Managing cold within planetary boundaries: the case of the Siberia Operation

Mayer, C. Julie
Université de Rennes, CREM
Julie.mayer@univ-rennes.fr

Guérineau, Mathias
Nantes. Université, LEMNA
Mathias.guerineau@univ-nantes.fr

Drouet, Florence
Campus de la transition
flo.drouet@gmail.com

Abstract :

Humanity is entering an era of cross-scale systemic ecological risks, with unpredictable, global and irreversible effects, called Anthropocene risks. Yet, most Occidental organizations are ill-prepared to face such situations as a "new normal". This article explores how Anthropocene risks are organized locally. We study the case of the "Siberia Operation", a project led in a French eco-hamlet, in which actors willingly and collectively experience extreme cold with few resources during winter periods, to experiment organizational solutions. Our findings reveal the process through which cold, tightly intertangled with energy consumption, is socially constructed as a "janus face" risk object. We highlight three anthropocenic forms of organizing that underlie this process: reifying hazard, deconstructing harm, and reenacting nature-humans' causalities. We discuss how organizing Anthropocene risks can lead to strategies for more sustainable, desirable and resilient futures.

Keywords : Anthropocene; Organizing risk; Planetary boundaries; Case study

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INTRODUCTION

The era of Anthropocene brings a wide range of unpredictable, cross-scale and irreversible risks, which urge our societies to search for alternative modes of organizing (Wright et al., 2018): the growing scarcity of natural resources propels human civilizations into a renewed vulnerability to the forthcoming extremeness of ecological phenomena. In this context, the confrontation to extreme temperatures is no longer an exclusive matter of localized Northern or Southern regions of the world: meteorological hazards, such as cold, are emerging as a universal "novel" risk (Maguire et al., 2020), for which many organizations remain ill-prepared. In this paper, we explore how organizations enact alternative forms of organizing by addressing Anthropocene risk objects. Anthropocene risks refer to the uncertainties that emerge from the complex, ambiguous and cross-scale causality links between natural hazards and human activities (Keys et al., 2018). They thus prompt for radical changes of organizing logics (Heikkurinen et al., 2021). Yet, the question of how to address such distant and blurry hazards in the present remains largely unanswered (Nyberg et al., 2022). We adopt the perspective of the social construction of risk (Maguire & Hardy, 2013; Power, 2016) to reveal prefiguring modes of organizing in the Anthropocene.

We study the case of the "Siberia Operation", a project led in a French eco-hamlet, in which actors willingly and collectively experienced extreme cold with few resources for three winter periods, to collectively prepare for an unpredictable - even hostile - future. Our findings reveal the process through which cold is socially constructed as "janus face" risk object. We highlight three Anthropocenic forms of organizing that underlie this process: reifying hazard, deconstructing harm, and reenacting nature-humans' causalities.

Our study points out the social construction of risks as a core process of organizing at the era of Anthropocene. By revealing the process through which a potential future natural hazard, such as cold, becomes a risk object, we contribute to better understanding how constructing "novel" occurs and prefigures more resilient modes of organizing. We also contribute to the sustainability literature by explaining how radically new forms of organizing can emerge, to build more sustainable, desirable, and resilient futures (Wright & Nyberg, 2020).

This paper is structured as follows: First, we present our theoretical framework, followed by a methodological section describing our case study and analytical process. We then present our results, followed by a discussion and concluding remarks on potential research avenues and practical implications.

THEORETICAL BACKGROUND

ORGANIZING IN THE ANTHROPOCENE

The idea of forthcoming natural systemic disruptions has been depicted in distinct ways, either as one of the "grand challenges" that contemporary organizations at all levels must tackle (George et al., 2016) or as the direct consequence of human predatory activities on Earth that led to the Anthropocene era (Wright et al., 2018). The Anthropocene refers to a new geological epoch in which humans' activities have irreversibly affected natural mechanisms such as weather patterns, climate, land surfaces or ocean activity (Richardson et al, 2023; Keys et al., 2019; Crutzen, 2010).

The Anthropocene calls for radical changes of organizing logics (Nyberg & Wright, 2020; Heikkurinen et al., 2021). Acknowledging the extreme uncertainty and complexity of the multi-scalar interactions between nature and human activities prevents from using established frameworks of action. Consequently, organizations must build and rely on uncertain and non-consensual representations of the future to drive their action (Levy & Spicer, 2013; Alcaraz et al., 2016). From these imaginaries, new forms and new norms of actions can emerge (Roux-

Rosier et al., 2018; Gümüsay et Reinecke, 2021). Yet, the question of how to make sense of distant and blurry hazards in the present remains largely unanswered (Augustine et al., 2019).

Organizing in the Anthropocene may be shaped by a wide range of risks that "emerge from human-driven processes, interact with global social-ecological connectivity and exhibit complex, cross-scale relationships", called Anthropocene risks (Keys et al., 2018, p. 668). These risks are characterized by natural hazard resulting in human vulnerability and social instability. They are also ambiguous to delimitate, as they exhibit cross-scale interactions and evolve insidiously, through the accumulation of tipping points. Because of their systemic and irreversible nature, Anthropocene risks exacerbate our "risk society" (Beck, 2006): organizations at all levels must enact - and answer to - a wide range of new risk objects, derived from the current crossing of planetary boundaries (Williams et al, 2024; Whiteman et al., 2013).

COLD AS AN ANTHROPOCENE RISK OBJECT: A SOCIAL CONSTRUCTION

Little is known on how collective responses emerge from organizing these Anthropocene risks. Actors must anticipate forthcoming hazards, which are complex to materialize "here and there", and which disrupt established frameworks and techniques. In other words, Anthropocene risks need to be addressed both "prospectively" and "on real time", as two tightly interlocked modes of organizing (Maguire & Hardy, 2016). These "novel" risks (Maguire et al., 2020) cannot be addressed by using established frameworks and tools: organizations need to produce alternative representations and discourses to make sense of such hazards. Consequently, Anthropocene risks should not be considered as objective nor stable objects (Hardy et al., 2020). They are socially constructed, by experiencing the interaction of nature and humans' limits: a hazard takes shape as a "risk object" when actors define it as a manageable object, and establish a causality link with a harm (Hilgartner, 1992).

Climate change is acknowledged as one of the greatest challenges that humanity will have to face in a close future (Wissman-Weber & Levy, 2018). Its direct meteorological implications

also bring a range of societal challenges, including social justice, migration movements, geopolitical tensions, resources scarcity, social orders' instability, etc. Until today, apart from localized exceptions, Occidental societies have overall been spared of the hazards derived from extreme temperatures. Yet, facing either cold snaps in winter or heatwaves in summer may become the "new normal" for many organizations in these regions too. Beyond controversial technological promises to overcome these risks, Occidental organizations remain widely unprepared and ill-adapted to face this potential new reality.

This gap offers wide research opportunities to build new knowledge on how to improve organizational lives. The Anthropocene brings challenges that require structural changes at the institutional level (Wissman-Weber & Levy, 2018). However, these changes are so disruptive (de Figueiredo et al., 2022), that scholars wishing to prefigure them should examine locally-rooted experimentations (Roux-Rosier et al., 2018). Alternative organizations such as citizens' movements, collective housing initiatives or circular economy networks provide a field to observe how actors experiment new modes of Anthropocene organizing (Hoffman & Jennings, 2015). Examining the daily practices through which organizations build signification and solutions to risks entails to what the recent literature calls "riskwork" (Power, 2016). Unfolding riskwork implies unpacking a variety of practices that underlie the social construction of risk, including how discourses and narratives emerge to qualify a risk object, social interactions, material artefacts and activities that actors display while anticipating or facing risk. Riskwork then can reveal prefiguring modes of organizing in the era of Anthropocene. We thus address the following research question: what organizing modes underlie the social construction of cold as an Anthropocene risk?

METHODOLOGY

CASE STUDY CONTEXT

This paper is based on a social experimentation called the "Siberia Operation", led in the French eco-hamlet the Campus of Transition. The Campus of Transition is an alternative living and teaching place, created to experiment and promote sustainable and humanist modes of living. Created in 2018 by a collective of academics, entrepreneurs and students, the Campus is located in an old castle in Forges, a small town in the South of the region of Ile-de-France. The Campus hosts two parallel activities: teaching programs on the ecological transition for business/engineering schools and professionals, and a collective of people who live in the castle by experimenting collective and frugal lifestyles. The Campus is located in the *Château de Forges,* 18th century castle (Figure 1). This 3000 m2-building has approximately a hundred rooms, some with ceiling heights of over 5 meters and large, single-glazed windows. So far the castle is poorly isolated, winters are particularly harsh: temperatures break down to 5°C in some rooms. Because of the limited possibilities to heat the place (for financial resources and ecological reasons), the Campus inhabitants launched in their first winter the "Siberia Operation", a project to explore "low-tech" solutions to overcome the cold period. The Siberia Operation (SO) aims at using as little heating as possible, yet, avoiding people to suffer physically and mentally from cold. Three Siberia Operation have been led so far since 2019 (i.e., three winter periods). A leading team of inhabitants was formed (the "SO team"), to design, promote and implement solutions to overcome the cold (e.g., distributing heating pads, equipping people with thermic clothes, selecting privileged collective rooms to concentrate the heat, etc.). The two authors launched a collaboration with the SO team in 2021, to study their experimentation from an organizational lens.

Figure 1. Chateau de Forges, a 18th century castle

We adopted a "pragmatist approach" to research, defined as a "*process of inquiry that starts with practical experience, progresses to doubts, and finds provisional closure in the social construction of new beliefs"* (Lorino, 2018). This research relied on an abductive experimentation, in partnership with the field actors, who sought to address similar questions - though formulated differently. The research team included two academic researchers and one member of the field (member of the SO team). This configuration allowed converting the internal and external observations into conceptual categories, in an interactive way (Kistruck and Slade Shantz, 2022). The e did not search for preventing researchers' influence on the field: our intervention deliberately introduced ideas and tools to observe its effects (Shadish et al., 2002).

DATA COLLECTION

Our empirical material includes a large corpus of 60 documents, 400 hours of observation from the two academic researchers, around 20 formal and informal meetings, and 30 semi-directed interviews with permanent members and punctual visitors of the Campus of Transition (between 2021 and 2022), at three different phases of winter periods (before, during and after). We relied on the internal experience of one of the SO member, and collected all the documentation related to the Siberia Operation, including internal reports, meeting reports, detailed notes from the SO team that described their daily activities, internal discussions on Discord (an open-source chat platform), photos of winter events and activities. The SO team also provided us with technical data that they gathered to monitor cold during the period. We

could mix both quantitative and qualitative data to apprehend what cold or energy consumption meant, in a technical and social perspective (Creswell and Plano Clark, 2011). We completed this dataset with secondary documentation related to institutional discourses on cold in France (French government official recommendation, national press review on the topic of cold in the period of 2022-2023's winter).

DATA ANALYSIS

The data analysis encompassed three steps. First, we built a general narrative of the case by reconstituting the chronology of the main events of the three Siberia Operations. Second, we operated a semi-opened coding of the evolution of the discourses and activities related to cold, by analyzing how actors qualified and treated the topic (coding categories: object, hazard and causality link). Third, we operated an emergent coding, by identifying coding categories that reflect the "social experience" of cold (Bateman, 2004): we analyzed how actors treated cold as an abstract problem that emerged in the practice (coding categories: material, sensorial, cognitive and social experience). By crossing these "cold experience" dimensions with the "risk object" dimensions, we found three modes of organizing.

RESULTS: CONSTRUCTING COLD AS AN ANTHROPOCENIC RISK OBJECT

COLD STANDARDS IN FRANCE AND IN THE TRANSITION CAMPUS

The Siberia Operation takes place in France, where cold is considered as a physical and sensorial state that can become harmful when reaching a certain level. The French government acknowledges long or intense exposures to cold as a risk of public health: "*Periods of extreme cold and very cold weather can also be the cause of other meteorological phenomena with dangerous effects*[1]". Yet, there is no clear official indicator to objective the level of risk. Official governmental recommendations settle interior living space temperatures between 17°C and 19°C (no higher to avoid the recent risk of energy shortage, no lower to avoid discomfort,

[1] Source: French Government Website: https://www.gouvernement.fr/risques/grand-froid

hypothermia, or other health damages). People living below such temperatures are considered in a situation of precarity and may benefit from public support. Exposure to cold thus mostly happens as a forced situation of lack of technical solutions (heating or thermic isolation).

Despite an ongoing restoration of the building, the Campus of Transition has remained a thermally ill-isolated space. A conventional solution to avoid winter-cold would be to install heating systems to raise the temperatures to 19°C, as advised by governmental directives. Yet, the Campus members sought to avoid this solution, to first explore alternatives that would limit as much as possible energy consumptions, for ideological, financial and technical reasons due to the building's specificities. The ideological motivation lied in the will to experiment sufficiency as a mode of living. In line with the ambition of the Campus to constitute a "vitrine" of frugal social practices, most of the pioneers inhabitants came to test how far they could push themselves in this ideal of living with as less as possible: "*When I first arrived at the Campus, I must admit that I also wanted to test my own limits, to explore how far I pushed myself in terms of "less comfort", most of all on the topic of heating in winter*" (Pioneer inhabitant). In addition to this intrinsic motivation, the Campus members also had to deal with limited financial resources: heating huge ill-isolated spaces would result in a financial hole. Furthermore, The utility agreement with the electric power supplier set a technical limit with a maximum inrush power of 42 kWatt. Beyond this limit, electricity bills would explode, and power failures could happen. As the first winter approached, avoiding consuming energy was therefore a shared concern between the inhabitants. They collectively agreed on a simple solution: not using the heaters at all, and turn to alternative solutions instead, by adapting their practices.

First winters at the Transition Campus (2018-2019 and 2019-2020): crossing energy consumption limits vs. human cold limits

During the two first winters, the absence of heating led to very low temperatures inside the castle, often beyond 10°C. In reaction, the inhabitants decided to use blow heaters, but

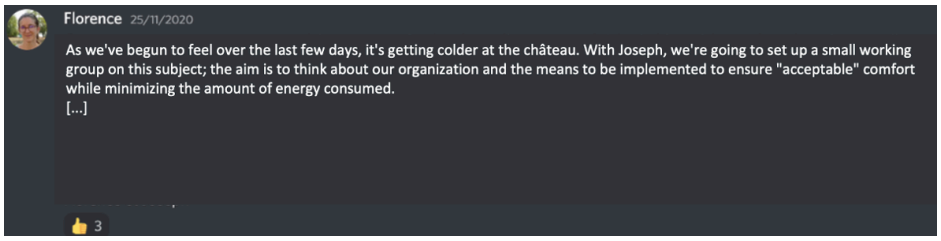
exclusively in the collective rooms (i.e., dining room, library). This configuration generated an implicit organizational rule: people who sought for heat should meet in the collective spaces. By doing so, they mutualized heating sources and benefited from the presence of numerous human bodies, as an additional warming strategy. Avoiding cold – and looking for thermic comfort – became intrinsically tight to socializing. It created or reinforced organizational routines, such as eating or spending the evening all together. However, this solution did not work as well as expected. The blow heaters were high-energy consuming, generating very high electricity bills (Figure 2).

Figure 2. Blow heaters used in collective rooms during the 2019-2020 winter

In addition, when other electrical devices (microwaves, toasters) were turned on at the same time, the excess power generated many power cuts. And yet, outside the collective warm spaces, many people physically and mentally suffered from cold: some members experienced frostbite, rough or even impossible night sleep, or extreme tiredness. They acknowledged that as early members, they all shared a high commitment to ecology and frugality, helping them cope with the cold. Because of the Covid-19 context of confinement, the Campus had remained closed to the public, creating a feeling of "living in their own bubble" reinforcing this feeling. Moreover, as the Campus expected more inhabitants and visitors by next winters, the members feared that keeping everyone satisfied without consuming too much electricity would become a dead-end. Not all of them would be willing to support such low temperatures in their daily life.

This tension between the stakes of electricity savings vs. human comfort led the Campus members to interrogate *how much cold* was socially acceptable in the Campus, for whom, and for which spaces. These two stakes became anchored in some members' discourses as two tightly interlocked parts of the same organizational problem: remaining in an acceptable zone between *being too cold* and *spending too much energy*. In fall 2020, five members took this as a challenge to manage formally, and as an opportunity to lead an experimentation: they launched the "Siberia Operation" (SO), a project in which they would imagine and implement organizational solutions to avoid cold without relying on electricity.

Figure 3. Announcement of the creation of the Siberia Operation in the Campus' chat (Discord)



Ultimately, four other members joined the SO team. The team thus represented the variety of social groups that structured the Campus: while some of them lived and worked in the castle, others only worked there, and others came as temporary volunteers. Their experience and expectations toward cold were slightly different, as they would not all be "trapped" every day and night in the coldness of the campus.

Winter 2020-2021- First Siberia Operation: organizing toward cold and energy consumption

Starting from November 2020, the SO team designed and implemented different solutions to avoid cold without using electricity. After several brainstorming meetings, they came up with five strategies: (1) organizing living spaces, (2) warming bodies, (3) keeping warm within heated spaces, (4) heating collective spaces and (5) communicating. Table 1 summarizes the actions experimented for each strategy.

Table 1. Actions experimented in the Siberia Operation

Strategies toward cold	Concrete actions experimented
(1) Organizing living spaces	• Defining a social function to each collective room of the castle (ex: resting, entertainment, working, eating, cooking). • Defining organizational rules for each room (ex: silence, period of frequentation)
(2) Warming bodies	• Superposing layers of clothes • Buying thermic-performant clothes (group purchase) • Sewing ponchos • Getting second-hand warm clothes • Displacing heating pads in beds and against the body
(3) Keeping warm within heated spaces	• Reducing volumes (ex: installing a bulkhead to divide by two the dining room) • Small repair works to isolate doors, windows, walls • Caulking doors with pillows • Covering doors with thick curtains • Setting behavior rules such as systematically closing doors and shutters
(4) Heating collective spaces	• Programming heaters (17-18°C in using hours, mostly between 8:30 am and midnight) • Punctual heating with radiant heaters (for meetings or mealtimes) • Defining rules to optimize and limit the use of heaters in collective rooms
(5) Communicating	• Posting visual "posters and signs" to remind and explain the rules (how to use electric devices, etc.)

The team worked with a "trial-error" approach: they tested an action during a few weeks and adjusted it according to people's feedbacks. Several SO team members had a scientific – mostly engineering – experience, as a former student either PhD or professional . This

background was clearly reflected in the methodological approach of the SO experiment: the team members used bibliographic sources to get inspirations, documented and monitored all their activities. Their ideas came from internal sources (own members' ideas or experience) and external inspiration (articles from "low-tech" associations or magazines. They meticulously took notes of every meeting and event, and kept track of daily electricity consumption, rooms' temperatures, and meteorological conditions. The formalization of the SO project was also driven by the reporting obligations from the public structure that provided financial support to the project[2].

Members could express their feelings about the SO actions during the Campus' formalized instances of discussion, with regular meetings and an open notepad accessible 24/7. Despite the unanimous success of the heating of common rooms, the purchase of warming clothes, and the general satisfaction from being aware of energy sufficiency issues, several actions generated disagreements and debates. Two organizational issues emerged. First, managing cold involved an arbitrage between various forms of comfort. As collective spaces were the best place to keep warm, some members lacked privacy and suffered from "over-socialization": "*I felt like I had to choose between feeling warm and being quiet, alone. Some evenings, I just wanted to retire quietly in my room, not to talk to others, but it was too cold in my room. Sometimes I felt tired of social interactions*" (Campus inhabitant). Others complained about keeping the shutters closed all day long, claiming that they preferred to be cold than to be deprived of natural daylight. Second, the rules defined in the SO created a feeling of normative and coercive pressure. Some members felt guilty or ashamed about turning on the heaters in their individual rooms. However, this issue was openly discussed during the last meeting, and some members felt relieved after that.

[2] The Siberia Operation was part of the "ORFEE" project, a project led by the Transition Campus to experiment low-tech solutions, funded by the French Governmental Agency of the Ecological Transition (ADEME).

Figure 4. Heated spaces: entertainment room (A) and meeting rooms (B-C)

Solutions emerged from the discussions between the Campus members. The SO team collected them and decided to implement them. They named a "cold referent", a person who would collect feelings and queries about thermal comfort, and to remind everyone that it was not "normal" to feel cold. They planned to organize physical activities to help people keep warm (i.e., sport, cleaning, gardening, outdoor games). They also planned to reinforce the communication, with posters reminding rules and tips. They also agreed on purchasing more radiant heaters for the rooms that members considered as "still too cold". However, after the Christmas break, the dynamic of the Siberia Operation slowed down. Some people had left the castle, others lacked time to get involved. As a result, many solutions were not immediately implemented. A closing meeting ended this first operation on February 23rd, with a collective agreement to reproduce the experiment next winter.

Winter 2021-2022- Second Siberia Operation: reinforcing vigilance to cold

The second SO occurred in a different context: in winter 2021-2022, the Transition Campus had decided to open its doors to a wider public. This means that the place hosted people with more heterogeneous background, personal convictions, and experience toward frugal living. To provide more general comfort to all these kinds of population, the project of installing a central heating was also on the strategic agenda of the campus. However, the SO team was still motivated to reconduct the experimentation: the Campus hired a part-time volunteer to hold the status of "Technical Sufficiency Referee", who ensured, with the SO team, the dynamic of the project. The experimentation started in October with a kick-off meeting, in which all the

members of the Campus were invited. The project was structured into the same 5 heating strategies presented below, through regular meetings, actions' implementation and monitoring.

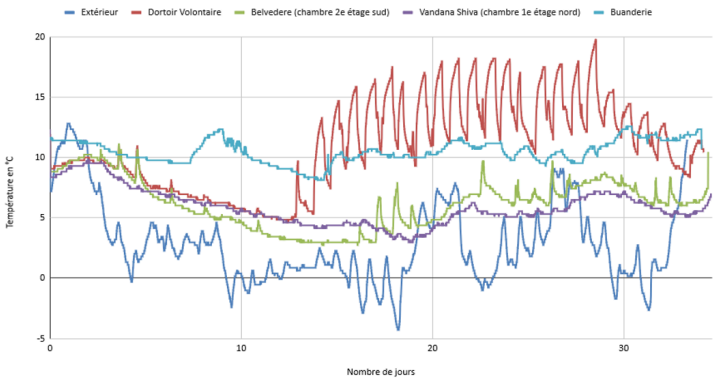
This second experimentation came with much more structured monitoring of cold and electricity consumption. While many members declared that the Campus was a cold place, the SO team wished to objective these statements. They installed many monitoring devices inside the castle, to report and analyze the data. Figure 5 illustrates one of the dashboards the SO team elaborated. Tracking cold and electricity consumption became a major concern among the members of the SO team. This could even trigger inquiries, when energy consumption figures exceeded a certain threshold, either too high or too low:

"*Consumption alert: we're blowing the power allowed by our meter. Does anyone know what happened on November 25 and 26?"* (SO Team member, on the SO Discord chat)

"*I came across someone who was using a radiant to heat the room, and who hadn't put himself under the radiant, so basically he was heating the table and the wall! And I'd already seen some people doing that last year*" (SO Team member2, on the SO Discord chat).

Concerned by the efficiency of every action, the SO team undertook meticulous calculations: « *I did a little energy calculation […] about hot water bottles, […] so here it is the conclusion: roughly speaking, the electrical energy spent to heat the water in a hot water bottle is equivalent to between 10 min (theoretical) and 13 min (experimental) of heating with a 750W radiator we have in the bedrooms".* Although this concern was less pressing outside the SO team, the rest of the inhabitants, workers and visitors were regularly informed and questioned about these figures (see Figure 6). Talking about cold and energy consumption became part of the social routines in the campus.

Figure 6. Temperatures dashboard between December 21th 2020 and January 28th 2021 (exteriors-dormitory-south room-North room-laundry room)



At the same time, fighting against cold while limiting the use of electricity created new social experiences among the Campus members. As "heating bodies before spaces" became an explicit rule, new clothing habits emerged and spread: it became normal to see people wearing a heating pad against their body (Figure 7. A). Heating bodies even gave birth to a convivial experience of sewing ponchos. Many members also appreciated the aesthetic that resulted from this initiative (Figure 7. B). Furthermore, fighting cold shaped daily routines by modeling the working spaces (Figure 7. C-D): people adapted their clothes, schedule, and activities, according to the temperatures. We note that spatial and social organization of work was also influenced by sanitary precautions related to the Covid-19 (e.g., avoiding sharing the same office). Generally, the Campus implemented a differentiated management of heating, each room having its own function and heating rules (temperatures, schedules,…).

Figure 7. Various corporal, spatial or social experiences of fighting cold in the Transition Campus

Despite this dynamic, tensions arose on electricity consumption and cold limits. On the one hand, the electricity consumption in the castle often exceeded the power subscribed, as one of the SO team members alerted: "*Hi! I come with bad news. The electricity consumption situation is a bit critical. The simultaneous power to which we have subscribed is largely exceeded, and this every day. In other words, we're using a lot of appliances simultaneously, and of course this is reflected in our bill […]. We're on a consumption multiplied by 1.5 and on the bill that's 8 times higher. So good luck to us in communicating as much as we can to try and solve these problems*." (SO team member, on the Discord chat). These excesses could last an entire day, and overpassing the threshold by over 50%. Going beyond the power subscribed became predominant in the SO team's discourses and practices (i.e., they took time to report and analyze daily consumptions and excesses). The SO team attributed these high levels of electricity consumption to the external construction workers who used blow heaters during their intervention, as well as to the increase of the number of visitors. They also pointed at other sources of electricity use, i.e., drying laundry. At the end of the winter, the Campus decided to raise this threshold by changing the electricity contract, to avoid overbilling. Despite these issues, the Campus succeeded in maintaining the same level of energy consumption than the previous winter, meaning that the average consumption of a Campus member was 55% lower than an average French consumer.

On the other hand, efforts to support the cold without heating spaces remained significant: the main dinner room could reach 6.5°C: "*we ate with gloves and were blowing mist!"* and the sleeping rooms were still hard to heat :"*Sometimes I was very cold at night, but I didn't dare heat any more than that with the electric heater because of the Siberian operation and a kind of pressure I put on myself*" (Campus inhabitant). The SO team also prompted the other members to find "*1 or 2 additional degrees that not too many people would complain to reduce*" (SO team member, on the Discord chat). What "too cold" meant evolved through a

« trial and error » logic. For example, working offices were initially set to 14°C, leading many members to retire to their bedroom, where they turned on individual heaters. The SO team thus decided to raise the temperature to 17°C. The question of the universality of these thresholds was also raised in the governance instances and reports: "*Data confirm the fact that it is cold at the Campus in winter, as evidenced by the temperature readings in the refectory, with an average temperature of 6.5° over the 4 days measured. These temperatures are far too low to be acceptable for certain types of public that the Campus wishes to welcome for training […], or simply people who are not used to low-heat spaces" (*extract of internal report*)*. At this point, the question remained open.

Winter 2022-2023-Third Siberia Operation: new temptations to use energy

The following winter came with additional challenges: the Campus was equipped with a new heating device, a wood-fire boiler. This solution could sound surprising for heating experts, as this device may not be the more ecological nor the more efficient. Yet, the Campus members deliberately chose this option for a symbolic reason: logs of wood are tangible and visible energetical resources (Figure 8-A). They need a physical effort to be carried and put in the boiler's oven, located outside the castle. Consequently, people were expected to use the boiler with more parsimony than other heating solutions. The Campus bought two central boilers, one to heat the ground floor, the other for the first floor. The boilers were located in a small shelter outside the castle (Figure 8–B). At the same time, the Campus kept receiving more publics to provide courses on sustainability. This public varied from management and engineering students who were curious about a frugal experience, to big firms' executive managers who expected professional high-quality services. In this context of exacerbated tensions between being an eco-hamlet and a professional training structure, the question of how to manage cold and comfort became even more crucial and controversial for the Campus members.

Figure 8. Wood stock (A) at the Campus and the two wood-fire boilers (B)

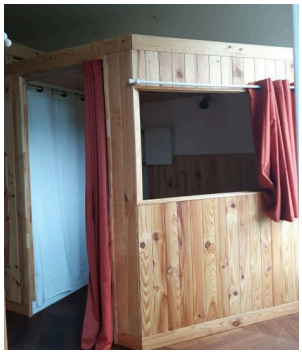
Fortunately, the wood-fire boiler provided a solution to mitigate the risk of being cold while preventing high electricity bills: from now on, the collective rooms of the campus would be "warm". Yet, the Campus members had to define what "warm" would mean, taking in account the variety of sensitivities and expectations of permanent members and visitors. For the people who had spent at least one winter in the Campus, 14-15°C felt already as warm enough, despite it was far below the national recommendation of 19°C: "*On Saturday, April 2, the average temperature outside was 3°, and by 6pm it was 15.7° in the refectory - the hottest it's been in a long time*!" (Extract from SO internal report). Once the temperature was defined, the Campus still had to come with an adequate organization: several times a day, someone would have to go outside and refill the boiler. This meant going out in the cold, sometimes early in the morning (5 am) or late at night. Beyond their personal motivation, people who would carry this task needed a minimal technical knowledge. The SO team 's ambition was to involve as many members and visitors as possible in this task, as a way to promote the value of energetic natural resources. However, they soon realized that training and mobilizing everyone was utopic: some were too busy, or not present in the adequate moment to relaunch the boilers, or not motivated enough. A few mornings, the castle's occupants woke up discovering that someone had forgotten his/her task: the place was unexpectedly cold, creating social tensions. Progressively, a more reliable protocol emerged: the Campus decided to dedicate this task to permanent members who enjoyed doing it. After this trial-and error period, they found the appropriate timing and amount of wood depending on the external temperatures and on how

many occupants were in the castle: "*Based on our experience over the past few weeks, we estimate that the boilers need to be loaded about 3 times a day, with the fire rekindled each morning. The working time required is estimated at 1 hour per day for two people*" (Internal SO report).

In the meanwhile, the Campus's renovation progressed. The SO team supervised the construction of sleeping alcoves (Figure 9): by reducing the volume of space to heat, these small spaces would allow members to sleep with more comfort, without using too much electricity. The SO team feared that making this technological heating solution available would divert people from social alternatives to cold: just turning on the boiler could become the "easiest" solution. To avoid this trap, they reconducted the SO by exploring additional actions: naming an official « Cold Referee » to play an mediation role with the visitors, lending clothes to the visitors and installing thermometers in rooms to help people keep aware of the temperatures. The SO team used the presentation of the boiler as a pretext to raise visitors' awareness of natural resources' scarcity. Preparing visitors to live a "cold experience" became part of the Campus' customer relationship strategy: before the training sessions, future students received information, warning and tips about cold.

As a result, many students became so prepared to be cold, that they felt that it was ultimately tolerable "*The last group of students we hosted were almost disappointed they weren't feeling colder*, *given all the warnings we'd sent them in advance. I had more negative feedback on other elements of comfort, such as the quality of the bedding and sheets, or the way the dishes were washed* [shared hand-washing tubs]" (Training and welcome coordinator). The SO team also realized that some devices played a performative role on visitors' perception of cold: while many of them felt warmer in the rooms' alcoves, the thermometers revealed that the temperatures were actually the same inside than outside the alcoves.

Figure 9. Rooms' alcoves



Paradoxically, these promising results raised a concern among the SO team: would this dynamic last in the long term? In fact, the 2022-2023 winter was particularly sweet: apart from punctual episodes of harsh temperatures, the castle did not have to endure long periods of intense cold. Furthermore, the heating and renovation actions had focused on spaces dedicated to visitors: providing a satisfactory customer experience had become a strategic priority, at the expense of inhabitants' expectations. For instance, their own private kitchen remained sometimes too cold to allow them to use this coveted space. Many of the actors involved in the Campus' strategic decision-making could actually escape from the daily inconveniences of cold: "*Personally, if I can, I wait to come back home to take my shower. When you've already spent 5 minutes under water that's not very warm, getting out wet in the cold is really painful. I'd rather go two days without a shower.* » (Campus employee). Therefore, strategic instances did not necessarily manage the Campus as an eco-hamlet but rather as a business. This tension led to the departure of several historical members, who felt that the spirit of the project, i.e., experimenting alternative frugal modes of livings, had vanished. Finally, the question of cold came along with other forms of comfort, which remained problematic: "*is it tolerable to receive professional public, while sharing clothes or washing the dishes in the same water bin?"* (Campus employee). While the Campus was already divided into different social categories (e.g., inhabitants, workers, volunteers, students,…), these categories showed conflicting interests, visions and behaviors toward the management of cold, and more generally of comfort. Finding

its own ambivalent identity would now be the next challenge of the Transition Campus, and concomitantly, redefining their own relationship to cold and energy.

Through these successive periods of winter, cold progressively became a "managed" object, and was tightly linked to the management of energy consumption, as the other side of the same coin: the logic was to remain under socially constructed limits, i.e., being "too cold" versus being too "energy consuming". These limits varied over time, as the SO team and the other members of the Campus experienced the concrete consequences of their own choices. In the next section, we unfold the forms of organizing that emerged from the anthropocenic nature of this risk object.

THREE ANTHROPOCENIC FORMS OF ORGANIZING RISK

Our analysis reveals three forms of organizing: reifying hazard, deconstructing harm, and reenacting nature-human's causalities (see Figure 10 below).

Reifying hazard depicts how actors artificially bring a possible future hazard into the present, by intentionally creating the material and social conditions to materialize this hazard "now and there". The Campus inhabitants were not imminently forced to live in an extreme cold situation. Yet, living under extreme cold temperatures with very few resources is a commonly acknowledged scenario among the actors of the institutional environment of the Campus. The Siberia Operation was designed as a strategy to prepare for such a possible future. The collective decision to reduce as much as possible the use of electric heating, as well as the choice to adopt a constraining mode of heating (i.e., wood boiler), reflect this intention to immerse the castle's occupants into this anthropocenic situation: few natural resources to struggle with harsh conditions. Many occupants considered it as an experiential challenge: "*I want to experience going all the way. I want to be more rustic, to experience rigor and to increase it. There will be less and less energy available in the world, for me it is a way to prepare myself for it*" (Campus Inhabitant). For the inhabitant, living in the castle is a way to

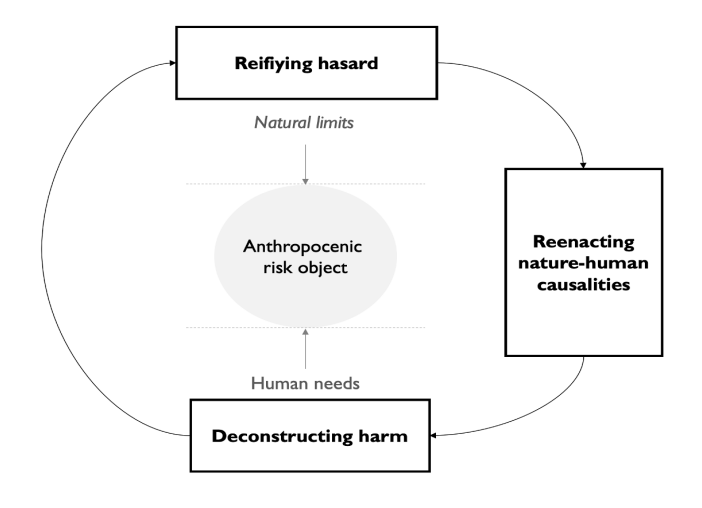
"reconnect to nature", to feel its seasonality. Instead of escaping the sensorial consequences of cold by using technologies and electricity, some members of the campus searched for physical awareness of the natural cold brought by the seasons. Recreating this sensitivity meant accepting a certain level of physical sensations, including feeling cold or enduring the physical efforts that are necessary to earn warmth. As one historical member declared, "*it is better to learn how to live this way now that we have time and no pressure, instead of waiting to be up against the wall, when we won't be able to afford democratic decisions or searching for social justice*".

Deconstructing harm refers to how actors individually and collectively question and redefine the criteria to qualify something as being harmful, instead of taking existing criteria for granted. Decisions to turn-on the heat or to engage into further actions occurred when a situation was collectively acknowledged as "too cold" or "too energy consuming". Yet, this state of "too much" was not easy to define, nor constant across time and people. Deconstructing harm therefore encompassed both problematizing and normalizing practices (Maguire & Hardy, 2013). Cold and energy consumption thresholds depended on objective measures (e.g., monitored rooms' temperatures), as well as sensorial and cognitive criteria: "too cold" meant that someone, despite trying all the solutions provided by the SO team, still felt an intolerable discomfort. While heating a collective room at 15-16°C became the "new normal" in the castle, physical signs such as chilblain were collectively accepted signals to declare a state of "too cold", and redefine norms. These norms thus changed along with the population of the castle, and may still vary as the Campus' members come and leave.

Reenacting nature-humans' causalities describes how actors overcome the uncertainty and complexity of multi-scalar human-nature interactions, by building symbolic narratives of these interactions, as a way to drive and legitimate their own actions. On the one hand, the general philosophy of the Campus lifestyle embraces the idea – shared by many ecohamlets – that the

ecological issues are too urgent to keep waiting to act. While they acknowledge the very high level of uncertainty and complexity of these multi-scalar issues, they refuse to wait for further scientific foundations to define what should be done: people should accept uncertainty and act now, starting at their own scale. On the other hand, from a scientific perspective, defining a legitimate action relies on the ability to prove a causality link between local human actions' effects and their consequences on natural systems. To overcome this contradiction, the Campus members found other ways of legitimating the SO actions: they built their own symbolic narratives of the link between their own practices and nature. Activities that occurred directly in contact with natural environments (i.e., walking in the forest, gardening) would be collectively considered as "good". Many members embraced the idea that natural hazards can also have positive impact on human well-being, such as a feeling of empowerment, freedom or the reinforcement of social links: « *I've come to understand that cold is part of the [ecological] transition, and that when you lose heat on the thermometer, you gain in human warmth. So don't renovate the castle too quickly!* » (Feedback from a visitor at the Campus, February 2021). Despite the scientific background of many members, the Campus community built strong normative discourses about simple life, "buen vivir" (good living), respect to every living thing or solidarity. These discourses cohabited with pragmatic and scientific approach in the Campus, as a set of fundamental assumptions that would drive the search for any technical and human solution to ecological problems.

Figure 10. Organizing an anthropocenic risk



DISCUSSION AND CONCLUSION

Our study points out the social construction of risks as a core process of organizing at the era of Anthropocene. We depict an anthropocenic risk as a "janus-face" object, shaped by intertangled limits that arise from the encounter of natural ecosystems and human' search for integrity. We reveal the dynamic of defining, crossing and reshaping these "too much" and "not enough" limits, as a micro-level strategy to remain in a macro-level "safe operating zone" (Rocktröm et al., 2009). By revealing the process through which a potential future natural hazard, such as cold, becomes a risk object, we contribute both to the literature of risk management and to the recent body of research in the field of sustainability.

First, we enrich the recent literature in the field of sustainability that calls to radically rethink organizing logics at an era of major natural disruptions (Nyberg & Wright, 2020; Ergene et al., 2021). By documenting the social construction of cold as a risk object, we provide more precise understanding on how actors can deconstruct dominant paradigms to reconstruct a collective vision to guide action (Gümüzay & Reinecke, 2016). The three modes of anthropocenic organizing help explain how actors can overcome the gap between global challenges and local actions (van der Giessen et al., 2021). Our results suggest that accepting natural hazards and constraints as an inevitable aspect of our living conditions in an Anthropocene era. Our model

provides conceptual dimensions that are congruent with relational ontologies (Ergene et al., 2020), which may be a crucial shift that organization studies will take to address the Anthropocene challenges. By underlying the mechanisms through which organizational actors enact risks by intertangling natural and human limits, we show a novel way of relating to nature. Addressing risk objects that materialize the interdependencies between humans and the rest of the living is a way to rethink our human-centered frames (Kalonaityte, 2018).

Second, we respond to the recent call to better understand how organizations can address risks that humanity cannot well define nor quantify (Hardy et al., 2020). We extend knowledge on riskwork, i.e., rooted daily practices through which new risks are identified and (Boholm & Corvellec, 2016; Power, 2016), by demonstrating the important role that sensorial and symbolic dimensions play in organizing risk. Further studies could explore how these rooted practices can scale up and find legitimacy at a more institutional level (Creeds et al., 2022). In our case study, we observe that the Campus of Transition was also a place of institutional work to promote to the society's stakeholders an alternative lifeway, yet generating some ambivalent or contradictory objectives, which would be interesting to further examine. Finally, our work encourages further studies that bridge these two literatures, as a promising conceptual foundation to renew organizational frameworks that make sense to the era of Anthropocene (Roux-Rosier et al., 2018).

This research presents several limits. First, our model is built from a single-case study, which may not reflect the variety of organizational settings and stakes. Although the Transition Campus integrates some business-oriented goals, we did not focus on the nature of business shifts that emerge from organizing anthropocenic risk. Yet, this remains a key question in management science, as reintegrating nature and human stakes together generate multiple contradictions with dominant economic approaches of firms' development. Studying anthropocenic risks in more business-oriented cases may reveal other natures of mechanisms

of organizing. Second, we studied an organization characterized by a certain homogeneity of profiles: most of the members of the Transition Campus share a management or engineering high-level academic background. Consequently, despite the variations in ecological convictions, most of them acknowledged the urgency and priority of acting for the environment. This homogeneity did not prevent political tensions to emerge: how far should the Campus expand, how radical should its choices be remained controversial questions that generated coalition and internal dynamics of influence. Though we did not focus on this dimension, the case highlighted a political dimension of the Anthropocene that remains to be studied.

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