TEACHING SUSTAINABILITY USING THE TEACHING CASE STUDY METHOD

Guideline and Framework

15.12.2024

Co-funded by
the European Union

Project partners

ésta
school of business & technology
Belfort

FHV
Vorarlberg University
of Applied Sciences

Silesian University
of Technology

UCn

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About the document

Document history

Date	Author(s)	Comment
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Dissemination level

Code	Access granted to	
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

About the SCABEE project

Climate Change is one of the most crucial challenges humanity must confront in an urgent manner. Therefore, the SCABEE project aims at strengthening sustainability skills & critical thinking of engineering and business students. This helps planting sustainability in future engineers' and managers' mindsets on partner level and beyond.

The project SCABEE introduces sustainability teaching and thinking in business and engineering study degrees as a persistent leitmotif. Students will discover sustainable products and solutions through Sustainability Teaching Case Studies and develop a more sustainable behaviour in their personnel and future professional life. They will also transport their knowledge and behaviour to their companies and thereby contribute to the green transition of the European industry and help saving our planet for future generations.

SCABEE partners will produce a total of 16 Teaching Case Studies with a focus on sustainability that can be used in higher education institutions as well as vocational education training courses.

Project duration: September 2023 to August 2026.

Legal Disclaimer

- **Acronym and name**
  - ➢ SCABEE - <u>S</u>ustainability teaching <u>CA</u>se studies for <u>B</u>usiness & <u>E</u>ngineering <u>E</u>ducation

- **Coordination**
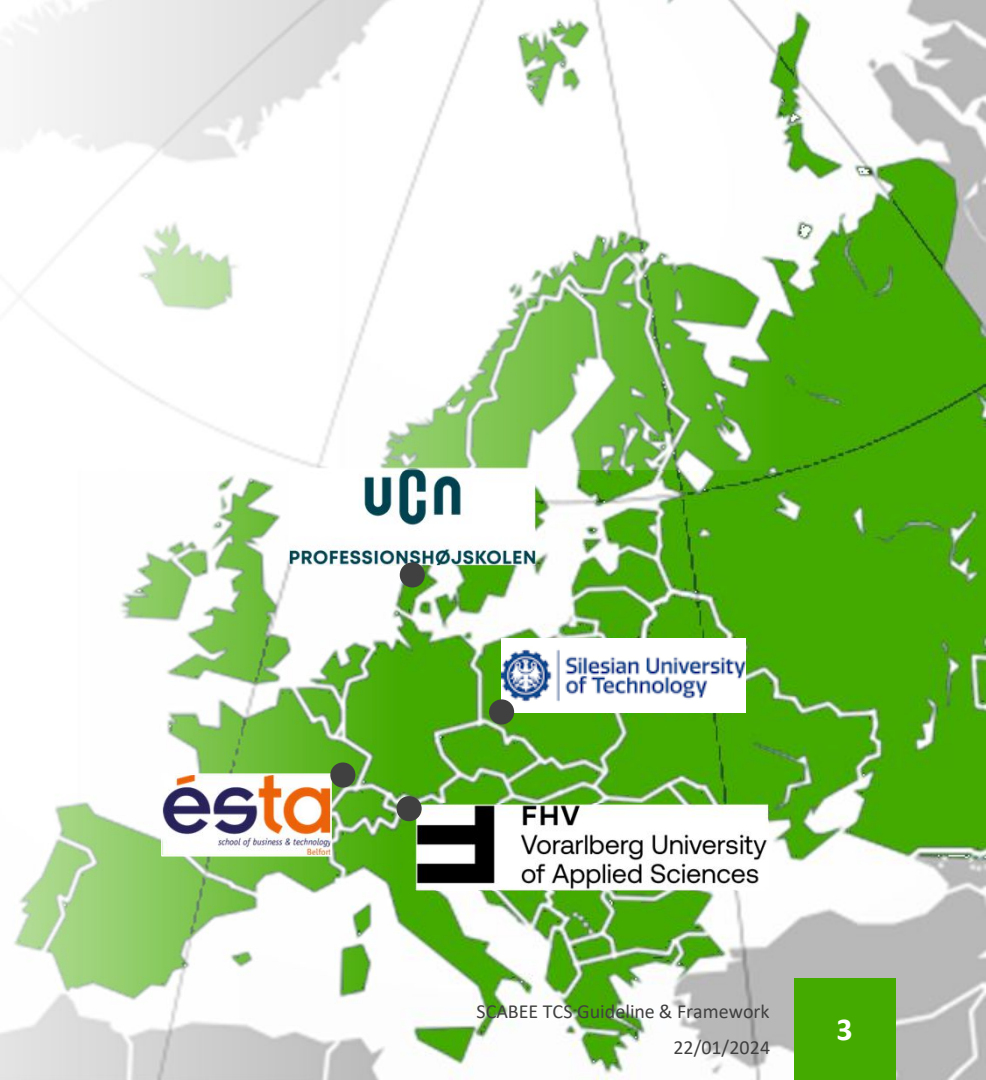 - ➢ ESTA Belfort

- **Objective**
  - ➢ Creating Teaching Case Studies for Engineering and Business Students with a focus on sustainability

- **Duration**
  - ➢ September 2023 – August 2026

- **Funding**
  - ➢ Co-funding by the Erasmus+ Programme of the European Union
  - ➢ Grant Agreement 2023-1-FR01-KA220-HED-000153431

Content

Lists of figures, tables & acronyms

Acronyms

- CCMP — Centrale de cas et de Médias Pédagogique
- CNU — Conseil National des Universités
- CSR — Corporate Social Responsibility
- e.g. — exempli gratia (for example)
- IT — Information Technology
- L1, L2, L3 — Licence level (bachelor degree) first year, second year, third year
- M1, M2 — Master level first year, second year
- MOOC — Massive Open Online Course
- SCABEE Engineering — Sustainability teaching CAse studies for Business & Education
- TCS — Teaching Case Study

Figures and tables

Introduction

About Case Method

Content

Related bibliography

- Barnes, L.B., Christensen, C.R. and Hansen, A. (1994), *Teaching and the Case Method: Text, Cases, and Readings*. Harvard Business School Press, Boston, Third Edition, 333 pages, ISBN 978-08-75-84403-9
- Bianchi, G., Pisiotis, U. and Cabrera Giraldez, M. (2022), *GreenComp The European sustainability competence framework*, Punie, Y. and Bacigalupo, M. editor(s), EUR 30955 EN, Publications Office of the European Union, Luxembourg, ISBN 978-92-76-46485-3, JRC128040. https://dx.doi.org/10.2760/13286
- Breslin, M., & Buchanan, R. (2008). *On the Case Study Method of Research and Teaching in Design*. Design Issues, 24 (1), pp.36-40. https://doi.org/10.1162/desi.2008.24.1.36
- Carmichael, J. (2019). *Du triangle pédagogique de Houssaye au tétraèdre TICC*. Revue suisse de pédagogie spécialisée, TRANSFORMATION NUMERIQUE, pp.30-36. https://ojs.szh.ch/revue/article/view/101/pdf
- Cova B., De la Baume C. (2000), *Cas et méthode des cas : fondements, concepts et universalité*, Gestion 2000, vol 3, p.71-95.
- De Vaujany F.-X. (2004), *Vers des produits pédagogiques spécifiques aux apprenants-praticiens: Invitation à développer de nouveaux formats d'enseignement*, CCMP.
- Houssaye, J. (1988). *Le triangle pédagogique. Théorie et pratiques de l'éducation scolaire*. Berne : Peter Lang.
- Juarrero J.M., A. S. (2008). *Petite histoire de la méthode des cas…*, Paris, document CCMP, octobre.
- Lamy, E., & Lapoule, P. (2015). *La méthode des cas, instrument du rapprochement entre éducation et recherche en management,* Management & Avenir, N° 79(5), 15-31. https://doi.org/10.3917/mav.079.0015
- SCABEE (2023a), Initial Analysis Research Framework (D2.1a), SCABEE Project, www.scabee-project.eu
- SCABEE (2023b), Sustainability in Teaching at partner institutions (D2.1b), SCABEE Project, www.scabee-project.eu

Teaching Case Studies in Education

History

☞ **First appearance at HARVARD UNIVERSITY** (around 1870)

- **Christopher Langdell** (Dean of Harvard Law School University) was the first to implement the case study method for undergraduates.

- **Objective**: allow students immersing in some professional realistic situations they couldn't experiment in their educational paths. Introducing the Socratic Method to help students by questioning about the situation of the case.

☞ **~ 1920: Case studies appear in Business Programmes**

☞ **Mid 1980s: First use in Medical Schools**

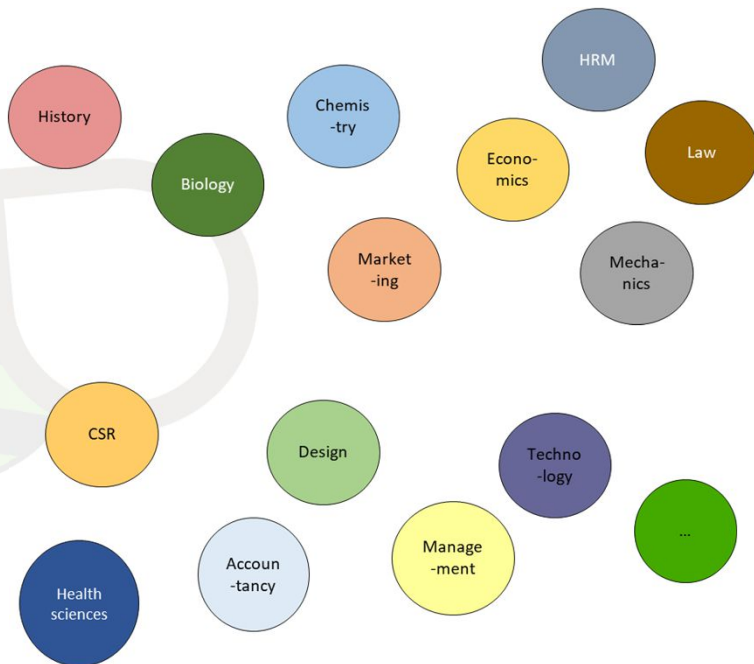☞ **2000s: Introduction in Design education**

- Graphic Design, Industrial Design, Interaction design, Environmental Design

☞ **Mid 2000: Case studies and IT**

☞ **Mid 2010s: Case method becomes a subject for research**

For all kinds of teaching areas

☞ **This guide provides a « universal » approach to raise awareness of sustainability when teaching other fields**

Main actors: Where to find case studies?

❧ **Universities and Business Schools**
- Websites, i.e. Harvard Business Publishing, INSEAD, HEC Montréal, HEC Paris, ESSEC Business School, EM Lyon, Kedge Business School, IMD in Switzerland, Darden in Virginia in their website
- Via the CCMP for most of the French business school

❧ **Online Learning Platforms (most of time in collaboration with universities and institutions) / MOOCs**
- i.e. Cas-store.fr, scribb.fr,…

❧ **Professional Associations**
- i.e. American Medical Association case studies

❧ **Nonprofit Organizations**

❧ **Consulting firms**

❧ **Dedicated institutions**
- CCMP- France
- The Case Centre - Great Britain and Ireland
- Harvard.edu – USA

❧ **Journal and Academics Publications, books**

❧ **Online Forums and Discussion groups, Web Platforms, Open Access Online Repositories**

❧ **National Library of Medecine at the National Center for Biotechnology Information (official website of the United States government)**

❧ **Scabee project**

**Support when
writing or managing a case study**

❧ The main sources are listed in the bibliography and webography at the beginning of each chapter of this guide

❧ Most institutions give advice and recommendations on their website to Case study authors

CONTEXT & DEFINITIONS: Sustainability

👓 **Sustainability** (according to The European sustainability Competence Framework suggested by GreenComp (Bianchi et al. 2022))

- « Sustainability means prioritizing the needs of all life forms and of the planet by ensuring that human activity does not exceed planetary boundaries. » This definition addresses sustainability from an environmental point of view, taking into account the concept of planetary boundaries and including both social, societal and economic aspects where appropriate.

👓 **Sustainability Competencies Framework**

World planetary boundaries

Sustainability Competencies Framework (Students perspective)

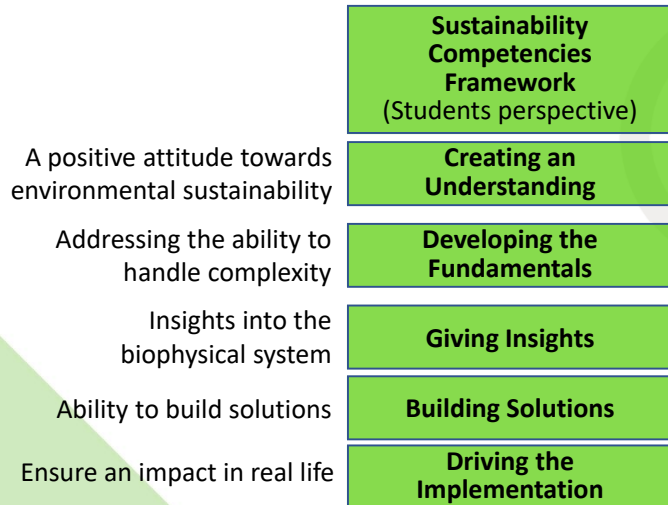|	
A positive attitude towards environmental sustainability	**Creating an Understanding**
Addressing the ability to handle complexity	**Developing the Fundamentals**
Insights into the biophysical system	**Giving Insights**
Ability to build solutions	**Building Solutions**
Ensure an impact in real life	**Driving the Implementation**

Figure 1: SCABEE Sustainability Competencies Framework
(Source: SCABEE 2023a)

Figure 2: Nine critical Earth system processes and their boundaries
Notes:
P = phosphorus
N = nitrogen
BII = biodiversity intactness index
E/MSY = extinctions per million species per year

Source: Wikicommons
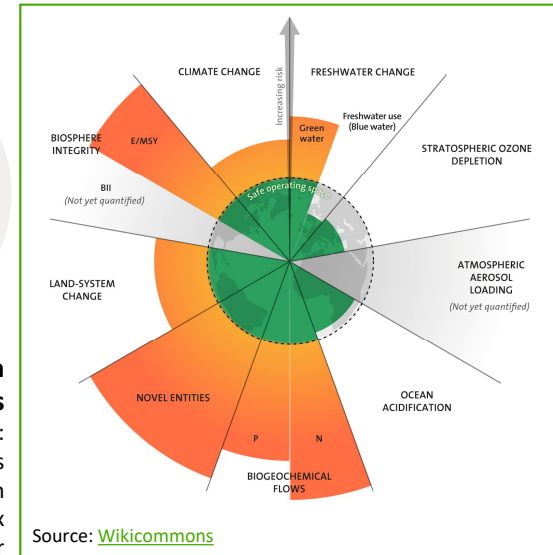
Context & Definitions: A pedagogical issue

👓 **A problem base learning approach** to link the studies to practical problems in a moving world including an ethics and sustainable orientation.

👓 **Various complementary tools**: It is important to mix the manner to spread knowledge and practices.

Lectures
- Face-to-face, reverse learning with exercises, tutorials sessions, in-class experiments or not
- Synchronous Distance learning
- Asynchronous Distance learning

Readings
- Books
- Articles
- Web information, …

Teaching Case Studies (TCS)
- **A complete case study scenario** for teachers and learners
- Based on multimedia supports (digital or not)
- With different steps including distance learning or not

Theorical modules
- Massive Open Online Course (Mooc)
- Learning modules with several illustrated cases or exercises (free or paid)

Games
- not a digital game, e.g. negotiation games, role games, board games, …
- An IT platform = Serious games (edumarket games, engaged games, simulation games, …)

Context & Definitions: A pedagogical issue

Figure 3: The pedagogical pyramid of the case study method
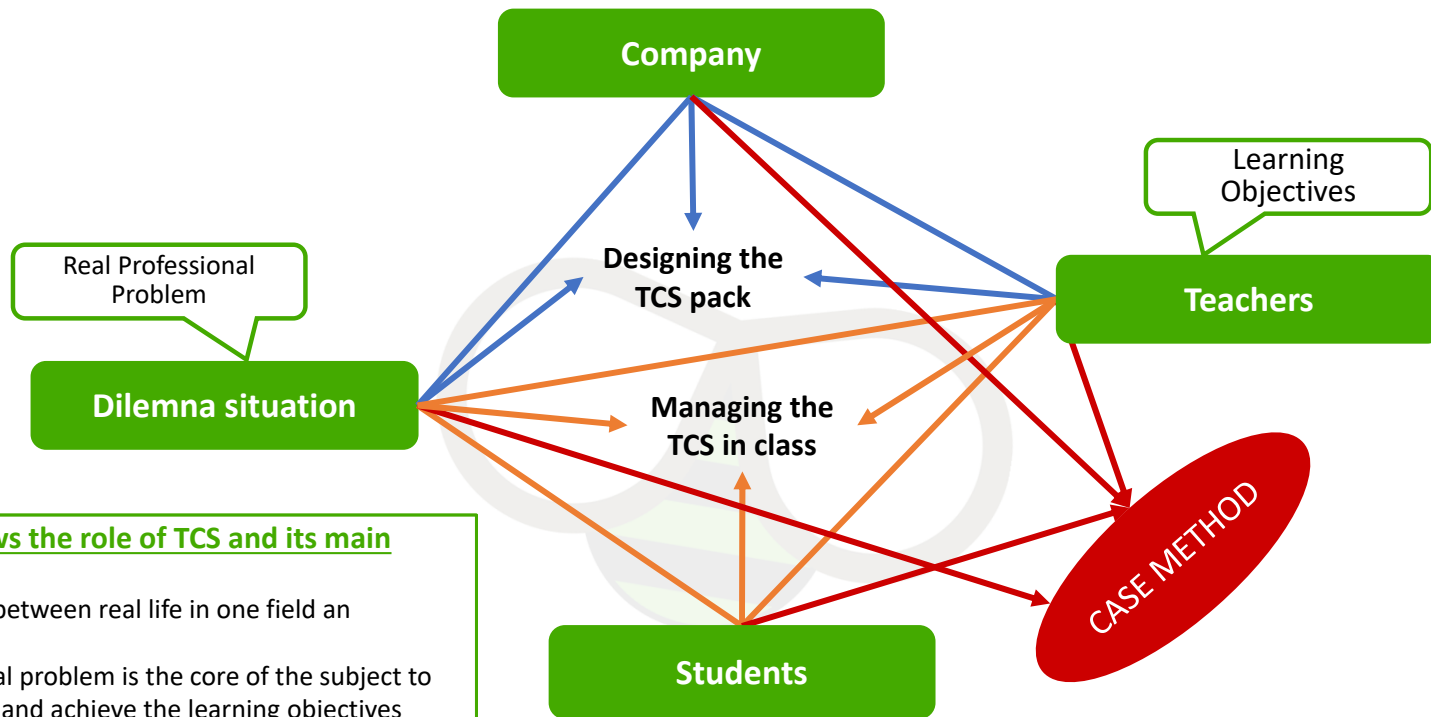
This figure shows the role of TCS and its main components

- Makes the link between real life in one field an apprentice.
- A company's real problem is the core of the subject to design the case and achieve the learning objectives
- Students play the role of the case's main protagonist

Based on the work of Juarrero J.M. (2008) « The diamond of Case Method » freely inspired by the « Pedagogical Triangle of Houssaye, 1988)

Context & Definitions: Teaching Case Studies (TCS)

❧ **What is a Teaching case study ?**

- A case study critically assesses an event, a place, personality, or situation to draw a conclusion. It uses all background information to identify the "key problems" and recommend further actions.

- "A good case is not just a history; it relates an event – or sequence of events- that contains enough perplexities to inspire a rich educational discussion" (Barnes et al. 1994).

❧ **Despite the discipline, some common points are:**

- Learning by doing and an iterative method,

- Learning by questioning: a Socratic method,

- The situation is or was a real one : the case imitates or simulates a real situation : it can be an evaluation scenario or a diagnosis problem scenario,

- It is a dilemma situation: a significant issue or issues, an important problem to solve,

- A rich data must be coherently presented,

- A clear and conjoint decision is necessary: as everyone has his own idea, a consensual solution in each working group must be defined by arguing,

- A pedagogic dimension to allow students to link reality of a situation to the theorical concepts in order to find a solution and act properly ... and for our purpose ... in a sustainable way.

Using Teaching Case studies « is an active student-involved teaching method »
(thecascentre.org)

Competencies & Skills worked: Acquired capabilities

The student will be able to

👓 **Make an appropriate diagnosis**

👓 **Find the relevant information needed and analyse them**

👓 **Identify / understand the problem** integrating complex and technical issues in a context of great importance and / or emergency

👓 **Develop solutions adapted to the needs respecting a sustainable orientation**

👓 **Take a decision**

👓 **Define an action plan**: selecting the most appropriate means to achieve the collective target

👓 And:
- Work with others,
- Argue,
- Synthetize,
- Manage time pressure,
- …

thinking welcome

Using Teaching Case studies « prepares students to the world of practice »
(thecascentre.org)

Benefits…

… for everybody

Section content

☞ **For students and teachers**   **#17**

☞ **For partners, companies or institutions**   **#18**

☞ **PROS and CONS**   **#19**

Related webography & bibliography

- Harvard.edu: https://hbsp.harvard.edu/cases/

- Excelia: https://www.excelia-group.fr/faculte-recherche/centre-de-cas-excelia

- Centrale des cas et Média pédagogiques CCMP: https://www.casestudies.ccmp.fr/

- The Case Centre: https://www.thecascentre.org

- Garvin D.A. (2003), *Making the case* , HARVARD MAGAZINE, September – October, https://www.harvardmagazine.com/2003/09/making-the-case-html

- Juarrero J.M. (2008). *Petite histoire de la méthode des cas*, CCMP, www.ccmp.fr.

- Van Stappen Y. (1989), *Enseigner… apprendre. Un ajout à l'exposé magistral. La méthode des cas*, Pédagogie collégiale, Volume 3, n°2, décembre, p.16-18, Download

All websites accessed on 16th January 2024.

BENEFITS for students

- ❧ **Engage in a challenging interactive learning environment**

- ❧ **Fun of making an important decision by endorsing the role of one protagonist of the case (a person or a staff)**

- ❧ **Individual and team phases**

- ❧ **Team's objectives to achieve and not individual evaluation***

- ❧ **Dialogue, debate : learn to express their ideas and convince others defending and challenging viewpoints**

- ❧ **Improve the capacity of thinking before acting and individual and collective responsibility for sustainable decisions and actions**

- ❧ **Develop creativity (original solutions)**

- ❧ **Encourage new ways of thinking**

- ❧ **Force to consider more than one solution**

- ❧ **Illustrate concepts with real examples**

* Unless the TCS is used as exam

BENEFITS for teachers

- ❧ **An interactive way of learning compared to « just » reading texts involving several kind of activities (role play, group discussion, viva-voce presentation,…)**

- ❧ **Bring excitement into the classroom and help maintaining interest through various learning style**
  - • class, case study, exercises, reverse learning,
  - • … using multimedia or not

- ❧ **Encourage student-to-student dialogue**

- ❧ **Make the link between theory and practice using authentic situations and improve the application of concepts seen in class**

- ❧ **And …**

- ❧ **Ask questions instead of giving answers**

- ❧ **Trust students to participate and discuss**

BENEFITS for partners, companies or institutions

❧ **Take a step back of a dilemma situation and its analysis**
- during the exchanges with the teacher
- during the case elaboration.

❧ **Using the case study to form its own employees**

❧ **Using the case study to find a collective solution from individual experiences**

❧ **Stimulate initiatives and "collective intelligence"**

Company's testimonials

❧ **"As an ESTA Graduate, I had the opportunity to set up my own business during my last fifth year. I would like to thank the pedagogical teams to substitute my end-of-study internship with the creation of the company, so it was important for me to take part of this project. I also wanted to give the students the opportunity to work on a real-life case study. ICTYOS perfectly reflects the challenges of an innovative Franch start-up in an industrial environment"**

Emmanuel Fourault , Sales Director, ICTYOS, France

PROS and CONS

- Connect students to social phenomena, real life experience and sustainable situations in a way that help to share thinkings

- Learn how to express your own opinion

- Learn how to link facts and decision making

- Offer the opportunity to practice concepts teachers gave before or to discover concepts before their structuration

- Force students to be active

- Learn to filter irrelevant or unimportant information

- Needs very clear pedagogical objectives

- Readers have to construct the meaning of the case
  - **A case gives them the « what » of thinking but not how to think**

- Students must learn how to read and understand information instead of argue and construct a false self-confidence in taking decisions

- A theorization is needed to structure knowledge

- For some fields, it is difficult to formalize case studies

Teaching using a Case Study

Section content

Related webography & bibliography

- Centrale des cas et Média pédagogiques CCMP: https://www.casestudies.ccmp.fr/

- Barnes, L.B., Christensen, C.R. and Hansen, A. (1994), *Teaching and the Case Method: Text, Cases, and Readings*. Harvard Business School Press, Boston, Third Edition, 333 pages, ISBN 978-0875844039

- Carmichael, J. (2019). *Du triangle pédagogique de Houssaye au tétraèdre TICC*. Revue suisse de pédagogie spécialisée, TRANSFORMATION NUMERIQUE, pp.30-36. https://ojs.szh.ch/revue/article/view/101/pdf

- Ellet W. (2018), *The Case Study Handbook: A Student's Guide*, Harvard Business Review Press, Revised edition, 272 pages. ISBN 978-1633696150

Sharing a Teaching Case Study

① **Upload of the TCS package to a platform with access control**

② **The platform publishes the TCS proposal sheet**

③ **A potential user consults the TCS proposal sheet**

④ **If the user is interested, order of the full TCS package**

⑤ **The platform checks whether the user fulfils all requirements**
- Correct target group, e.g., teacher?
- Payment received (if needed)?

⑥ **If yes, the platform grants the user access to the full**

   TCS package

TCS database/ platform

Potential user

TCS fact sheet

TCS package
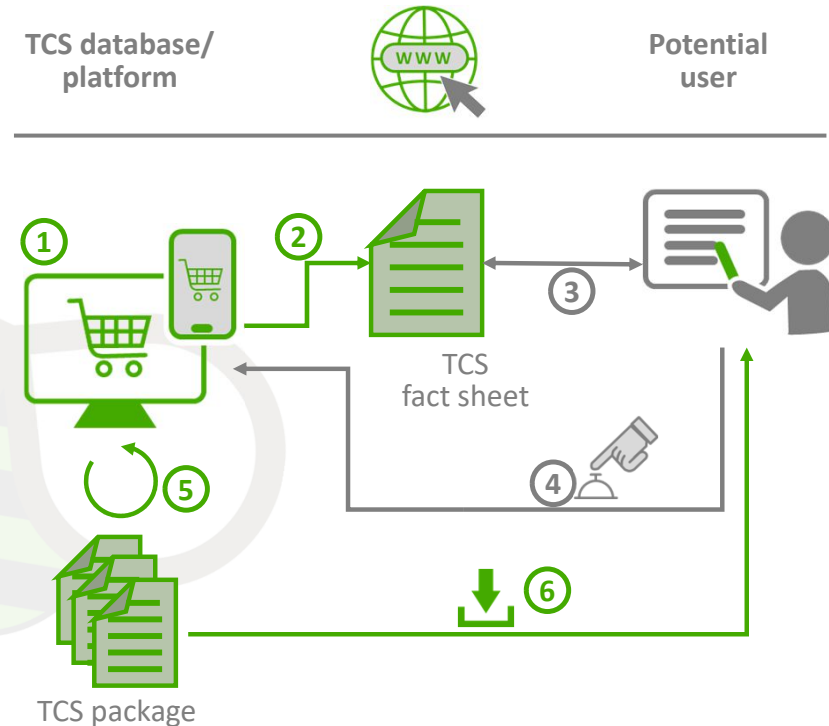
Figure 4: Schema for sharing SCABEE's TCS

ANIMATING A CASE STUDY : Before writing a case…

👓 **Before writing a complete TCS, it is necessary to know how to manage it in class …**

👓 **Some simple rules :**

Generally, a TCS admits more than one solution.	A TCS contains both relevant and irrelevant information. It is necessary for the learners to analyse and select the facts useful for their decision and plan of actions.	It represents the complexity of the actual environment, but it is simplified to make it feasible by the students.	Groups must deal with time pressure.

ANIMATING A CASE STUDY: The 3-step-approach

1. Analysis	2. Discussion	3. Confrontation
Individual work *Appropriation of the situation*	Small groups (co-operation work) *Analysis, diagnosis, and draft solutions*	*Whole Class (restitution work)* *Presentation, feedback, and structuration of knowledge*
☻ **Take time to familiarize themselves with the case** ☻ **Identify the problem and the valuable information** ☻ **Examine ways to improve the situation**	☻ **Find, sort, analyse, prioritize, share information** ☻ **Synthetize information** ☻ **Diagnose the situation** ☻ **Discuss, argue, and agree on a common solution** ☻ **Formalize the recommendations**	☻ **Presentation by several groups of the work done** ☻ **Questions and debate** ☻ **Reformulation and achievement of a common diagnosis of the situation and summary of discussions** ☻ **The teacher highlights the theorical framework**

Figure 5: The 3 TCS animation steps

There is not one right answer but a lot of more or less effective solutions

ANIMATING A CASE STUDY // with Bloom's taxonomy

TCS approach	Remember	Understand	Apply	Analyse	Evaluate	Create
	Recall facts and basics concepts	Explain ideas or concepts	Use information in new situations	Draw connections among ideas	Justify a stand or decision	Produce new or original work
TCS itself	Define the problematic using knowledge	The way a TCS is managed	2 levels: 1) apply in class to learn how to 2) operate in real situation later	Link theory to real situations to find a solution to a real problematic	The solution is a consensual one debated in the work group	The main objective of a TCS
Step 1 : Individual work	Read the TCS: identify relevant information and the concepts associated	Understand and precise the TCS purpose of the case: TCS problematic		Examine ways to improve the situation		
Step 2 : Small work group		Classify, discuss, explain in a work group	Solve, interpret, demonstrate, schedule	Diagnose, examine, experiment, formalize	Argue, defend, judge, value to choose their best solution(s)	Formalize the best consensual recommendations or solution
Step 3 : Class group	Define and highlight the theorical framework (teacher)	Discuss, explain		Compare, question, test	Argue, appraise, positive critique	Design, formulate final global solution and conclusion

Table 1: Teaching with TCS according to the Bloom taxonomy

THE TEACHER'S JOB

❧ **There are different ways to use a case study :**

1. To illustrate a course:
The theory has already been given in class and the TCS allows learners to apply a method, or to use specific tools in order to achieve an objective.

2. To discover concepts or a method by experimentation:
Students search a solution or a way of achieving goals by experiments. The debriefing is very important and must define the theorical basic concepts to structure knowledge and favorize understanding and memorization.

  o It is possible to teach using only case studies with specific focus and formalize the theorical framework at the end of each course.

3. To conclude and evaluate a course

  o A case study provides an interesting synthetic complete exercise including knowledge and appliance (a lot of the Bloom's objectives) but as it takes a lot of time to correct TCS, especially if you want an individual evaluation, it is only worthful for very small groups.

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e.g. planning of a marketing B2B course:
Fundamentals for beginners: (21h)

➢ 6h of lecture for the acquisition of vocabulary and context illustrated by small exercises including a presentation of what is the TCS method (can be done in an asynchronous remote way in 15 min)

➢ 4h TCS work for applying the whole marketing approach

➢ 1h30 of lecture for debriefing and continuing the presentation of marketing concepts

➢ 4h TCS work to be more confident about the marketing approach and capitalize the use of TCS

➢ 1h30 of TCS closing class for feedback and discussion

➢ 2h of lectures to end the course

➢ 1h for an evaluation

➢ 1h to 2h of work at home (asynchronous remote work, readings)

THE TEACHER'S JOB

☞ **Before (the first) TCS :**

- Inform students about the method and what they will have to do during the time dedicated for working on the TCS
- Share the case study before the class time to allow students to read it carefully twice (but not to do it!)
- Be sure that, for the case study sessions, you have enough room and time to discuss with each group without disturbing the others.

☞ **Launching the TCS: A short time slot with the whole class before the beginning of the small groups' work**

- Before starting the work group sessions, ensure that the goals to reach and the time to achieved them are well understood by everybody.

- E.g., in my first class, when I present the objectives and the schedule of the whole course, I introduce the TCS method and ask students to read a small explanatory text until the next course). I question them at the beginning of the next class and answer questions if needed.

- Once, a group of students spent time and did the analysis of the TCS before the cases study session: the 3 hours planned to solve the TCS was very long for them indeed!

- I use several small rooms when my students are working on a TCS.

- Before starting the work in small groups, I always
  o regroup students in a room to answer questions they have after reading the TCS and explain what they will have to do – the expectations (content and form, time limits,…).
  o use the Socratic method and use questions to help them, considering the difficulty of the case and/or the level of students (defining the problem, sorting out which tools could be useful, the concepts to be linked, …
  o adapt the approach to the students' level: E.g., when students must formalize a marketing plan for a company using TCS:
    ▪ for level 1 students, I ask during the lecture time to describe the marketing method and the several steps;
    ▪ for more advanced students, I will just say that they have a marketing plan to do (they are supposed to know the marketing approach).

THE TEACHER'S JOB

☞ **During the work group sessions' time**

- Help each group by questioning (before answering).
- Be careful to see all groups even if some needs more help than others.

☞ **During the feedback phase**

- Group all students in the same room
- Manage the restitution time (number of groups presenting their work, ask for reactions from the others or complement, question students, manage the debate and discussion
- Synthetize and sum up about the case
- Conclude and highlight theorical concepts (prepared in advance)

- The teacher's support phase is very important, and the more exchanges and discussions occur, the richer it will be for students.

THE TEACHER'S JOB: Planning a 4 hours' Business TCS session
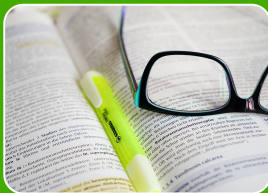
Phase 1 : Individual work and launching (0h40)

- Individual preparation: reading (30 min) prior not during the lecture/TCS time
- Launching the TCS: whole class (10 min)

Phase 2 : Co-operation work (2h00)

- Forming the groups and roles attribution
- Analysis, diagnostic and draft solutions

### Phase 3 : Restitution work with the whole class (1h20)

- 2 or more groups' restitution (10 – 15 min / group)
- Synthesis and sum up (10 min)
- General debate and discussion (15 min)
- Theorical synthesis by teacher (15 min)

THE STUDENT'S JOB: Before the case study session

☞ **Read the case carefully (and actively) to provide a first quick analysis of the situation,**

☞ **Find out the problem,**

☞ **Understand the context and the situation,**

☞ **Have a first idea of some clues to achieve issues respecting the challenges of sustainable development.**

« The process is similar to a research project. You wouldn't gather and read all of the possible sources. You would look for sources on specific aspects of the issue you're researching, sort them into categories, read them to determine their relevance, and they are relevant, capture the information. »

Ellet W. (2018)
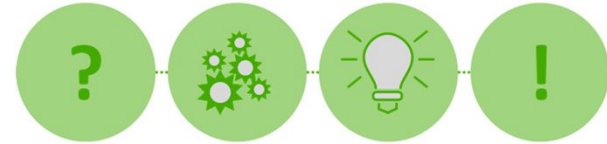
Understanding the TCS situation

❖ Who is the main character?

❖ What has to be done?
  o Which decision?
  o What does he have to evaluate?
  o Value? Performance? Outcomes?

❖ What is uncertain?

❖ What is the problem?
  o Is it Positive? Negative?
  o Why does it not work?

Table 2: Understanding the TCS situation (Ellet W., 2018)

THE STUDENT'S JOB: During the case study session

Discuss and propose a common solution in his work group by answering the following questions:

👁 **What do we need to know to accomplish; what has the main character to do?**
- TCS deals with the evaluation of a situation (which is called an evaluation scenario TCS) or the understanding of how and why something happened (which corresponds to a problem diagnosis TCS)

👁 **Which tools do we master to solve the problem ?**
- List all information needed: information to find or to be calculated (evidence)
- Which criteria to choose the right solution (for an evaluation scenario TCS)?
- Do a diagnostic which includes both main positive and negative aspects (for a problem diagnostic TCS)
- Classify information and data: Which one is relevant? Which are important or not?
- Find out the contingencies between information and objectives

👁 **What are the different options ?**
- A yes or no answer; or several possibilities (the most logical ones)

👁 **What shall we implement to achieve our goals respecting the challenges of sustainable development ?**
- Recommended decisions and planned actions : students must keep in mind that a decision has to be implemented
  - Don't forget to summarize the major reasons for the recommended decision(s),
  - Prepare long term and short-term plans,
  - Describe how your actions plan will change the situation,
  - Don't forget to mention the major or minor risks associated with the decision and how they can be reduced (or eliminated).

THE STUDENT'S JOB: Find a solution

1. <u>An evaluation scenario TCS</u>

- Selection criteria to measure the subject,
- Evaluate + and – ,
- Diagnose,
- Judge what is important,
- Recommend actions.
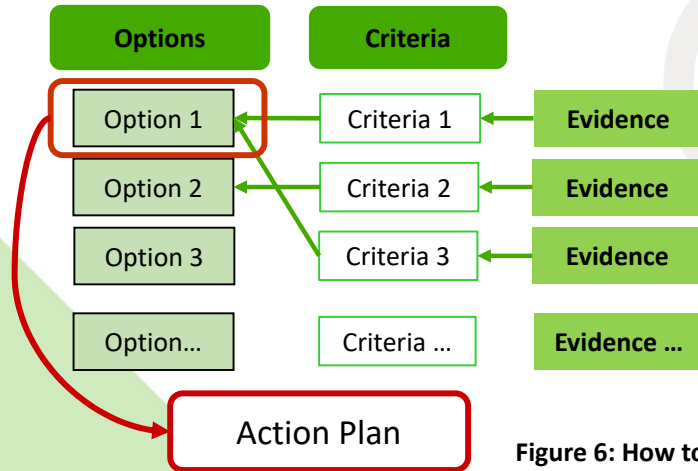
**2. <u>A problem diagnosis scenario TCS</u>
to understand the logic of why something happened or is happening** *(i.e. a doctor's consultation)*

- Define the problem,
- Find evidence about it,
- Diagnosis through causal analysis,
- Prescribe actions that solve the pb or mitigate it.
  - *Ex : why a company is more competitive ?*
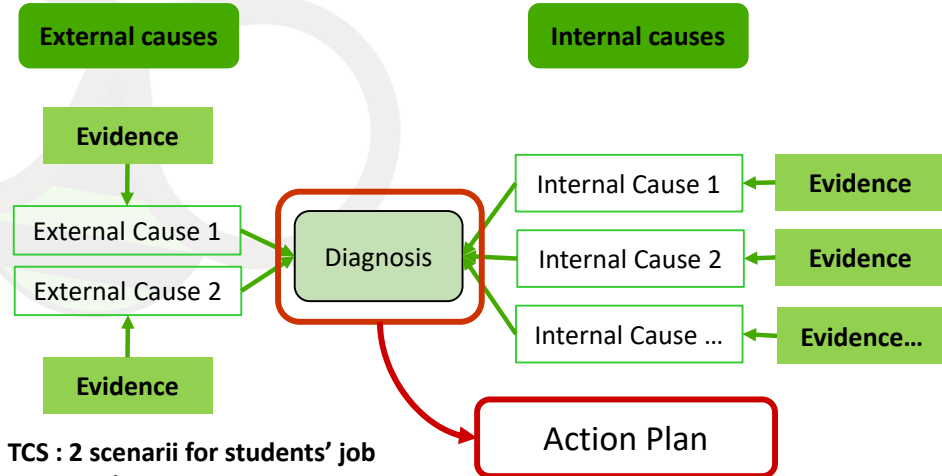 - *Why this product increases its sales ?*

Figure 6: How to deal with a TCS : 2 scenarii for students' job (adapted from Ellet W., 2018)

THE STUDENT'S JOB: The learner's responsibilities

❧ **Be prepared: read the case before the case study session and take time to identify the subject**

❧ **Exchange with others in a work group about the case**

❧ **Take part in the discussion** (easier if the TCS is well-prepared)

❧ **Extend respect and respect others in return :**

- o Consider seriously what other students say
- o When you disagree, do it in a constructively way : it is not interesting to prove that you are cleaver than anyone else !)
- o When someone disagrees with you, it is not a personal attack but an opportunity to examine another point of view to make your solution better
- o Don't try to dominate the discussion
- o Listen attentively to others (students and teacher)

Sources of reluctance to participate :

❧ **No preparation**

❧ **Introversion: fear of speaking or not saying brilliant things**

❧ **Fear of being judged by others (stupid, incompetent,…)**

❧ **Language, culture**

« Nothing bad can happen if you express your point of view! »

How to design a Sustainable Teaching Case Study

Content

- The proposal sheet
- The TCS text + annex +multimedia files
- The teaching note
- Key items / debriefing support
- The company's broadcast agreement

Related webography & bibliography

❦ Barnes L.B., Christensen C.R. and Hansen A. (1994), *Teaching and the Case Method: Text, Cases, and Readings*. Harvard Business School Press, Boston, third Edition, 333 pages, ISBN 978-0875844039

❦ Mc Guire S.JJ, Whaley G.L., (2017), *Guidelines for writing a Management Teaching Case Study*, Journal of Case Research and Inquiry, Vol.3, pp.236-271.

❦ https://www.ijsr.net/guide/howtopublishacasestudy.php

❦ https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2597880/

❦ https://www.pressacademia.org/how-to-write-a-case-study/

❦ https://www.ccmp.fr/edition/publier-un-produit-pedagogique

❦ https://conseil-national-des-universites.fr/cnu/#/entite/entiteName/CNU/idChild/0

❦ https://www.un.org/en/exhibits/page/sdgs-17-goals-transform-world

Developing a sustainable TCS: The global approach

9 Improve the TCS

10 Test the TCS in class

11 Make necessary updates

12 Complete the TCS package*

13a Use it

13b Diffuse it

8 Gather buddy feedback

1 Define the problem

2 Collect data

7 Write the TCS's script

6 Describe the protagonists

3 Create the key sheet

5 Complete the TCS form

4 Look for missing additional data

*The TCS package
The fact sheet
The TCS text + annex +multimedia files
The teaching Note
Correction items / debriefing support
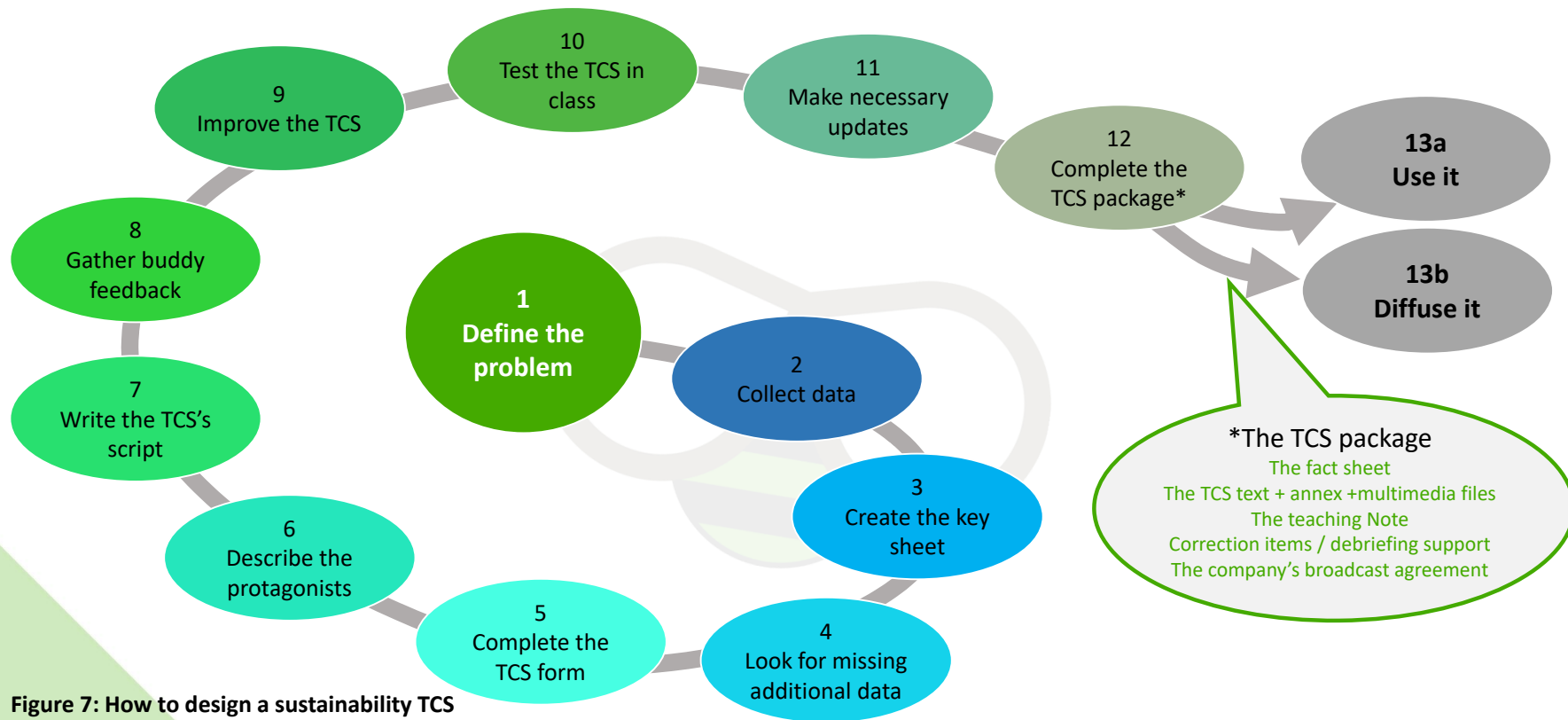The company's broadcast agreement

Figure 7: How to design a sustainability TCS

CREATING A SUSTAINABLE CASE STUDY: Activities before starting to write

- **Define your pedagogical objectives:** the academic concepts you want the students must appropriate and apply, and the sustainable development orientation;

- **Clearly describe the dilemma situation:** identify the real problem the company (a team or a person) had (or the decision to be taken) or issue;

- **Gather information:** collect as much information as possible about the problem or issue of all kinds (reports, data, interviews, surveys,…).

- **Analyse the data and identify the key factors that contribute to the situation and any potential solutions.**

- **Find a company to support the situation** (it can be a real or an imaginary one: different levels are possible as described later).

Imagine what the students are interested in to make the case funny for them.

- **A TCS must have 4 characteristics:**
  - A significant issue
  - Sufficient information on which to base conclusions about an issue
  - More than one exact solution (especially in management science)
  - An iterative way of going through a conclusion (Scrum method ?)

VIDEOS

PUNS

CARTOONS

PHOTOS

TCS PACKAGE: The TCS fact sheet (#1)

The (submitting) proposal sheet

- This proposal sheet is established in order to communicate and inform about the purpose and the competencies addressed by the TCS.
- It is a short document with the main elements of the case to attract potential users.
- All the SCABEE TCS include this « Fact sheet »

Content of the proposal sheet

1. **Title (with subtitle if needed)**
- E.g., "Ananké SAS; It's all about energy! Valorising waste heat for a cooler future"

2. **Educational domain(s) addressed in the TCS: see** ➡

Example "Ananké SAS; it's all about energy!"

1. Title: "Ananké SAS: it's all about energy!"
   Subtitle: "Valorising waste heat for a cooler future"
2. Domain(s): Energetics, Mechanical Engineering, Marketing & sales

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☞ **Domain(s) : (according to French CNU sections)**

☞ Law, Economic and Management sciences
- Group 1: Law and Political Sciences
- Group 2: Economic Sciences and Management Sciences (CSR, Finance, Human Resources Management, Information Systems, Marketing, Organisation Theory, Strategy, Supply Chain Management and logistic)

☞ Literature and Human Sciences
- Group 3: Literature and language Sciences
- Group 4: Psychology, Ergonomics, Philosophy, Arts, Architecture, Design, Sociology, Demography, Historical Sciences, History of Art, Geography, Urban planning,

☞ Sciences
- Group 5: Mathematics and Computer Science
- Group 6: Physics
- Group 7: Chemistry
- Group 8: Earth and Universe Sciences
- Group 9: Mechanical Engineering, Civil Engineering and Processes, Electrical Engineering, Electronics, Energetics, Photonic
- Group 10: Biochemistry, Biology, Neurosciences

☞ Multidisciplinary
- Group 12: Education Sciences, Information and communication Sciences, Science and Techniques of Physical and Sports Activities, Regional Culture and languages

☞ Medical Sciences: Medicine, Pharmacy, Dentistry, Maieutic, Nursing, Rehabilitation Sciences Abstract

TCS PACKAGE: The TCS fact sheet (#2)

3. **Activity sector**

4. **Sustainability goals :**

   a. according to the « 17 goals to transform our world » of the United Nations' sustainable Development Goals Report 2023

   1. End POWERTY
   2. Achieve ZERO HUNGER
   3. Ensure GOOD HEALTH AND WELL-BEING
   4. Ensure QUALITY EDUCATION
   5. Achieve GENDER EQUALITY
   6. Provide CLEAN WATER AND SANITATION
   7. **Ensure access to AFFORDABLE AND CLEAN ENERGY**
   8. **Promote DECENT WORK AND ECONOMIC GROWTH**
   9. **Build resilient and sustainable INDUSTRY, INNOVATION, AND INFRASTRUCTURE**

   10. Reduce INEQUALITIES
   11. Make SUSTAINABLE CITIES AND COMMUNITIES
   12. **Ensure RESPONSIBLE CONSUMPTION AND PRODUCTION**
   13. **Do CLIMATE ACTION**
   14. Preserve LIFE BELOW WATER
   15. Preserve LIFE ON LAND
   16. Promote PEACE, JUSTICE AND STRONG INSTITUTIONS
   17. Strengthen PARTNERSHIPS FOR THE sustainable GOALS

   b. Place in the Circular Economy Wheel

3. Waste heat recovery for industry

4. a) UN SDG:
   - 9th goal – Build resilient and sustainable industry, innovation and infrastructure
   - - 12th goal – Ensure Responsible consumption and production
   b) Circular economy model: Production, Residual waste

Figures 8/9: UN SDGs / Circular Economy Model

TCS PACKAGE: The TCS fact sheet (#3)

5. **Key words**

6. **Level of difficulty**

   Depends on who is doing the TCS and how difficult it is:
   - Initial and alternative education // Continuing education
   - Beginners // Intermediaries // experts

7. **Authors / Institution / Country**

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5. Heat recovery, Energy reduction, Cost calculation, Impact assessment, Project Management, Commercial offer

6. Initial and alternative education : Beginners and Intermediaries
   Continuing education: Beginners and Intermediaries

7. By Thomas Röhr[1], Laurence Borderiou[1,2], Krzysztof Kalinowski[3], Maxime Perge[4]

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[2] ELLIADD, ERCOS Pole (U.R. n°4661), UBFC, Belfort, France
[3] Silesia University of Technology,
   Institute of Engineering Processes Automation and IMS, Gliwice, Poland
[4] Ananké SAS, Belfort

TCS PACKAGE: The TCS fact sheet (#3)

8.   Abstract

9.   Pedagogical goals

- Clearly define the learning objectives you aimed to achieve through the TCS in accordance with the broader « educational » goals of the whole course.

10. Sustainability objectives and part / TCS

- Describe in few lines the aim of the TCS about sustainability.

11. Year of the problem

- Sometimes, it is interesting not to date the TCS, so that you don't have to update figures and use the TCS for longer. Students don't like using old TCS. If the TCS does not need to be dated in order to be processed, preferably use the references « N » , « N+1 » ...

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8.   Students are working as Junior Project Manager at Ananké SAS, a Belfort (France) based engineering and integration company active in the field of heat recovery. Ananké is in contact with Alsace Burnhaupt Metallurgie SARL (virtual customer), a company producing metal parts for the automotive industry. They want to improve their environmental impact to be in line with European and national legislation. Therefore, the management is looking for potential solutions in their plant in Burnhaupt-le Haut/France (location can be chosen and adapted to local situation) to reduce their energy consumption and carbon footprint. Two potential usages have been identified in previous discussions:

1) Reinject preheated air into the oven to reduce gas consumption for heating up the air.
2) Contribute to the heating of the shopfloor in winter to maintain a minimum temperature.

9.   This Teaching Case Study aims at the following pedagogic goals:
- Enable students to discover and identify suitable environmental and economic indicators to compare different industrial solutions and to find arguments for a discussion.
- Discover heat exchange as an economically interesting mean to reduce energy consumption and carbon footprint of production tools.
- Present and defend the solution to be presented to the customer to the project manager and the team.

The following prerequisites are recommended:
- Basic knowledge about heat exchangers and potential energy recovery solutions helps better understanding the case (self-learning material is provided).
- Basic knowledge about technical calls for tender,
- For the detailed project development (optional step): Basics in project management

10. This TCS allows students to reflect and benchmark two different technical solutions to recover and reuse waste heat from an industrial installation, and to identify and present the better one to the customer. The decision is based on an evaluation scheme developed by the students that considers economic and sustainability criteria. The TCS shows students how to reduce a company's environmental impact while maintaining an economic equilibrium.

11. 2024

TCS PACKAGE: The TCS fact sheet (#4)

12. **Animation settings**: including duration, language(s), structure
   - **Duration** in a scale from 1h30 / 3 hours / 3h to 6 hours / 6 to 12 hours or in time slots depending on your organisation.
   - Indicate the different **languages** available

13. **Case format**: it depends on the goal of the TCS

14. **Category** (presented in the next page)

15. **Agreement sheet**

16. **Number of pages: Student's script / Annex**

17. **Number of pages: Teacher's note**

18. **Number of pages: debriefing support**

19. **TCS Pack components**
   - List all the documents included in the TCS script

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12. Preparation (60 min) + implementation: 4,5h
    Available in English and French (for the document addressing students only)
13. In class
14. C1 (see next page)
15. Yes
16. 9 pages / 16 pages
17. 5 pages
18. 18+4 backup slides*
19. TCS pack components:
    - SCABEE TCS Ananké (2024) – Proposal sheet.pdf
    - SCABEE TCS Ananké (2024) – Company agreement Ananké.pdf
    - SCABEE TCS Ananké (2024) – Base Scenario.pdf
    - SCABEE TCS Ananké (2024) – Introduction to heat exchangers.pdf
    - SCABEE TCS Ananké (2024) – Analysis form (student, beginners).xlsx
    - SCABEE TCS Ananké (2024) – Teacher's note.pdf
    - SCABEE TCS Ananké (2024) – Introduction (base scenario)
    - SCABEE TCS Ananké (2024) – Analysis form (teachers).xlsx
    - SCABEE TCS Ananké (2024) – Debriefing support.pptx
    - SCABEE TCS Ananké (2024) – Evaluation oral presentation.docx
    - SCABEE TCS Ananké (2024) – Evaluation report.docx
    - SCABEE TCS Ananké (2024) – Update form.doc

TCS PACKAGE: The TCS fact sheet (#4)

TCS's categories: (adapted from the CCMP's categories by the authors)

- **C1:** Case written in collaboration with a company which has given its consent for using of its internal sources such as the company name, figures, photos, videos, and so on. Join the agreement sheet;

- **C2:** Case based on real company information and with the acceptance of the company to use its data, but names (of company and persons) or figures are modified to keep them confidential. Join the agreement sheet;

- **C3:** Case written using external public sources (annual report, websites, brochures, newspapers, …) where names or verbatims of the protagonists are used. Join the agreement sheet;

- **C4:** Case based on real company using public information without the agreement of the company; the names of both compagnies and persons are changed to anonymous ones ; impossibility to make the link between the TCS and the company.

- **C5:** Imaginary case based on teacher's experience who collected information from several companies in order to write a case study with a fictive integrative company. It can also be a compilation of different situations of several periods put together at the same time to form a pedagogic tool.

- C1: this case was written in collaboration with Ananké SAS which has given its consent for using of its internal sources. We would like to thank the members of the company who took part in some of our working meetings, in particular Mr. Perge.

TCS PACKAGE: Preparation of the TCS text

☞ **TCS must contain all information for students to understand the situation and find solutions plus additional information in order to make them doing choices and keep only relevant facts.**

☞ **Who when where what (how): think of the protagonist and describe him (her).**

☞ **General characteristics of good cases:**
A TCS must give « enough material for student-readers to make imaginative reconstructions of the world in which the events took place » (Barnes et al, 1994).

- The story must be seen « as a set of decisions that will lead to consequences »;

- « The decision involves a protagonist who must analyse a situation, identify alternative courses of action, and do something – usually under pressure »;

- « The story takes place in a complex context »

- « A few key players [...] are available to provide their points of view »;

- The case « presents one broadly applicable theme »: Everybody, wherever they come from, must easily understand the purpose of the case while reading the title;

- « The story has one major decision point. Several minor branches in the path, and a resolution that reveals the road that may be followed. »;

- « One or more events perplex and irritate the character who experienced them »: The situation makes the protagonist upset! « How should I have handled the situation better ? » « Why didn't I see this happen? »

- « When analysed, the case events yield common rules of thumb that can apply to a variety of similar situations. ».

TCS PACKAGE: Designing the TCS

☞ **The origin: 2 possibilities**

1. I have a pedagogic need and look for materials to write a TCS.
2. I discover a real situation, and I would like to use it for writing a TCS.

☞ **The different steps :**

1. Formalize the objectives and the global scheme of the case « How do I imagine the TCS? (storyboard).
2. Find the materials, collect the data.
3. Make the key document : think of what do you want students to do ? Method, tables, different solutions, pros and cons of each of the solutions, academic goals…
4. Are some data missing? Can I find them, or do I have to imagine them, or shall students look for them?
5. Choose the style of your TCS (text, calculation sheet, pictures, video, audio, …)
6. Describe your main characters or company's information.
7. Begin to write and shape your TCS.
8. Find a « Buddy friend » to read your TCS and review the TCS with his feedback.
9. Finalize the TCS (script, annex, teacher's note, key, debriefing).
10. Test it with at least one class.
11. Update the TCS package + complete the proposal sheet.
12. One more test if needed.
13. Use the TCS and / or submit it for diffusion.

For example, I would like to update a TCS for complex business negotiation to apply sales method for key accounts. I was looking for a nowadays context and put the situation and the objectives of my old case in a recent one in the wind turbine context.

I meet the CEO of a small company and during our discussion, I found that it would be interesting for students to work on this field: it can be on a real problem of the company or just using the context and materials.

Don't forget to make the company sign the agreement (in the beginning of the process) Once I had very interesting interviews with a product manager who agreed to let me write a TCS form his company but because of the Covid situation, I lost contact for a few time and he never send me back the agreement sheet, so I lost all the materials for a potential TCS.

Laurence Borderiou / ESTA, France

TCS PACKAGE: The TCS scenario and correction

☞ **The objectives:** Begin with the main relevant idea of the TCS, the situational problem and the global shape.

☞ **Find the materials:** Search data of all kind, cull them in order to generate a concrete reference framework. Pictures, videos, keywords, images can help you to express your thoughts.
- From websites
- From interviews
- From your own experience

Remind that the goal is a pedagogic one:
« the sole objective of writing the story is to educate,
never to cause problem ». (Barnes and al)

☞ **Prepare the correction:** When you began to formalize the key document, you will see the information you use and where they came from, the format (internal, public materials, texts, articles, commercial, technical documents, pictures,…) and you finally would find the information which miss students to achieve the goals

☞ **Additional materials:** depending on the nature of the information, imagine which data are needed and how to present them. To do so, think of the category of your TCS (with company agreement or not)
- Ask your contact in the company about these special data
- Find these data on public sources (web, newspaper, …)
- Invent them
- Do students have to find more data by themselves, or they just have to read, understand the problem before the group session? Depending on the TCS' objectives.

- During an interview, the person would give you information about a problem she had to deal with: be very respectful as she gives you information about her life and how she managed a difficult situation, sometimes, delay the publication of the TCS

- For the correction document I often use a ppt file in order to propose to teachers a visual support they can use in class (to facilitate the animation of the TCS).
For example, for a global marketing plan TCS, I begin to edit the SWOT analysis, then I wrote the diagnostic. I immediately see the important information missing and think at the way to introduce it in the TCS text or annex of the text.

Laurence Borderiou / ESTA, France

TCS PACKAGE: Prepare the TCS text

☞ **Case format** depends on the goal of the TCS
- Sometimes, it is easier and richer to work with a co-author.

☞ **Writing**
- Choose the tone you would like to give to the story.

  You can:
  - Use conversations, reported dialogues, a story, pictures, videos;
  - Describe the main characters, give them a personality, a story, express their feelings and thoughts;
  - Give details of the environment to immerse students in the "world" of the TCS";
  - You can give the point of view of an externally observer (as a camera);
  - It is also possible to use a clinical and antiseptic tone;
  - Presents figures and facts, reports … ;
  - Use techniques of « drama » so as the students play the story in their mind like movies.

- It is easier to co-write and discuss with each other of the form and content of the TCS. When I wrote TCS alone, I always asked colleagues to read it and give their first impressions. Even if it is not pleasant to hear that what you wrote isn't good enough!

- Barnes and al. (1984) recommend not more than two persons writing together.

- The Ananké TCS's text presents the story of a junior Project Manager who is in charge, with some colleagues of preparing a sustainable oriented project for a customer called Alsace Burnhaupt Metallurgie SARL (Alsabur). The names of the characters are based on puns and the text contains description, pictures, minutes of meetings, suppliers' technical proposals.

Highlights the context and situation of the TCS

TCS PACKAGE: Prepare the TCS text

👓 Writing

- Use the convenient words (usual, technical, formal ,…);
- Then write the case keeping in mind « how you would you like students to work using this material »;
- Place information in the right place;
- Try to put yourself in students' situation;
- Ask you the right questions:
  - Does the TCS invite the reader in? Is it difficult to read?
  - How long for reading all the sentences of all the documents (it should be a raisonable time to spent; too long, students won't read all the pages.)
- Promote dialogue, resolution and decision-making process
- Keep in mind the characteristics of your audience

« Your decision about what facts to include, how to phrase them, and how to order them within the pattern of your case all guide your readers » (Barnes and al.)

- Find the right balance between the essential and superfluous information without making the TCS difficult to read and process.

- A major fact is easier to identify it is placed at the beginning or the end of a subsection or in a subtitle. Or if you want to challenge students you can put a major fact in ended page notes… The place you put information will help students or not !

- For example, for the Ananké TCS, the buddy friend said that there were too much direct technical information given. The appendices have been redesigned to correspond to existing documents such as quotes from suppliers, minutes of meetings, emails, etc.

- How old are the students? How academically advance ? Do they have some practice of the field?

Don't forget that the objective is not writing a document but stimulating learnings!
The TCS is just an intermediate.

TCS PACKAGE: The Teaching Note (exclusive diffusion for teachers)

This document explains to teachers how to use the TCS and gives all the explanations to manage it:

- o knowing immediately the different ways of using the TCS
- o checking that the objectives of the TCS are the same than his
- o Using easily without changing all the organization of his program.

☞ **The Teaching note gives the main information to decide if using the TCS or not**

☞ **Teaching Note contains:**

1. ABSTRACT & PROBLEMATIC: Case summary and the main issues addressed in the case. Describe the problematic if needed.

2. PEDAGOGIC GOALS & BIBLIOGRAPHY: describe in few words the main skills and knowledge involved. Add suggestions for further reading.

3. SUSTAINABILITY GOALS: describe the objectives in few lines. Replace them in the circular Economy Model and the UN SDG.

4. TARGET AUDIENCE & PREREQUISITES: Indicate the level of students for whom the TCS is intended and the knowledge required to complete it (prerequisites).

5. SUGGESTED TEACHING SCENARIO: complete the table (duration, umber of students per group, the type of work, …) and describe how to implement the TCS in a teaching course and suggest a marking scheme.

6. CASE PACK COMPONENTS: name the supports of the whole TCS package and their type of supports (Excel, PowerPoint, Pdf and the number of pages) and to whom each support is addressed.

7. ELEMENT TO ANALYSE AND SOLVE THE CASE: any information to give students during the key answers' presentation (including further comments).

8. FEEDBACK ON PREVIOUS EXPERIENCE: describe how students reacted when the TCS was first carried out in class.

Example «Ananké SAS: It's all about energy!»

Example of teaching note
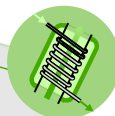
The Teaching Note takes up the main elements of the "fact Sheet" with more details and explanation.
It should help the teacher to run the TCS easily so that he (or she) can focus on interaction with the students.

Conclusion

- **Design a TCS is a very interesting project for teachers in all fields.**
  - «The SCABEE project has given me a new knowledge of how to prepare these kind of teaching material. It is very valuable for my programme. » K., Mechanical engineering teacher, UCN, Poland.

- **Don't underestimate the time needed to write the all TCS package.**

- **Students appreciate this different way of learning, and it allows to work on sustainable situations in order to reinforce their perception and knowledge of sustainable development.**

- **Be creative and enjoy using or designing a TCS!**

- **The SCABEE project offers at least 16 sustainable TCS in areas such as production, design, marketing, project management for all level of students (from beginners to experts), using different forms and designs (text, calculation sheets, web solutions…)**

Thanks to all the members of the SCABEE project for their involvement and exchange in the creation of this guideline and all the SCABEE's TCS!

Thank you to "Europe 's programs", through the Erasmus + projects, for making this international collaboration possible.