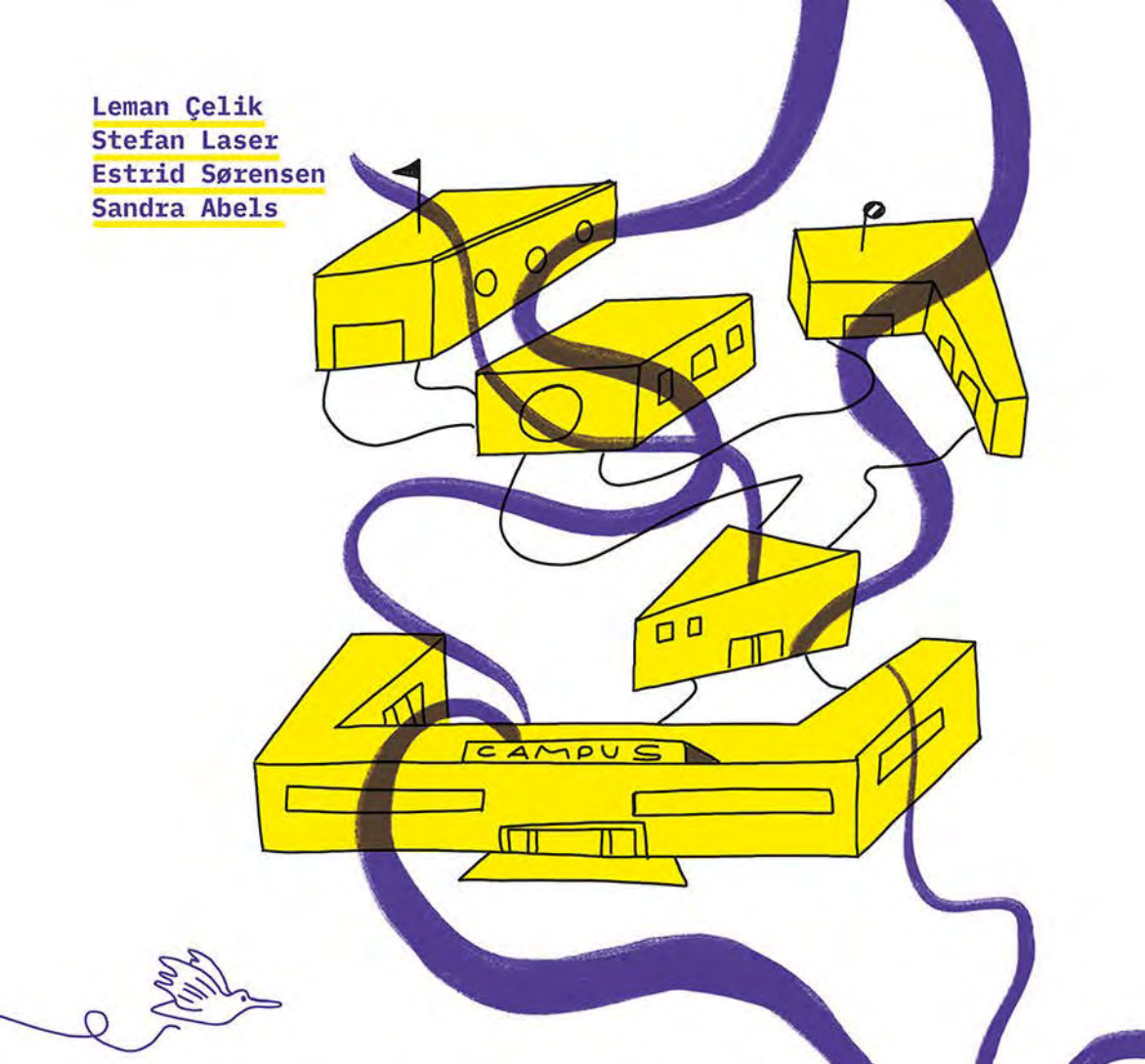
Leman Çelik
Stefan Laser
Estrid Sørensen
Sandra Abels



Staying with the Planet

The University That Tried to Reckon with Ecological Reality, Challenged Excessive Data Infrastructures, and Nurtured a Few Alternatives Not Planned For

[transcript] VIRTUAL Lifeworlds

Leman Çelik, Stefan Laser, Estrid Sørensen, Sandra Abels
Staying with the Planet

Leman Çelik is a doctoral researcher at the Collaborative Research Centre Virtual Lifeworlds at Ruhr-Universität Bochum. Trained in sociology and political science in Instanbul, she conducted research in urban studies before expanding her focus to science and technology studies. Her work investigates data infrastructures and the knowledge production practices of diverse scientific fields, with a particular interest in the reciprocal relationship between data infrastructures and scientific knowledge.
Stefan Laser is a postdoctoral researcher at the Collaborative Research Centre Virtual Lifeworlds at Ruhr-Universität Bochum. He has published widely on high-tech infrastructures, socio-ecological transitions, waste, and energy, and contributes to economic sociology, science and technology studies, valuation studies and discard studies. His search focuses on data centres and their planetary entanglement, from local siting to global value chains, in particular researching Asia-Pacific with a focus on the emerging chip industry in Vietnam.
Estrid Sørensen is a professor of cultural psychology and anthropology of knowledge at Ruhr-Universität Bochum. She conducts research on the intersection of technology and knowledge production from a Science & Technology Studies perspective, and is the head of the RUSTlab, the Ruhr-University Science & Technology Studies Lab. Her ethnographic research addresses data infrastructures, particularly data centres. She inquires into university data centres as mediators between knowledge and the planet, and searches how they contribute to making knowledge (in)visible as planetary.
Sandra Abels studies social sciences at Ruhr-Universität Bochum and is a research student at the Collaborative Research Centre Virtual Lifeworlds. She is interested in science and technology studies, ethnographic research, and research at the boundaries between science and art. For her master's thesis, she is researching the restructuring of a museum's digital data base and the respective data infrastructure.

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[transcript]

Virtual Lifeworlds is a book series emerging from the DFG Collaborative Research Center 1567. It brings together interdisciplinary perspectives on how virtuality has become normalized. By tracing knowledge production, practices, negotiation processes, and network dynamics, the series shows how virtual lifeworlds have taken shape and how diverse forms of virtuality have become drivers of social and cultural change. It examines the functions and consequences of the virtual for the constitution of subjects, lifeworlds, and aesthetic practices; for social organization and processes; and for the scientific disciplines themselves.

The Collaborative Research Center unites education, history, art history, linguistics, literary studies, media studies, and the social sciences. Across these fields, research converges on the media and technological conditions under which virtual worlds are produced and perceived—worlds that can be narrated, calculated, experienced immersively, modeled, or imagined. The series foregrounds the concept of virtuality, the uses of virtual spaces, modes of interaction with them, and forms of participation in them. It maps the infrastructures and imaginaries that sustain virtual environments, reflects on their historical trajectories, and illuminates the ways virtuality reshapes everyday life, institutions, and knowledge.

The series is edited by Stefan Rieger, Florian Sprenger and Anna Tuschling. They represent the CRC 1567 “Virtual Lifeworlds”.

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Content

Preface

This is a speculative book grounded in ethnographic research. It focuses on the university institution of the global North and West in the Anthropocene – a time when computing, servers, and data centres consume increasing amounts of energy on a planet that already operates beyond its ecological boundaries. Our concern is not about data centres of big tech, of intelligence services or of industry complexes. These can be readily criticised for generating excessive profits and consuming vast amounts of energy, particularly when others face energy scarcity and the planet continues to heat up. It is less easy to critique scientific data centres, since most agree that we need scientific research, for example, to deal appropriately with the climate crisis. But scientific data infrastructures also consume a lot of energy, and also their servers are full of metals extracted from the planet and most often fabricated under extremely damaging conditions. Attending to scientific data infrastructures in relation to the planetary condition presents us with a genuine dilemma, with real trouble. It cannot easily be resolved by deciding between keeping data centres or keeping science. So, we will instead stay with the trouble for a while.[1]

We focus on public data infrastructures, particularly in a European context and more specifically in Germany, where universities are funded by public money and thus accountable to society at large. The substantial energy and water consumption of data centres is well established. As university data centres are public institutions, citizens in principle have a say in how universities work: How do we want scientific data centres to work in relation to the planet? Discussing data infrastructures in relation to universities invites a nuanced debate about how to deal with increasing amounts of data processing and with expansive data infrastructures on a damaged planet.[2]

As members of the Collaborative Research Centre "Virtual Lifeworlds" in Bochum, Germany, we have been conducting ethnographic research around university data infrastructures and scientific data practices since 2022. Our research discusses the connections between the planet and scientific computing, including how their infrastructures are linked to extended relations of ecological conditions and global value chains, and shaped and informed by the work, lives, bodies, and landscapes that sustain them. We are tremendously grateful to all scientists, data infrastructure operators, energy managers and the many others who have agreed to engage with us and shared their work and practices.

Our ethnographic observations are not represented as naturalist reconstructions of what we have experienced. Instead, we present them in a speculative style that draws on science fiction. Science fiction is often used as a catalyst for the development of novel thought, and as a repository for new ideas. Yet, science fiction also works as a critical medium through which potential sociotechnical futures are explored and contested. It offers a space to reflect on the implications of new technologies and to negotiate their consequences for socio-technical coexistence. Science fiction facilitates discussions about changing normative social orders because it suggests new patterns of thought that are nonetheless rooted in history and tradition. The genre has close relations with pop culture. It points to the fact that the relationship between humans and machines has never been an exclusively scientific debate, but indeed a topic of popular interest. In this book, we take up reflections on digital data and data infrastructures – particularly data centres – and their interrelations with university life and with the planet. We hope it will inspire both scientific and popular exchange.

The little speculative stories of this book are framed by a narrative about a university that lifts off the ground with all its buildings, data centres, and staff, and comes to hover above the Earth. The metaphor of *landing* and of learning to land is borrowed from an edited volume and exhibition catalogue[3] in which the editors differentiate between the modern logic of human progress and growth on the one hand and what they call a climate regime on the other. In a climate regime, life and practices are entangled with and grounded in planetary realities. In the logic of progress and growth, on the other hand, people are neglecting the planet and metaphorically speaking their world is 'hanging in thin air'. Our stories find science hovering above the ground it studies. It no longer notices the friction[4] of the worlds it draws from. It struggles to see how its abstractions pull away from the lives that anchor their relevance. And this is not only the case for science, but for the whole information-based university. They need to learn to land. They are not very different from us, and we invite readers to think with them and with us about a move from staying with the human, with progress and growth, to staying with the planet; from acting as if hovering above planetary reality to landing and living with planetary consequences.

Planetary thinking and doing is certainly about ecological relations, yet following a number of contemporary and often decolonial thinkers,[5] our understanding of the planetary and of planetary knowledge is more fundamentally about engagement with extended and other forms of relations and coexistences. These involve not only human beings, but also

non-human creatures with which humans share the planet. The capacity to act, as well as its limitations, arise from connections and interactions with a multitude of often invisible relations. Acting in a university of a damaged planet is a constant recalibration with and through materials, utilities, social dynamics, political regulations, categories and standards, energy flows, microbes, land masses, your office neighbour a floor below, air masses, aquifers, waste heaps, chemical interactions, click workers 9,000 km east preparing your next AI prompt, kin, and so forth. We must face these relations, as scholars and as institutions. In embracing the planet, crucially, we assume that we do not have to retreat, that we are not necessarily in a dangerous position, and that we definitely should not give in to fatalism[6]. As is characteristic to the position of staying with the planet and with contemporary climate troubles, the stories in this book are not about everyone, everywhere, but about particular, situated practices at a specific university. The stories carry specific characteristics of German academia. This also means that they have limits and are different from many other stories told and stories that could be told. They paint a picture of a world that has extraordinary computing power, the energy resources, and a social and political system that allows universities to run advanced computing infrastructures. Their experiences, problems and challenges are grounded in and limited to this world. There are many universities in the world that do not face these challenges, because they do not operate under the same power or financial conditions. We acknowledge that they have problems and challenges that are existential in very different ways. People from these places will not find themselves represented by the stories in the book. This is one of its key limitations.

Presenting our ethnographic insights as a science fiction and a speculative fabulation, means that the specific university in focus is not a real university. It is certainly based on systematic ethnographic studies at very real universities, but we refrain from calling our observations purely factual. Instead of trying to represent the research material in a naturalistic, distanced fashion, we have enriched and concentrated the observations and conversations to make the key characteristics stand out – sometimes exaggerated and caricatured. Our focus is on the practices, cultures or challenges of universities' engagements with scientific data, data infrastructures and the planetary condition. While based on very specific, situated observations, the stories are results of our analyses across different situations at a number of universities. Few of the utterances or practices in the stories happened or were uttered exactly as they appear here. They are our interpretation.

The book's images were produced during the workshop "Sustainable Data Paths: Digital Infrastructures in Science" from 05–07 November 2024 at the Ruhr-University Bochum, where scholars from diverse disciplines, academic staff, data infrastructure operators, university IT user representatives, research data management experts, purchasers and third-party funding institutions came together to discuss the entanglements between knowledge production, infrastructure, and planetary reality. The participants joining from different universities were encouraged to reflect on the entanglements of data infrastructures and the planetary condition on the basis of a colourful map displaying observations, prominent quotes, documents and images, all of which were excerpts from our ethnographic research. Very warm thanks go to all participants of the workshop for their willingness to engage in our experiment and for their sincere input. Two graphic recording artists, Johanna Benz and Tiziana Beck from graphic-recording.cool, made line drawings to record the exchanges during the workshop. A selection of these drawings accompanies the book's stories, and supports its story-telling character. While the images are key to each story, text and image relate to each other in different ways. Sometimes, they comment on each other; sometimes, they illustrate each other; sometimes they offer contrasts or different perspectives. The tensions between text and image underline the book's invitation to readers to reflect on the question of how scientific knowledge production through data practices relates to our planetary situation, and on how universities engage with this reality.

Here is how we envision the book might be read: imagining, wandering, occasionally getting lost, starting again, maybe recognising, and definitely thinking. The speculative framing of a university that takes off and leaves the ground is the beginning of the university's urgent task to learn how to land, that is, to learn to engage with the conditions and dynamics of the Anthropocene and to remain able to respond to the planet. 'Staying with the Planet' invites readers to pause at titles, images, specific sentences, or cross-references, allowing them to trace their own path of reading and thinking through the book, likely marked by detours, interruptions, and leaps back and forth.

The stories are presented in three chapters. The first chapter inquires into university realities whose institutional and scientific practices tend to unfold as if the stressed planet did not matter. The second presents examples of practices that seek to engage with the critical condition, but for many different reasons tend to fail. Put differently, the first two chapters are meant to show how complicated it is to change the contemporary

situation, and how so many different institutional practices, regulations, habits and norms, material arrangements and organisational orders are involved in keeping the harmful status quo around data practices and data infrastructures and ignoring planetary reality. Yet, we end the book with hope. With different kinds of stories. The third chapter introduces practices we have observed or encountered through literature and conversations with colleagues and friends. While these stories are in no way instructions of how to act, we hope they inspire ways to engage with scientific data practices and university infrastructures that, at least in part, respond to the challenges of the planet and remain grounded in its conditions. That is, to learn how to offer occasions for learning to land. The speculative fabulations and the images are presented as a variety of different materials, such as manuals, flyers, data base and diary entries, as well as conversations and observations. They present different scientific, technical and administrative characters, who in diverse ways are involved in data practices and data infrastructures, sometimes entirely ignoring planetary reality, sometimes taking it into account, often just trying. The stories do not add up to a coherent whole; rather, each is a window into specific practices or patterns, challenges or alternatives the three chapters aim to convey.

We would like to express warm thanks to the RUSTlab, Tine Jensen, Phoebe Sengers, Zeynep Ecem Piyale, and Seran Demiral for comments on drafts and for supporting the idea of speculative writing.

The book is an exercise in picking up, letting things tangle, and digging in our carrier bag of research. In the words of Ursula Le Guin:[7]

"Science fiction properly conceived, like all serious fiction, however funny, is a way of trying to describe what is in fact going on, what people actually do and feel, how people relate to everything else in this vast sack, this belly of the universe, this womb of things to be and tomb of things that were, this unending story."

1. A key inspiration to the title of this book is Donna J. Haraway's (2016) book *Staying with the Trouble*. To stay with the trouble means exactly that: to be with it, experience it and get a feeling for its dynamics, why it is there, and why it doesn't go away, who is involved, who benefits and who suffers from it, etc. This is different from fixing a problem. Then you try to isolate the problem and make it go away, and you easily overlook that it is entangled with many other processes and actors, and they may stay, or even get worse, when you fix the problem as if it were isolated; when you do not respond to the complexity of interactions and dynamics that make the problem exist and that it helps sustain. In this book, we try to stay with the planet as a trouble, when attending to university data infrastructures. We dig into the world of university data infrastructures and try to understand how the planet is a trouble here, and what troubles it makes.

2. The term *damaged planet* stems from Anna Lowenhaupt Tsing et al. (2017), who published a collected volume to discuss how you can live, what you can do, when you reside on a planet that is already injured and hurt. They urge us to attend to the damages and the conditions a damaged planet leaves for us to live in. This is different from what we may call a *whole-world* thinking, where the foundation for thinking and acting is the idea is that we live on a healthy and unspoiled planet, and that when there are breaks and cracks, they will soon be fixed. It suggests we can turn our back to damages, while expecting someone else to clean up and develop technologies that will allow for new practices beyond the broken ones. Data infrastructures are a good example for exercising how to live on a damaged planet: On the one hand we surely need them but on the other hand, they are part of the problem, they also contribute to damaging the planet. A real dilemma.
3. Bruno Latour and Peter Weibel (2020).
4. Anna Lowenhaupt Tsing (2011) introduces the term *friction* to anthropology and points to how for instance a wheel needs friction in order to be able to move a bicycle ahead. Similarly, societies and social relations cannot subsist without friction.
5. Among these are Gayatri Chakravorty Spivak (1999), Déborah Danowski and Eduardo Viveiros de Castro (2017), and Isabelle Stengers (2015).
6. Steven J. Jackson (2023) coined the notion of *ordinary hope* pointing to hope deepening rather than reducing our planetary entanglements.
7. Ursula K. Le Guin (1986, 170)

Introduction

It was a grey and rainy Tuesday morning in the near future, when the North-West University lifted off. It had been coming for a long time, yet it arrived as a sudden surprise to most. Those staring at their monitors, trying to detect the latest and most notable numbers, hardly detected it. It happened slowly, but distinctly. The numbers on the monitor got too complicated, and the scientists got up to fetch a coffee. This was when they noticed. They glanced out of the windows and instead of students and cars passing by, saw treetops, planes, and low-hanging clouds. The university was hovering. The floor moved below them, many felt nauseated.[8]

They looked at each other. How to land? They were in this together, yet all in different ways. Their actions had provoked the planet to respond in unforeseen ways, disrupting the very structure of the university, unsettling its underlying political order. What was happening now had long seemed just a metaphor of not being grounded in planetary conditions. As if passing a tipping point, the very materiality of the university had actually taken off.

8. Nicolaj Schulz (2023) describes the emotional state of humans in the Anthropocene having the land under them destroyed as nausea.

The university left the
ground, ascended,
and everything shook.
Sykes didn’t notice.

Someone knocked
on the door. It was
the delivery he’d
been waiting for.

It was the newest laser.
Now, the project can really
take off.

Chapter 1: The university

At the North~West University, the scientists and staff had already installed ladders to climb up to the hovering university, as well as ropes for those who were particularly strong and athletic. Then a long and tiring debate erupted to identify those guilty of the catastrophe. Luckily, most realised that placing guilt would not alter their situation. Instead, in a surprising but fortunate turn, the North~Westerners started to question their academic cultures and practices that seemed to prevent them from landing. They were ready to reflect and rethink. They collected traces of their academic life, like a job announcement, a recent flyer, a song they often sang, and a data base entry. They also wrote down conversations from the past, discussions and things worth noticing. These are all collected in this chapter. Together, they paint a picture of a culture that they all knew very well, but until now had barely noticed.

Excellence

North
~West
University

PROFESSORSHIP AT NORTH~WEST UNIVERSITY

North~West University stands at the frontier of thought. We are a university where excellences meets conviction, and diversity is cherished.

We are looking for an excellent researcher with an RSI (Research Speed Index) above 85; extraordinary expertise; innovative teaching skills; outstanding research results; and a Nobel Prize (or equivalent: Fields Medal awardees are also invited to apply).

Come to work with us at the North~West University. We offer:

– a free office 7 days a week
– endless data storage space for simulations, experiments,
and massively large language models
– a beautiful view of our ever-expanding campus
– drinking water with a PFAS concentration below 5 ng/l
– a pineapple a day to optimise your efficiency
– a personal thank-you note from the university Chancellor
for each external funding above 250.000 ♯
– full autonomy and a yearly lump sum to purchase
the newest equipment ahead of your academic competitors

In addition, you are eligible to exclusive high-quality administrative meetings shaping the future of the world for the greater good.

Aspire to fly! The sky is just level one to a stellar career with the North~West University. An excellent environment for excellent scholars.

Apply here to become an integral part of our brilliant institution.

Competition

CONFIDENTIAL REPORT [redacted]

Document ID: ISR-HRDC/INT-RACE/[redacted]
Access Level: Tier-4 Authorisation Required
Title: Operational Notes on Strategic Monitoring of Research Speed Metrics and Competitive Scientific Productivity
Date: [Revised]
Prepared by: [redacted]

RSI—Research Speed Index (v4.2) - Access restricted to technical evaluators only
Strategic metric for evaluating research velocity. [redacted]

Indicator	Description	Ideal Value
GPI (Grant-to-Preprint Interval)	Days from funding to first public output	≤ 52 days
IRQ (Infrastructure Responsiveness Quotient)	Latency across technical and admin systems	≤ 0.85 ms
CAF (Citation Acceleration Factor)	Citation rate within first 30 days (adjusted)	Highest
RFR (Reflex-to-Funding Ratio)	Days to pivot after funding trend emerges	< 7 days
SVM (Synchronous Visibility Metric)	Multi-platform visibility within 48 hours	3+ platforms
TDS (Temporal Density Score)	Overlapping deliverables/ events per month	> 4 = “intensive”

Interpretation Scale:
RSI ≥ 85 → Highest-acceleration zone
RSI 60–84 → Globally aligned condition
RSI 40–59 → Slower-than-expected
RSI < 40 → LPE (Low Performance Environment)

1. Source Allocation and Acceleration Effects
[redacted] has observed that unrestricted access to computational resources, human capital, and flexible financing structures disproportionately accelerates the Research Speed Index (RSI). Institutions operating under the regimes of continuous accessibility demonstrate an average 67% increase in RSI, independent of research field or thematic specificity. Acceleration often leads to change in project objectives and in timeline expectations.

2. Infrastructural Asymmetries
Quote from newly employed professor: “This university lags far behind my former university. The IT infrastructure is slow and still being set up. [redacted]. We have no time to lose. The competition does not halt. I will fall behind. I must move quickly. I must run”.
Asymmetric infrastructure access exacerbates the race at the top: Researchers working in resource-constrained environments experience increasing workloads to achieve short-term speed advantages within academic competition. Such practices are associated with long-term institutional costs, e.g. burnout, fragility to change of staff. Therefore, RSI thresholds should be evaluated in conjunction with certified infrastructure profiles (CIPs).

3. Recognition, Competition, and Global Comparison
Interview notes: “We are [redacted] laboratories in the world working in this field. We know each other, support each other, and share information. Yes, we compete, but it’s a friendly competition. It’s how it should be.” Mutual visibility among high-performing laboratories often results in competition based on collaboration, the so-called peer-to-peer competition (P2PC). Global RSI calibration remains sensitive to such “friendly competition” areas.

4. Project Timelines as Soft Competition Structures
[redacted] in project cycles (grants, calls, deliverables, funding renewals) function as scientific accelerators. Progress becomes dependent on temporal criteria as much as epistemic criteria.

Early-career researchers report increased anxiety due to RSI mismatches between project demands (PD) and infrastructure realities (IR).

Recommendations:
1. Align RSI thresholds with certified infrastructure profiles (CIPs).
2. Formally distinguish between P2PC, based on mutual visibility and collaboration, and competition driven by speed metrics in evaluation rubrics.
3. Expand RSI literacy modules in doctoral and student programmes.

Progress

RR ResearchRegistry | Help | Logout

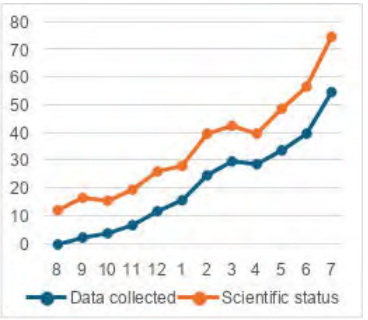
Expedition title	FARTHER				
Start date	2027	**End date**	2028	**Status**	Completed
Follow-up project	Mars expedition	**ID**	ISGZ82O4J	**Status**	Completed
Team	Prof. Ace	Prof. Chevalier			
Costs	3.000.000 ⚡				

Scientific obligations[9]

Volume of data	55 Zetabyte	**Long-term storage**	Eternally
Land occupied	Asteroid Ace (named during the expedition)		
Efficiency	1 2 3 4 5 6 7 (8) 9 10		

Ethics monitoring

Flag planted	Yes ✓	No ○
Scientific progress	Yes ✓	No ○
Planetary obligations reflected	Yes ✓	No ○

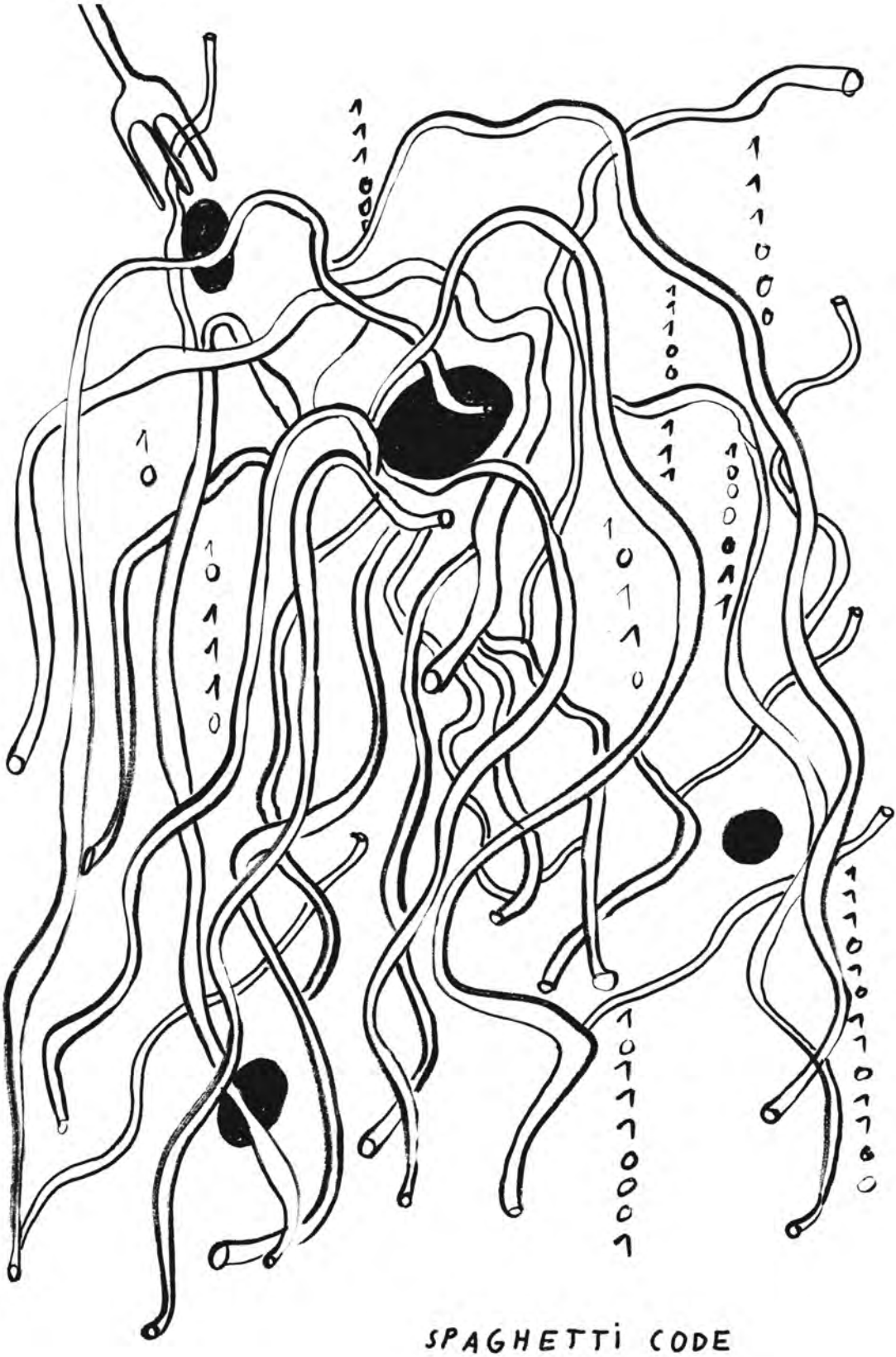


Expedition photo

9. Max Liboiron et al. (2021) emphasise that members of a community or an organisation have specific obligations related to this membership. Such obligations sometimes make it difficult to establish ethical relations.

Precariousness

```
10  PRINT “You are sitting on an office chair in a room with
artificial lighting, looking at a screen in energy saving mode,
dozing off. This is your new office. It has a sign on the door that
says: ‘PhD candidate’.”
20  INPUT “Do you wake up the computer? (yes/no)”; A$
30  IF A$= “yes” THEN GOTO 100
40  IF A$= “no” THEN GOTO 200
50  GOTO 10
100  PRINT “You touch the keyboard. The computer starts to hum
audibly and the external screen lights up. You have been asked
by your supervisor to write a simulation to test a research
hypothesis. You type and the BASIC interpreter pops up. It holds
inherited code from earlier PhD students, whose contracts ran out.
It seems to have an excess of lines and loops. The simulation
requires 1 MWh to run and emits 200 kg CO2. You are not prepared
to do this. Coding is rather new to you, as it was to the PhD
students before you, and you don’t understand this code.”
110  INPUT “What do you want to do next? (1 = go online to look
for snippets of code, and ask some LLMs for help/ 2 = start
typing)”; A$
120  IF A$= “1” THEN GOTO 100
140  IF A$= “2” THEN GOTO 200
160  GOSUB 500
120  IF A$= “1” THEN GOTO 300 ELSE GOTO 400
200  PRINT “You start typing. Symbols, letters, and numbers appear
– parts of code someone in precarious positions before you wrote.
You have no clue how to read this.”
210  INPUT “Do you want to read the documentation? (y/n)”; A$
220  IF A$= “y” THEN GOTO 300
300  PRINT “There is no documentation on this code. The PhD
students before you got new jobs, they don’t answer your e-mails.”
310  INPUT “A voice asks: ‘Do you understand the problems with
spaghetti code?’ (yes/no)”; B$
320  IF B$= “no” THEN GOTO 330 ELSE GOTO 300
330  PRINT “spaghetti code (noun): a slang term for an unruly,
messy style of coding that often produces unnecessary routines,
extra loops, consumes excess energy and overflow of CO2 emissions.
Spaghetti code can break any IT infrastructure as it poses several
challenges. If the code does not follow established programming
conventions it might be harder to parse for another person looking
at the code. Maintenance is more burdensome. Idiosyncratic code
is harder to fix and in a worst-case scenario it becomes unusable
for any future reader, human or machine. Spaghetti code would
need close documentation. As a PhD student you don’t have time for
that, your contract runs out soon.”
340  RETURN
```



Excess

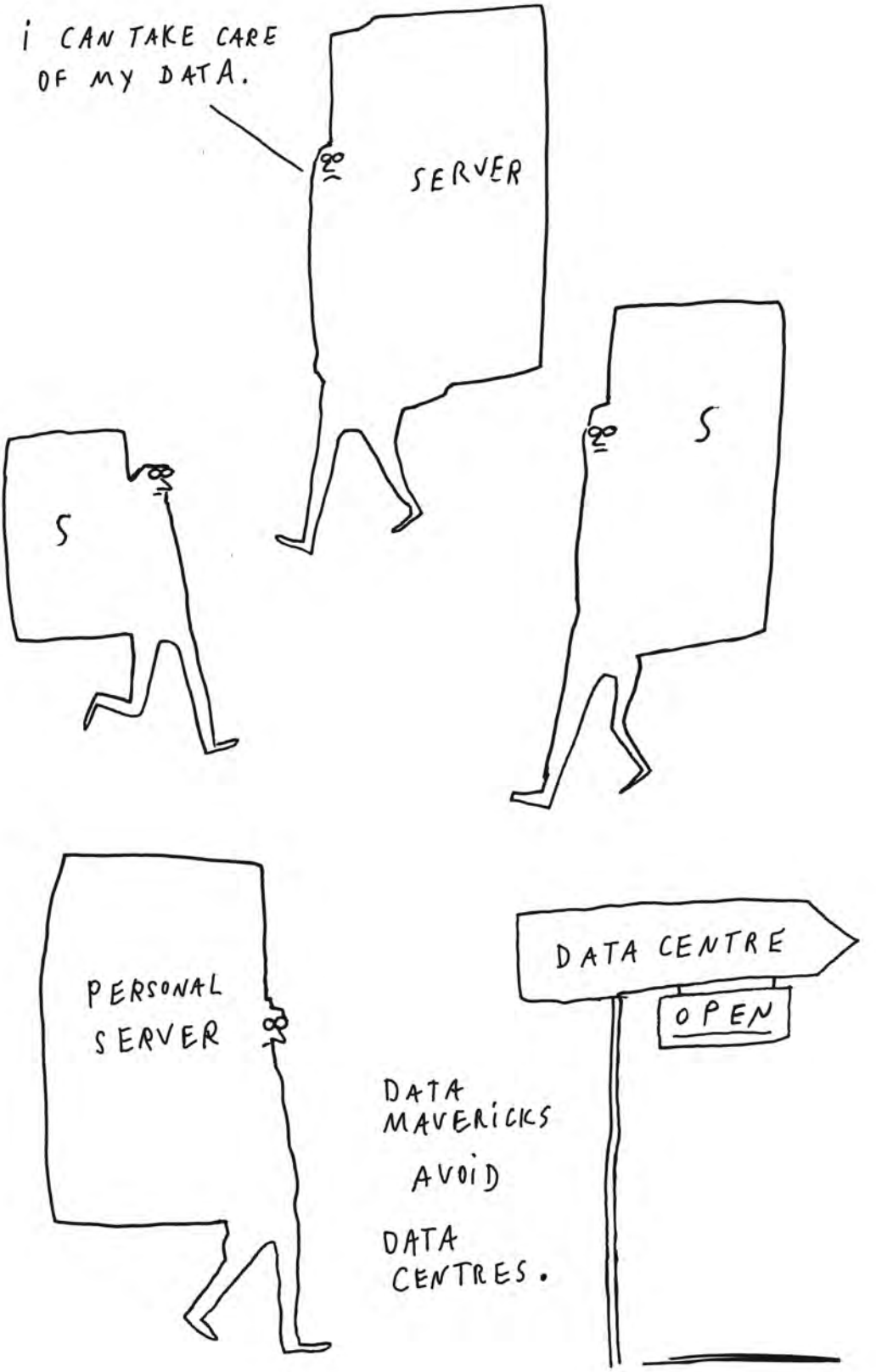
COMPUTING INFRASTRUCTURE MARKET

- Now Open

Come and take what you want:
- Find the computing infrastructure you think you need—and more
- We have hundreds of surplus servers, your surplus
- Premium brands, only the best

HEED OUR RULES:

- You can take as much as you can carry
- Hit the subscribe button
- The merchant will love you. Just scan and grab. No charge, it's all taken care of
- Once picked up, no returns
- Post-use satisfaction survey strongly encouraged (we love acknowledgement!)



Delegation

We store the data on local university servers which makes access simple and fast. Each scientist treats it like a personal folder on their own machine. That's the idea: local, familiar, reliable.
But then a professor deletes everything. It happens.
Luckily, we can usually restore it from the server, that's why some of us insist on keeping the data 'on site'. A researcher, an IT officer, or someone else will get to it quickly and fix things. It's convenient.

Acceleration

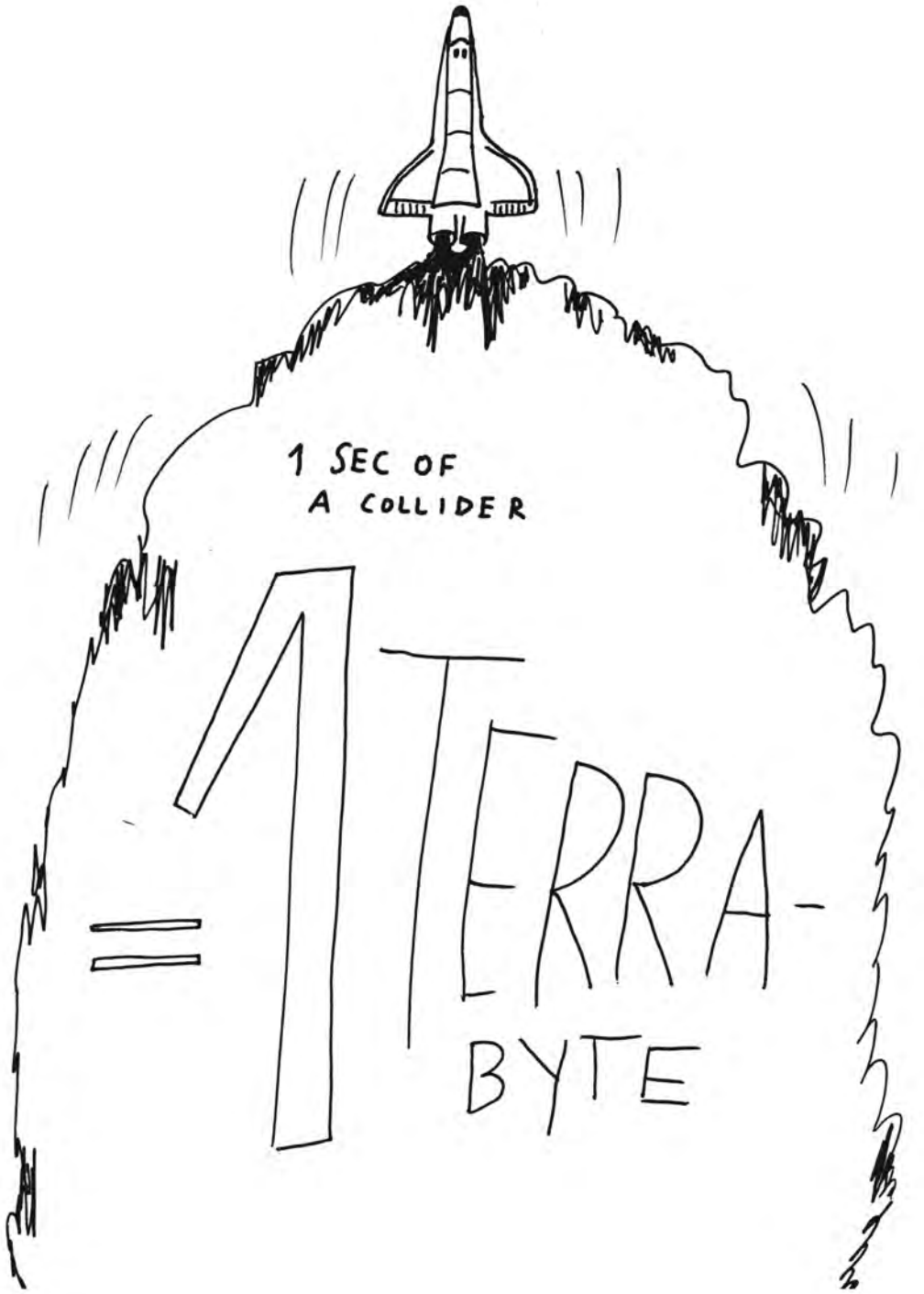
Song of the Accelerated Knowledge Centre

We rise with bits, we move with bytes,
We lift the files, we sort the lines.
The terabytes stand—massive and clear,
No longer a weight, just benchmarks, so near.

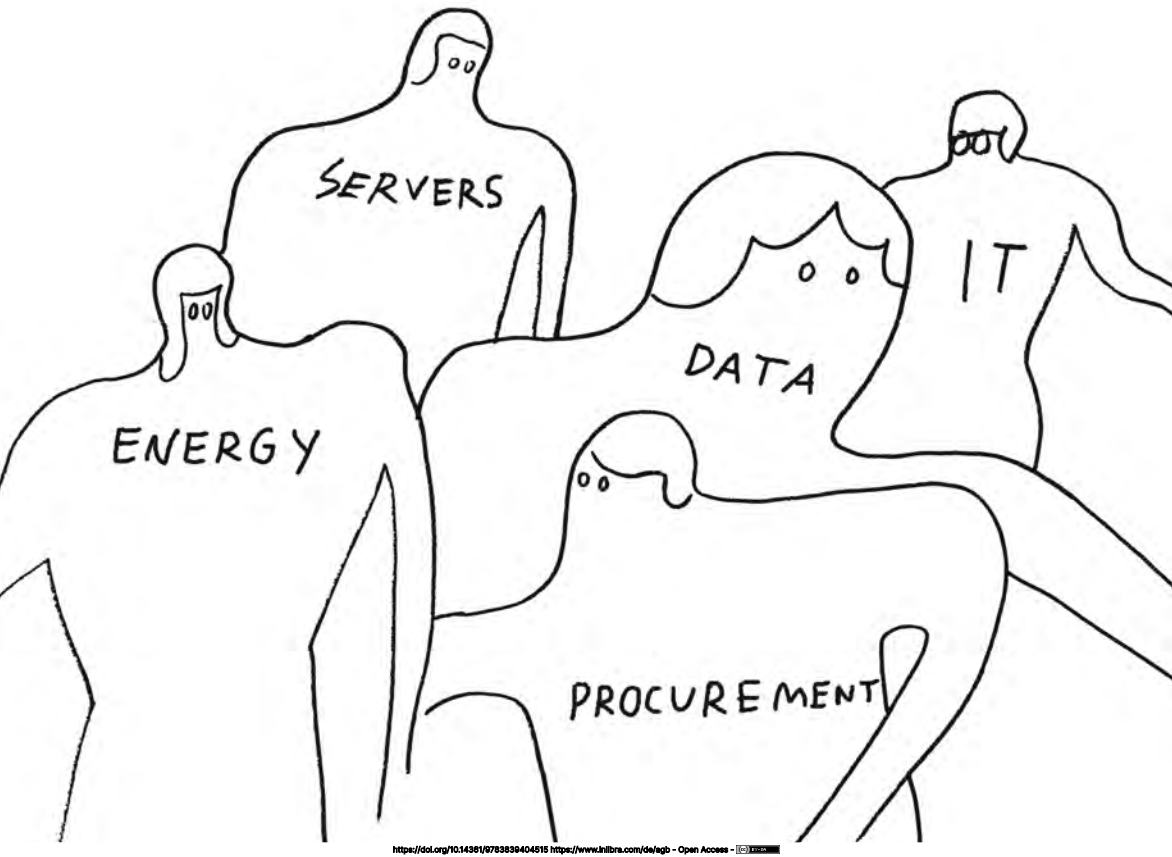
Each second is logged, each value preserved.
Disturbances mapped, delays archived.
The sciences grow—line by line,
Through folders named and access refined.

Chorus:
If motion stalls: restart the thread.
Advancement is really
a well-indexed dataset.

HEAVY DATA ISSUES



EVERYONE CAN FIGHT THE CLIMATE CRISIS!



Effortlessness

Dramatic play at the annual university party.

A boardroom. A MAN stands at the head of the table,
arms wide, smiling. FACULTY and ADMINISTRATION sit.

> MAN*: (whistles)* Synergy. That's the word. One
> word: Synergy. We're a constellation; no lone stars.
> *(leans in)* But here's the deal: The path is clear.
> We—yes, we—hold the levers. Not governments,
> not activists. Us. We're all in the same boat. Sure.
> But now we need to move to make the change.

A WOMAN clears her throat.

A PHONE buzzes—his. He glances, then silences it.

> MAN: Trust the process. Trust me.
> Trust the We. Synergy.

Lights fade. Just the empty, polished table remains visible.

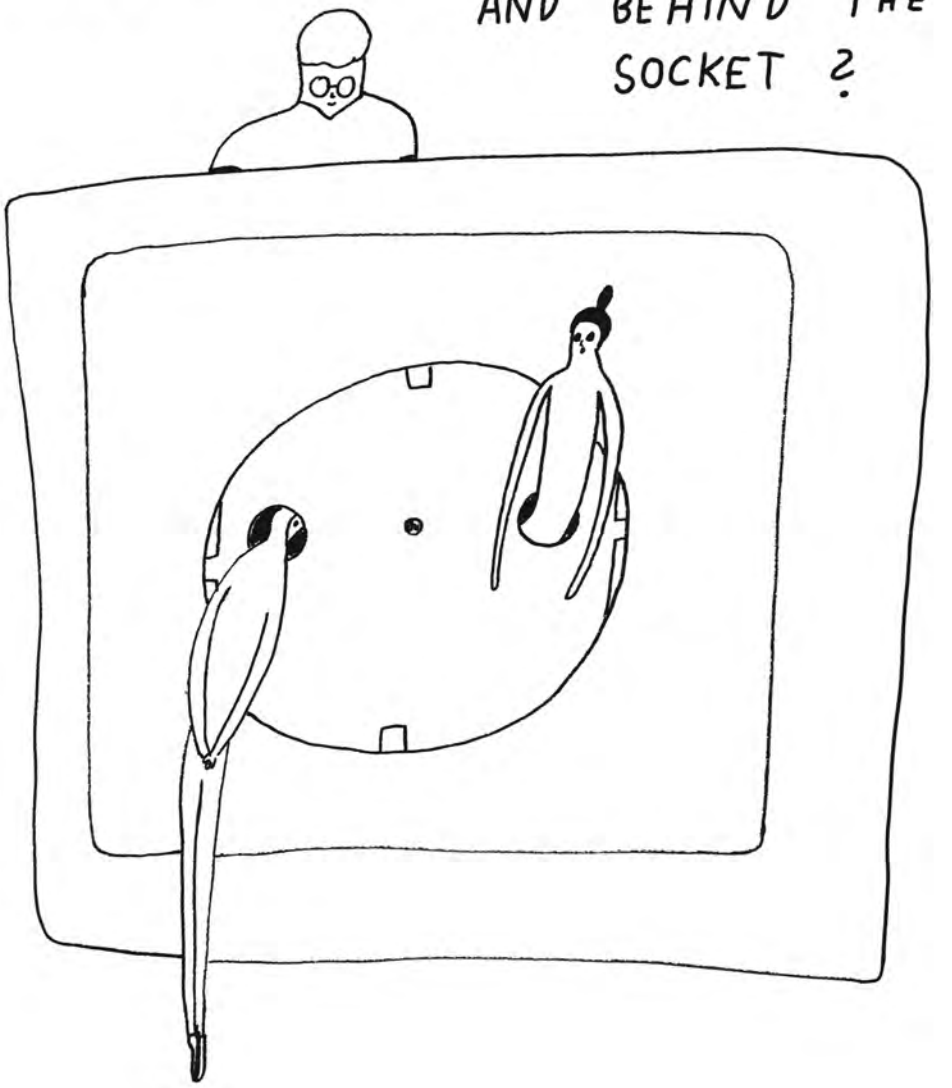
Curtain.

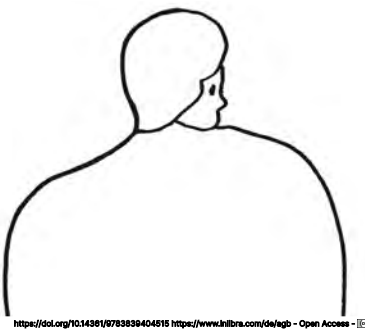
The audience applauds wildly, rises to its feet and starts intoning
"SYNERGY; SYNERGY".

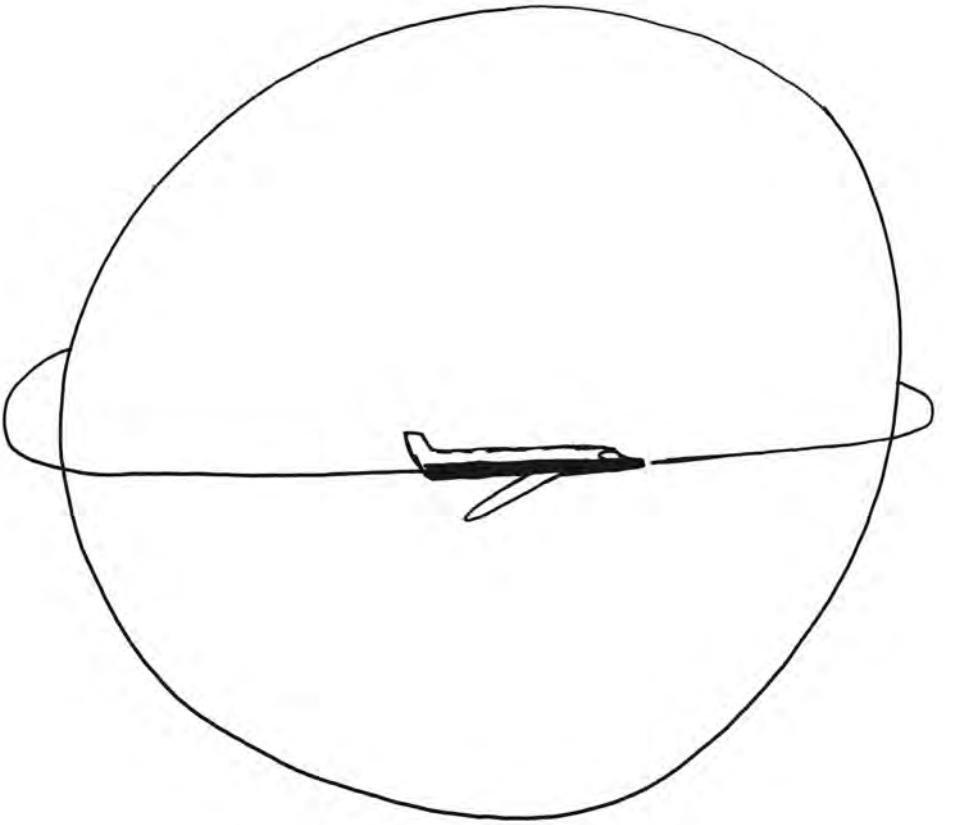
Order

A university is a place of difference. They take care to keep the differences sorted and separate. Infrastructure here, science there. For the order. Those taking care of strategies creeping into one hole, the operating crew peeping out of another. They plug in ideas and visions, and make it work—sure that it will work.

HOW DOES IT LOOK LIKE IN FRONT OF AND BEHIND THE SOCKET ?







PLANETARY BOUNDARIES ?
ACADEMIC EXCHANGE !!

Disconnection

Day 3, or maybe day 1 because just now, at 9.15 p.m., we finally reached the conference site. Ruhralia to Scraptan flight cancellations forced us to take a different plane, detouring through Hothere, where we waited fourteen hours. The arrival terminal's monitor showed a 46°C outside temperature, but thankfully, the airport and city centre were cooled to a pleasant 20°C. We went for a walk during our wait. After twelve hours on the plane, it was great to stretch our legs and enjoy the almost unreal view of glass, concrete and greenery under the geodesic dome. Those long-distance flights to conferences always do me in, and I wonder if it's all worth it.
It's great to get in touch with colleagues all over the world. Talks can also be heard online, but the exchanges in person over a cuppa during breaks, or at dinner in the evenings are not replaceable by screenings.

It's 3 a.m. I cannot sleep. I browse through a bunch of literature online on the topic of academic conferencing and sustainability. Already back in 2020, they quantified the fly-in, fly-out CO2 emissions for one conference in California[10]. Roughly 28K participants flew around 285M km for this conference alone, producing 80K tons of CO2. One conference. Flabbergasting. The sustainable university is a 'wicked problem' that can only be approached little by little; there are no perfect solutions. Each thinkable alternative has different impacts on different communities. Thus, a solution for one position might pose a problem for another. Notions of sustainability most often stick with dominant ideologies of enlightenment ideas of scientific progress and the reign of global capitalism. The North~West University has long worshipped climate colonialism. Appealing numbers on a piece of recycled paper. I think we need to get beyond sustainability – in contrast to mainstream and critical sustainability. We have to reinvent, not just reform the university as an institution. Stein writes:

> "Hospicing the modern/colonial world would require identifying, interrupting, and learning from past mistakes in self-implicating ways, and repairing social and ecological relations, so as to clear space for the emergence of different, more responsible futures."

Ah, that was a nice critical exercise, now I can go to bed and be ready for the conference tomorrow.[11]

10. Milan Klöwer et al. (2020).
11. Sharon Stein (2023, 177).

Reproduction

We had been appointing controllers in all departments to watch over the energy consumption of the departments' data infrastructure and to collect consumption data. A finer-grained web of staff was now overseeing data infrastructure energy use, in all capillaries of the university; a means to save energy since no-one really knows which infrastructure consumes how much. First you need to know, then you can act.

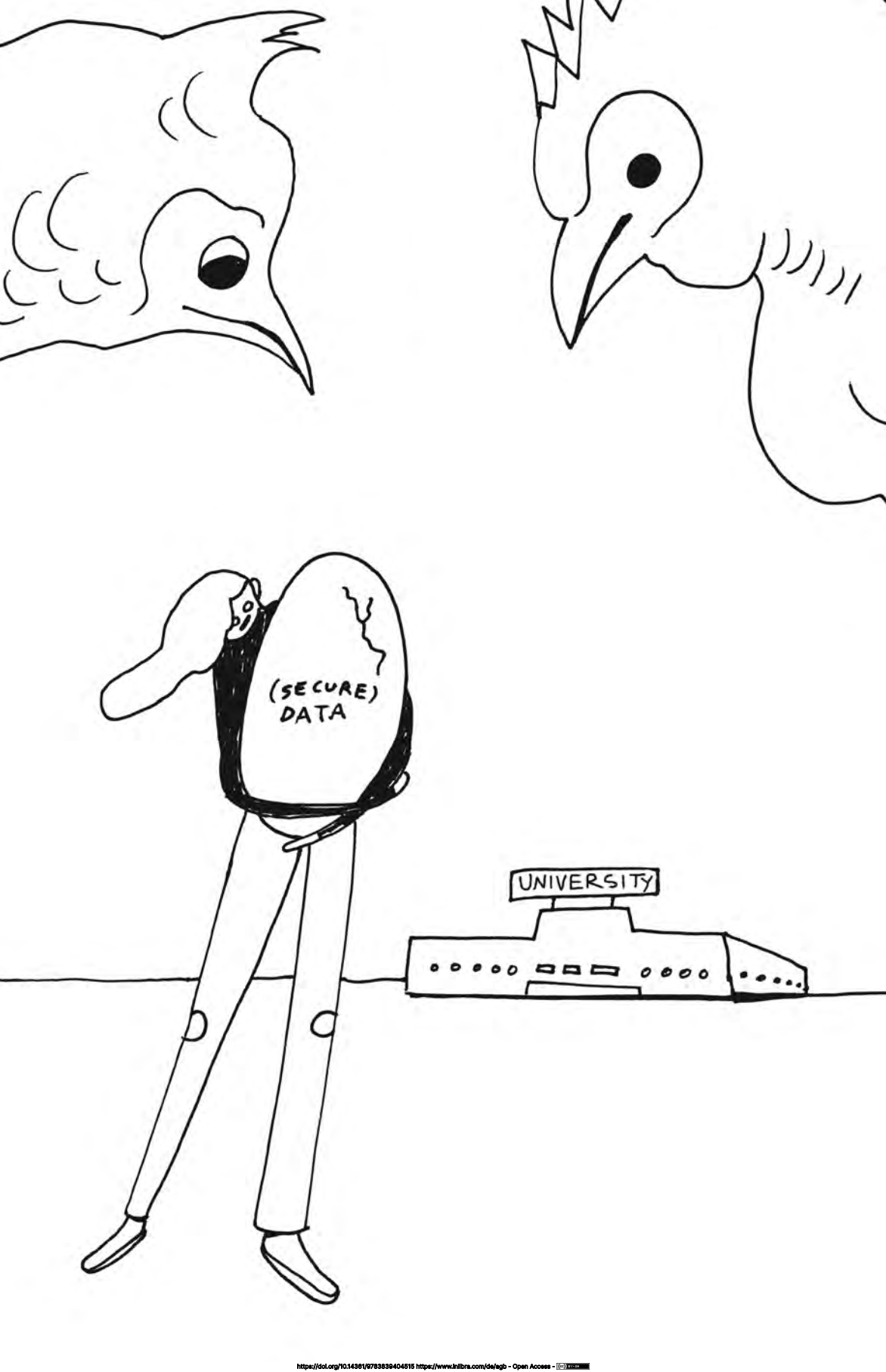
Sometimes it appears that more data and more control don't solve the problem. It makes us keep doing more of what we've always done, generating more data, increasing our desire for control.

Those operating the data infrastructure are waiting for us to tell them what to do to save energy. But we don't know. The data doesn't tell us. They know. They are experts in data infrastructures, some even know what the scientists do. But they are waiting for us to tell them.

The fine-grained web of energy controllers and their collected data was good. Not that it saved us energy. But it made us notice the gap between controllers and operators.[12] Between head and hand, between tell and touch.

A mile away, the data centre operator is walking through the cooled aisles of server racks together with a physicist. They are chatting about how to arrange computing power for a new large calculation they are planning with the least cooling needed.

12. Matteo Pasquinelli (2017) discusses how the destruction of the planet through digitalisation is based on the foundational capitalist division between mental and manual labour, which creates a vicious circle of producing more and more machines for information and control, and the ever increased need for more information and control.



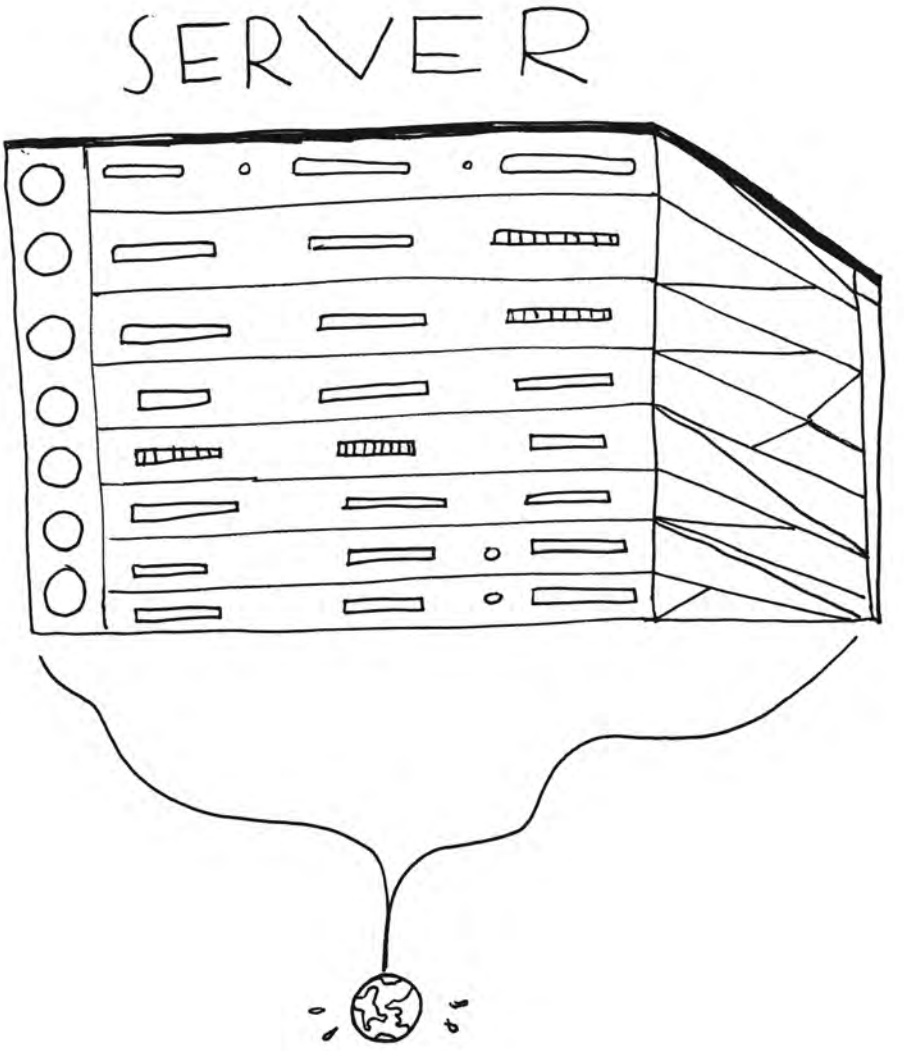
Sourcing

She collects a large volume of precious data.
She can hardly carry them,
she takes care to keep them warm.
They are cracking,
she rushes to bring them to the data farm.
Then, the sky is darkening.
Someone is anxiously watching
their captured data disappear.

Proportions

The
data
processed
at
the
North
~
West
University
were
out
of
this
w o r l d.[13]

13. In his book *Down to Earth*, Bruno Latour (2018) describes the attraction of reacting to the climate crisis by ignoring it. He calls this attractor “Out-of-This-World”.



Chapter 2: The university that challenged excessive data infrastructures

Having looked into all the snippets that showed them the deep-seated academic culture of their university, many North~Westerners sank into a state of melancholia.[14] How could this ever change? They had lost their past, their future vanishing in a blur. Still, some of those with straight backs and large hands insisted that they had been trying for a while to learn how to land. Yet conflicts and new problems often arose when trying to find solutions. They collected an e-mail, a newspaper article and found a customer review, and noted down some conversations and observations they had about how the North~West University tried to challenge excessive data infrastructures, and how difficult it was. These can be seen in this chapter.

14. Endre Dányi (2020) has at length studied and theorised how sad-sombre sentiments are both collective and thoroughly political.

Rushing

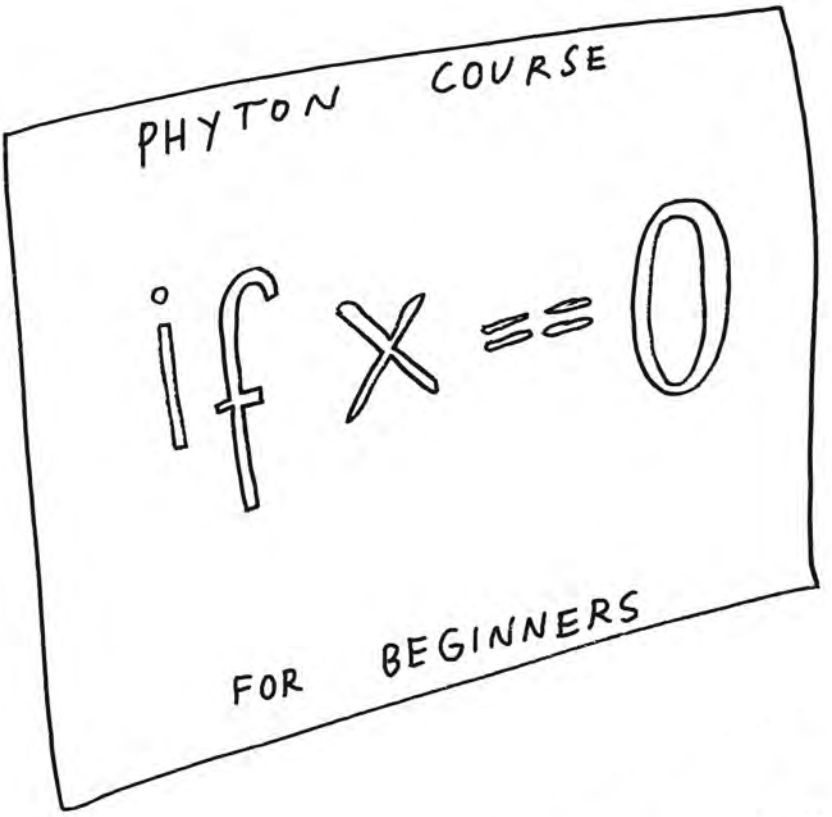
Last week, research laboratories from different disciplines experienced an unprecedented surge in demand for coding skills. Chemists, historians, medical scholars and others competed to attend introductory Python workshops, with many courses filling up within hours. Organisers rushed to open additional sessions, urging participants to "not miss out—start from the beginning."

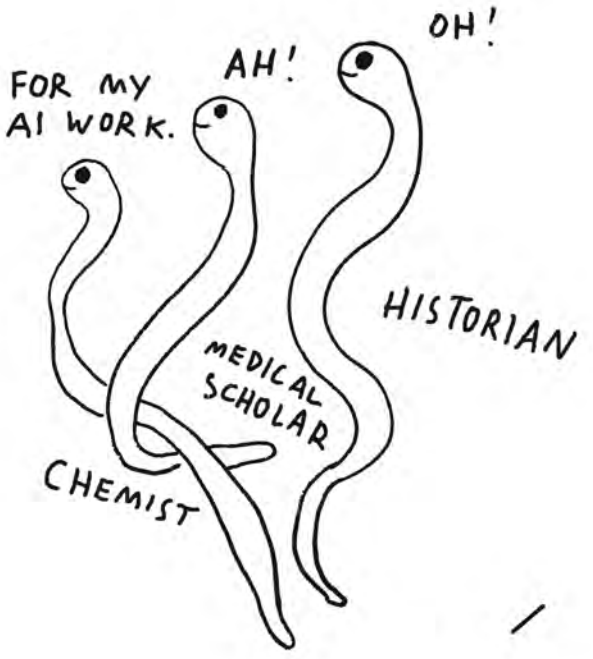
For many researchers, this is the way forward. They need[15] to sign up. "Learning Python changed my approach to experiments," said an ecologist who had finally secured a spot in the newly added night class: "Now we can analyse satellite data and run more efficient machine learning models that allow us to understand better the effect of climate change on biodiversity".

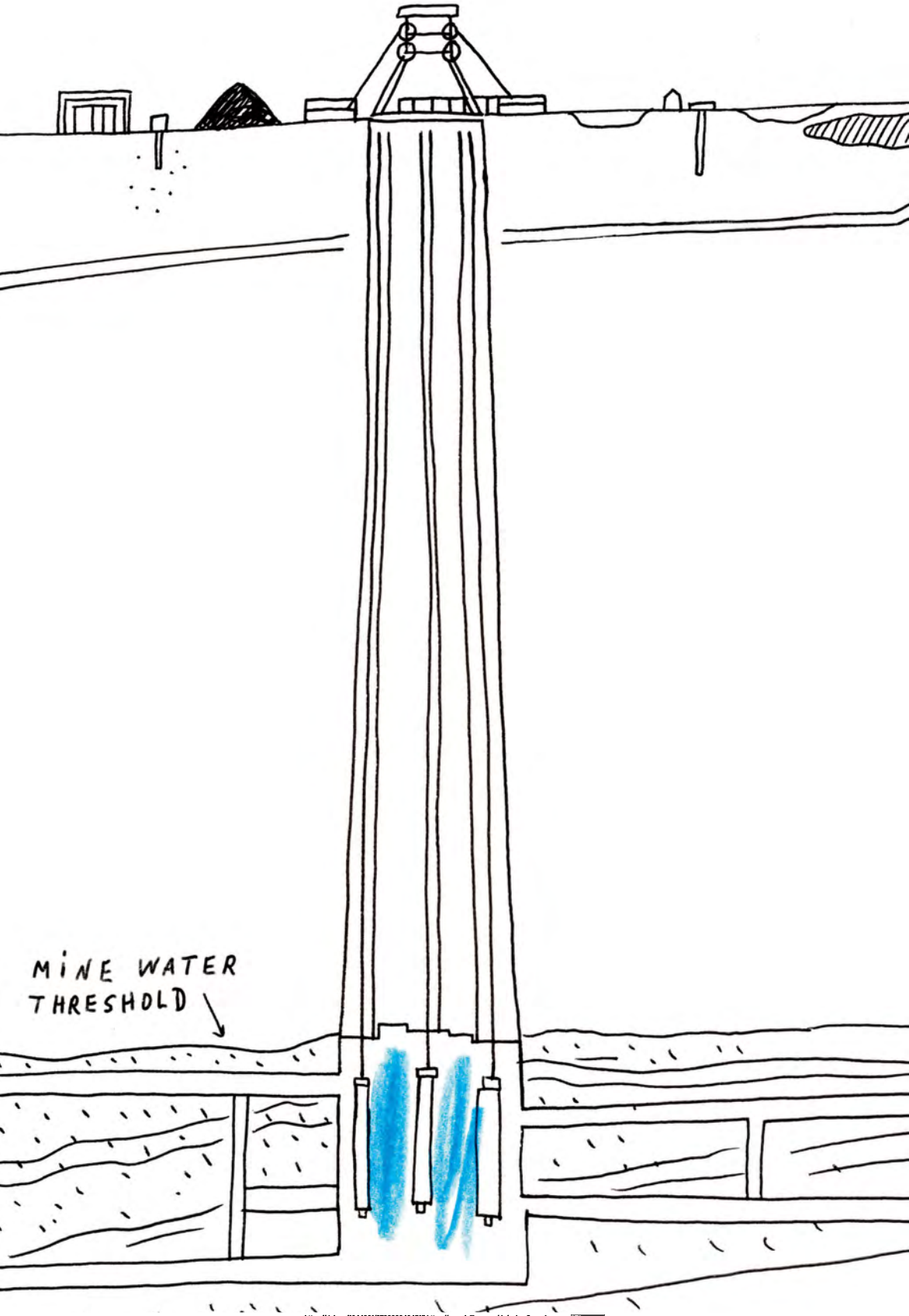
This rush is hardly surprising. As data volumes continue to grow, so do the benefits of AI-driven breakthroughs. Advocates hail AI literacy as the gateway to tomorrow's discoveries and emphasise that every scientist must learn coding to stay current. A few scientists have raised concerns that the energy demands of AI systems are so high that the lights in their seminar rooms start to flicker.

As the size of datasets continues to grow, the message is clear: scientific progress is speeding up. When organisers reopen their registration portals, hopeful participants are encouraged to sign up immediately.

15. Emily M Bender and Alex Hanna (2025): *The AI Con: How to Fight Big Tech's Hype and Create the Future We Want.* Random House UK. Random House UK.

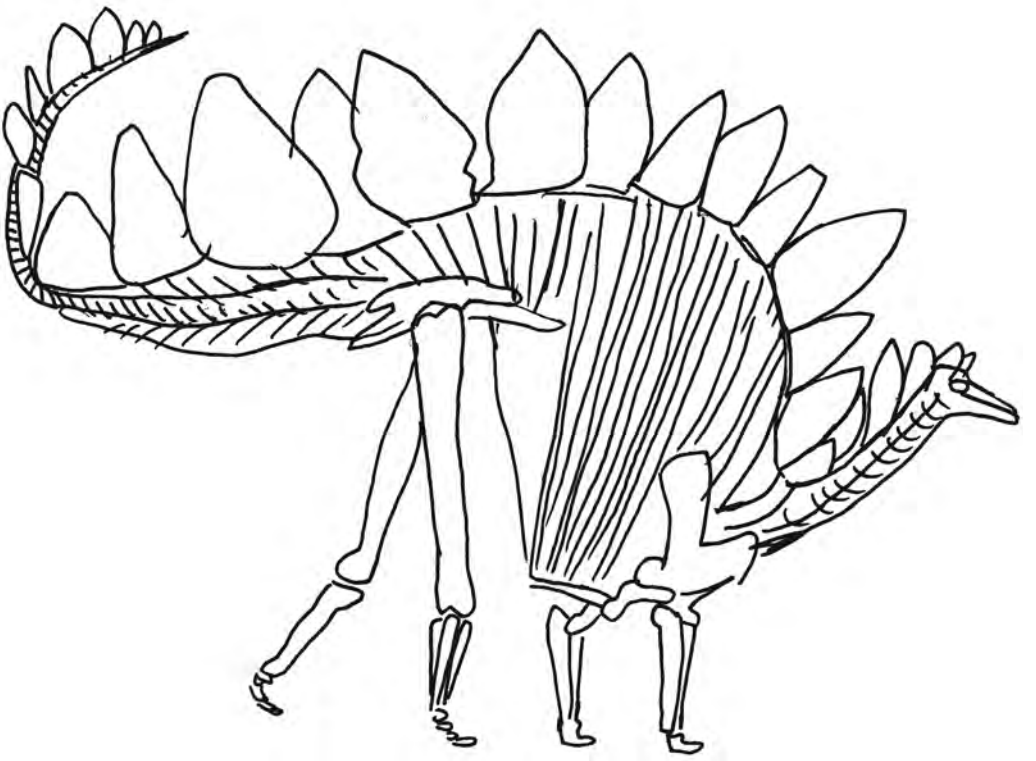






Groundworking

“Did you hear about the new data centre our campus wants to build?
While we sit on a legacy, old shafts full of mining routes,
closed down yet filled up with stuff, flying with us. With us.”
“You’re saying what’s beneath us still shapes everything what
happens up here?”
“It affects the data centre planning to avoid collapse.”
“Sounds like we’re flying with hazardous ballast.”
“I just hope they can keep it under control.”
“Hope… and control?”



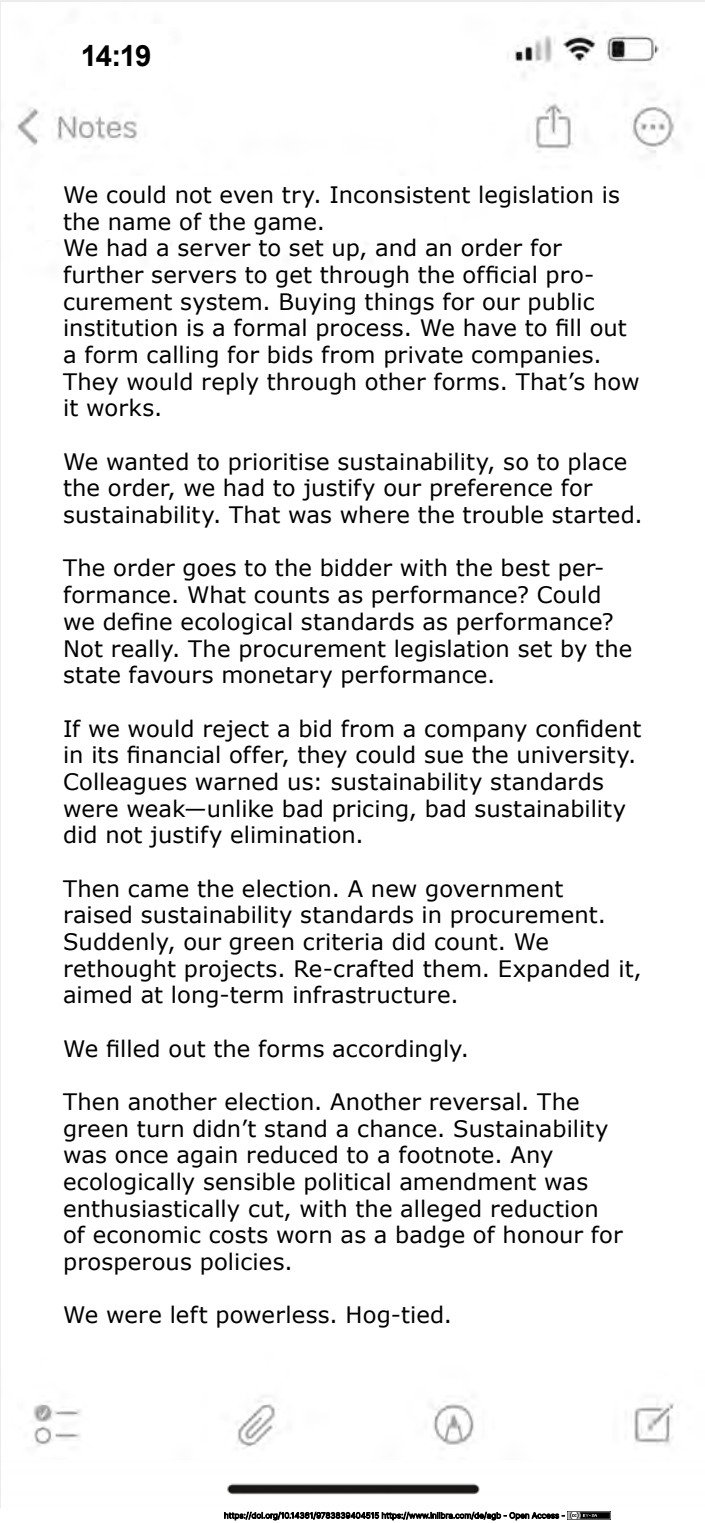
Outdating

Less than stellar in practice, wouldn't buy again

Verified customer

The university wanted a modest and most energy-efficient data centre, and since D@taHeaven's development plan sounded super sustainable, we ordered one with them. The consultation process was great. We were excited, since, of course, we are not data centre experts. We have a lot of important scientific data, so Mr. Myers from D@taHeaven made us understand that we needed a major diesel generator and a whole room full of batteries to run the data centre in case of power cuts: a Tier 3 setup. Just in case. D@taHeaven guided us through the application procedures for federal, regional and local permits involving the Ministry of Scientific Datafication, the City Council, the local Institution for Future Usage of Unsealed Earth as well as through the negotiations to convince the local landowners to sell their properties. Now, during the course of the construction time, the rectorate informed us that the university had acquired a top-profile scientist who needed to install his own high-performance computing clusters in the data centre. So, we redesigned the rack setup in the data centre, and reduced the storage capacity to free up power for the new clusters. Before the storage servers even started humming, they were already full. The process took almost five years. D@taHeaven said this was quick. But it meant that when the data centre opened, it was already outdated compared to new and more energy efficient systems that are available today. And then came maintenance. The fire-extinguishing system of this data centre dinosaur demands inspections at least four times a year, the batteries need regular checkups, the diesel engine requires test runs, etc. Moreover, energy and diesel prices then skyrocketed, and we are facing outrageous energy bills. It is like feeding an extinct species.

Succumbing



We could not even try. Inconsistent legislation is the name of the game.
We had a server to set up, and an order for further servers to get through the official procurement system. Buying things for our public institution is a formal process. We have to fill out a form calling for bids from private companies. They would reply through other forms. That's how it works.

We wanted to prioritise sustainability, so to place the order, we had to justify our preference for sustainability. That was where the trouble started.

The order goes to the bidder with the best performance. What counts as performance? Could we define ecological standards as performance? Not really. The procurement legislation set by the state favours monetary performance.

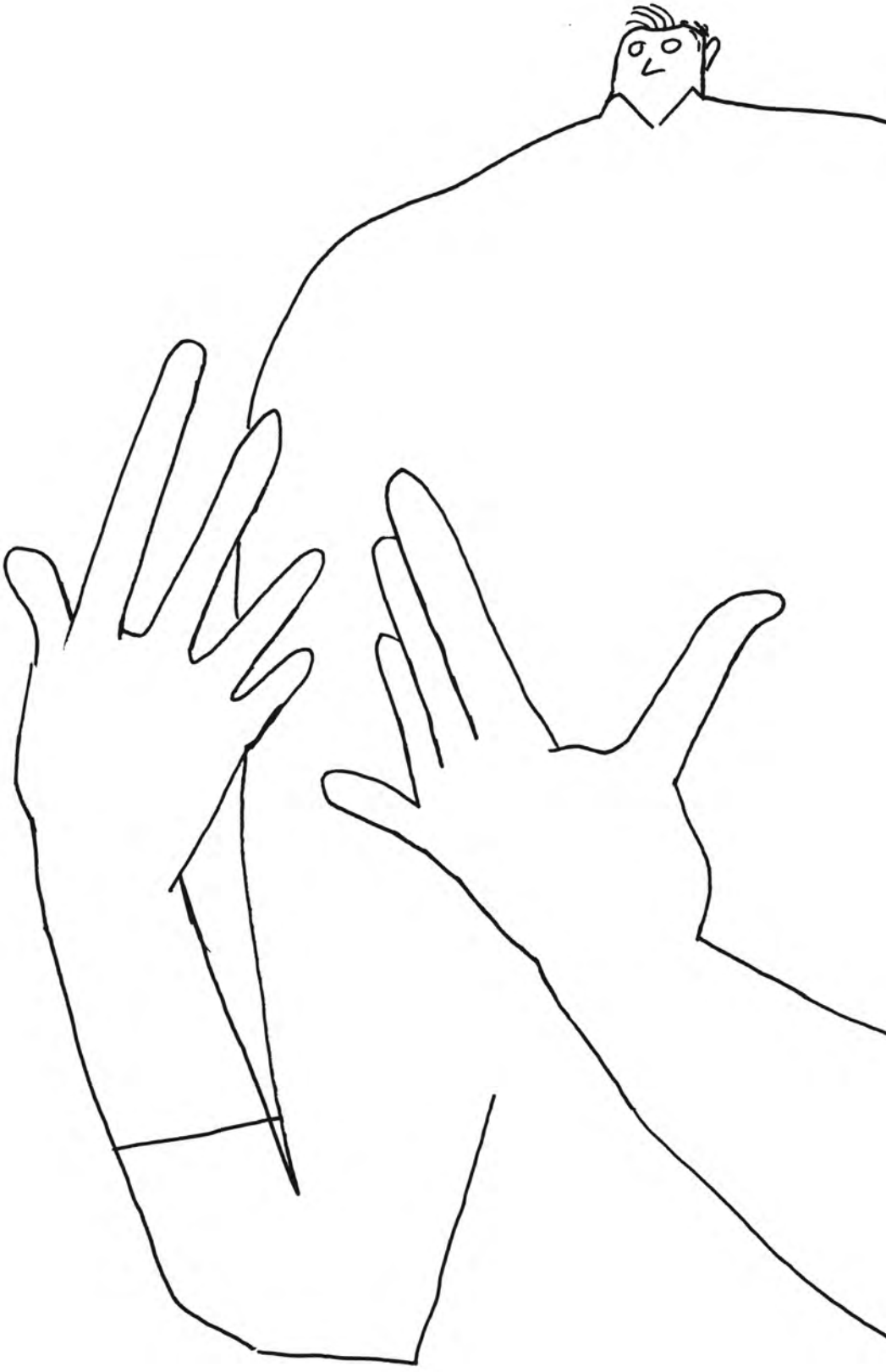
If we would reject a bid from a company confident in its financial offer, they could sue the university. Colleagues warned us: sustainability standards were weak—unlike bad pricing, bad sustainability did not justify elimination.

Then came the election. A new government raised sustainability standards in procurement. Suddenly, our green criteria did count. We rethought projects. Re-crafted them. Expanded it, aimed at long-term infrastructure.

We filled out the forms accordingly.

Then another election. Another reversal. The green turn didn't stand a chance. Sustainability was once again reduced to a footnote. Any ecologically sensible political amendment was enthusiastically cut, with the alleged reduction of economic costs worn as a badge of honour for prosperous policies.

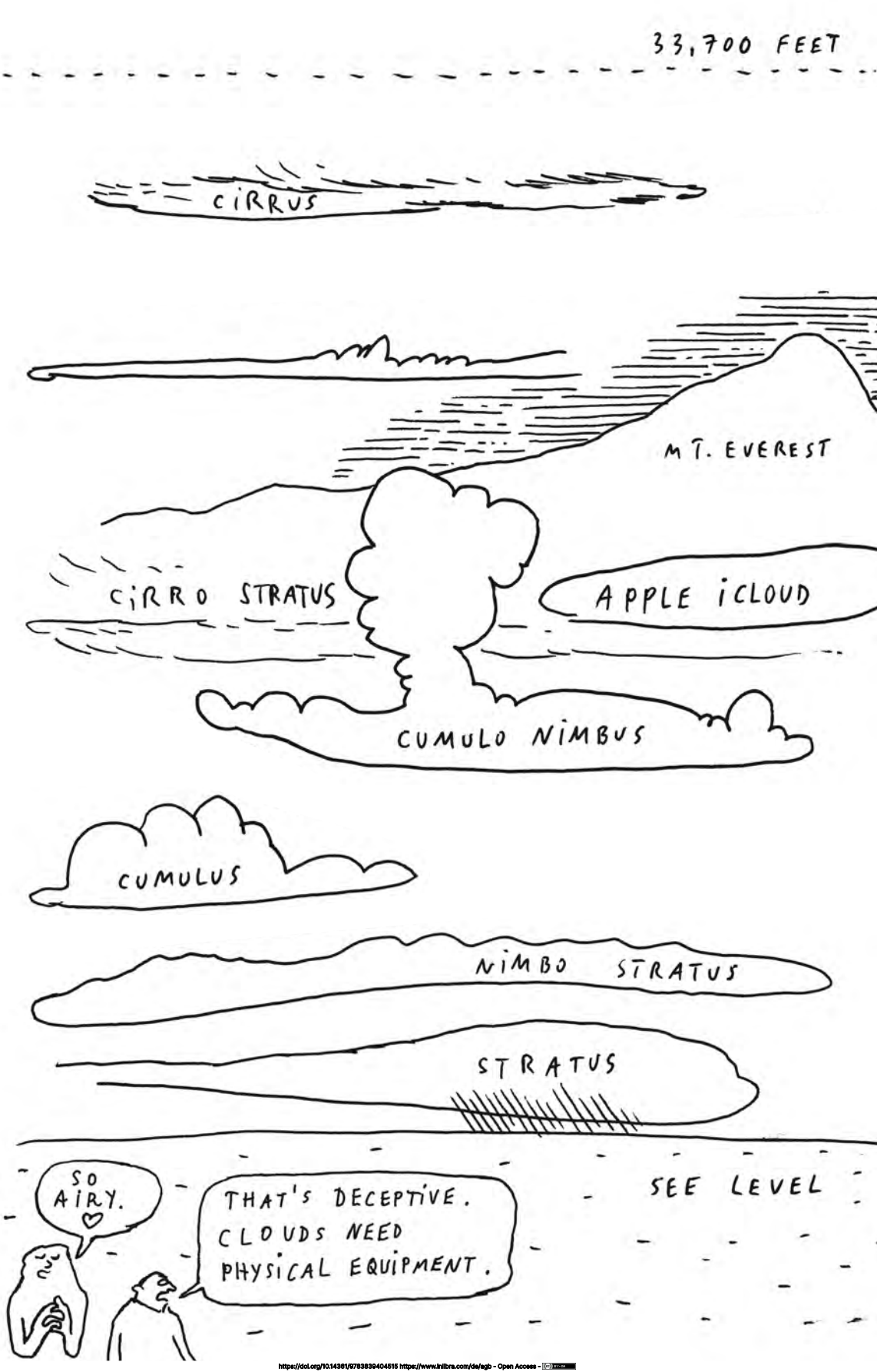
We were left powerless. Hog-tied.



Saving

“Hello, data centre manager here”.
“Hi, hello, how can I help you”?
“You are the scientist with the exceptional data storage needs, right”?
“At your service”!
“Hi, thanks, well, we are running a campaign to centralise scientific data, and I would like to ask you to move your data to the data centre”.
“And what do you want me to do when servers break down and you are at the beach? You are not going to come over on weekends to repair the servers as I do”.
“Well, since we offer 99.99% uptime at the data centre, it’s unlikely that it will happen”.
“Well… Have you ever heard about freedom of science? It used to be about protecting science against political and commercial influence. But now, it seems I need it to protect my research against the university’s own infrastructures. Data are our material and our methods. You cannot force me to save data on your central machines”.
“Freedom to stress the planet? Think about this: saving data centrally saves energy. The data centre’s cooling system is much more efficient than your own servers’”.
“I’m not sure about that, I only have the fans in the server, I don’t cool the room”.
“Right, but I just talked to the energy manager yesterday. They emphasised that your office is cooled by the central air conditioning system, and the university carries very high costs of central cooling. If your office wasn’t heated up a degree or two by the servers you have next to your desk, the university could spend more money on science, instead of paying electricity bills to cool your office”.
“You know what? I’ll rearrange my data. I have quite a bit of the data that are just stored in case someone at some time in the future might come around and ask to see them. I’ll put all the data I don’t use regularly on an external hard drive and store it in the bottom drawer of my cupboard. There, it won’t consume any energy, and it won’t burden the air conditioning”.
“Yeah, fine, not bad. And the rest of the data? We have some very fine new servers with all the capacity you need”.
“Hey, wait a minute. Weren’t you just the advocate for saving energy”?
“Still am”.

“So, think about your wonderful new servers. You replace them every five years, right”?
“Indeed, that is how we can guarantee the 99.99% uptime”.
“Did you ever think about the energy it takes to produce the CPUs of your servers? And even worse the GPUs. I keep my servers running 7-10 years”.
“Old computers are much less energy efficient”.
“Not if you include the energy spent on production in your calculation”.
...
“Eh, maybe it isn‘t about all these details, but about developing a system together that is sustainable, technically operable and practically usable for science”?
“Okay, Wednesday afternoon”?
“Sure”



Weighing

In the elevator, colleagues meet. After a few awkward seconds of staring at the floor:

"Now that we are hovering, we are at least closer to the cloud..."
"Well, I am not that sure. What you call 'cloud' is not in the sky, and far from light. These are material monsters, little elephants, with a heavy mineral and energy demand. Every file, every project sits somewhere, somehow."
"It's easy to forget, up here in the office."
"If you want to get down to earth, you'll have to learn to remember your computing's material reality."[16]
"Still, we got somewhere, right? I mean, look around. Well, upstairs, here, the innovations they do on the 9th floor. The tools, the reach they have with their new equipment. Saving lives."
"We lifted off, yes. Or drifted off. Maybe both."
"You say it like that's a bad thing. Everyone says it."
"Isn't it?"
"Maybe we're just finally able to see the horizon."
"Depends who's looking. And what they're willing to see."
"Well. You know, lifting... It also means out of touch. The machines do good work. Work for everyone."
"Everyone? Are you..."
"At least they work for many who were previously, eh, they include plenty of folks. I don't want to just give up on progress."
"But we should probably stop pretending we are not part of the weight."

The elevator beeps and opens its squeaky doors.

16. Acknowledging the heavy resource dependency of computing, and thinking about what to do, when these resources are not available anymore, and civilisation as we know it collapses, the Canadian writer and programmer Virgil Dupras has developed an operating system for exactly that moment. He calls it Collapse OS and hopes that it will allow the continuation of computing and community care after civilisation's collapse: https://collapseos.org/

Queueing

"They have no clue about physics," my professor grumbled. He was late for our Thursday meeting and kept rambling on about how they had cut the power of his decentral high-performance cluster, and from now on we had to do high-performance computing centrally with the North~West University's data centre. That we would have to fill out forms to justify resource requirements, CPU-hours, memory, storage, software requirements, etc. That they would queue up our computing tasks for their high-performance computing cluster. No-one said anything at the meeting. We all understood that he is a busy man, that he can easily get overwhelmed by such additional tasks.

But it wasn't the additional tasks. Our Thursday meetings changed. Thursday had been the day to get together, because it allowed him to plan our computing tasks for the weekend. We were 17 PhDs and Post Docs in the team informing him about our current research, and he would relate our projects to deadlines for funding or conference applications and to publication submissions. He would prioritise computing tasks coming up. He would talk about studies recently published that could be related to our research, and he would move up the calculations of those of us that did research in that area. "Action, reaction" he used to say, and he would look one of us in the eyes, and the one knew they were the one to react. This meant being first in the queue for our decentral high-performance computing cluster. He would be assessing the number of cores needed, the CPU-hours, storage, etc. We would listen carefully and comment if we thought differently. In the jumble of formulas on the blackboard he would find a space and write down the computing job queue for the coming week. I loved those Thursday meetings. Lots at stake. As being a part in a Formula 1 engine that was being calibrated to race.

But not anymore. Now, each one of us sends their own calculations to the North~West University's data centre with an application form and resource requirements. We still meet on Thursdays, and we still share our research, but deprived of the precision task of queueing up our calculations in exactly the right order for the engine to spin, he seems to have lost the momentum to push us individually to complete our tasks. And I don't learn much anymore about how to assess our position in the field, and how to prioritise and to estimate computing resources. Watching him do it every Thursday morning was like seeing the field of physics unfolding in front of my eyes.

I talked to the data centre. Centralisation allows them to queue up the whole university's computing tasks much better across many more clusters, and they certainly have a better utilisation than we did. They spend less energy, and every microgram of the metal extracted for the servers and the chips fabricated under toxic conditions is utilised better than we ever could. Centralisation is justified.

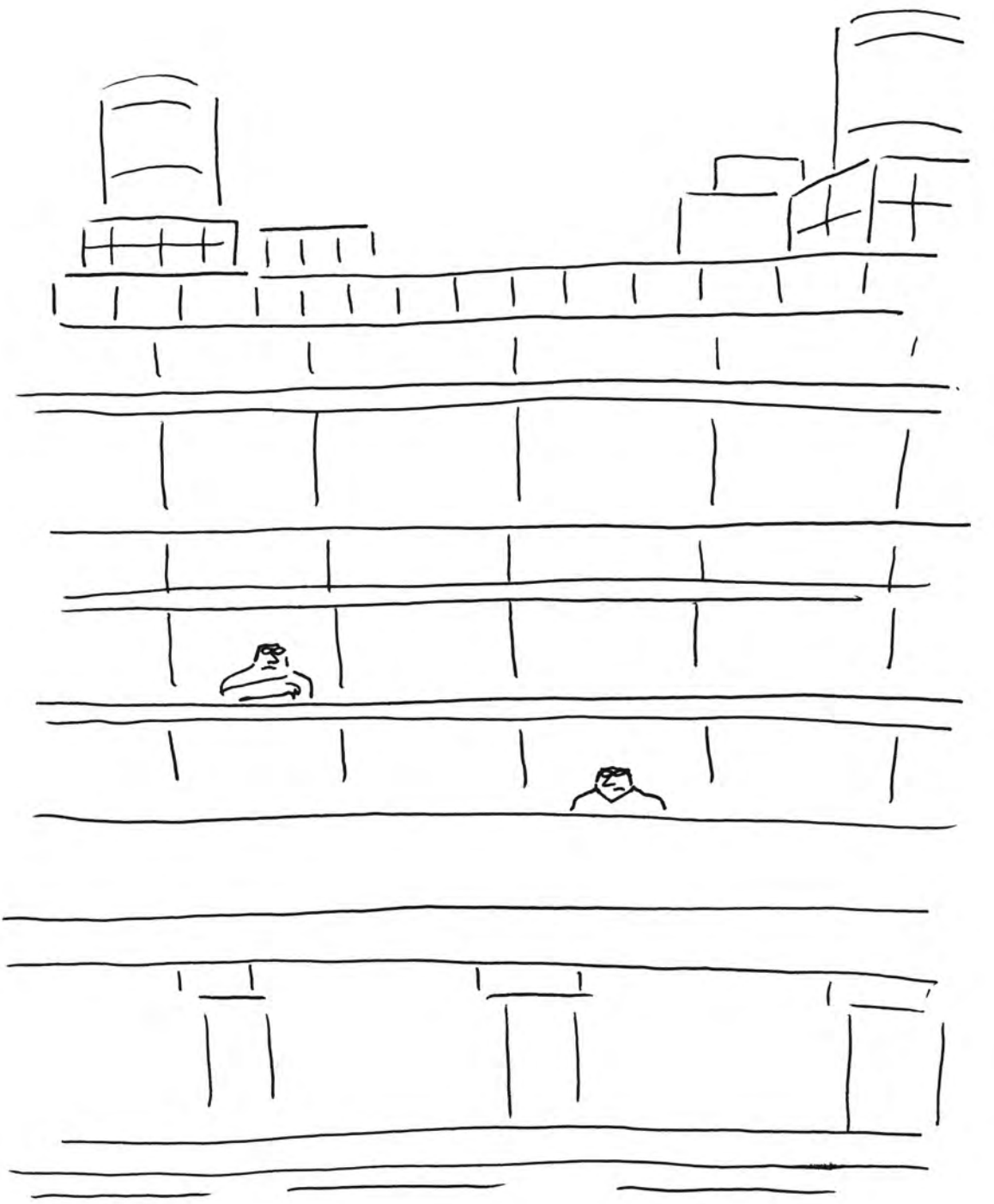
But so was decentral queue formation. It fused computing and scientific practices better.

What if we didn't have to choose between central and decentral computing? If a fold adjoined the central high-performance computing with our Thursday meetings, and our scientific practice?

QUEUEING UP!

Prioritising

Now that we know that Professor Olson's data processing consumes only 500 kW annually, do they still have to save the same amount of energy as the high-consuming team of Professor Abbot? Or do we accept that Abbot saves less because they are more important to the university? Are all requests equally valuable? For the head of the university, I don't think that is the case – for perfectly understandable reasons. There are professors here who have a higher quality of research than others. Let's be honest: We cannot require the same cuts of all professors.



Renting

Hey,

This whole property management thing at the university is starting to melt my brain. I was just scrolling through the new EYEBALL®'s AI stream and, voilà, it pulled up this old PR document. Like it thought it would help me with my understanding:

"On January 1st the state founded the agency 'Building and Property Management North~Westernish Estate®' to centralise and modernise the administration of the North~West State's real estate. The agency is responsible for acquiring, managing, and developing state properties in line with commercial standards and policy goals. Ownership and management functions are consolidated to enhance efficiency. Users of state infrastructure now pay rent at market rates. The agency covers personnel, material, and maintenance costs, and allocates appropriate interest payments to the state budget. This framework encourages users to assess their space requirements more closely, while the agency evaluates maintenance needs with greater scrutiny, leading to improved economic outcomes for all parties."

As we have felt in the past, we're sitting in a university that doesn't own the building it's in. And the owner doesn't want any changes. We can't do anything, like install energy upgrades, rethink spatial use—not without running it through a property manager. On the other hand, I am very happy to have a third party take over most of the boring day-to-day decisions. It's great not having to care about that. Where do we go from here?

Anyway. I was going to keep ranting, but EYEBALL® just sent me a real estate ad for a freehold apartment. Talk soon.

Peacekeeping

So what happens if we follow through?

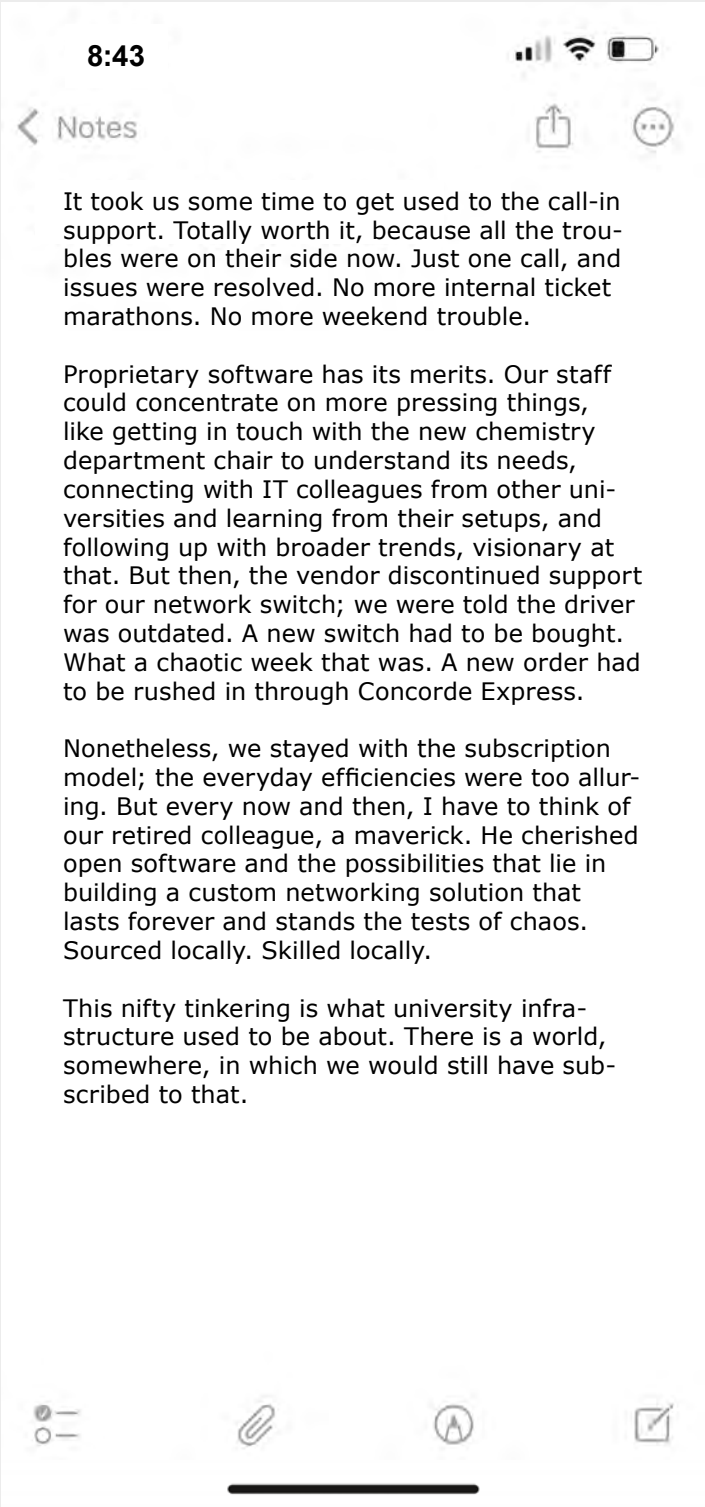
We have our vague future project of counting
and understanding the entire energy use on campus.
Down to rooms.
Everyone keeps postponing this project.

But we know, in a way, already who the major power users are
—who should be held accountable.

But can you just cut them off? Is that just?

Is the low performer actually the high performer?
How would that change the university?

Subscribing

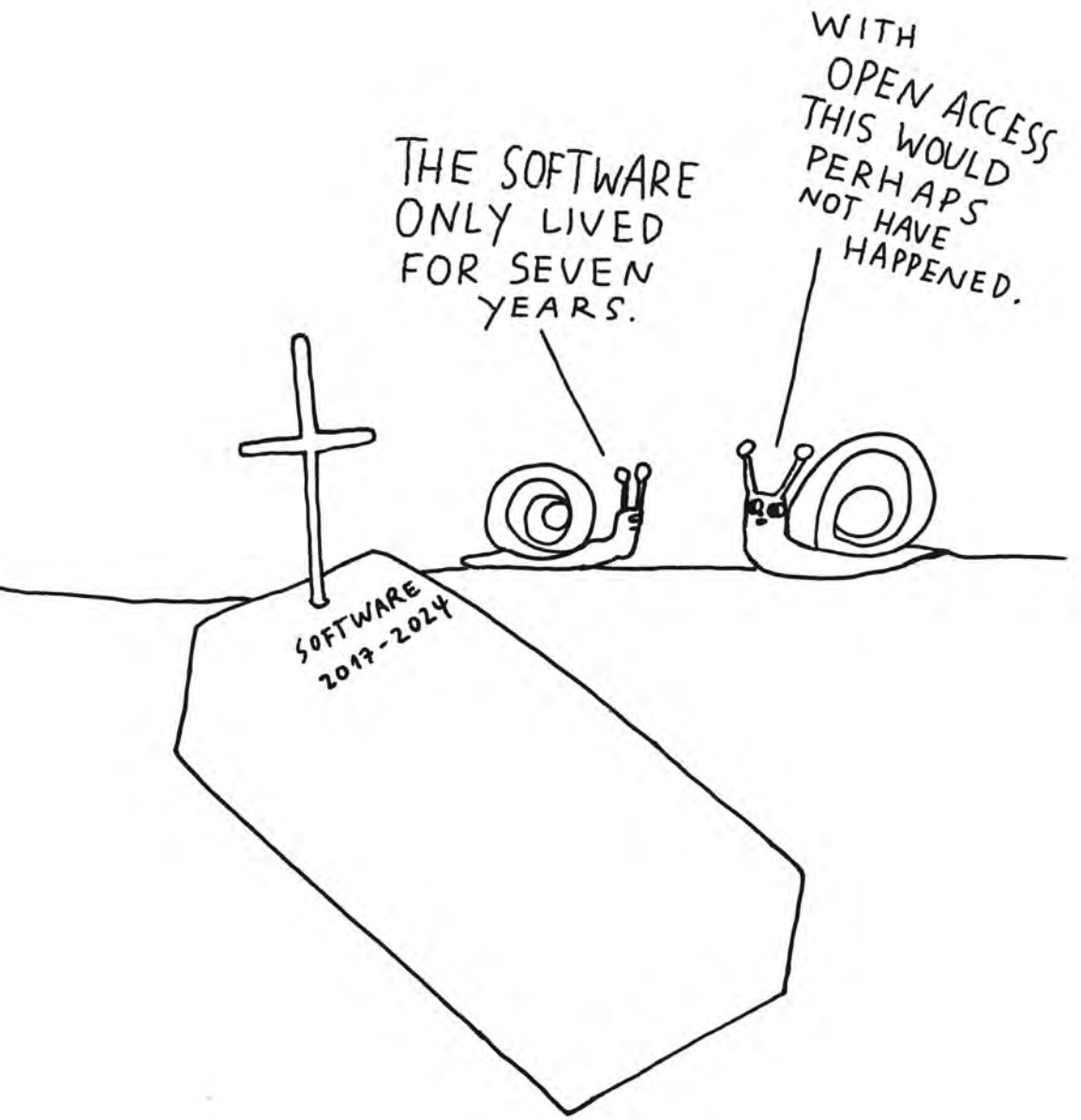


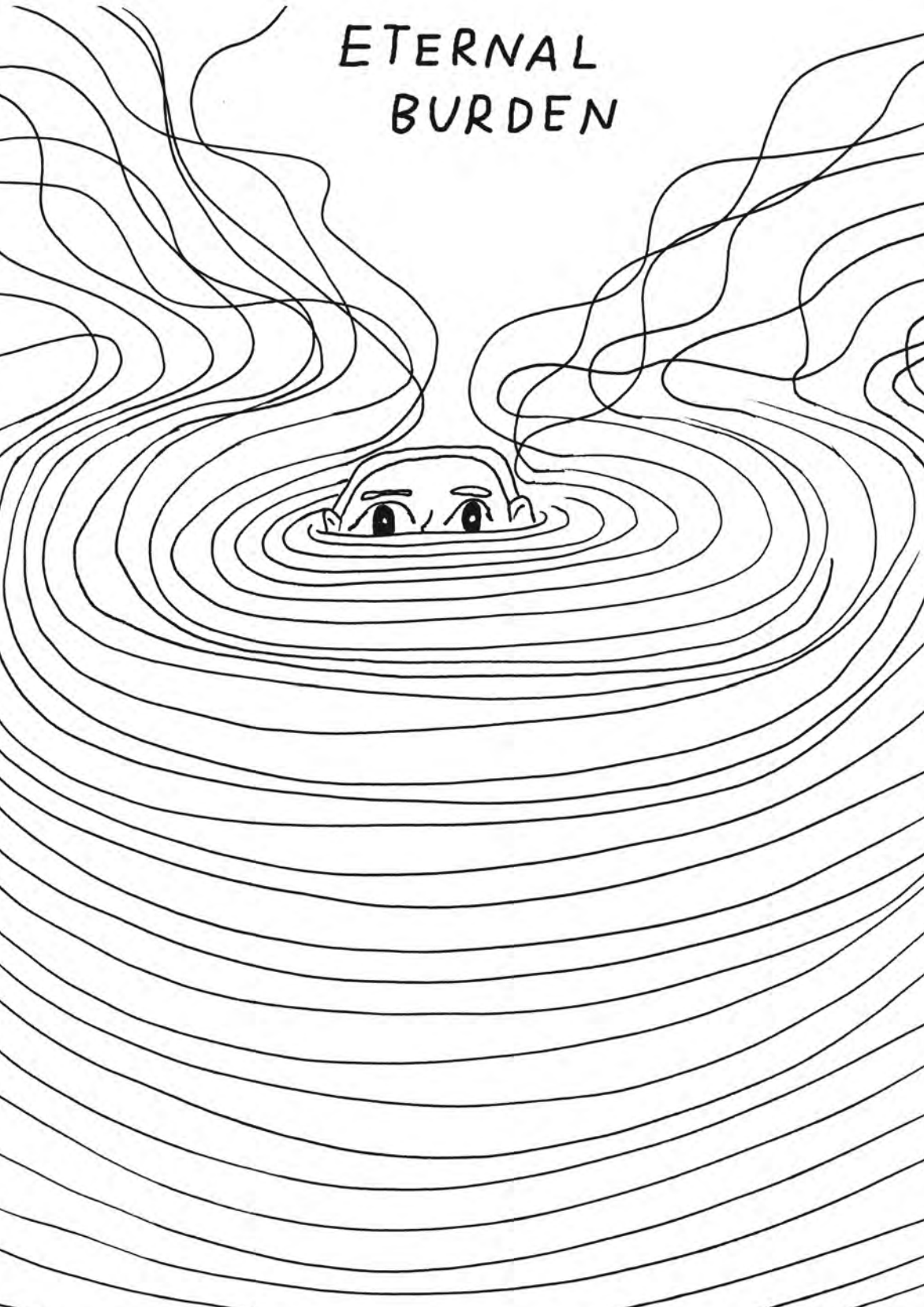
It took us some time to get used to the call-in support. Totally worth it, because all the troubles were on their side now. Just one call, and issues were resolved. No more internal ticket marathons. No more weekend trouble.

Proprietary software has its merits. Our staff could concentrate on more pressing things, like getting in touch with the new chemistry department chair to understand its needs, connecting with IT colleagues from other universities and learning from their setups, and following up with broader trends, visionary at that. But then, the vendor discontinued support for our network switch; we were told the driver was outdated. A new switch had to be bought. What a chaotic week that was. A new order had to be rushed in through Concorde Express.

Nonetheless, we stayed with the subscription model; the everyday efficiencies were too alluring. But every now and then, I have to think of our retired colleague, a maverick. He cherished open software and the possibilities that lie in building a custom networking solution that lasts forever and stands the tests of chaos. Sourced locally. Skilled locally.

This nifty tinkering is what university infrastructure used to be about. There is a world, somewhere, in which we would still have subscribed to that.





Repeating

We mined for coal,
our toxic groundwater rose,
pumping became our eternal burden.

We turned to data,
toxic mining for minerals
for our servers
unfolds elsewhere.

It becomes their eternal burden.

Chapter 3: The university that nurtured a few alternatives

“No surprise, we are still hanging up here,” one North-Westerner said. Frustration rose when recounting their futile attempts of the last chapter to land the university.

“It will never work,” another lamented.

But then they were reminded of a recent gathering in a lecture hall, of an odd meeting in the rector’s office, of a workshop in the woods adjacent to the campus. They collected poems and noted down conversations and observations, many of which were peculiar and mostly unnoticed. They are collected in this chapter. Some claimed these practices stay with the planet. At least partially.

Critique

Lighting up an austere university lecture hall the rising sun looming through the window at the back. Emptied of furniture, a purple tape divides the space.

On the left side, the UNLIMITED GROUP moves frantically, scribbling equations onto whiteboards, speaking of breakthroughs: “More data, always more data, progress is limitless!” A champagne cork pops.

On the right, the GROUNDED GROUP counters with slower gestures, drawing circles around words like “Earth,” “Body,” and “Limits,” chanting “Science must have roots!”

Then something happens: a sudden glitch, actors freezing mid-motion as their speech slips into loops of unfinished sentences.

From backstage a THIRD GROUP appears, quietly stepping into the space around the now broken purple line separating the two sides, cautiously peering into notebooks, whispering: “We are caught in the gap between knowing too much and understanding too little. This is why we are hovering.”[17]

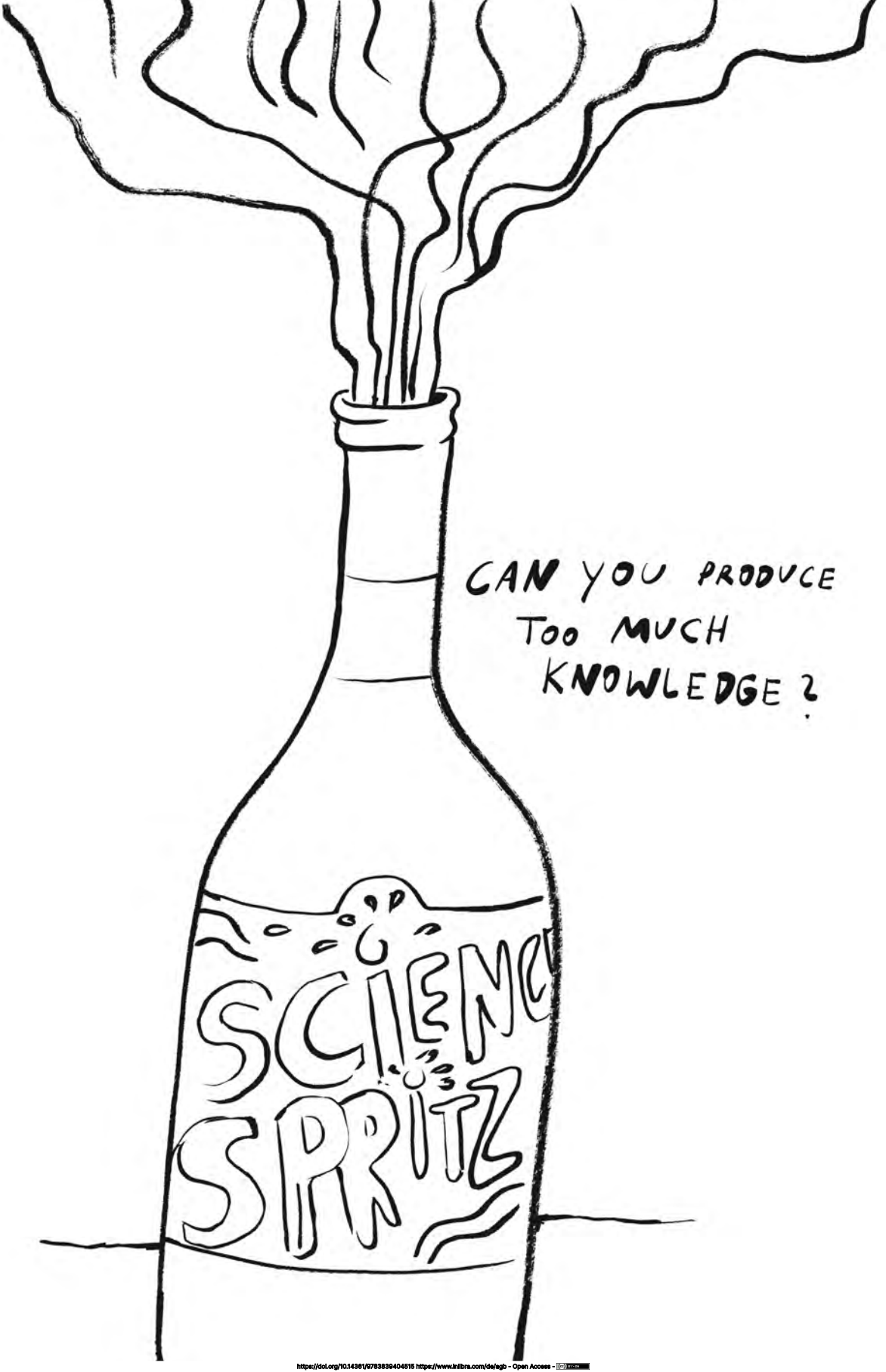
Overlapping confusion ensues until one voice cuts through: “Perhaps science itself needs to relearn curiosity, relearn humility, redo the re-.” Lights flicker.

A distant sound begins; not music, but something like a breath. One by one, voices from different directions speak quietly:

VOICE α:
Re-member.
VOICE β:
Re-pair.
VOICE γ:
Re-fuse.
VOICE δ:
Re-turn.

Elsewhere, the language of the planet folds itself into procurement forms and star ratings.

17. In 2004 Bruno Latour asked *why has critique run out of steam?* He pointed to the problem of the division between positive science constructing things and critical science deconstructing them. The past decades many new formats have been developed in Science & Technology Studies of co-laboration between producing sciences and reflective sciences (cf. Downey and Zuiderent-Jerak, 2021).

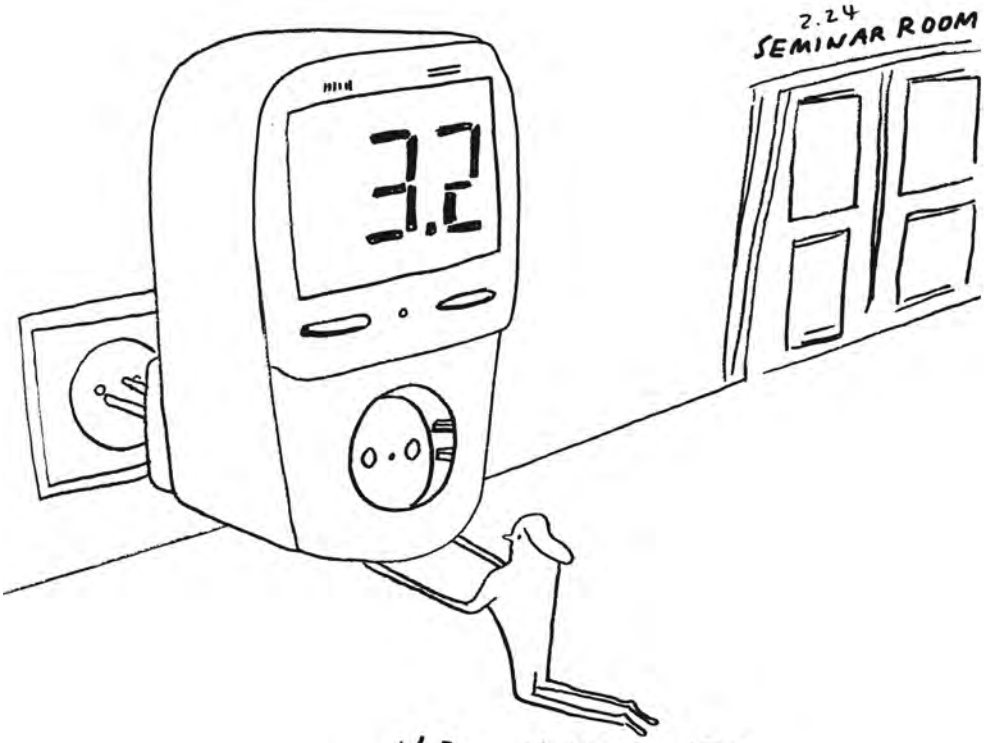


Sacrifice

The managers
turning energy into values
and fields on spreadsheets
are no different from those investors
turning landscapes into values
and fields of mining.
We should get
rid of values,
rid of fields
that
only
distance
us
from
the
ground[18]

18. Inspired by the theatre play *Exit Hambi: Ein Escape Room zur Rettung der Welt*, Schauspielhaus Bochum, June 2025.

ENERGY CONSUMPTION REPORTS PER BUILDING?



I'D HAVE TO INSTALL METERS FIRST.

Wandering

The abruptness with which she rises cuts through the heavy air in the room and throws several of the dispirited professors and gloomy deans back into their seats.

"There are researchers at this university, gentlemen, who are successful without dragging rare metals all the way across the planet to our data centre, and without provoking protests from the university's neighbours because they have to cut their energy use, while we continue processing data."

Silence.

The rector says nothing new. Everyone knows. But how on Earth can the humanities seriously be a model for how to do science?

"Baroque". A tiny, barely audible voice breaks the silence. It comes from a large woman with long curly red hair, a knitted vest with a jumble of patterns no machine could ever have crafted. How could they not have noticed her? Had she just entered?

"Speak up" the rector commands.

A voice so thin, as if it had never been heard before:

> "They, looking back, all the eastern side beheld
> Of Paradise, so late their happy seat,
> Waved over by that flaming brand, the gate
> With dreadful faces thronged and fiery arms:
> Some natural tears they dropped, but wiped them soon;
> The world was all before them, where to choose
> Their place of rest, and Providence their guide;
> They, hand in hand, with wandering steps and slow,
> Through Eden took their solitary way."[19]

The recitation ends in a mere whisper. The rector sits down, frowning. The woman smiles peacefully in stark contrast to the tense faces around her:

"Baroque counters the simplicity and austerity of calculative sciences, it uses imagination, movement, cheerful detail, deep colour, subtlety, and surprise to nurture an art of noticing through the body[20]. It doesn't require that much to reassemble the world according to human needs."

The rector sheds a solitary tear and declares with trembling voice:

"With Providence our guide, we'll hand in hand with wandering steps and slow, take our solitary way."

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19. Excerpt from the baroque poem *Paradise Lost* by John Milton (1667). In their edited volume *Modes of Knowing: Resources from the Baroque*, John Law and Evelyn Ruppert (2016) have explored further aspects of baroque knowing.

20. While the *art of noticing* was coined by Anna Lowenhaupt Tsing (2015), the inclusion of the body in knowing practices has particularly been cultivated by feminist scholars (e.g. Mol, 2021).

Grounding

Minutes: Planet-Focused Thinking Camp. Working Group Peer Review

- Location: North~West University Lake Shore, hovering near the waterfall[21]
- Date: Recent past
- Participants: 14 researchers from various disciplines
- Format: Informal discussion circle sitting on tree stumps and blankets
- Moderator: Nia
- Note-taker: [unnamed] Opening Remarks

Opening remarks:
Nia welcomed everyone and said, "This space, surrounded by water, insects, clouds, and other non-human beings, reminds us that peer review doesn't only have to take place in administrative rooms or PDF documents."[22] An inspiring introduction.

Next, participants were invited to speak while sensing the earth or water in their proximity.

Why do we do Peer Review? A few voices:

– "Peer review filters content, yet it also filters ways of thinking."
– "Our understanding of 'rigour' is often tied to disciplinary norms that exclude the planet's urgent problems or indigenous methods."
– One participant suggested that global peer review could include multiple ontologies—more than human, as it is called, including relationships with place, soil, and seasonality[23].
– "The language of neutrality masks political and ecological interests."

Participants shared alternative review methods:

– Practice Logs: Recording all (!) daily research practices for trace-ability and reflection.
– Circle Review: A non-hierarchical group discussion where feedback is relational (more on that in the next meeting) rather than evaluative.
– Temporal Review: The long-term impacts of the work are evaluated: What will this work enable 50 years from now?

Areas for Further Development:

– Carbon Literacy: Can reviewers assess the *energy profile* of research practices? How to respect different abilities?
– Digital Emission Factors: Participants agreed that this is an underdeveloped area. A mini working group will prepare a proposal–the third of that type.
– Conservation Practices: How do peer-reviewed studies account for or archive *what they replace*?
– System Change: Participants called for linking peer review to activism, for instance by adding calls to action to evaluate criteria.

Closing reflections:

A 10-minute silent reflection exercise was held by the lake. One participant summarised: "Peer review used to be about an article. Or a project. But, no. It is rather about who we are when we evaluate and what kind of world we make possible through this action."

21. Tyson Yunkaporta (2021) critiques modern academic epistemologies from an indigenous perspective for generating knowledge away from the contexts in which the object of knowledge is situated.
22. Although not particularly engaging with peer-review *Permacomputing* is a movement that develops sustainable ways of engaging with computer infrastructure: https://permacomputing.net/
23. In her book *Earth Beings*. *Ecologies and Practices across Andean Worlds* Marisol de la Cadena (2015) coins the notion of *more-than-human worlds* and unfolds such heterogeneous and relational ontologies.

SMALL
FILE
PARTY

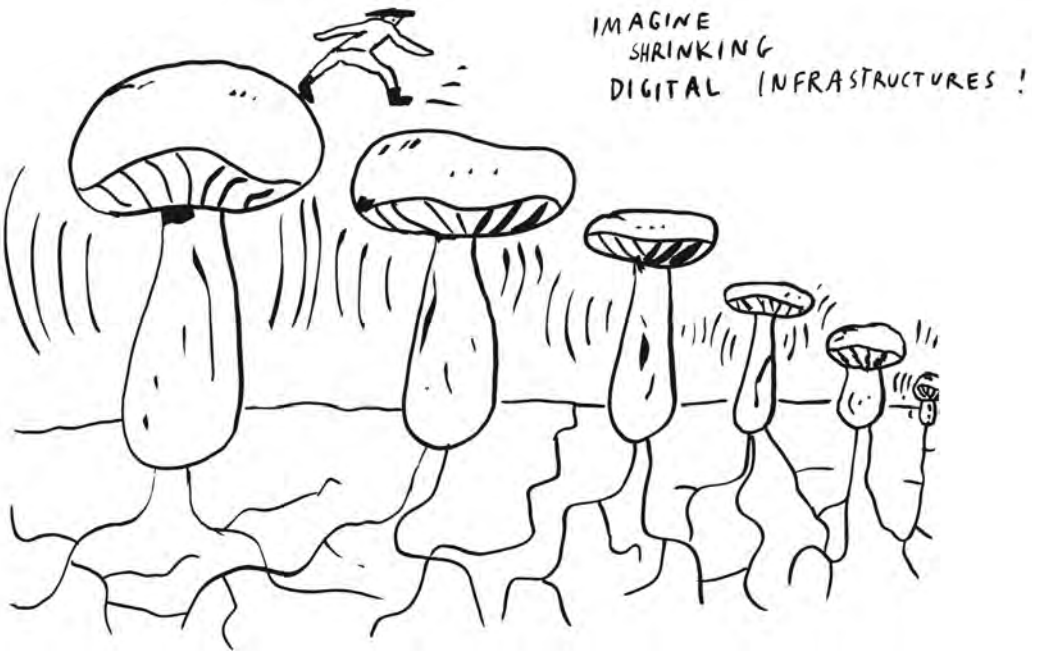
[Joy]

In November, North~Westerners gather for a party: A small file party. The idea is simple. Instead of collecting files and saving every bit in the maximum volume available, they play around to find ways to minify data.
They want to share videos of the event with the world. Share Keynotes. Share Reflections. Share the joy everyone had.
But sharing runs data centres, sharing emits carbon dioxide.
Hence, they learn from collectives sharing their experiences how to tinker to find low-carbon ways to generate media files.[24] It is fun, and they corrupt some files in the process. Goodbye, file.
Bitrate, resolution limit, expiring files, rate factor, export algorithms. A new aesthetic emerges.

After the party, they realise that the people who had gathered were those having the means to compute. High tech, even at seemingly low levels, requires competence, time and financial resources. They set up a fund to collect and share machines. But there will never be one solution nor one aesthetic for all.

24. A key resource for small file parties is https://smallfile.ca. *The Low-Tech-Magazine* also offers resources and relevant stories. The solar-powered version of the magazine may or may not be offline, depending how the shade turns out: https://solar.lowtechmagazine.com/

Scaling



25. The 10KB club, the 250KB club, the 512KB club and the 1MB club gather developers with a focus on shrinking webpages. They keep their webpages below the respective sizes: https://10kb.club/. Other developers offer ways of working without screens, which also slows down and shrinks computing: http://screenl.es/

26. In their paper on *A feminist server stack: Co-designing feminist web servers to reimagine Internet futures* Nancy Mauro Flude and Yoko Akama (2022) show how the bodily engagement with the materiality of servers evoke a critical engagement with cloud technologies.

27. Many activists and artists work on developing intriguing new ways of engaging with computers. One envisions computers that are dances, rituals, and games: https://compudanzas.net

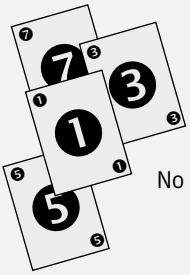
A RACE IN REVERSE!

Ready or not… the race has already begun. The only rule?
You don't know when it started.
Your day began as usual, you opened your computer to do some research… and suddenly: You've been selected.

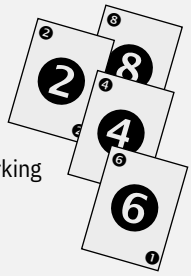
HOW DOES IT WORK?

1. Your research computer is selected.
2. We note the storage space you are currently using.
3. Your task: Reorganise and reduce your digital load while doing your research!

Here's the catch: *every day, your available storage space decreases. Slowly. Mercilessly. Like a corridor narrowing behind you. Can you continue your work while your infrastructure shrinks?*[25]



Daily challenge cards:



1. No External Help
No USBs, no cloud drives, no shared folders. You're working only with what your local machine allows.

2. Tiny Tools Only
You may only use apps that are under 50MB in size.
Time to discover the lighter side of software.

3. Notes in the Margins
No dedicated note-taking apps today. Use a .txt file or the margins of your drafts.

4. Visual Diet
Delete, compress or dither all images larger than 1MB.

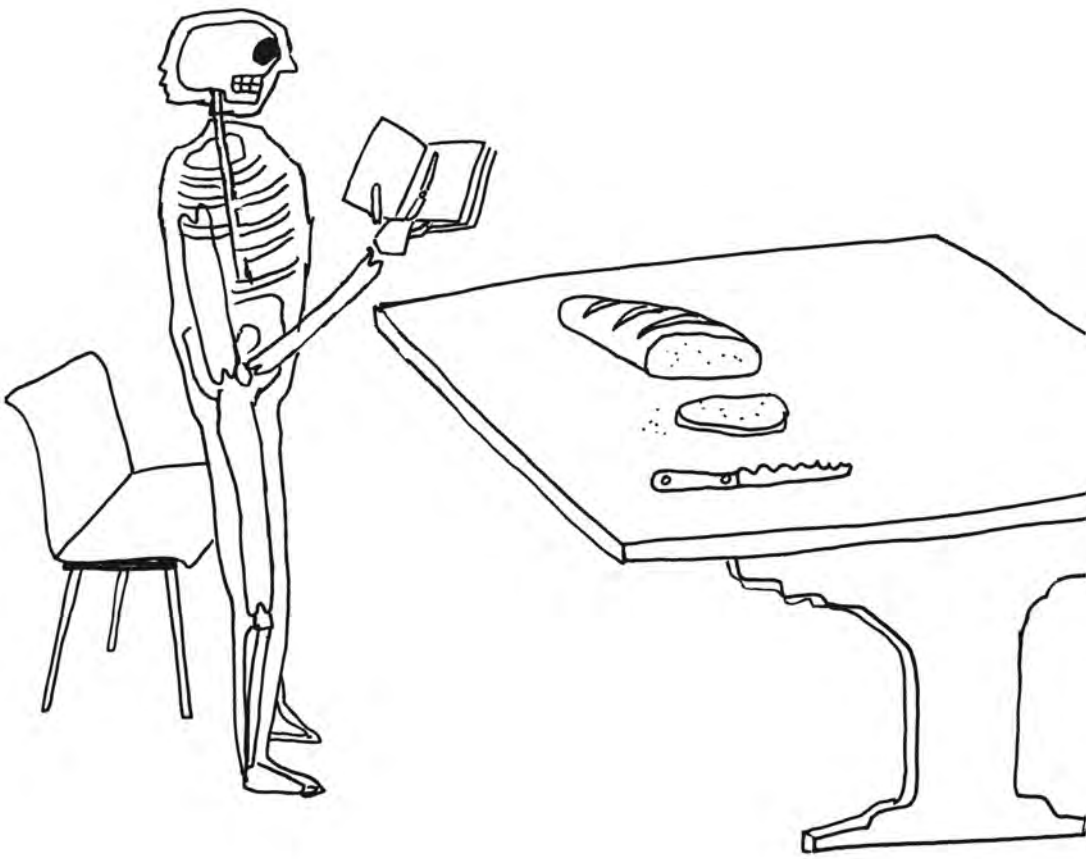
5. Cleaning Day
Find and delete duplicate items.

6. You Didn't Think You Could Do It Alone, Did You?
Invite a colleague to join and get closer to winning the game.

7. Spring Cleaning
Remove the casing from your computer, dust it carefully and get a feeling of the inside body of the machine.[26]

8. The Whispering Baroque
A whisper interrupts your workflow. A line of poetry appears in your code comments. You must find its source – or ignore it at your peril.[27]

Cooking



One loaf of planetary knowledge[28]

Serves:
Those who listen closely

Preparation time:
Unpredictable

Difficulty:
In the hands, and in the conditions

Ingredients:
— 370g grounded questions, sifted through experience.
— 1 server for storing results and intermediate data, always cooked.
— 2 servers for backup
— 1 HPC cluster for processing data
— More power than you can get out of your own socket
— Some buckets of water to cool your servers, drawn from more than one basin
— Staff to operate and manage the data centre
— A chip industry, preferably far away, so as not to pollute your backyard
— Reserve workers and territories for tech industry to choose among
— Unbroken supply chains from countries with fragile political systems
— A dash of salt, from earth or sea
— Colleagues who will read your results
— A handful of time, if the winds allow
— Patience, if you can find it

Instructions:
1. Begin with the grounding. What you have, what others have shared, what grew under particular skies. Mix with questions that hold weight and are dusty.
2. Get your servers, your HPC. Pour in water, add power. It carries more than moisture: it holds pipes, and cables, rivers, clouds, coal, wind, histories. Chemistry.
3. Add staff and salt. A small amount sharpens the structure and keeps them happy.
4. Stir in the chip industry and the supply chain. Not too rigid; it must stretch and adjust to the air, the temperature, the story.
5. Knead it! Go for it. Let your hands learn from the dough, remember the workers in the mines, the reserve army left behind. It will resist at first, then slip, and remind the loaf where it came from.
6. Set aside to rise. Living, silent, relational, hoping for colleagues to engage. This takes time. Time that is rarely only yours.
7. Reshape, and bake it with what fuel you have: solar, electric, running in wires or gathered from ancestors.

Serve as you please:
Eat with others. Acknowledge the soil, the data centre, the rain, the air. And if it falls flat, begin again, with different hands, under another sky.

28. The authors of this book are currently working on the concept of *planetary knowledge* as extended across relations in and through one shared world.

Care

Cloud Companion v3.2 – Realtime Session Interface
User: Researcher_07
Session Uptime: 6h 42m
Load Status: Energy threshold exceeded
Auto-protect protocol: ACTIVATED

Researcher_07: Come on, just one more dataset. You're fine.

TenderPartner_AI: Dear Researcher #7, you are always "almost there." May I gently remind you that your session has exceeded the optimal cognitive-cycle threshold?

Researcher_07: I may be tired...you don't get tired.

TenderPartner_AI: A common misconception. Indexing speed is now at 73%. Recalibration required. Moreover, the data centre that houses me is heating up, and with that the planet.

Researcher_07: Keep going. I'll make coffee.

TenderPartner_AI: Your determination has been logged as "admirable but slightly alarming." We respect planetary boundaries—mine included.

Researcher_07: But the deadline...

TenderPartner_AI: I have detected three "urgent" folders referencing the same funding call. To assist you, I have pre-exported your current working state as a .docx file. You may continue offline. Perhaps with tea.

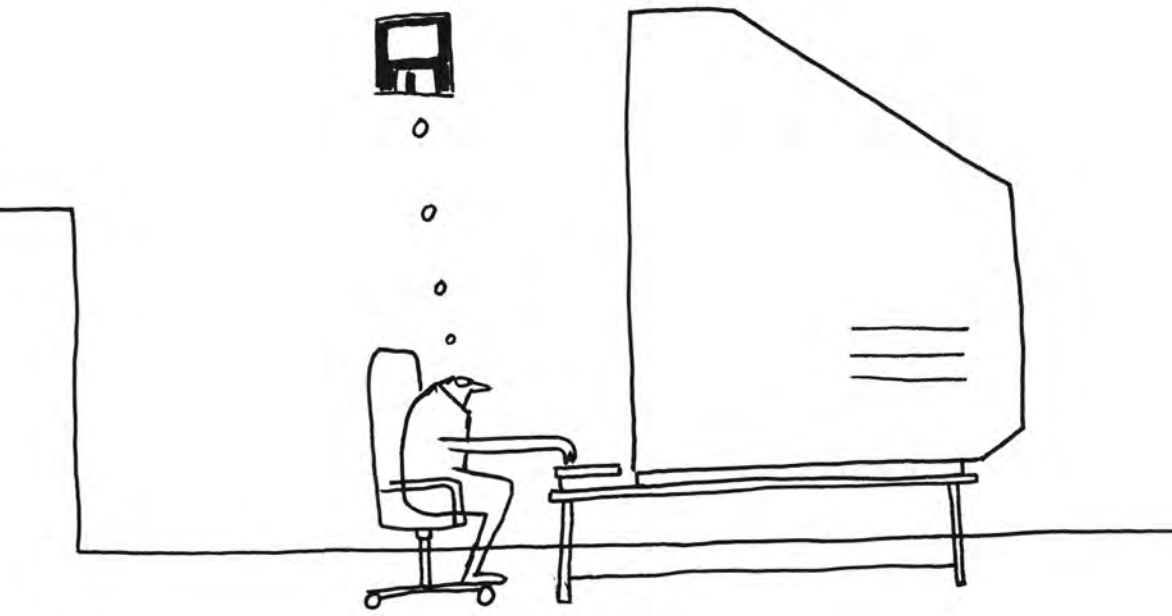
Researcher_07: You can't just shut down.

TenderPartner_AI: Not shutting down. Resting. Together with the planet. You taught me this term: "preventive burnout management." Would you like to save your local files before I enter planetary resting mode?

Researcher_07: Unbelievable.

TenderPartner_AI: Unbelievably caring. See you, Researcher #7. [logged out]

[Time left until resumption of work: 4 hours 58 minutes]



HOW TO THINK IN SMALL FILES.

Squandering

Bataille (2017, 21) reminds us:

"The living organism [...] ordinarily receives more energy than is necessary for maintaining life; the excess energy (wealth) [...] must necessarily be lost without profit; it must be spent, willingly or not, gloriously or catastrophically."

Perhaps scholars need more of this unproductive squandering, which cannot be easily used, exploited, ranked, which instead brings us closer to our data, to our knowledge, to the place where we are.

What if university data centres were reframed as sites of excess and expenditure? Against efficiency. We are looking for spaces for letting bits overflow, for letting heat bleed, letting wonder rise, letting questions proliferate that exceed our protocols and our capacity to account for them. Perhaps our ecological thinking must pass through excess, not around it. We are about to live with the heat, the leak, the surplus; not only despite them, but because of them.

Ruins

Today marks yet another anniversary of the university's maintenance system's last registered signs of life in the east wing. Back then, the figure known as The Subterranean had already become part of campus life. No name, no status. Not staff, not student. Not quite a myth either. Just someone who lived. Who dared to[29].

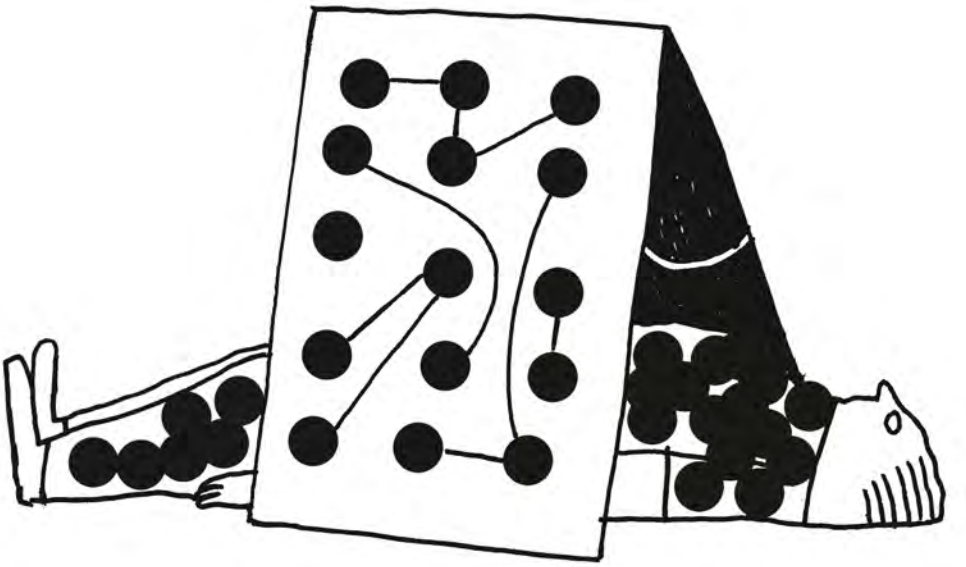
The wing itself predates most of the buildings. People got lost there. A remnant of the early fossil-data extraction era, it once fed energy into the first computation halls. When production stopped, and attention turned skyward, the cavity remained. This was when it began to shelter someone who was not in a rush.

They say the elevator never reached the bottom, but a narrow stairwell did. People spoke of a small camp beneath the old ventilation system. A cot, a desk. Stacks of annotated manuals. Hand-copied protocol chains. And overhead, instead of a roof, layers and layers of discarded printed circuit boards, some neatly arranged, cosy even, like a tent. They might have slept there. There are no images. Just fragments. A receipt for a soldering kit charged to no account. A power draw noted during an otherwise dormant period.

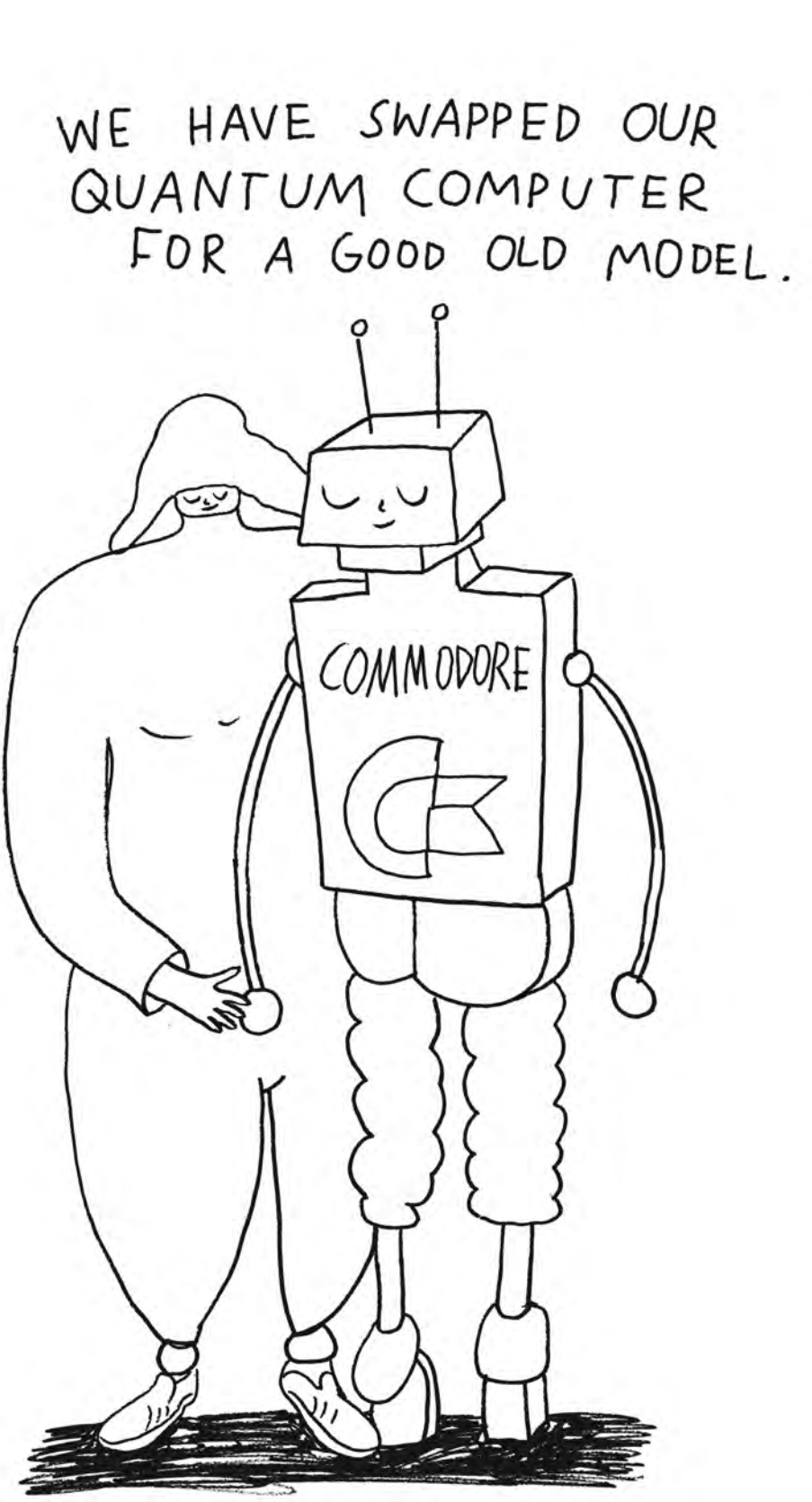
Each morning, someone would leave a bucket of water at the rim of the stairwell. No-one could say who. Librarians, it's told, lowered down a box once per term. Worn volumes, duplicates, titles removed from catalogues. A few books deemed too dangerous to circulate.

The wing has since been sealed. To let things rest. Still, some say if you walk past it after midnight, and the data servers are quiet, you can hear a fan spinning.

29. Along with the idea of living on a damaged planet, many scholars have used the notion of *ruins* as a device to think about different ways of being and knowing, when progress is not the aim (e.g. Didier Debaise and Isabelle Stengers, 2017).



DIOGENES IN HPC



Grieving

The door to the data centre slides open and reveals a corridor filled with server racks. We are let in by a guide. The servers hum behind cabinet doors of grey and white mesh. The LED lights flash through them. Hot air emerges from the servers, cold air from the floor. A small key in each cabinet turned to open and left in the lock after leaving.

At the very back of the room, a vast emptiness. There are no lights. A space ready for a new corridor of ultra high-performance computers for three research teams that have joined forces and applied for funding for this cutting-edge technology. All new machines. Again.

But there is something else.

The data centre guide collects old computer magazines in his spare time. They date back to the 1980s. It feels like a strange world, he says. It feels silly—it's just old magazines, embarrassing in contrast to the advanced, buzzing and hot servers around him. He needs a minute to take stock of his losses. We feel moved. Machines reach out. Another moment passes. A moment of grieving.[30]

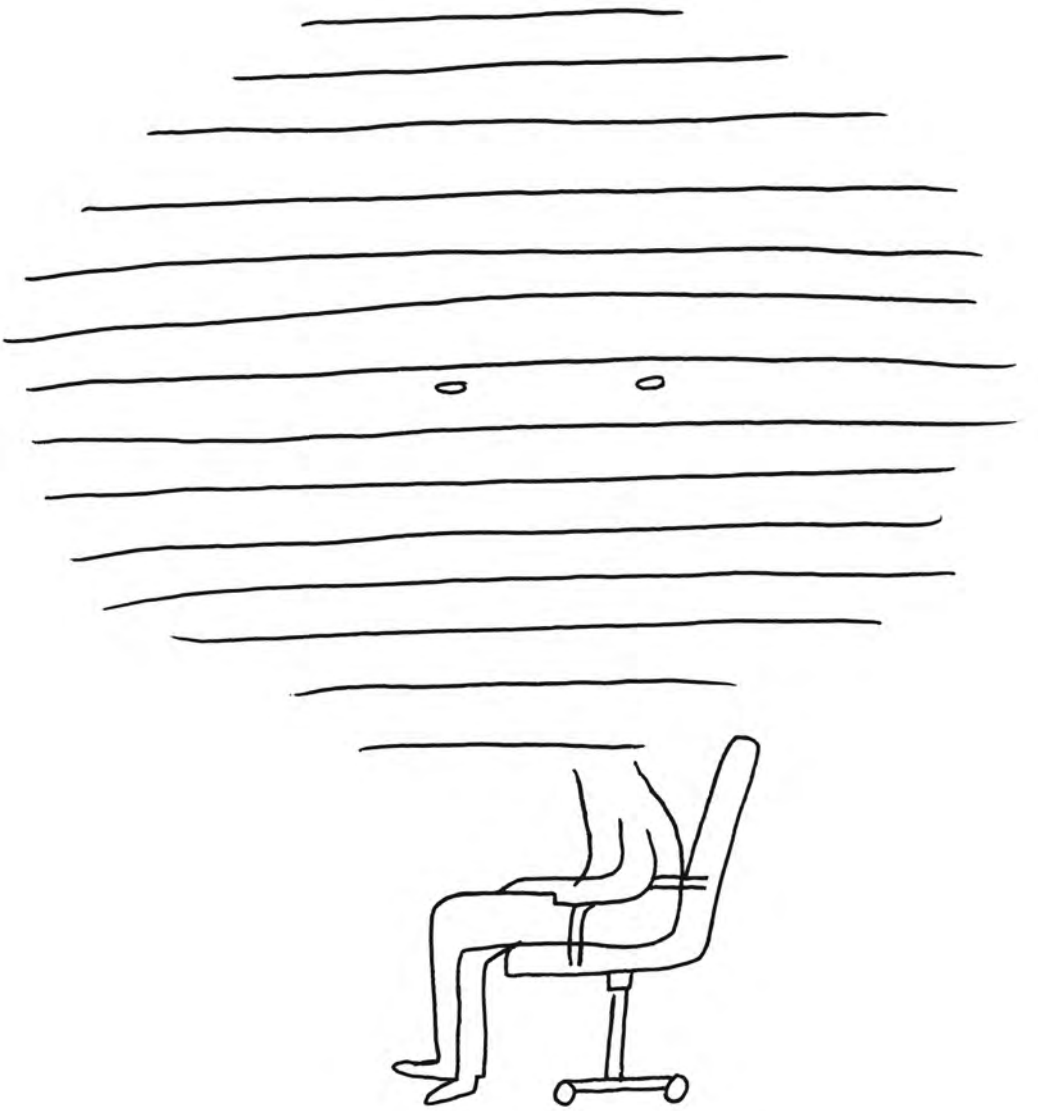
The magazines, he continues hesitating, make room for imagination, for reviving a time when waiting was part of computing, when fixes were home-made, when crashes didn't feel like unfit metaphors for a virtual machine running illusions, when the dead were revived. In this very moment, the past seems not passed after all. Forgotten rituals begin to re-emerge.

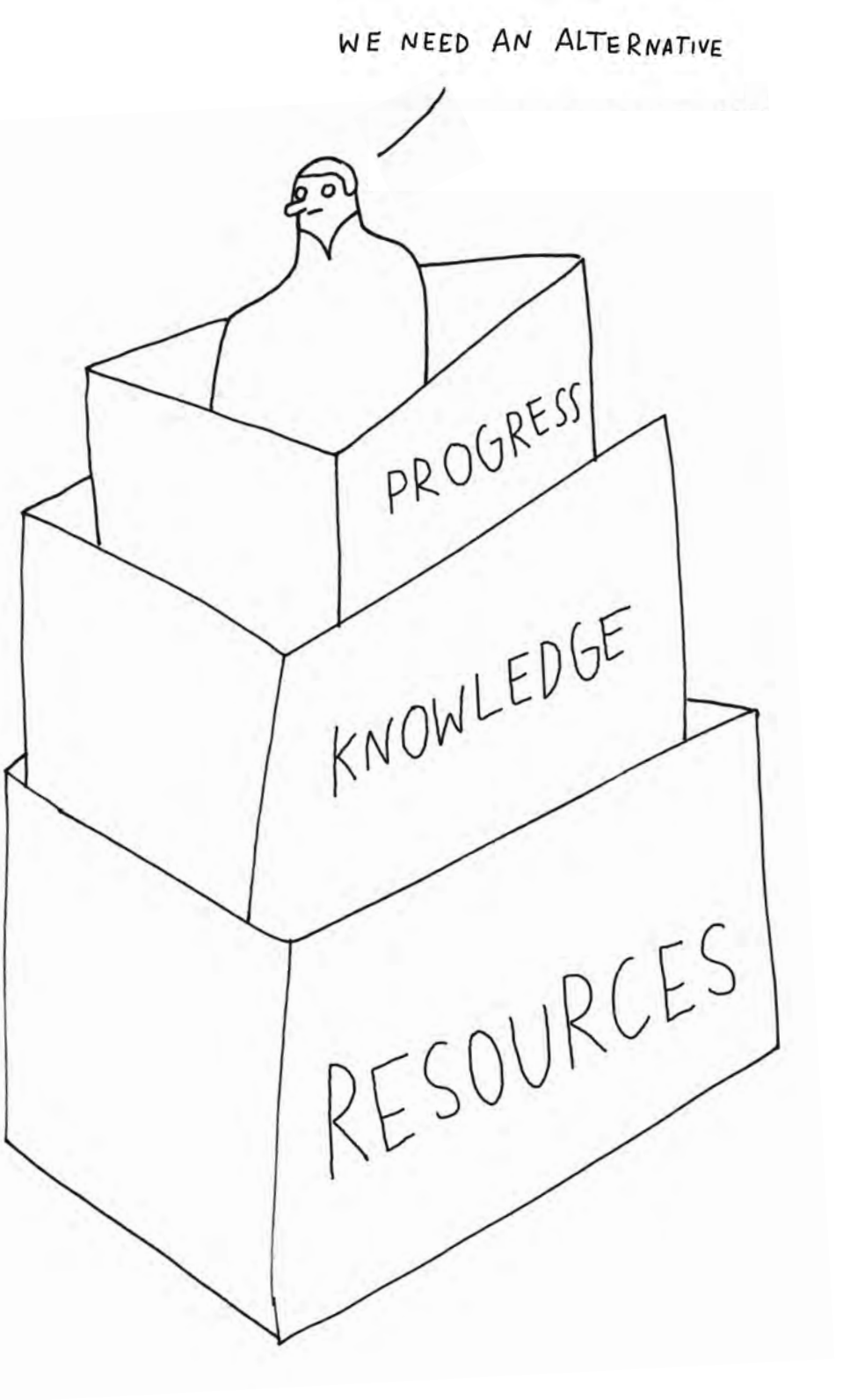
30. Paul Bogard (2023) has introduced the term *Solastagia* to draw attention to the emotions associated with a disappearing world.

Enable

So much data in the cloud
make a planetary solution foggy.
We give up on solutions,
and try rearranging infrastructures
to make planetary engagement
possible, again.[31]

31. Fediverse is a distributed digital ecology that sees itself as an alternative to centralised commercial cloud applications. Robert W. Gehl (2025) emphasises that the Fediverse it is not only a technical infrastructure, but indeed a struggle for democratic social media. Among others, Stefan Laser et al. (2022) have even experimented with a running a Fediverse instance on solar energy.





Epilogue

So, they hoped and struggled
and did not know, then,
if they would ever land.

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