

The Climate Fresk

The Climate Fresk is a fun activity that aims to explain the causes and consequences of climate change. The game is played with cards showing IPCC diagrams. The participants are divided into groups of 8 and have to arrange the cards from causes to consequences according to the sets of cards given by the facilitator. Activities are then facilitated to allow participants to share their feelings and possible actions.

A climate fresco session lasts 3 hours and is composed of a card game session (1h30) and a collective debriefing with structured exchanges between participants (1h30). The debates are organised by the facilitators and can vary from one session to another, depending on the facilitators and the audience.

See the website: <https://climatefresk.org/>

Criterion 1: interactions between human systems and the biosphere

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 1: Interactions between human systems and the biosphere	The biosphere is not mentioned	The biosphere is considered as a block outside of humans. This biosphere is referred to as the environment, without distinguishing between the elements that make it up.	The biosphere is seen as a set of complex interactions external to humans. Human activities understand the complexity of the biosphere while having a utilitarian relationship	The biosphere is seen as a set of complex interactions of which humans are a part. Humans are embedded in an environment

Theory: The aim is to show how human activities contribute to climate change and the disruption of the biosphere.

Answer method: The Climate Fresk aims to show the causes and consequences of climate change using maps. Therefore, the method chosen to show the interactions between human and natural systems is for participants to have maps of both types of systems and to make causal connections between these maps.

In practice: Participants draw links (arrows) between cards. Some cards relate to human activities (transport, industry, agriculture), while other cards relate to physical phenomena related to biodiversity. The impacts of climate change affect both biodiversity and human systems. In this way, a series of interactions between humans and the biosphere are presented to participants as they progress through the game.

General comment on the gap between theory and practice: This activity links human systems with natural systems and dramatises the mutual interactions between the two types of systems: humans and the biosphere suffer mutually from the consequences of climate change. Humans are presented as part of a complex set of interactions (Level 3).

Criterion 2: Perspective in which the relationships between human systems and technical systems are considered

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 2: Interactions between human and technical systems	Human systems and artefacts are perceived as independent	Humans build artefacts (action only from the human systems to the artefacts)	Human is affected by artefacts (action only from the artefact to the human)	Human and artefact affect each other (two-way action)

Theory: The Climate Fresk shows the extent to which industrial activities can have dramatic consequences for human societies.

Answer method: The Climate Fresk aims to show the causes and consequences of climate change through maps. Thus, the method chosen to show the interactions between human and technical systems is for participants to have maps of both types of systems and to establish causal links between these maps.

In practice: Participants draw links (arrows) between maps. Some maps relate to technical systems or industrial sectors (transport, industry, agriculture), while other maps relate to social phenomena. Technical systems, in the way they are designed, contribute to climate change and, at the end of the chain, affect human systems (famines, health problems, wars). Thus, a series of interactions between humans and the designed technical systems are represented and become apparent to participants as the game progresses.

General comment on the gap between theory and practice: This activity links industrial systems with human systems and dramatises the mutual interactions between the two types of systems, in particular the fact that humans produce activities and that these activities disturb the climate and thus negatively affect social systems in the long term. Human and technical systems (artefacts, complex industrial systems) interact with each other. Level 3 is therefore addressed.

Criterion 3: involvement of local actors in a pedagogical module

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 3: Involvement of local actors in a pedagogical module	No non-academic actors involved	Local actors involved in the pedagogical module (but not involved in the educational part)	Local actors involved s but a posteriori	Local actors and academics co-construct an educational activity

Theory: The Climate Fresk is open to all types of participants and can be carried out in all territories and in different languages. However, individuals and professionals cannot register for the same session (price, slightly different format).

Answer method: The organisation of a Climate Fresk must be declared on the association's website if it is accessible to all types of actors (except for the distinction between individuals and professionals).

In practice: Participation depends on the context in which the Climate Fresk is organised. Sometimes the mural is organised as part of a course, in which case only course participants (students) have access. In other cases, the mural is organised by a university outside of the course and its openness to the actors of the territory depends on the organisers.

General comment on the gap between theory and practice: The type of organisation around the mural influences the degree and integration of local actors in this educational

activity. Thus, in our grid, the climate mural is located between levels 0 and 2. Level 3 is not very accessible for this activity because the maps of the mural already exist. However, we can note that after the card game, activities are organised for the participants to express themselves (expression of emotions, expression of opinions and ideas). The management of these expression activities can be co-constructed by organisers from different backgrounds before the Climate Fresk.

Criterion 4: Accessibility of knowledge for the territory (three level criterion)

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 4: Accessibility of knowledge for the territory	The module is proposed within the University but it is difficult for the actors to take it up	The actors of the territory can take up what is done, but the access is not free	Territorial actors can take up what is being done elsewhere.	Local actors can take up the activity and are accompanied to do so

Theory: The educational module of the Fresk is proposed by an association outside the university. It is therefore open to all types of actors. A process to become a facilitator is proposed free of charge by volunteers of the association. Future facilitators are free to take part in this process or not. The maps of the fresco are under Creative Commons licence.

Method of response: The maps of the fresco are freely available and a 6-hour training is required to become a facilitator.

Practice: Different actors have taken up the Fresk (academic, non-academic, local and national elected officials, professionals).

General comment on the gap between theory and practice: The Climate Fresk was initially proposed in an academic context to facilitate the understanding of climate-energy issues for engineering students. Its formalisation and pedagogical character have allowed the mural to be used outside the academic environment. Associations, companies and organisations have used it to raise public awareness of climate change. Level 2 is therefore addressed.

Criterion 5: Diversity of actors involved in the activity

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 5: Diversity of actors involved in the activity	Only 1 type of actor can participate (e.g. companies)	2 types of actors can participate (e.g. 1 public and 1 private actor)	The activity can be addressed to different types of actors.	The activity is inter-generational and multicultural

Theory: Participants in the Climate Fresk must be 18 years or older. The Fresk can be produced in several languages (45 languages available). The language of the workshop depends on the language of the chosen cards. However, individuals and professionals cannot register for the same Fresk (price, slightly different format).

Method of response: Actors from the same territory can register for a Climate Fresk on the association's website. In this way, the actors can be mixed.

Exercise: The human activities depicted on the maps are not necessarily geographically or temporally localised. The vision proposed by the maps is European-centred.

The association The Climate Fresk offers different workshops according to the type of actor. This contributes to the segmentation of actors in the territory.

General comment on the gap between theory and practice: The fresco is a pedagogical module with the possibility of mixing the actors of a territory (level 2). The aim of the fresco is to make as many people as possible aware of climate issues. However, the implementation of this awareness is proposed in a segmented manner (students, individuals, professionals, elected officials). This limits the capacity of the fresco to bring together the actors of a territory on climate issues, and therefore potentially to act together or to understand each other's problems in relation to this issue. Therefore, most of the time level 1 is addressed (and only occasionally levels 2 or 3).

Critère 6: Level of commitment

Participants: free or paid

Organizers: volunteer or commercial

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 6: Level of commitment Participants: either it is free, either they paid Organisers: volunteer or in a commercial approach	Case where participants and organisers are in a commercial approach both pay or are paid to participate / organise)	Case where participants do not have the choice to participate (but do not pay for that) and there is a commercial approach on the part of the organisers (payment of a fixed price, service).	Case where the participants are volunteers. The organisers in a commercial approach - commercial: pay free price	Case where participants and organisers are volunteers to participate / organise the activity (it can be free or they pay via a donation).

Theory: the use of the Climate Fresk (educational, awareness, consulting, team-building...) varies according to the stakes. Climate Fresk organised in a context of service (by some consultants for instance) is not free (organisers and participants pay).

Answer method: different according to the stakeholders involved.

In practice: all types of stakeholders are involved.

General comment on the gap between theory and practice: regardless of the user, the Climate Fresk allows to narrow the gap between theory and practice. It serves its purpose of awareness. It does take the activity "out" of the classroom. It follows a "gamification" process that can be substantially more useful for non-sufficiently educated people on climate change. For students and practitioners that are literate on CC, it brings a practical learning component that reinforces their theoretical knowledge using systems thinking. Therefore, all levels can be addressed.

Fresque du renoncement

The workshop on 'renunciation' is designed by Victor Ecrement and Diego Landivar as part of the Closing Worlds Initiative research project.

The aim of the workshop on 'renunciation' is to collectively imagine which activities to stop and how, in order to respect the planetary limits. By describing an activity in different ways, participants discover the complexity of the process of 'renunciation'. At the end, they devise a strategy together to renounce the activity or certain aspects of it.

This workshop is structured in 4 steps. Firstly, the participants choose a topic together, such as cars, ski resorts, or meat... or propose another one. Secondly, in order to understand the complexity involved in the process of 'renunciation', participants describe the activity from different perspectives: technical, economic and logistical, and social and use value. In the third step participants list the communities that are most dependent on the activity, and which are therefore likely to be affected by a renunciation. Then each person chooses a community to represent and prepares claims and proposals. The final stage consists of comparing the different proposals of the groups, who must then together develop a strategy for renouncing the activity or certain aspects of it.

See the website: <https://lafresquedurenoncement.xyz>

Criterion 1: Interactions between human systems and the biosphere

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 1: Interactions between human systems and the biosphere	The biosphere is not mentioned	The biosphere is considered as a block outside of humans. This biosphere is referred to as the environment, without distinguishing between the elements that make it up.	The biosphere is seen as a set of complex interactions external to humans. Human activities understand the complexity of the biosphere while having a utilitarian relationship	The biosphere is seen as a set of complex interactions of which humans are a part. Humans are embedded in an environment

Theory: This is not one of the objectives of the workshop.

Methodology: As the identification of interactions between human systems and biodiversity is not one of the objectives of the workshop, there is no specific methodology used.

In practice: In practice we can see that in the descriptive part of the activity (where participants have to identify dependencies, uses and attachments, i.e. question who would be affected by renunciations and how), it is possible that at this moment participants identify the link between the activity (the human system) and biodiversity, or plant and animal species. Thus, depending on the participants and the facilitator at this stage, we can address level 0 or go to level 3, where participants become aware through the study of a technical system or human activity, that humans are part of a set of complex interactions with the living. Level 3 can also be reached through a reflection when the participants have to describe the supply chain of the chosen technical system. For example, for a car, it will be necessary to list the main assembly sites, but also the places where the metals are extracted, the oil wells that will be used to create the fuel, and thus become aware of the interactions with the non-living.

General comment on the theory/practice gap: It can be seen for this criterion that even if there is no objective concerning it with this workshop, in practice it may address this criterion.

Criterion 2: interactions between human and technical systems

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 2: Interactions between human and technical systems	Human systems and artefacts are perceived as independent	Humans build artefacts (action only from the human systems to the artefacts)	Human is affected by artefacts (action only from the artefact to the human)	Human and artefact affect each other (two-way action)

Theory: The objective of the workshop is to see what are the possibilities of renouncing a human activity or a technical system, and that the participants acquire technical knowledge while realizing that we can renounce a great diversity of things (component, material, supply chain...).

Answer method: To answer this objective, it is necessary to become aware that the human being can act on the technical system, thus several steps of description of the technical system are asked to the participants. Make a causal tree and represent the supply chain of the studied entity. Once the entity is known, the participants start to imagine what would be affected by waivers and how.

Practice: In practice, we see that participants have a good grasp of the interactions between humans and technical systems (level 3). There is an amplification of this understanding when the participants exchange on the claims and proposals of the studied collectives to then conceive a strategy to renounce the activity or some of its aspects.

General comment on the theory/practice gap: Regarding this criterion, we see that the gap between theory and practice is weak.

Criterion 3: integration of the territory's actors in a pedagogical module

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 3: Involvement of local actors in a pedagogical module	No non-academic actors involved	Local actors involved in the pedagogical module (but not involved in the educational part)	Local actors involved but a posteriori	Local actors and academics co-construct an educational activity

Theory: The mural is open to all types of public and can be realized in all territories where the french is spoken.

Answer method: The workshop can be made for a group of 8 people maximum. This group is accompanied by a facilitator. If the animation is done by the designers of the workshop, a financial participation is requested. On the other hand, it is possible to animate the workshop to participants without having a particular training, with the help of a manual provided, as long as it is not a commercial use. This mural is also under a creative common license that allows remixing, transforming and creating from the material, which allows a certain form of integration of the actors in the pedagogy afterwards (level 2).

Practice: In practice, the actors interested and having the competences to animate the workshop seize it and propose animations to the actors of the territory. But a modification of this workshop by other actors than the designers is not known at the moment.

General comment on the gap between theory and practice: In theory, the actors of the territory can be integrated in the approach (level 1) and the proposed method. By allowing a possible modification of the workshop, it can reach level 2 of this criterion. But in practice, we can see that we are rather at level 1.

Criterion 4: Accessibility of knowledge for the territory

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 4: Accessibility of knowledge for the territory	The module is proposed within the University but it is difficult for the actors to take it up	The actors of the territory can take up what is done, but the access is not free	Territorial actors can take up what is being done elsewhere.	Local actors can take up the activity and are accompanied to do so

Theory: There is no training in workshop facilitation, so the tacit objective is to learn how to facilitate the workshop independently.

Answer method: Files are available on the workshop website. They include facilitation materials, a manual and a presentation for workshop participants. There are also tools available, i.e. 7 files corresponding to the steps of the workshop.

Practice: In practice, for participants who have done the mural once or twice, it is possible to use it to facilitate the workshop, because the tools are easy to learn.

But we can see that it is easier to facilitate the workshop when the facilitator has a fairly well-developed skill in systemic visualization of a system.

General comment on the theory/practice gap: The accessibility of the knowledge for this workshop is not really elaborated, but all the files to realize the workshop are accessible. It is thus possible for the actors of the territory to seize it and to realize it in another framework as long as it is not commercial, so we can say that we are at level 2. On the other hand, the manual is not very detailed and as there is no training in facilitation offered, so the appropriation of the workshop by the actors may be difficult depending on their ability to have a holistic vision of the technical system.

Criterion 5: Diversity of actors involved in the activity

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 5: Diversity of actors involved in the activity	Only 1 type of actor can participate (e.g. companies)	2 types of actors can participate (e.g. 1 public and 1 private actor)	The activity can be addressed to different types of actors.	The activity is inter-generational and multicultural

Theory: All types of actors can participate, and can facilitate.

Answer method: The choice of the topics is made by the actors, so it can be adapted to all types of actors.

Practice: In practice, we notice that it deals with concepts that are difficult for children, but affordable for teenagers. Moreover, the technical system chosen can be anything and

everything, and therefore adaptable to the interests of the participants. But the workshop can be a bit more challenging to run. The playful side is not very present and could be accentuated to reach a level 3. Also the workshop is only available in French, but it is free to make a translation in another language if needed.

General comment on the theory/practice gap: In practice, it is clear that not all actors can participate in the workshop, even if a wide variety of French-speaking actors can be integrated.

Criterion 6: Level of commitment

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 6: Level of commitment Participants: either it is free, either they paid Organisers: volunteer or in a commercial approach	Case where participants and organisers are in a commercial approach both pay or are paid to participate / organise)	Case where participants do not have the choice to participate (but do not pay for that) and there is a commercial approach on the part of the organisers (payment of a fixed price, service).	Case where the participants are volunteers. The organisers in a commercial approach - commercial: pay free price	Case where participants and organisers are volunteers to participate / organise the activity (it can be free or they pay via a donation).

Theory: With the creative common license used, it is not possible to make commercial use of it. But it is possible to pay the animators.

Answer method: Using a creative common license.

Practice: In practice the workshop is organized between volunteers, whether they are participants or organizers (level 3).

General comment on the gap between theory and practice: There is no real gap between theory and practice.

Ecodesign challenge

The Ecodesign Challenge is an original exam organised as part of an Ecodesign course at the University of Technology of Troyes. It is jointly organised by a team of researchers and a company. In the form of a competition, teams of students (between 3 and 8 students per team) have to propose an ecodesign approach to a topic proposed by a company, an association or the teaching staff. Each group has a different topic of its choice. The students have between 24 and 30 hours to respond to the topic, which they must present in the form of a 5-minute pitch. A jury made up of researchers, actors from the Aube region and businesses votes for the best presentations. It should be noted that the evaluation is not based on the jury's vote, but on the skills used during the eco-design process.

See the website:

<https://recherche.utt.fr/interdisciplinary-research-on-society-technology-environment-interactions-insyte/ecodesign-challenge>

Criterion 1: interactions between human systems and the biosphere

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 1: Interactions between human systems and the biosphere	The biosphere is not mentioned	The biosphere is considered as a block outside of humans. This biosphere is referred to as the environment, without distinguishing between the elements that make it up.	The biosphere is seen as a set of complex interactions external to humans. Human activities understand the complexity of the biosphere while having a utilitarian relationship	The biosphere is seen as a set of complex interactions of which humans are a part. Humans are embedded in an environment

Theory: The groups of students have to carry out a functional analysis and identify the impact of the system to be redesigned, both on the biosphere and on human systems. Thus, identifying the impact of human systems on the biosphere is one of the objectives of the activity, as it is present in a classical eco-design approach.

Answer method: Groups should present the extent to which human systems affect the biosphere through a specific service or product (varies according to the topic). In this way, human systems and the biosphere can be placed in relation to each other.

In practice: Students present the biosphere as an "environmental" block in their presentations at the end of the event (to the jury). Students have little time to go into detail about the elements of the biosphere impacted by human systems.

General comment on the theory/practice gap: Students are positioned at level 1 in most cases. The relationship between human systems and the biosphere is not very detailed by the students, who prefer to keep more time in their pitch for the presentation of eco-design solutions. Thus, this criterion is part of the event's objectives but is only partially addressed.

Criterion 2: interactions entre systèmes humains et systèmes dits techniques

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 2: Interactions between human and technical systems	Human systems and artefacts are perceived as independent	Humans build artefacts (action only from the human systems to the artefacts)	Human is affected by artefacts (action only from the artefact to the human)	Human and artefact affect each other (two-way action)

Theory: Student groups must carry out a functional analysis and identify the impact of the system to be redesigned, both on the biosphere and on human systems. Some eco-design approaches involve services and can therefore have an impact on the habits and uses of individuals and social groups.

Answer method: Students must apply known methods of analysis (functional, systemic) to an artefact redesign issue.

Practice: Students use known methods only if they think of them (no obligation on the part of the teacher). The groups link the modification of the artefact they are studying to changes in behaviour.

General comment on the gap between theory and practice: There is a lack of systematisation in the implementation of analyses of the impact of the technical system on human systems. Furthermore, although humans and artefacts do influence each other (level 3), these influences are analysed by students in a rather superficial way (without any real scientific support to prove the mutual influences, for example). This is partly due to lack of time. Therefore, only level 1 is addressed.

Criterion 3: involvement of local actors in a pedagogical module

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 3: Involvement of local actors in a pedagogical module	No non-academic actors involved	Local actors involved in the pedagogical module (but not involved in the educational part)	Local actors involved s but a posteriori	Local actors and academics co-construct an educational activity

Theory: The event should enable students to apply an eco-design approach to specific topics. The involvement of companies in the pedagogical activity for the submission of topics is part of the economic model.

Answer method: Co-construction of the event between researchers and a company. Participation of schools other than the Troyes Technical University, depending on the edition. The topics were submitted by companies that could potentially participate in supporting the teams.

In practice: A company co-constructs the hackathon with the team of researchers (organising the game sessions, participating in the logistics, supporting the themes). In addition, the topics are sometimes proposed by companies or associations (non-academic legal entities). For several editions, the hackathon has been organised at the Aube en Champagne technology park (outside the walls of the university), so that the site can also take part in the opening of the event.

General comment on the gap between theory and practice: The event has allowed a company to co-organise the hackathon since the first edition. It should be noted that this

company does not take part in the evaluation of the students (only the pedagogical director of the course evaluates the students). Recent editions have seen the integration of several types of stakeholders in the event: the alumni of the University, the Design University of Troyes, a foundation. We can therefore say that this event is at level 3 on this criterion, between the original company and the research team. The other partners are involved a posteriori (level 2).

Criterion 4: Accessibility of the knowledge for the territory

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 4: Accessibility of knowledge for the territory	The module is proposed within the University but it is difficult for the actors to take it up	The actors of the territory can take up what is done, but the access is not free	Territorial actors can take up what is being done elsewhere.	Local actors can take up the activity and are accompanied to do so

Theory: The Ecodesign Challenge is an examination of a university's ecodesign teaching module. The accessibility of knowledge for the territory is not the main objective of the activity.

Answer method: The initiators of the Ecodesign Challenge invite different actors to accompany the students and to lead the playful workshops (during the breaks).

In practice: In practice, the actors of the territory can take part in the event, but access has a cost: payment of a subject for a company or participation in the logistics for the other partners.

General comment on the gap between theory and practice: The Ecodesign Challenge is at level 1 of this criterion because stakeholders can take up the concept, but access is not free (financial cost). In addition, the event is organised annually, so stakeholders have to respect this timing in order to take part in the event (unlike other activities that can be carried out spontaneously and several times during the year).

Criterion 5: Diversity of actors involved in the activity

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 5: Diversity of actors involved in the activity	Only 1 type of actor can participate (e.g. companies)	2 types of actors can participate (e.g. 1 public and 1 private actor)	The activity can be addressed to different types of actors.	The activity is inter-generational and multicultural

Theory: The Ecodesign Challenge should enable students to apply their knowledge of ecodesign to a concrete issue.

Answer method: Various ecodesign stakeholders will be involved in the process to ensure the quality of the topics and the support offered.

In practice: In practice, different actors participate to the event:

- Alumni of the University
- Companies
- Local public and/or private Universities
- Fondation

- Researchers and PhD students
- Regional institutions (technopole)

General comment on the theory/practice gap: The ecodesign challenge is at level 2 of this criterion because it allows addressing several types of actors (private, public). However, the activity does not address intergenerational or multicultural aspects (depending on the issues raised by the topics).

Critère 6 : Level of commitment

Participants: free or paid

Organisers: voluntary or commercial

Criteria / Levels	Level 0	Level 1	Level 2	Level 3
Criterion 6: Level of commitment Participants: either it is free, either they paid Organisers: volunteer or in a commercial approach	Case where participants and organisers are in a commercial approach both pay or are paid to participate / organise)	Case where participants do not have the choice to participate (but do not pay for that) and there is a commercial approach on the part of the organisers (payment of a fixed price, service).	Case where the participants are volunteers. The organisers in a commercial approach - commercial: pay free price	Case where participants and organisers are volunteers to participate / organise the activity (it can be free or they pay via a donation).

Theory: Students pay for their education and the Ecodesign Challenge is a test of their education. Companies pay to provide a topic for the students to work on.

Answer method: A fun hackathon where groups have a few hours to work on a topic.

Practice: The Ecodesign Challenge was an event where the topics submitted were not specifically linked to a company. The topics are now all linked to a company that pays for access to the event.

General comment on the gap between theory and practice: There is little gap between theory and practice for this criterion. The event is at level 0 for this criterion.