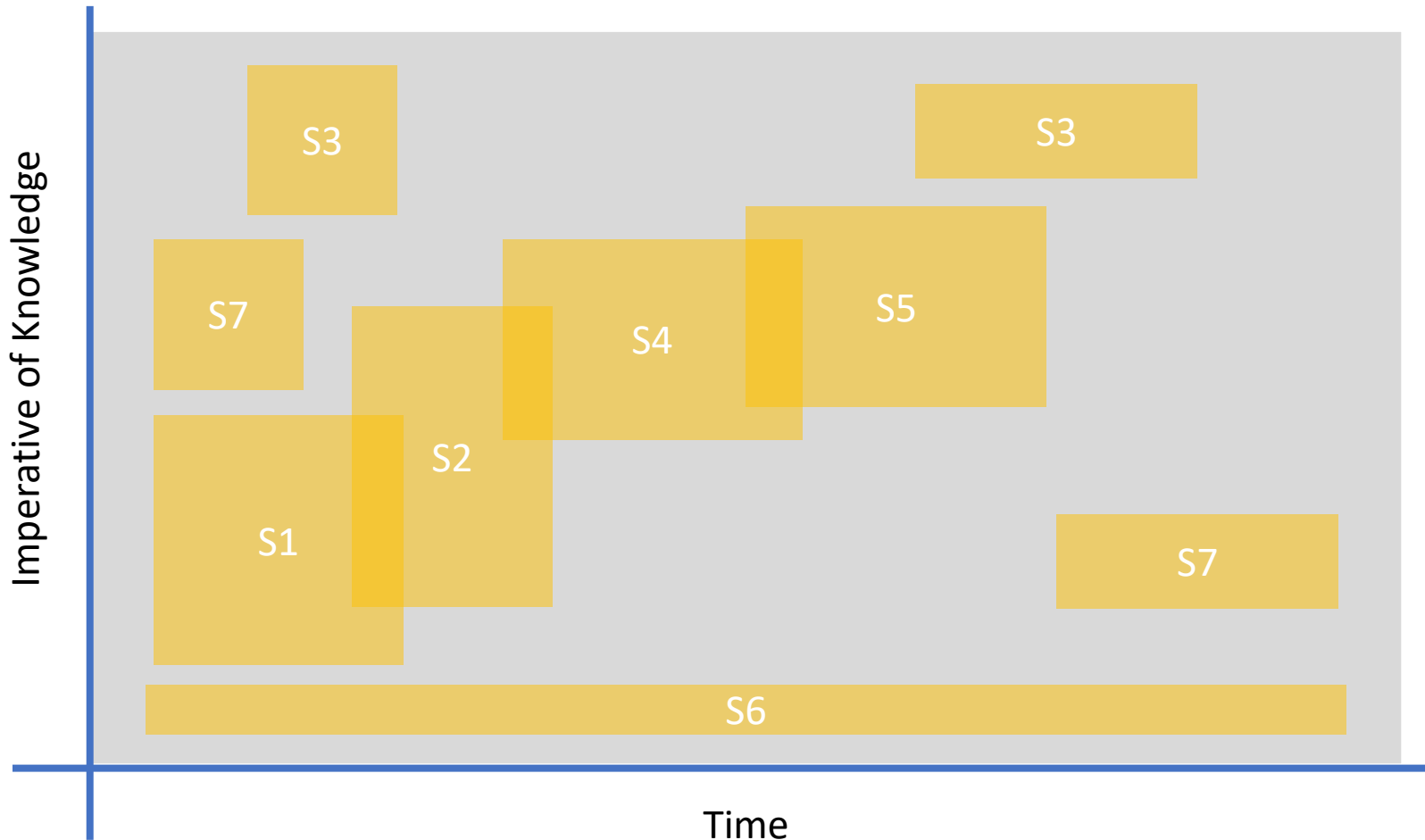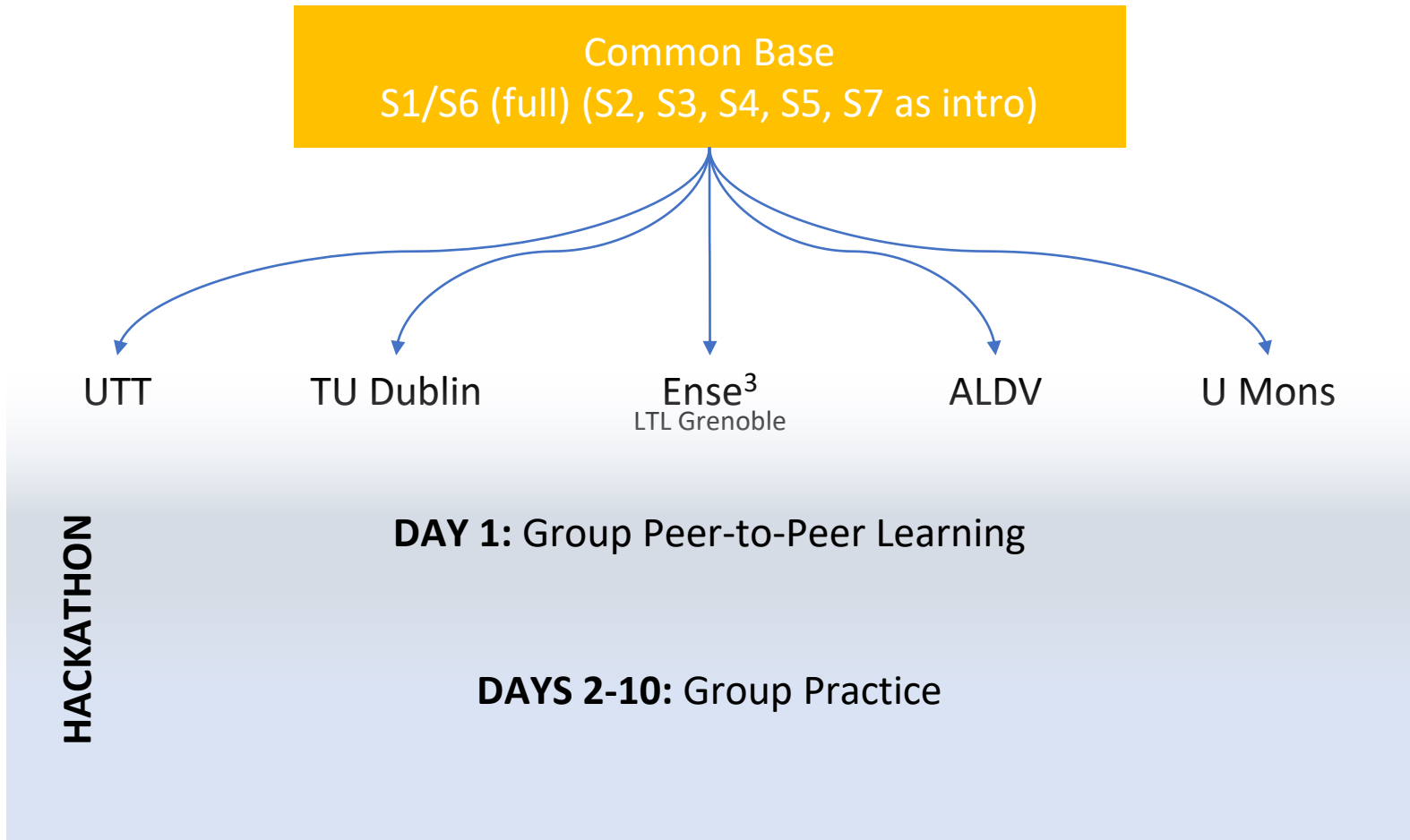# Today's work

- Model 2

Today's work

- Model 3

Common Base
S1/S6 (full) (S2, S3, S4, S5, S7 as intro)

UTT TU Dublin Ense³
LTL Grenoble
ALDV U Mons

HACKATHON

DAY 1: Group Peer-to-Peer Learning

DAYS 2-10: Group Practice

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