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and sus

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The compost engineers and/sus saberes lentos: a manifest for regenerative technologies

Joana Varon and Lucía Egaña Rojas

Abstract: The concept "artificial intelligence" is a loaded terminology, situated in a very specific territory and sparking a very particular imaginary of possible futures. Silicon Valley and Hollywood's fast and metallic futures, which are incompatible with values, desires, and dreams of decolonial, antiracist, and transfeminist visions of being on this planet. We seek to explore and expose the limitations of applying the term AI to feminist technological practices and propose alternative epistemologies and approaches to develop decolonial feminist tech. This paper is an epistemological, historical, political, and creative exercise to expose the harmful Western-centered logics and imaginaries that are guiding tech development towards technologies of war, extractivism and domination and seek alternative terminologies that serve

us as tools to help envision systems guided by social-environmental justice and feminist principles, technologies of life and *del buen vivir*. To achieve such goal, we travel in the history of western science fiction to untangle colonial and patriarchal imaginaries that are guiding mainstream tech development; start to decolonize our imaginaries by departing from a map of everything that is left behind when we use the terminology "artificial intelligence", and from a brief immersion in biology and ecology studies, focused on mycology, soil studies, and a symbiotic approach to evolution, using radical imagination and speculative narratives, we propose concepts to inspire tech development that can be regenerative and in symbiosis with the Earth, all its beings, temporalities and rhythms. Guided by these concepts, this article ends with a proposal of a feminist tech prototype, an exercise to regenerate, recognize, and reconnect humans with the organic decision-making systems that operate in the wild: the compost engineers' regenerative systems.

Key words:

Feminist AI; Ancestral Knowledge; Alternative Futures; Decolonial science-fiction; Tech Epistemologies; Social-environmental Justice; Tech Imaginaries; Non-human centered technologies; Regenerative Tech

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The compost engineers and / sus saberes lentos: a manifest for regenerative technologies[1]

"Historians of this time have suggested that the period between about 2000 and 2050 on earth should be called the Great Dithering.19 The Great Dithering was a time of ineffective and widespread anxiety about environmental destruction, unmistakable evidence of accelerating mass extinctions, violent climate change, social disintegration, widening wars, ongoing human population increase due to the large numbers of already-born youngsters (even though birth rates most places had fallen below replacement rate), and vast migrations of human and nonhuman refugees without refuges.

During this terrible period, when it was nonetheless still possible for concerted action to make a difference, numerous communities emerged across the earth. The English-language name for these gatherings was the Communities of Compost; the people called themselves compostists. Many other names in many languages also proposed the string figure game of collective resurgence. These communities understood that the Great Dithering could end in terminal crises; or radical collective action could ferment a turbulent but generative time of reversals, revolt, revolution, and resurgence."

Donna Haraway[2]

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1   In this work we have used many bibliographic references in our mother tongues (Portuguese and Spanish), even though they were texts written in English as the original language.

2   Donna Haraway, *Seguir con el problema. Generar parentesco en el Chthuluceno*, trad. Helen Torres, Bilbao: consonni, 2019/2016: 144.

The concept "artificial intelligence" is a loaded terminology, originated in very specific territories and sparking particular and restricted imaginaries of possible futures. Very likely, Silicon Valley and Hollywood fast and metallic futures, which are incompatible with values, desires and dreams of decolonial, antiracist and transfeminist visions of being in this planet. This paper starts by recovering mainstream narratives and imaginaries from the history of Western science fiction, exposing its colonial world view to what was technology, what was science and how the future should look like. Then it shows how these imaginaries were intertwined with the origins of the term "artificial intelligence" when considering the biographies of its most famous figures and the political-economic trajectory that is leading such technological development, technologies of war and domination. In the second chapter we explore and expose the limitations of applying the term "artificial intelligence", what values and concepts are attached to it, what values and worldviews that are important to decolonial transfeminist theories are left behind? In the third part, reclaiming concepts that are left behind when we use the term artificial intelligence, we propose alternative epistemologies and practices for technological development that recognize our current context of climate emergency and realign with ancestral knowledges, which got depreciated by colonial violences that have crossed time and are still present in the development of digital technologies. We propose the figuration of the compost engineers and it's *saberes lentos*. Through a creative exercise, we propose to envision a decolonial feminist tech prototype that has the goal to regenerate, recognize and reconnect humans with the organic decision making systems that operate in the wild: the compost engineers regenerative systems. Departing from radical imagination and speculative narratives, and from everything that is left outside when we use the terminology "artificial intelligence", we want to propose concepts able to inspire tech development that can be friendly to the Earth, all its beings, temporalities and rhythms. Instead of artificial, we propose natural, organic, multiple, chaotic; instead of a rational data lead intelligence, we propose a reconnection with the uncontrolled *saberes*

de la tierra (earth and soil wisdom) and with all the senses that led humankind blind enough to menace biodiversity and its own existence. We propose a re-connection with technologies of life, technologies *del buen vivir*.

This project blends different areas of knowledge that provide critical approaches to the current and dominant human-centered Western heteropatriarchal neoliberal world order: feminist theories and practices towards science and technology; de-colonial thoughts; biology and ecology studies, particularly focused on mycology, soil studies, permaculture and a symbiotic approach to evolution; science fiction analysis; ancestral knowledge; and design justice practices to tech development. It depart from our work experiences over the years, which have been connected to various critical approaches to technology from a decolonial feminist perspective, as well as creative practices using digital and analog technologies. And it lead us towards a still timid but open journey engaging with biology and other Earth scien-ces. Part of this journey was also inspired by three interviews conducted from June to August 2023 with Chilean biotechnologist Daniela Torres, director of the Chile office of the Fungi Foundation[3]; Cinthia Mendonça, director of Silo,[4] a rural station in Brazil that is designed to search for interrogations and answers to the challenging questions of our time, offering experiences for knowledge exchange and human development, working with art, science, technology and agroecology, and Denise Alves-Rodrigues, queer technologist, maker, artist and educator, inspired in reposi-tioning other technologies in the same status as digital technologies.

From the territories we inhabit, it is impossible not to link technologies with their globally distributed and geopolitically interconnected effects. In this sense, we seek to consider how feminist technology can serve the restoration, repair, and preservation of territories and their knowledge.

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3   https://www.ffungi.org

4   https://silo.org.br

1. The term "Artificial Intelligence" has its roots in colonial and patriarchal technosolutionist Science Fiction: from imagination to reality

> *If imagination can lead to troublemaking, is it any wonder, then, that those in power work tirelessly to squash us from having radical imaginations that dare to envision a world in which everyone can thrive?*[5]
> **Ruha Benjamin**

To create something, first we need to imagine it. Studies in the fields of philosophy, anthropology, psychology, cognitive science and arts, among others, have asserted that imagination plays a central role in our world, as it becomes a creative action of reality. Chilean philosopher Andrea Soto Calderón, in her book *Imaginación Material*, states that "imagination configures ways of doing, its dimension is always performative in the sense that it articulates ways of tracing, desiring, affecting and inhabiting reality. It is an inventive thing. It creates, regulates and transforms society. It raises figurations, interferences, thresholds that introduce variations not as an image of something existing, but rather establish their being-there."[6] Therefore, we ask: Which imaginaries are inspiring the development of Artificial Intelligence? Are there dominant imaginaries and narratives in the field? What are the main aspects that characterize them? How are they being materialized into the mainstream vision of technologies? What are the imaginaries and values that inspire feminist futures? Inescapably, all these questions lead us to analyze some landmarks in the history of western science fiction. Therefore, what follows is a very brief visual anthropo-

5   Ruha Benjamin, *Imagination: a manifesto*, New York: Norton Shorts & Company, 2024.

6   Andrea Soto Calderón, *Imaginación material*, Santiago de Chile: Metales pesados, 2022: 55. (Translation is ours).

logy exercise, focused on the history of dominant science fiction with the goal to understand its prominent characteristics and how it influences current imaginaries, development and narratives around artificial intelligence.

Some Western science fiction writers consider *Frankenstein*, published in 1818 by English writer Mary Shelley, as the first literary work to which the label "science fiction" can be assigned. Though written as a gothic novel, it does feature experiments with advanced technology. Indeed, she created two enduring archetypes that would be common to science fiction narratives: an obsessed mad scientist, Victor Frankenstein, and a human-alike being, created by man.[7] But as a female writer, who reportedly was also inspired by the practices of her mother, a feminist philosopher, her work has been neglected to the point of even having authorship of her master piece questioned.[8] Therefore, as it tends to happen in the history of patriarchy, born 66 year later then Shelley, the futurist English writer, Herbert George Wells, with novels like *The Time Machine* (1895), *The Island of Doctor Moreau* (1896) and *The War of the Worlds* (1898), became recognized as "the father of science fiction" in a western centric world view. Altogether with the french surrealist Jules Verne, with his series *Voyages extraordinaires,* both Wells and Verne became knowledgeable as the references of the beginning of science fiction in European literature. In their narratives: space, time and ocean travels, wars between humankind and extraterrestrial beings and lands to be explored, all enabled by technology, were setting the grounds for the genre to flourish in Europe and North America in the late 19th.

It was a different approach to technology than the one initially presented in the work of Shelley on *Frankenstein*, which does not show a positive view towards the so-called progress and technology. Literary scholar Kari Lokke once interpreted

7   John Clute and Peter Nicholls, "Mary W. Shelley". *Encyclopedia of Science Fiction*. Orbit/Time Warner Book Group UK. Archived from the original (1993) on 16.11.2006.

8   Fiona Sampson, "Frankenstein at 200 – why hasn't Mary Shelley been given the respect she deserves?", *The Guardian*, 13.01.2018. Available at: https://www.theguardian.com/books/2018/jan/13/frankenstein-at-200-why-hasnt-mary-shelley-been-given-the-respect-she-deserves

Frankenstein, but also another piece from Shelley, entitled *The Last Man,* saying that "in its refusal to place humanity at the center of the universe and its questioning of our privileged position in relation to nature (…) constitutes a profound and prophetic challenge to Western humanism".[9] But that was not the dominant view early in her time and neither the prevailing view in the years to come.

In the book *Colonialism and the emergence of Science Fiction*, John Rieder, highlights that "science fiction emerges as a recognizable genre during the nineteenth century in an atmosphere of colonial and imperial endeavor, and the repetitive motifs and patterns that make the genre recognizable represent ideological reflections of the contradictions of colonialism".[10] Analyzing the work of those who became recognized as "fathers" of English science fiction, Rieder expressively pointed out to the exploitation of racist ideology[11] present in *The Island of Doctor Moreau*, as it permeated the colonial narratives of the exotic "other." He also referred to how **science fiction narratives, perpetuating what he called "Colonial Gaze", ultimately retro feed the ideological basis of colonial practices in the non-fictional world,** pointing out that "when Verne, Wells, and others wrote of voyages underground, under the sea, and into the heavens for the readers of the age of imperialism, the otherworldliness of the colonies provided a new kind of legibility and significance to an ancient plot. Colonial commerce and imperial politics often turned the **marvelous voyage into a fantasy of appropriation** alluding to real objects and real effects that pervaded and transformed life in the homelands."[12] For him "science fiction ad-

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9   Kari Lokke. The Last Man. In: Schor E, ed. *The Cambridge Companion to Mary Shelley*. Cambridge Companions to Literature. Cambridge University Press; 2003: 116-134.

10   David M. Higgins, "Colonialism and Ideological Fantasy". Science Fiction Studies, #107, Volume 36, Part 1, March, 2009. Available at: https://www.depauw.edu/sfs/review_essays/higgins107.html

11   John Rieder. *Colonialism and the emergence of Science Fiction*, Middletown: Wesleyan University Press, 2012: 30.

12   Idem: *6*.

dresses itself to the ideological basis of colonial practice".[13] By ideological basis he meant a **set of beliefs perceived at least as three recurrent *ideological fantasies:***[14]

-   *discoverer's fantasy*: "We know very well that there are people living in this land, but we act as if it were empty before our arrival";[15]
-   *missionary fantasy*: "Although we know that our arrival disrupts and destroys the traditional way of life here, we believe that it fulfills the deep needs and deslres of all right-thinking natives. The narrative of progress dictates that the old was must give way to the new ones";[16]
-   *anthropologist's fantasy:* "Although we know that these people exist here and now, we also consider them to exist in the past-in fact, to be our own past."[17]

These **fantasies are all dependent on various aspects of the Ideology of progress**. As Riders notes "the pseudo idea or proto narrative of progress pervades the ideologies of colonialism that **code the non-European world in all its diversity, not simply as the Other, but in various ways as the veritable embodiment of the past: wild, savage, tribal, barbarous, despotic, superstitious**, and so on."[18]

Historically, the scientific and economic moment for the emergency of these literatures was the **Second phase of the Industrial Revolution**, marked by **large-scale iron and steel** production, as well as the construction of railroads, electrical power and adoption of telegraph and telephone networks, which lead to an unprecedented movement of people and communication, particularly in some europeans countries, where these science fiction stories were being written, mostly in Britain, France and Germany, and also in the US. For Rieder, by that time "an orientation toward pro-

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13   Idem: 30.

14   Rieder deployed the term in reference to slovenian philosopher Slavoj Žižek concept of *ideological fantasies*, meaning "beliefs that we consciously disavow, recognizing them as untrue, but nonetheless support in practice".

15   Idem: 31.

16   Idem: 31.

17   Idem: 32

18   Idem: 29-30.
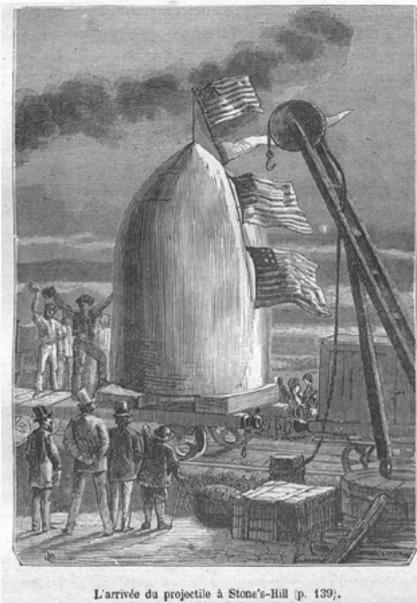
Image 1: Illustration from the edition of 1872 of De la Terre à la Lune

Image 2: Le voyage dans la lune. Geo Méliés, 1902

ductivity and efficiency certainly conforms both with the popularity of stories about marvelous inventions and scientific discoveries (…) and also with ideologies of progress."[19] Interesting to note that the aesthetic of iron, steel, as well as the logics of productivity, efficiency and progress still mark the imaginaries of emerging and futurist technologies up to today.

That trend continued across the 20th century, when science fiction reached the cinema, drawing upon H.G. Wells and Julio Verne. In 1902, French illusionist Georges Méliès screened *The trip to the moon (Le Voyage dans la Lune)*, often considered the first science fiction film. Space travel in a capsule with the format of a bullet and capture of Selenites (lunar inhabitants) are in the center of the plot.

In 1920, the **word robot was used for the first time** by Czech playwright, Karel Čapek. It has its **origins in the word *rabota*,** which means **servitude of forced labor**. Čapek used it to name creatures in his sci-fi play named R.U.R. They were mass produced by a factory entitled Rossum's Universal Robots. **In the plot, they end up assuming all the work for humans, but didn't stop there. They took over the factory, the army and the Earth, killing all but one human.** But the most famous robot from that decade was ....

19   Idem: 28.

Image 3: Robots from R.U.R. breaking into the factory, 1920

featured in the film *Metropolis*, released in 1927, directed by the German expressionist Fritz Lang. The story is set in 2026, and includes elements such as a robot, a mad scientist and a futuristic city, inspired by the landscape of New York. The script was written by Lang's wife, Thea von Harbou, who also contributed to the production of what was considered the most expensive film ever released by that time. Once again, a mad scientist, Rotwang, was trying to create a human-like creature, a *Maschinenmensch* (machine-person), or a woman machine. In that case, the goal was to impersonate Maria, deceive man (very biblical), incite worker mutiny to destroy factory machines, but the *Maschinenmensch* ends up burned in a stake, like in medieval witch hunts.

Interesting to see that both *Frankenstein* and the *Maschinenmensch* experiments to create human-like creatures, failed. But the criticism of a technocentric vision of progress, present in both science fiction stories, Frankenstein and Metropolis, written by women authors on science fiction, would take even less space in the mainstream science fiction production. Metropolis was heavily criticized by many, including H.G. Wells, who disliked its premise for pointing out that automation created enslavement instead of relief.

Image 4: *Maschinenmensch in* **Metropolis, Fritz Lang, 1927**

In the United States science fiction historians and critics consider the period from the late 1930's to 1946 as the *Golden Age of Science Fiction,* characterized by hard science fiction stories, marked by "linear narratives of **heroes solving problems and countering threats in a technological adventure or a space opera**".[20] **A celebration of scientific achievement and a sense of wonder about technology** was also seen as key characteristics of that period, combined with the notion that sheer science and technological development would solve all the problems. **Imaginaries produced** during that period, which also encompass the scientific and **technology race of World War II, were intertwined with and had significant effects upon people in power in the military and in science and technology development**, particularly in the US and Europe, but also, through cinema and other medias, affected many aspects of modern popular culture worldwide.

Around that golden period, the US magazine *Astounding Science Fiction,* under John Wood Campbell Jr. editorship, became often referred as the leading publication, featuring stories of the authors who later became known, in that male and US-British dominant field, as the Big Three of science fiction: Isaac Asimov, biochemist born in Russia but grown in Brooklyn, New York; Robert A. Heinlein, aeronautical engineer and naval officer in the US and pioneer in the subgenre hard science fiction; and Arthur C. Clarke, British physicist obstinate by space travel.

The colonial trends that Rieder pointed out in his book continued to be present in the publications from the US. **If science fiction emerged in the context of industrialization, the imperial competition of European countries and the US gave space to an arms race in which technology was at the center.** For Rieder, "the key element linking colonial ideology to science fiction's fascination with new technology is the new technology's scarcity. **The thrill of the technological breakthrough is not that it benefits everyone but that it produces a singular, drastic difference between those who possess the new invention or power source and those who do**

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20   Adam Roberts, *The History of Science Fiction*, New York: Palgrave Macmillan, 2006: 195.

Image 5: Six covers from the magazine Astounding Stories y Austounding Science Fiction. Source: https://pulpcovers.com/tag/astounding/

not. Speculations about technology itself may be of significant interest to the technically oriented readership of early science fiction, but the relevance of colonialism to stories about technology shows up in the social relations that form around the technology's uneven distribution."[21] As the cover below shows, once again, "the exotic other", who does not possess the new inventions, is portrayed as someone seen as wild and that, under the ideology of progress, could be subjected to the discoverer, the missionary and the anthropologist fantasies.

But, apparently, since the R.U.R. play of Čapek, and the *Maschinenmensch of* Metropolis, the exotic other was also taking a futuristic metallic shape. It was around 1940 that Isaac Asimov started to write his robot stories, published in 1950 as the collection entitled "I, Robot". That anthology also comprised his short story "Runaround", which coined the following **three laws of robotics**:
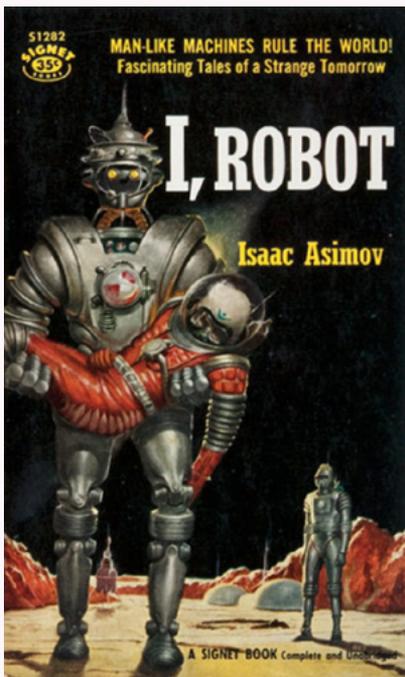
1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Image 7: Cover from the book I, Robot de isaac Asimov

The spirit behind it is a lot of suspicion and distrust around robots, an aspect that was also commonly depicted in many other stories and illustrations:
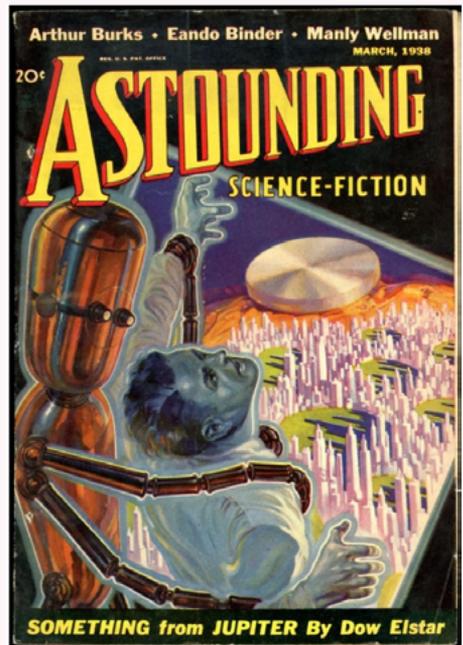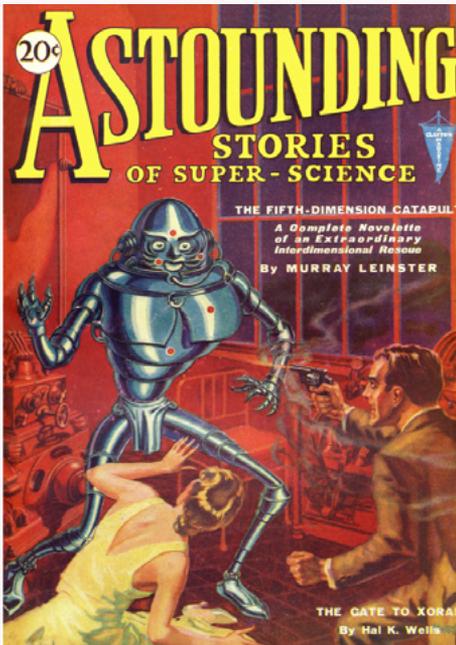
Image 8: Covers of the magazines *Astounding Stories of Super-Science, which was later called* **Astounding Science Fiction, as per the cover of 1938. In 1960, the magazine had it's name changed again to Analog Science Fact & Fiction, when it was sold to the global mass media company Condé Nast, which currently owns tech media brands such as Wired, Reddid, Ars Tecnica, besides other world own culture and lifestyle magazines, like Vogue, The New Yorker and Pitchfork, among others.**

Beyond sci-fi, the **three laws of robotic guided** not only several of Asimov's narratives and inspired other science fiction authors, but also, though fictional, they influenced thinking in the **field of ethics of artificial intelligence.** In 1950, the **same year as "I, Robot" was released,** Alan Turing, a British mathematician and computer scientist, published an article entitled "Computing Machinery and Intelligence", where he depicted an exercise which later become known as the **"Turing Test", considered to set the basis for what would become known as Artificial Intelligence**. In that article he proposed to replace the question "Can machines think?"[22]

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22   Alan M. Turing, «Computing Machinery and intelligence», *Mind* LIX, n.º 236, October, 1950: 433-60. https://doi.org/10.1093/mind/LIX.236.433

by a less ambiguous approach, one that does not require defining what "thinking" actually means. Then he suggested an adaptation of the "Imitation Game", where an interrogator, by asking questions to person A and person B, was meant to determine who was the man and who was the woman. But instead of having people in every position, he proposed:

> *"What will happen when a machine takes the part of A in this game?"*
> *Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman? These questions replace our original, "Can machines think?" - Alan Turing*[23]

So, by that time, we adopted a paradigm for the term Artificial Intelligence, considering that a **machine would be taken as intelligent exactly if it is able to deceive us, humans,** by deceiving the interrogator. Like the *Maschinenmensch* Maria. Ironically, since the 1940s, with the rapid development of computers, it was possible to observe the rising concerns over the possibility that intelligent machines or autonomous technologies would threaten the future of humankind. Comparative literature scholar, Andreas Huyssen, in the article *The Vamp and the Machine*, that analyzes Metropolis, says that **"As soon as the machine came to be perceived as a demonic, inexplicable threat and as the harbinger of chaos and destruction (…) writers began to imagine the Maschinenmensch as woman** (…) The fears and perceptual anxieties emanating from ever more powerful machines are recast and reconstructed in terms of the male fear of female sexuality (…) **Woman, nature, machine had become a mesh of signification which all had one thing in common: otherness; by their very existence they raised fears and threatened male authority and control."** [24]

Alike the machinic version of Maria, from Metropolis, but created 55 years later, the replicants, bioengineered androids, were also depicted as an inferior class to
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23   Idem: 434.

24   Andreas Huyssen, "The Vamp and the Machine: Fritz Lang's Metropolis," in Andreas Huyssen, *After the Great Divide: Modernism, Mass Culture, Postmodernism*. Bloomington: indiana University Press, 1986: 226.

be executed. Initially portraited in Blade Runner, launched in 1982, the term was later on used in several other science fiction and video game stories. Directed by Ridley Scoot, english filmmaker who was admittedly influenced by H. G. Wells, Blade Runner was inspired by the science fiction novel "Do Androids Dream of Electric Sheep?" written by Philip K. Dick in 1968, two years after the first **bioengineering** program was launched in the US, at the University of California. The history happens in Los Angeles, in 2019, after Earth was contaminated by a nuclear war that has destroyed almost all the flora and fauna. In such context, **governments were encouraging the colonization of Mars, offering a replicant to anyone who wishes to leave for that planet. Replicants would be used for dangerous, menial and pleasure work in the alien colonies.** But after a riot, **replicants became illegal** and banished from Earth. Blade Runner was the police officer, who investigates, tests, and executes replicants. **The test, was pretty much inspired in the Turing Test: using the Voight-Kampff,** a machine with sensors like a polygraph to monitor the target while the investigator, or the interrogator, would ask questions to determine if it was a human or a replicant. **Rachael**, an experimental Nexus 7 replicant, was submitted to the test. She puzzled the test, because, **unlike other replicants, she was implanted with memories from Lilith Tyrell,** the niece of the owner of Tyrell Coorporation, a powerful tech coorporation that manufactured the replicants. **Tyrell implanted her memories as a test to provide a cushion for her emotions and avoid more riots among replicants. Rachael was unaware of what she was.**

In Blade Runner, **the mad scientist archetype acquires the form of a Big Tech corporation**, but the reminiscence of Victor Frankenstein and Rotwang remains, now boosted with advances in biotechnology. Just like Frankenstein and the robotic version of Maria, the man made creature, replicant Rachael also dies, but during childbirth, setting ground for its continuation. Fourthy 42 years latter, in 2023, Bella Baxter, from Poor Things, by the greek director Yorgos Lanthimos, became our steampunk contemporary version of Frankenstein. Now, the mad scientist is Dr. Godwin Baxter, ironically nicknamed God. **Bella is presented as science wonder, a scientific experiment** in which a women was able to survive brain death by being

transplanted with the brains of her unborn child who she was pregnant of. Unconscious of her past, just like Rachael, she was unaware of what she was. Becoming mother and daughter, women and child at the same time,[25] the conflict between her owning and exercising her desires disregarding attempts submit her to external patriarchal and societal control took the

Image 9: Rachael, replicant from Blade Runner

lead of the narrative. Just like the previous creatures, **Bella's freedom causes fear and an impulse to control her.** But, unlike the other science made creatures, Bella managed to run her life frustrating all her male counterparts, including her creator,[26] maybe because, in this case, her intelligence was never artificial?

As we have seen, **the idea of otherness, for Western, colonial and patriarchal mindframes, comes with the violent urge to dominate and control everything that**
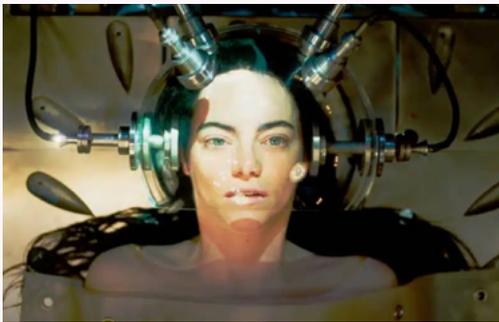
Image 10: Bella Baxter, from Poor Things

is seen as the other. More than 80 years later, letters and statements from industry tech bros have been recurrently alarming about a supposed existential risk of I.A. "Will A.I. destroy humanity?" has been the underlying question proposed by them. These discourses focused on the **risk of extinction from AI[27] don't look any**

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25   Manuela Cantuaria. "Virei uma espécie de ímã para a tortuosa pergunta sobre 'Pobres Criaturas'", Folha de São Paulo, 12.02.2024. Available at: https://www1.folha.uol.com.br/colunas/manuela-cantuaria/2024/02/virei-uma-especie-de-ima-para-a-tortuosa-pergunta-sobre-pobres-criaturas.shtml

26   Instagram @VulneráveisVenceremos, 13.03.2024, https://www.instagram.com/reel/C4dV1MtLcvP/?igsh=cGFxZzJnYmpseGU=

27   Statement on AI Risk https://www.safe.ai/statement-on-ai-risk#open-letter

different from what was imagined and depicted in sci-fi films and magazines be-fore AI even existed… **Despite the current and present social and environmental harms and risks of implementing these technologies today,[28] they prefer to defer the problem to the future, replicating colonial sci-fi imaginaries and narratives, where, in one hand, autonomous technologies run out of control and unleash its destructive potential on humanity, leading us to wait for a hero in a journey to save us** from this mysterious otherness created by man, and, **in the other, tech-nology can also solve everything, including enable the most innovative and bold humans to colonize other planets, therefore, continue to nurture the discoverer, missionary and anthropologist fantasies.** Both approaches have been leading us to understand the **term "artificial inteligence" under tech imaginaries that are not only colonial, but also patriarchal by design.**

Image 8: Elon Musk posing as CEO of SpaceX, a spacecraft manufacturer and a cover of Astounding Science Fiction from 1941

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28   Open letter to News Media and Policy Makers from Tech Experts from the Glo-bal Majority in response to the Statement on AI Risk: https://www.freepress.net/sites/default/files/2023-05/global_coalition_open_letter_to_news_me-dia_and_policymakers.pdf

Technologies of War and Destruction

The development of computer technologies has been intertwined with military destructive power. As Jack Halberstam states in the article *Postmodern Feminism in the Age of the Intelligent Machine,* **"computer technology is in many ways the progeny of war in the modern age. The fear generated by computer intelligence, indeed, owes much to this association of the computer with highly sophisticated weaponry**."[29] **That intertwinement is also easily perceived when we look at the biography of those who became known as references to set the ground on AI both in science and science fiction.**

A first exploration of the life stories of some names that make it to the history of AI easily connect them to the Second World War and the Cold War. Allan Turing worked for the British government as a crypto-analyst to crack encrypted communications from the nazi. Asimov, who was a biochemist, while writing his science fiction stories, also worked as a civilian chemist for the US Navy during World War II. In the Cold War period, he was approached by the Defense Advanced Research Projects Agency (DARPA) , the research and development agency from the United States Department of Defense responsible for deploying emerging technologies for military use. Asimov contributed with that agency at least with the paper "On Creativity"[30] focused on bringing creativity to government-based science projects, and by working on a missile protection project from DARPA.[31]

Turing did not have such continuity, before publishing the historical article *Computer Machinery and Intelligence,* during the 40's he helped to develop the idea of using

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29   Judith Halberstam "Postmodern Feminism in the Age of the Intelligent Machine", Feminist Studies, Vol 17 No 3, Autumn, 1991: 444.

30   Isaac Asimov, on Creativity, 20.10.2014. Available at: https://www.technologyreview.com/2014/10/20/169899/isaac-asimov-asks-how-do-people-get-new-ideas

31   James Dean, "The write stuff: Asimov's secret Cold War mission", The Times 27.10.2014. Available at: https://www.thetimes.co.uk/article/the-write-stuff-asimovs-secret-cold-war-mission-jc8k5w9pb7b

the computer's own memory to hold both the program and data, which gave him access to the earliest stored-program computers, the Manchester computers. But in 1952 he was **prosecuted for homosexual acts and accepted chemical castration** as alternative to imprisonment. As Halberstam says, **"The machine Other, like the sexual Other within a system of gender inequality, is contained even as it participates in the power dynamic."**[32] In 1954 **Turing was found dead by biting an apple poisoned with cyanide.** This story is surrounded by mystery, it remains unclear if it was an accident, a suicide, a cover up for burning files. If willful, was Turing performing a fatal version of Snow white, or a tech version of Eve, choosing to bite the forbidden fruit, even if the consequence was being through out of paradise? Some even consider that this tragic end inspired the logo of the Big Tech, Apple. All the possible versions show us an **environment of technologies of war and destruction where there is no room for "threatening" the patriarchal social order.**

"The fear of artificial intelligence, like the fear of homosexuals infiltrating the secret service, was transformed into a paranoid terror of femininity. Similarly, the machine itself was seen to threaten the hegemony of white male authority because it could as easily be used against a government as for it; autonomy was indeed its terrifying potential. The same argument that propelled a witch-hunt for possible homosexual traitors in the British government in the 1950s gendered the machine as female and attempted to convert threat into seduction. Turing now became the object of scrutiny of the very security system he had helped to create", says Judith Halberstam.[33]

A few years after the suicide of Turing, the **workshop Dartmouth Summer Research Project on Artificial Intelligence, held in 1956 at New Hampshire, is credited for introducing the term "artificial inteligence".** The proposal[34] of the meeting was to

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32   Jack Halberstam, Ibid: 444.

33   Idem: 444

34   J. McCarthy, M. L. Minsky, N. Rochester, C. E. Shannon, "A proposal for the Dartmouth Summer Research project on Artificial Intelligence" 31.08.1955. Available at: https://raysolomonoff.com/dartmouth/boxa/dart564props.pdf

discuss "computers, natural language processing, neural networks, theory of computation, abstraction and creativity". The meeting was **attended by 20 male scientists and in the same year, as a result, AI started to be founded as an academic discipline and DARPA and other government agencies started to pour money into the field.**

Interesting to note that, also from the **1940 onwards, technology development was influencing agriculture as well**. In the path to the disastrous **"Green Revolution", machinery and chemicals like pesticides and fertilizers started to be deployed with the purpose of boosting productivity, towards food self-sufficient and stemming any appeal of Communism.** Mexico was the playingfield of US scientists and politicians and became the show case for extending that tech revolution focused on cultivating the land to other countries. A few years later up to now, the result was several damages to local ecology, contamination of waterways, and health problems of farmers. The "Green Revolution" is also a major contributor to greenhouse gas emissions. "Industry had declared war on the parts of the ecosystem - the leafy plants and the broad-leaved trees, the beings that chew, scavenge, infest - seen as competitors and parasites of commercial crops, but were actually necessary to heal the earth", relembra Suzanne Simard.[35] Currently, many of the narratives for deploying AI in agriculture can be seen as the next technological iteration of the Green revolution. **Technologies of War and Technologies of Destruction of humans and the Earth have emerged from the notion of surveillance, control, progress and productivity, coining the logic of technosolutionism.** Likewise, many AI projects also use the same problematic notion of "green" as in the "Green Revolution", now to "solve" climate change. As Vandana Shiva wisely poses: "**In the dominant paradigm, technology is seen as being above society both in its structure and its evolution, in its offering technological fixes, and in its technological determinism.**

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35   Our Free Translation by ourselves from the edition in Portuguese: "A industria havia declarado guerra às partes do ecosistema - as plantas folhosas e as árvores latifoliadas, os seres que mastigam, catam, infestam - vistas como concorrentes e parasitas dos cultivos comerciais, mas que eram necessárias para curar a terra". Suzanne Simard, *A ÁRVORE-MÃE Em busca da sabedoria da floresta*, trad. Laura Teixeira Motta, Rio de Janeiro: Jorge Zahar Editor, 2022: 14.

It is seen as a source of solution to problems that lie in society, and is rarely perceived as a source of new social problems. Its course is viewed as being self-determined. In periods of rapid technological transformation, it eis assumed that society and people must adjust to that change, instead of technological change adjusting to the social values of equity, sustainability and participation."[36]

Can we change the course of the dominant paradigm? Can we bring back society above technology and see it as tools, not solutions? Can we recover what is left behind when we use the term "artificial intelligence" and inspired by these visions, center them and foster other imaginaries? This is the exercise proposed by this paper.

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36   Vandana Shiva, "The seed and the spinning Wheel: The Political Ecology of Technological Change". In *The Violence of the Green Revolution: Third World Agriculture, Ecology, and Politics*, 231–64. Lexington: University Press of Kentucky, 2016.

2. What is left behind when we use the term artificial intelligence?

The world is beautiful,
but has a disease called man.
F. Nietzsche

La Tierra es un lugar hermoso,
pero tiene una enfermedad llamada hombre.
F. Nietzsche

The constitutive outside

The idea of "constitutive outside" considers that the creation of a particular field always implies tracing a line between what is different, what is distinct and separated from that field. In general, this differentiation operates based on hierarchical relationships, grounded in the history of western logic of separate things in binarisms, such as: white-black, man-woman, intelligent-stupid, civilized-barbaric, heterosexual-homosexual, among many other possibilities.

Chantal Mouffe affirms that all identity is relational, meaning that it is in the relation of oneself with a different other that our particularity is set. In this approach, difference is a condition for anything to exist, and this perception of the "other" constitutes its "outside"[37]. According to Mouffe, this "other" can be considered friend or enemy, and in the latter case it is because it is configured as a threat, something that puts one's own identity or existence at risk. For example, normative, heterosexual identities, which carry with them structures such as the nuclear family, are threatened by other identities

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37   Chantal Mouffe, "Por una política de identidad democrática", Globlalización y diferenciación cultural, Macba-CCCB, 20.03.1999. Available at: https://www.macba.cat/antagonismos/castellano/09_04.html.

Image 9: The bus of the transphobic organization "Hazte oir".

that are outside their norm. That was the case of the bus against gender ideology[38] that toured several cities in Europe and Latin America in recent years, promoting the dangerous lgbtphobic notion that transsexuality was a threat to gender binarism.

This recent fact has many previous antecedents. One of them can be seen in the times of the conquest, about 500 years ago, through an image by Theodor de Bry. It portrays the moment in which Vasco Núñez de Balboa, in the 16th century, sends the dogs to wolf down the so called "sodomites".

How the artist occupies the space in the engraving already expresses a division: indigenous people coexist in the lower half of the engraving with animals, while in the upper half are the white settlers. A division is also expressed on how bodies are represented, settlers are dressed and armed, while the

Image 10: Engraving Theodor de Bry (1475-1571).

indigenous lie half-naked and in a kind of symbiosis with the dogs, and therefore, animalized. A similar principle and distribution of the space of the illustration can ....

38   They did many tours in different territories. Here is an example from the Chilean press about its passage through Chile: https://www.emol.com/noticias/Tendencias/2017/07/06/865742/Llegada-de-bus-transfobico-a-Chile-causa-polemica-lanzan-campana-para-impedir-su-circulacion.html

be seen in Image 3 from the previous chapter analyzing science fiction. Therefore, almost 500 years later, the same vision and separation remained
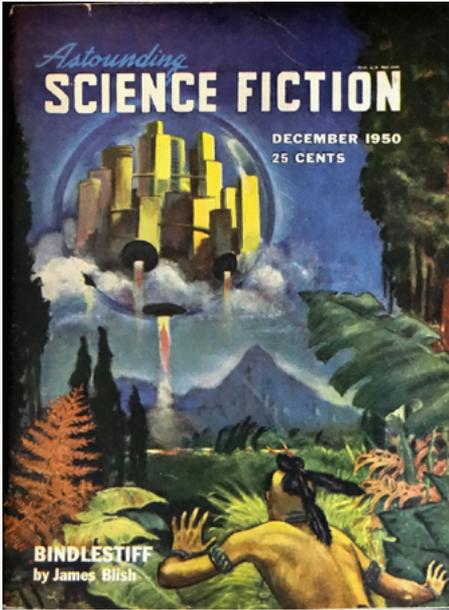
Image 11: Cover from magazine Astounding Science Fiction, 1950

We consider Theodor de Bry's engraving as an early example of the way in which the logics of the "constitutive outside" operate, establishing differences and hierarchies that are prolonged in time and history. In that sense, indigenous peoples in the colonies were indispensable in the "production" of European subjectivity, for the narratives about an existence as "developed", "powerful" and, in short, superior in contrast to the "savages of the new world". That is to say, we could affirm that the European identity has depended on positioning the other in a subaltern condition.

The tool of the "constitutive exterior" serves us to understand a non-essentialist relational dimension of things. If applied to the idea of Artificial Intelligence, we can see that AI may not be something concrete in itself, but is embedded in a relational framework. AI requires a "dumb", "stupid" or non-intelligent otherness to signify itself as intelligent. An idea aligned with the imaginaries of AI that we have mapped in Western science fiction in the previous chapter, an AI that is considered intelligent if it can deceive a human. For the notion of AI to have meaning, its concept is placed within an ecosystem in which a series of binarisms, traceable in the history of Western culture, are negotiated.

In order to give continuity to this idea of the constitutive exterior, and determine which values, ethics, ways of doing and policies remain outside the notions contemplated by the contemporary idea of AI, we have been developing this chart:

constituitive exterior

Outside the blob: Natural ingeniousness · Emotions · space for doubts · Spirituality · Intimacy · Subjectivity · Multiplicity · Intuition · Complexity · Organic · situated · Generous Skepticism · Gender and Sex Dissidence · Short-lived · Non-binary · Freedom · Diversity · Chaos · Regeneration · surprise · symbiosis · fleeting · Wilderness · slow · Raw · Non-capitalist · Ancient Knowledge · Collectivity · Non-linear time · Non separation of human and nature · Elasticity of thought

Inside the blob — ARTIFICIAL INTELLIGENCE: Promises "solutions" · Mathematics · Objectivity · Isolates problems · Fascination/Enchantment · Mechanic · Computation · Big data · Universalizing · Heterocisnormativity · Binary · Stigmatizing · Surveillance/Control · Automation · Prediction/Pattern · Dependent on mining · Speed · Efficiency · Present itself as bodyless and wasteless · Intensive water and energy consumption · Facilitates work/Replaces humans? · Progress and Future synonym · Human-centered · Linear vision of time · Relies on precarious human labor

Diagram developed by the authors with inputs from interviews and other conversations

We can see that a lot of values, principles and world views that are important to feminists are left outside the mainstream notion of AI. Next we will try to trace some aspects of feminist[39] theories and practices that are being left out of the concept of AI. But first, as we embrace a plural concept of feminism, we will locate the feminisms that we relate the most and are interested in having as framing references.

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39   It is important to clarify at this point that we conceive of feminisms in plural, as a series of diverse expressions within a wide range of politics. Examples of these proposals can be read in IIker Zirion y Leire Idarraga, «Los feminismos africanos. Las mujeres africanas "en sus propios términos"», *Relaciones Internacionales* 27 (2015): 35-54.; Miriam Solá y Elena Urko, eds., *Transfeminismos. Epistemes, fricciones y flujos*, Tafalla: Txalaparta, 2013. We will further develop this idea throughout the section.

We have chosen these feminisms and not others due to multiple factors. Firstly, we are from Latin America/Abya Yala, in these territories it is complicated to accept or submit to the idea of an universal (and universalizing) subject that the Western feminism seeks to apply to the totality of the female subjects (understood as a homogeneous subject). It is this territorialization that makes us center decolonial theories, ecofeminist and anti-extractive positions in our work, as it is our territories that are the most affected by reiterative practices of colonization and the politics of extractivism of our bodies and territories. Our bodies are also seen as battlefields, as queer activists, we are sexually dissidents from the heteronormative order, therefore, we are also closely related to queer, lesbian and transfeminisms. Lastly, our work and trajectory in technology also make us embrace critical positions towards capitalist models for tech development, as they are the same affecting our territories with extractive practices and promoting patriarchal technological imaginaries. The following are very concise summaries of what we mean by the feminisms and decolonial theories we are naming as references to our analysis.

Ecofeminism and anti extractivist feminism

Ecofeminism is an activism and a school of thought that explores the relationship between ecology and feminisms.[40] It considers that the environmental crisis is related to the crisis of care and that we need a systemic change towards a more equitable world. Much of ecofeminism seeks to destabilize and deconstruct the binary and hierarchical division between nature and culture, human and machine, man and woman, among others. Additionally, to address the continuous extractivist offensive, there are many ecofeminists, especially in Latin America/Abya Yala, who are fighting to defend territories against large corporations.

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40   Yayo Herrero, «Apuntes introductorios sobre el Ecofeminismo», *Boletín de recursos de información, Centro de Documentación Hegoa* 43 (junio de 2015): 1-12; Andrea Díaz Estévez, «Ecofeminismo: poniendo el cuidado en el centro», *Ene, revista de enfermería* 13 (4) (diciembre de 2019): 1-18; Vandana Shiva, *Los monocultivos de la mente. Perspectivas sobre la biodiversidad y la biotecnología*, trad. Ana Elena Guyer. Monterrey: Fineo, 2008; Mina Lorena Navarro Trujillo, «Mujeres en defensa de la vida contra la violencia extractivista en México», *Política y Cultura* 51 (2019): 11-29.

Black feminisms and other decolonial and indigenous theories

Black feminisms have historically fought to destabilize the hegemonic female subject of Western feminism, which, as mentioned above, is typically white. In this sense, black feminists have strongly advocated for an intersectional perspective that overlaps oppressions, complexifying and broadening the possible relations that affect us. In that sense, we are influenced by the proposals of black feminists from the african diaspora in the United States[41] and Brazil, but also from thinkers from the African continent who have been published in English.[42] Likewise, many indigenous and Latin American feminists have promoted decolonial thoughts, which also strongly opposes the consideration of the white female subject as an enclave of attention and political activation. Commonly, these schools of thought also position the extension of colonial relations and predatory extractivism, as well as land rights and a demand from a shift from the Eurocentric logic of viewing the world in the center of their political analysis.[43]

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41   Combahee River Collective, «Un manifiesto feminista Negro», en Lucas R. Platero, ed. *Intersecciones: cuerpos y sexualidades en la encrucijada.* Barcelona: Bellaterra, 2012: 75-86; Patricia Hill Collins y Sirma Bilge, *Interseccionalidad*, trad. Roc Filella. Madrid: Ediciones Morata, 2019/2016; Kimberlé Williams Crenshaw, «Cartografiando los márgenes: Interseccionalidad, políticas identitarias, y violencia contra las mujeres de color», en Platero, Lucas R., ed. *Intersecciones: cuerpos y sexualidades en la encrucijada.* Barcelona: Bellaterra, 2012: 87-122.

42   Oyèrónké Oyěwùmí, *La invención de las mujeres. Una perspectiva africana sobre los discursos occidentales del género*, trad. Alejandra Montelongo. Bogotá: Editorial en la frontera, 2017/1997; Esther (Mayoko) Ortega, «Las negras siempre fuimos queer», en Vila, Fefa, y Javier Sáez, eds. *El libro de buen Vmor.* Madrid: Ayuntamiento de Madrid, 2020: 222-29.

43   Yuderkys Espinosa, Diana Gómez Correa, y Karina Ochoa Muñoz, eds., *Tejiendo de otro modo: Feminismo, epistemología y apuestas descoloniales en Abya Yala.* Popayán: Universidad del Cauca, 2014; Ochy Curiel, «CRÍTICA PÓS-COLONIAL A PARTIR DAS PRÁTICAS POLÍTICAS DO FEMINISMO ANTIRRACISTA», trad. Lídia Maria de Abreu Generoso, *RTH. Revista de Teoria da História. Universidade Federal de Goiás* Volume 22, Número 02 (Dezembro de 2019/2017): 231-45; Rubén de J. Solís Mecalco, «Decolonizando las sexualidades Mayas del sureste mexicano», *Periphere* 157/158 (2020): 1-23; Marta Cabrera y Liliana Vargas-Monroy, «Transfeminismo, decolonialidad y el asunto del conocimiento: inflexiones de los feminismos disidentes contemporáneos», *Universitas humanística* 78 (78) (2014).

Cyberfeminism and transhack feminism

Influenced by hacker culture and transfeminism, the feminisms that address technology as part of their political agendas, generally speaking, have initially focused on gender inequality in access to tech, technology enabled gender-based violence and digital security, gender-based surveillance and censorship. Many initiatives also emerged focused on building autonomous and feminist spaces for learning exchanges and appropriation of tools.[44] More recently, there has been significant and very deep work focused on understanding and addressing the relations between our bodies and technologies, exploring the geopolitical dimensions of tech development and seeking social transformation through the pursuit of alternative imaginaries and forms of technology. Cyberfeminists in latin america have been particularly prominent in the last decade, forming creative and inspiring networks.

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44   Irene Soria-Guzmán, «Mujeres hacker, saber-hacer y código abierto: tejiendo el sueño hackerfeminista», *LiminaR Estudios sociales y humanísticos* 19 (1) (2020): 57-74; Lucía Egaña, «Tecnofeminismo, apuntes para una tecnología transfeminista (versión 0.3)», en Miriam Solá y Elena Urko, eds. *Transfeminismos. Epistemes, fricciones y flujos.* Tafalla: Txalaparta, 2013: 313-22; Klau Kinki, «Ofensiva transhackfeminista, your machine is a battleground», en Miriam Solá y Elena Urko, eds. *Transfeminismos. Epistemes, fricciones y flujos.* Tafalla: Txalaparta, 2013: 305-12, among others.

Queer and transfeminism

Just as gender binarism is based on the existence of only two possibilities, we advocate here for a feminism that resists operating from a universal subject (as the white woman that has been subject and object of many feminist proposals) and that instead seeks a range of intermediate options or goes beyond the male-female binary. Here we find the trans,[45] queer,[46] and lesbians[47] engaged in political work that aims to destabilize the notion of a singular subject of feminist, that would be the hegemonic hetero cis woman, who is usually white.

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45   Susan Stryker, *Historia de lo trans: las raíces de la revolución de hoy.* Madrid: Continta Me Tienes, 2017; Cuerpos Distintos, *Ocho años de activismo transfeminista en Ecuador.* Quito: Comisión de Transición Consejo Nacional de las Mujeres y la Igualdad de Género, 2010; Anne Fausto-Sterling, «The five sexes», *The sciences* 33, n.º 2 (1993): 20-24; Emi Koyama, «The Transfeminist Manifesto» in Dicker, R. y Piepmeier, A. eds.. Catching A Wave: Reclaiming Feminism for the Twenty-Firste Century. Boston: Northeastern University Press, 2001, available at: http://eminism.org/readings/pdf-rdg/tfmanifesto.pdf; Sylvia Rivera y Marsha P. Johnson, «S.T.A.R.» Acción Travesti Callejera Revolucionaria. Supervivencia, revuelta y lucha trans antagonista., trad. Peligrosidad Social. España: Editorial Imperdible, 2015; Julia Serano, *Whipping Girl: A Transsexual Woman on Sexism and the Scapegoating of Femininity.* Emeryville: Seal Press, 2007; among others.

46   Fernando Davis y Miguel A. López, "Micropolíticas Cuir: Transmariconizando el Sur", *Ramona, revista de artes visuales* 99 (2010): 8-9; valeria flores, *Interruqciones. Ensayos de poética activista, escritura, política, pedagogía.* Neuquén: La Mondonga Dark, 2013; Érica Sarmet, «Pós-pornô, dissidência sexual en la situación cuir latino-americana: pontos de partida para o debate», *Revista Periódicus* 1, n.º 1 (2014): 258–276; Diego Falconí, "De lo queer/cuir/cuy(r) en América Latina. Accidentes y malos entendidos en la narrativa de Ena Lucía Portela", *Mitologías hoy: Revista de pensamiento, crítica y estudios literarios latinoamericanos* 10 (2014): 95-113; among others.

47   Monique Wittig, *El pensamiento heterosexual y otros ensayos*, trad. Javier Sáez y Paco Vidarte, Madrid: Egales, 2006/1992; valeria flores, "Con luz propia", en *Mesa redonda: Masculinidades: (re) definiciones y apuestas entre la academia y el activismo*, XIV Jornadas Nacionales de Historia de las Mujeres y el IX Congreso Iberoamericano de Estudios de Género, Universidad Nacional de Mar del Plata, Argentina, 2019: 1-10. Available at: http://www.bibliotecafragmentada.org/wp-content/uploads/2019/08/Con-luz-propia_val-flores.pdf; Carmen Romero Bachiller y Lucas (Raquel) Platero, "Diálogos interseccionales sobre lo butch/femme, las diásporas queer y lo trans", en Platero, Lucas R., ed. *Intersecciones: cuerpos y sexualidades en la encrucijada.* Barcelona: Bellaterra, 2012, 159-98; among others.

How the main characteristic of AI clashes with feminisms and decolonial approaches to life?

The platform notmy.ai[48] features an investigation about possible harms that could be caused by AI systems deployed by the public sector in Latin America, particularly considering in the sectors of Education, Judicial System, Policing, Public Health and distribution of Social Benefits, which were flagged as trending areas after a mapping exercise of projects being piloted in the region. Posing the question: "Why AI is a feminist issue?" since 2020, through a series of workshops[49] grounded in case-based analysis to quick start debates about the impact of these AI systems in feminist agendas, Joana Varon and Paz Peña developed this framework about possible harms causes by algorithmic decision making systems in the public sector:
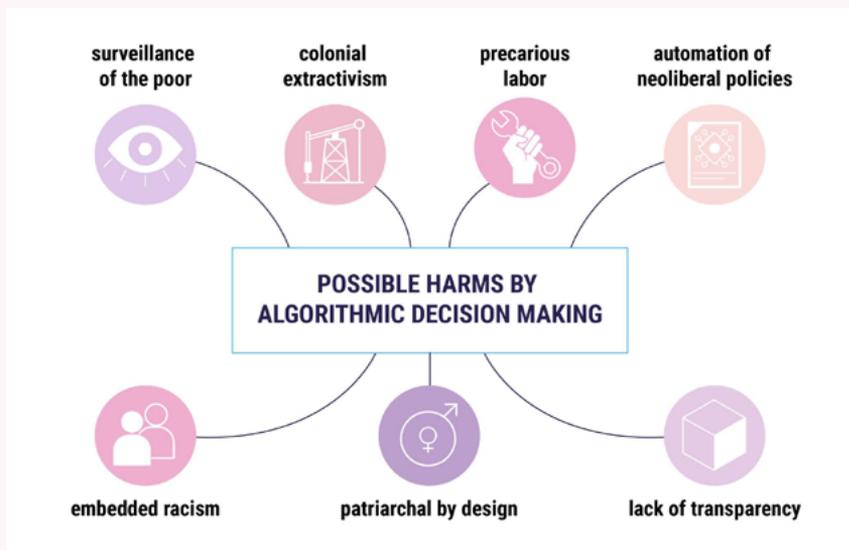
Oppressive AI framework developed by Joana Varon and Paz Peña for the project notmy.ai

Our diagram of the Constitutive Outside of AI could be seen as an extension of that exercise. It also departs from feminist theories but considers not only the harms of specific projects regarding the deployment of public policies, as it focuses on

48   https://notmy.ai/mapping-of-projects/

49   Materials for helding workshops around the question: Why AI is a feminist is-sue? https://notmy.ai/pt/recursos

what constitutes the idea of AI, therefore it also addresses the epistemological, narrative, and imaginary layers that constitute the notion of AI and how it affects directions of technological development and conceptions of life and of the future. Nevertheless, these two analytical diagrams overlap, so we suggest consultations with the platform that hosts that resource as it explains further every point of the framework, and also brings a bibliographic review of researchers working on critical approaches to technology. Analysis that complements our narrative.

Looking at the diagram of the Constitutive Outside, highlighting values, concepts, and notions of life considered important in the feminist theories and practices we are positioned at, and not only in tech development, but also in this moment of climate emergency, we can say that the current conception of AI is embedded by the following characteristics:

Extractivist technologies that cause socio-environmental harm

In the book Atlas of AI, researcher Kate Crawford considers the planetary infrastructure of AI as an extractive industry. She says that "AI is born from salt lakes in Bolivia and mines in Congo[...] rare earth minerals, water, coal and oil: the tech sector carves out the earth to fuel its highly energy-intensive infrastructure. [...] The opacity of the larger supply chain for computation in general, and AI in particular, is part of a long-established business model of extracting value from the commons and avoiding restitution for the lasting damage."[50]

This extractive logic implies that companies from certain territories exploit and process the so called "raw materials", while others merely serve as lands for extraction. From mining to oil extraction, these activities not only affect the territories that have these resources, but also impact the lives of people who live in those lands, either by exposing them to toxic substances resulting from mining, affecting their traditional ways of subsistence, or by subjecting them to precarious work condi-

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50   Kate Crawford, *Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*, New Haven: Yale University Press, 2021: 217-218.

tions that these extractivist industries entail, invisible work normally concentrated in what is called "developing" or "third world countries". This aspect contradicts a widespread narrative that sustains that technology is supposedly meant to substitute hard and precarious labor, a narrative that not only is not true but also invisibilizes the work of certain humans (commonly those living in the Global Majority).

Furthermore, all the processes described above are characterized by a large expenditure of fossil fuels. The carbon emissions produced by the transportation of materials used in the production of electronic goods are expressive. First, we need to consider the transportation of all the basic minerals used in the electronic industry, which are normally extracted in Africa and South America, and head to the manufacturers in China and other countries in Asia. Then all these goods, now in the format of electronic devices, from computers to all the components needed to host a server, need to be shipped to the countries where AI services are being developed, normally in the Global North. Which then, due to programmed obsolescence, will also quickly turn into toxic electronic waste, once again shipped to countries in the Global Majority.[51] All this happens in complete contradiction with the narrative that led to the massive amount of extractivism of lithium in the first place: the promise of being able to store energy in powerful batteries and dispense fossil fuel.

Besides transportation, a lot of the carbon emissions of this industry are also related to the destruction of certain ecosystems. Environments that were actually also capable of filtering or storing carbon. This is the case of peatlands, wetlands capable of trapping carbon in their interior up to 5 times more efficiently than a forest. Unfortunately, the extractive logic has also begun to destroy peatlands and with it their capacity to clean our planet.

Last but not least, these models of technological production are also accountable

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51   These patherns of digital colonialism can be easily visualized in the map from the platform http://cartografiasdainternet.org, which has the goal to materialize the narrative of "the cloud" to unveil geopolitical dimensions of our digital technologies.

for an enormous expenditure of water and energy. A study about the environmental footprint of data centers in the United States, where several data centers are located, pointed out that a large data center can spend between 1 million and 5 million gallons of water a day, the equivalent of a city of 10,000 to 50,000 people.[52] The reflection on Digital Communality, by Sursiendo, stressed that: "We depend on excessive use of energy, including a huge amount of water to cool down data centers. Greenhouse gas emissions, land dispossession and electronic waste are some of the outcomes. The consequences of the current technological development model are still being studied and understood since the "backstage" is deliberately opaque. However, we know that excessive competition, social polarization, attention deficit and physical and psychological conditions are far from being healthy for society. These assertions remind us that the internet is one of the areas in which we need to question, unlearn, claim our rights and revalue care."[53]

Indeed, if we continue to develop tech under these logics, hardly any technology used to access available AI models (chatGPT, face recognition, etc etc) will be able to operate according to the ideology of decoloniality and ecofeminism.

Technologies developed through universalizing profiles

Our analysis of AI encourages a situated[54] approach, somehow connected with the territories we inhabit and our experiences. We believe it is an important aspect to counteract the universalizing notion that is guiding mainstream tech development. The one that considers that AI (or any other technology) can be designed in one place

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52   Md Abu Bakar Siddik et al. "The environmental footprint of data centers in the United States". IOP Publishing Ltd, 2021. Available at: https://iopscience.iop.org/article/10.1088/1748-9326/abfba1

53   elyaneth mtz y la_jes, *Comunalidad Digital: una aproximación desde la ética permacultural*, Chiapas: Sursiendo, 2022: 18-19.

54   Donna Haraway, «Conocimientos situados: la cuestión científica en el feminismo y el privilegio de la perspectiva parcial», en Donna Haraway, *Ciencia, cyborgs y mujeres: la reinvención de la naturaleza.* Traducido por Manuel Talens, Madrid: Cátedra, 1995/1995: 313-46.

and then scale up and be extensively applied everywhere. Technologies developed by specific bodies and in specific spaces, even if the intention is different, very frequently are technical developments that respond specifically to their bodies and conditions.[55]

Technologies have demonstrably presented harmful biases in their operability when they are conceived, developed, and produced just by a homogenous group of people, very frequently by white, cisgender and heterosexual male from the Global North. That goes from seatbelts and airbag technologies to facial recognition and other machine learning systems developed to classify people. For instance, until recently, tests of car accidents were conducted only with male dummies, as a result, for more or less 20 years, women and children were at a much higher risk for injury or death in accidents, because. When female dummies started to be used by law, tests have shown that "not only are women smaller, placing their chin where an airbag might hit them but also their necks are less muscular, potentially leading to spinal trauma and brain injuries as a result of sudden deployment of an airbag."[56] When that data was released, the director of the Center for Injury Prevention Policy & Practice at San Diego State University, David Lawrence, replied: "Manufacturers and designers used to be all men. It didn't occur to them they should be designing for people unlike themselves".[57]

The same works for facial recognition. Researchers Joy Buolamwini, from MIT, and Timnit Gebru have already demonstrated[58] that facial recognition technologies from

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55   This can be seen in the project: http://gendershades.org

56   Lisa Nietner "Tough Facts: Why We Need Diversity in Design and Engineering", Stemgem, 26.11.2017. Available at: https://www.stemgem.com/blog/tough-facts-why-we-need-diversity-in-design-and-engineering

57   ABC News, "Female Crash Dummies Injured More: What Car Should Women Buy?", 29.03.2012. Available at: https://abcnews.go.com/Business/female-crash-dummies-injured/story?id=16004267

58   Larry Hardesty. "Study finds gender and skin-type bias in commercial artificial-intelligence systems", MIT News Office, 11.02.2018. Available at: https://news.mit.edu/2018/study-finds-gender-skin-type-bias-artificial-intelligence-systems-0212

large ICT companies, such as IBM, Microsoft, and Amazon, are more likely to fail to recognize faces when they are from black women. Same happens with transgender faces.[59] Once again, just like the airbag, these systems have been universalized based on the face of a white cis male.

In non-white feminisms, specifically feminisms developed by thinkers from the Global Majority, as well as black, decolonial and indigenous thought, it is common to see a direct critique questioning the supposed universality of things. Instead, they promote situated knowledge, which is related to multiple and intersecting elements of our lived experiences.[60] The fact that current mainstream technologies are mostly developed by cis hetero ableist men (or by companies led by men), and going even further, universalizing world views from the perspective of the Global North, means that the particularities and ways of life of the Global Majority are not reflected in the usability of these technologies. Universalization of "solutions" conceived in isolation from the problem they are intended to solve can only result in stigmatization and automated oppression.

Disembodied, but still cis-heterocentered technologies

When we speak of disembodied technologies, we refer to the imaginaries that have been behind the narrative of AI and other technologies. There is a sense of magic that detaches them from materiality. "The cloud", "artificial intelligence", just as we mentioned in the session about extractivism and socio-environmental harm, are narratives and images that lack territoriality, but also lack to acknowledge different bodies (and the power relations among them) that are needed for these technologies to run. As if they were self-sufficient and did not seem to require care or

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59   Mariah Rafaela Silva and Joana Varon. "Threats in the usage of facial recognition technologies for authenticating transgender identities". Privacy International, 31.03.2021. Available at: https://codingrights.org/en/project-item/threats-in-the-usage-of-facial-recognition-technologies-for-authenticating-transgender-identities/

60   Combahee River Collective Ibid; Hill Collins Ibid; Angela Davis, *Mujeres, raza y clase*, trad. Ana Varela Mateos, Madrid: Akal, 2005/1981.

attention. Besides being arrogant, this idea is false once it disconsiders hours of sometimes invisible and ghost work to maintain things running. A work that is kept hidden to both maintain the sense of magic and the precarity of the workforce (how would you value what you do not see as important?). How much time and who are spending hours taking care of the servers, running updates, doing the maintenance of submarine cables, whose writings are feeding large language models-based chatbot, so we can then ask chatGPT to compose lyrics for a reggaeton song?

Called the "Giant Brain", ENIAC was the first programmable, electronic computer in the USA. Completed in 1945, it was financed by the US Army to automate calculations during World War II, mostly ballistics computation and solving other questions towards the development of the hydrogen bomb. It was designed by J. Eckert and John Mauchly, but in order for it to work hundreds of women worked on the project as "human computers",[61] doing mechanical calculations needed for ENIAC to work. Six of them were actually programmers, with the task to study the machine's blueprints to determine how to manipulate its switches and cables. The huge computer, weighing around 27 tons, had cables that should be inserted and exchanged on 6,000 pins in order to perform the required calculations. Ultimately, we can say that these women were in the background taking care of the machine and its processes. But just as other care work, that function was invisibilized in history. Unlike today, where the job of programers can be perceived as a masculine work, it did originate as a feminized labor.[62]

The idea that tech does not require care has been unreal since its early days. But the imaginary and narratives of machines that seem to work on their own and even do not generate any type of waste remain. The idea that technologies are clean and self-sufficient. But cyberfeminist from Latin America, as well as Ecofeminists, both center care as one of the core elements to conceive tech and to interact with

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61   Jennifer S. Light. "When Computers Were Women", Technology and Culture. Vol. 40, No. 3. Jul., 1999: 455-483. Published by The Johns Hopkins University Press.

62   Idem: 455.

the environment, not only because it is a work historically feminized, and as such a depreciated activity, but also because it is indispensable for social justice.

Interesting to note that, while mainstream technologies are sold in a disembodied narrative, they actually also embody the cis-heteronormativity logic. As a system that organizes the world, cis-heteronormativity has been imposing on us an universal subject, whether male or female, which in some way has universal problems, a body with the same problems, difficulties and above all potencies. A body that doesn't take up much space, that doesn't let itself be seen, that is there just like everything else, a body that is the ideal of the western woman (or man), "this happy white woman that is put in front of our eyes, the one we should all make an effort to look like, but that apart from the fact that she seems to lose her mind for little, I have never met her anywhere. It is possible she doesn't even exist."[63] This idea has been deeply criticized by the queer and transfeminism, once the existence of a universal female (or male) subject is at the core of its concepts. Transfeminism and queer feminism are committed to a non-heterosexual, and non-binarized worldview and system. The body is a key space for these feminisms since it is where a series of situated and specific problematics are condensed. For this reason, feminists of color have placed so much emphasis on race (and racism) as an axis of oppression that it is essential to address and problematize from feminist perspectives.

Technologies sold as progress in a linear vision of time

Mainstream notions of technology development have been sustaining a linear and evolutionary narrative of time, based on the colonial idea of progress. Progress is a concept introduced in the early-19th century, a moment in history we have already depicted here while addressing Western sci-fi origins, it denotes a movement towards

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63   Our translation from the quote: "esta mujer blanca feliz que nos ponen delante de los ojos, esa a la que deberíamos hacer el esfuerzo de parecernos, a parte del hecho de que parece romperse la crisma por poca cosa, nunca me la he encontrado en ninguna parte. Es posible incluso que no exista". Virginie Despentes, *Teoría King Kong*, trad. Paul B. Preciado, Barcelona: Random House, 2018/2006: 11.

an improved state of human condition, often due to advancements in technology, science and social organization. An aftermath of the so-called Age of Enlightenment, or Age of Reason. French philosopher and mathematician, Auguste Comte, is one of the references who brought the notion of progress to social theories. He is known for formulating positivism doctrine, as an attempt to remedy social unrest that emerged in the French Revolution. For him the new social order emerging would be based on science, a particular kind of science, Western science. Positivism rejected other ways of knowing, intuition, senses, religious practices, and traditional knowledge were all rejected. His work influenced the path of Sociology, Psychology and other social sciences. John Stuart Mill, English politician and political economist, was heavily influenced by Comte while setting the grounds for classical liberalism. It is ase to see how this notion of progress anchored in valuing a particular science as a source of knowledge just became another tool for colonialism. Mill was also an employee of the East India Company, a English company that "seized control of large parts of the Indian subcontinent and colonized parts of Southeast Asia and Hong Kong"[64] becoming for a few years the largest company in the world, with an army that was even bigger than the British army. Just as we saw in the sci-fi illustrations, Mill once talking about the administration of EIC colonies argued:

> "To suppose that the same international customs, and the same rules of international morality, can be obtained between one civilized nation and another, and between civilized nations and barbarians, is a grave error.… To characterize any conduct whatsoever towards a barbarous people as a violation of the law of nations, only shows that he who so speaks has never considered the subject."[65]

That world view has prevailed. Guided by the narrative that there is one linear way to progress, those self-entitled as civilized and, later, as developed countries, draw themselves an open space to impose their way of living into other cultures. That

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64   More information at: https://en.wikipedia.org/wiki/East_India_Company

65   John Stuart Mill, *Dissertations and Discussions: Political, Philosophical, and Historical*, New York, 1874. Vol. 3: 252–253.

goes for the relationship among countries, but also inside countries. It is not minor that the current Brazilian flag, created after the country was proclaimed a republic in 1889, has the saying "order and progress". It was a motto inspired by positivism, which was literally taken by the military during the dictatorship to surveill and control urban areas (order) and to seize indigenous lands and ancestral ways of being in the attempt to construct the roda Transamazonica (progress).

Nowadays, shiny new devices that are constantly improving, looking better, smaller, faster, are the equivalent of progress, of modernity, of the future. Just like in the industrial revolution, their development is basically oriented towards automation in order to increase productivity. Ultimately, this vision of progress drains the energy of humans and the Earth. Our energy is finite, just as the Earth's capacity to regenerate from all the extractivism, pollution and waste that progress entails. As a result we have humans and the Earth burning out. But we continue. Now Artificial Intelligence is the new shiny device, the ultimate frontier of modernity. Everyone should jump in, learn, develop it, cause that is the path to progress.

This linear approach to time organizes all areas of life, including history and is highly reductionist, scaling down the multiplicity of alternatives to be on this planet. As Gavilán points out, "The linear thinking model is highly deterministic, as well as reductionist, since it breaks down the whole into small parts, reducing the interactions between them. It considers the whole as composed of independent parts."[66] That looks like pretty much the description of how to conceive a machine learning system or other AI systems. The complexity of a problem needs to be reduced for that intelligence to work. This fragmentation goes against any holistic and comprehensive approach to hard questions, eventually, making it simpler to ignore consequences of actions taken in one part of the whole ecosystem. For instance: how can we separate extractivism from the hegemonic technological industry? How can we disconsider the correlation among today's diagrams of submarine internet ca-

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66   Victor M. Gavilán Pinto, *El pensamiento en espiral. El paradigma de los pueblos Indígenas*, Santiago de Chile: Ñuke Mapuförlaget, 2011: 16.

bles and the colonial traffic routes for transporting enslaved people?[67] This is only possible because the focus is in a future in which somehow everything progresses to something better, even without being accountable to past and present actions, without noticing the bigger picture, without recognizing other paths.

These ways of conceiving reality are not tuned with assumptions of several indigenous cosmologies and decolonial feminist thinking, which proposes to acknowledge a conception of time in which the present, past and future interact and influence each other, not in a straight line, but in circles or spirals. Temporalities organized non-linearly,[68] that can repeat themselves again or "move backwards", as the Zapatistas suggest.

Mainstream technological imaginaries, and specifically those linked to AI, are part of the Western genealogy that organizes everything in a linear time and isolates, breaks down the whole into isolated parts. Hollywood has produced many examples of this: metallic images, mostly blue, with colored lights. Task-solving robots, spaceships, holograms, lightning and automatons that represent a future to come. An imaginary that somehow disagrees with ecofeminism since it is based on an over-industrialization as a sign of both progress and evolution.

The linear time is also opposed and contradictory to several Afrofuturists works, which sometimes are also inspired by black feminist theories, and seeks an more organic approach to science fiction, history and technologies in intersection with afro ancestrality, projecting a future that also refers to the past and, therefore, disorganized time. A good example is the work of Black Quantum Futurism collective, who seeks an "approach to living and experiencing reality by way of the manipulation of space-time in order to see into possible futures, and/or collapse space-ti-

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67   This idea has been taken up by the French Guyanese artist Tabita Rezaire in her video DEEP DOWN TIDAL, which can be consulted in the collection of the Musea M.A.M.I. at: https://museamami.org/trabalhos/deep-down-tidal/

68   Indigenous Action «Repensando el apocalipsis. Un manifiesto indígena antifuturista», en VVAA, *Futuro ancestral*, Valencia-Chiapas: Ediciones OnA, 2021: 25-43; Ailton Krenak, *Futuro ancestral*, Sao Paulo: Companhia da Letras, 2022.

me".[69] They say that their "vision and practice derives from quantum physics and Black/African cultural traditions of consciousness, time, and space."

Technologies for speed and efficiency

While there is no common agreement on the differences and particularities of the terms efficacy, efficiency, and effectiveness in their common use, it is possible to find nuances[70] that, whether in the field of health or in material production, are essentially related to notions from economics and finance.

Efficiency has to do with the ability to achieve more and better results with less investment, optimally achieving the maximum benefit with the minimal use of resources and the least possible expenditure. In technological terms, lower investment is often associated with evaluating economic costs in a delocalized manner, which frequently results in different forms of socio-environmantal harms, particularly in territories where people from the Global Majority inhabit, to benefit a few people who are profiting with such efficient investments.

Another interpretation would be considering maximum technological efficiency in terms of speed. For instance, thinking that the faster an AI solve a problem, the more efficient the technology is, without considering how many energy resources are involved in that operation. The "cost" of the operation is not being evaluated in a multifactorial way, nor considering the various materials involved. AI seeks speed and quickness in its execution, and it is precisely this that makes it competent and effective. However, it operates under capitalist and extractive criteria. When Donna Haraway asks, "With whose blood were my eyes created?"[71] she is inviting us to consider a deeper dimension of the materiality involved in the act of looking, an act

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69   Black Quantum Futurism at: https://www.blackquantumfuturism.com/about

70   Rosa María Lam Díaz y Porfirio Hernández Ramírez, «Los términos: eficiencia, eficacia y efectividad ¿son sinónimos en el área de la salud?», *Revista Cubana de hematología, Inmunología y Hemoterapia* 24 (2) (2008): 1-6.

71   Donna Haraway, *Ciencia, cyborgs y mujeres: la reinvención de la naturaleza*, trad. Manuel Talens, Madrid: Cátedra, 1995/1991: 330.

that might seem innocuous. Haraway is essentially asking how much blood had to be shed for me to be able to see something, an image, a scene, a machine. Many ecofeminists and thinkers from black and indigenous movements that inspire us frequently ask these kinds of questions, understanding that there is a long memory of violence and the exploitation of bodies-territories that has been essential for the existence of current machinic technologies. Does the planet allows us to maintain a model for tech development that follows the Silicon Valley motto: move fast and break things? That motto is even more intense in the context of AI development, where Big Tech companies are unfolding an AI arms race, a competition lead by fear and greed, that puts aside care and safety concerns.[72]

Several feminist perspectives propose a transformation of the socio-economicl model that is leading us towards the destruction of the planet. A vision aligned with indigenous movements who resist against the rapid planetary massacre and advocate for embracing the rhythms of nature, which are fundamentally our own.

Going even further, considering proliferation of studies that demonstrate the increase in the levels of anxiety and depression in society caused by the intensity and speed of information flow provided by new technologies, can we, as human beings, withstand further increases in such speed?

Open (for grabbing): technologies that expropriate knowledge

In late 2022, ChatGPT was released for public and in early 2023 it was already the fastest-growing consumer software application in history, with an estimate of 100 million monthly active users.[73] The chat bot's foundation model is GPT-n, an OpenAI

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72   Andrew R. Chow and Billy Perrigo. "The AI Arms Race Is Changing Everything". *Time.* 17.02.2023. Available at: https://time.com/6255952/ai-impact-chatgpt-microsoft-google

73   Krystal Hu, "ChatGPT sets record for fastest-growing user base - analyst note", *Reuters*, 02.02.2023. Available at: https://www.reuters.com/technology/chatgpt-sets-record-fastest-growing-user-base-analyst-note-2023-02-01

proprietary series of generative pre-trained transformer (GPT) models, trained on large internet datasets.

Traditionally, the term "open" was been used by open-source software and open science communities to indicate alternatives systems of research and development where knowledge is shared and developed in a collaborative and public manner. But in AI the term has been appropriated under different practices. In the study "Open (for Business): Big Tech, Concentrated Power, and the Political Economy of Open AI"[74], authors wisely expose that: "some companies have moved to embrace 'open' AI as a mechanism to entrench dominance, using the rhetoric of 'open' AI to expand market power while investing in 'open' AI efforts in ways that allow them to set standards of development while benefiting from the free labor of open source contributors."[75] The study particularly points out that while open AI systems could "offer intentional and extensive transparency, reusability, and extensibility – the resources needed to build AI from scratch, and to deploy large AI systems at scale, remain 'closed'—available only to those with significant (almost always corporate) resources."[76]

So, as capitalism does, the "open" terminology was capture from movements and instrumentalized for market purposes by large tech corporations that, in one hand, benefit from free labour, while in the other, steal content and credit from creators worldwide while using internet content that is available "in the open" to train their proprietary models. It is not a coincidence that soon after its public release, ChatGPT, and later on other generative AI models, have been target in lawsuits of copyright infringement.

Furthermore, a search result from ChatGPT and alike generative AI models erase the sources, the credit, the acknowledgement of all the ideas it has consumed to

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74   David Gray Widder, Sarah West and Meredith Whittaker, "Open (For Business): Big Tech, Concentrated Power, and the Political Economy of Open AI", SSRN, 17.08.2023. Available at: https://ssrn.com/abstract=4543807

75   Idem: 1.

76   Idem: 1.

produce the output. Consequences are severely harmful. On the one hand, if the source cannot be traced or contrasted, it is impossible to verify its veracity. On the other hand, it lends itself to the erasure of authorship, making invisible a series of agents that must be taken into account. Non-white feminisms have taught us the importance of the recognition of previous experiences and knowledge. This is how many black and indigenous feminists, for example, have pointed out the need to acknowledge our memories and ancestralities.

Technologies that invisibilize care labour

AI is not artificial. In order to any AI system to work, a lot of care labour is needed that is being both invisibilized and precarized.[77] While Big Tech CEOs and top engineers working on AI profit from the hype, thousands of data workers doing labeling, data annotation, content moderation and other tasks to databases are being hidden operating under precarious work conditions, very frequently located in countries outside the Global North.[78] Going even further, models are also being feed by "Zombi trainers"[79], meaning refugees, children, prisoners, and low wage workers that are doing data collection labour for these platforms without even consenting. There is no AI without a carefully curated database, but this important work is being invisibilized. Feminisms have a long history of politicizing and visibilizing care labour, women's productive and reproductive work, as well as the gender division of work and the gendered labour precarity. Feminist tech cannot disconsider this long trayectory of feminists thinkers exposing how care work have been systematically undervalued, while also being the central to the functioning of capitalism.[80]

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77   More about it can be seen at Data Workers Union website: https://dataworkers.org

78   As it can be seen in the reports from Data workers' Inquiry: https://data-workers.org/#Inquiries

79   Adrienne Williams, "Zombie Trainers and a New Era of Forced Labor", *Newsweek*, 03.05.2024. Available at: https://www.newsweek.com/zombie-trainers-new-era-forced-labor-opinion-1896624

80   To name a few, we have: Silvia Federici. Caliban and the Witch: Women, the Body and Primitive Accumulation. Autonomedia, 2004; Angela Davis. Women,

Technologies for surveillance and control

Increase in computational power has led to changes in our economic paradigm as it enabled the monetization of data obtained through constant monitoring of digital data flows, a trend that the researcher Shoshana Zuboff has labeled as Surveillance Capitalism.[81] As Nicole Shephard notes in her article Big Data and Sexual Surveillance:[82] "surveillance has historically functioned as an oppressive tool to control women's bodies and is closely related to colonial modes of managing populations." Indeed, women and LGBTTQA population have been historically under scrutiny of conservative eyes afraid of changes in the *status quo* of the ongoing patriarchal heteronormative power dynamics. Nevertheless, the massive capacity of data processing that we experience today brings a particular layer of complexity to this historical struggle. Now, "Big Data" feeds that old Big Brother, which means that the amount of information and level of control of women's and gender non-binary bodies and behaviour, through monitoring, categorization and even prediction also got bigger and potentially more harmful than ever before.

From the witch-hunting times to a world with high (misleading) hopes for artificial intelligence to solve human problems, gendered surveillance have been performed under excuses such as population control, public health, morality, normativity and even aesthetics, body shaming and marketing purposes. And while old surveillance tactics used to targeted suspects, emerging technologies not only allow for pervasive surveillance, but actually AI's high demand for data has surveillance as

Race & Class. New York: Random House, 1981; Nancy Fraser. Fortunes of feminism: from State-Managed Capitalism to neoliberal crisis, New York: Verso, 2013.

81   Shoshana Zuboff, Big Other: Surveillance Capitalism and the Prospects of an Information Civilization, *Journal of Information Technology* (2015) 30: 75–89. Available at: http://www.shoshanazuboff.com/new/recent-publications-and-interviews/big-other-surveillance-capitalism-and-the-prospects-of-an-information-civilization

82   Nicole Shephard, "Big data and sexual surveillance", *APC*, 09.12.2016. Available at: https://www.apc.org/en/pubs/big-data-and-sexual-surveillance

the requirement for its function. And the results are different, according to whose bodies are being targeted. For example, the research "Facial recognition in the public sector and trans identities: techno-politics of control, surveillance and threats to gender diversity in their intersectionality of race, class, and territory",[83] mapped harmful threats to transgender and non-binary people by the deployment of facial recognition technologies. Considering that these technologies are being developed and created in a context in which trans experiences very often are understood as threats, their deployment also is likely to result in trans people becoming subjected to embarrassing institutional constraints in order to maintain structures of surveillance and risk control.

Likewise, the platform notmy.ai maps[84] a series of AI systems being deployed by the public sector in Latin America that functioning under premises of gendered surveillance and control, also are likely to have biases that interfere with feminist agendas. That was the example of "Plataforma Tecnológica de Intervención Social" ("Technological Platform for Social Intervention").[85] This initiative was pushed by Microsoft in the Argentinian municipality of Salta under the excuse to predict teenage pregnancy through the collection of sensitive data from girls and female teenagers. The project was highly criticized not only for it's mistaken statistical approaches, but also for posing a huge risk to stigmatize poor women and children. Feminist technologies can not be based on surveillance and control.

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83   Mariah Rafaela Silva and Joana Varon, "Threats in the usage of facial recognition technologies for authenticating transgender identities", *Privacy International*, 31.03.2021. Available at: https://codingrights.org/en/project-item/threats-in-the-usage-of-facial-recognition-technologies-for-authenticating-transgender-identities

84   http://notmy.ai

85   A full analysis of this case and other is available at http://notmy.ai

Alternatives for resistance or alternatives for systemic change?

The above descriptions of the AI are just a few overarching pillars that building the structural unity of mainstream AI development. They leave out a series of important ethical, political and philosophical approaches to be considered while envisioning feminist technologies.

Many intelligences that emerge from deeper senses are being erased when the logic of problem-oriented mathematical thinking is mainstreamed as intelligence. Many kinds of intelligences are not included in the biased concept of "Artificial Intelligence". This model of intelligence makes invisible a series of proposals, practices, materialities, methodologies and actions that do not respond to its value system. In the Western episteme, reality has been constructed on the basis of hierarchical binarisms that are structured in a universal manner. The logic of colonization operates over and over again. This has generated ideas of purity and excludes anything that is mixed or the "contamination" between opposites. In this sense, many Latin American feminists have contributed to exploring the nuances and intersections, that which is neither pure nor clean (Gloria Anzaldúa[86], Ochy Curiel[87], Silvia Rivera Cusicanqui[88], among others), our proposal here is to explore the compost engineers as an alternative figuration to reposition other kinds of intelligences in the center of our technological development. The compost originated from waste to create life. The work of the compost engineers is to take to the garbage all these western-centered patriarchal imaginaries and practices that are leading AI development and let it compost. We will nourish it by the feminist values and views mapped here as ....

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86   Gloria Anzaldúa, *Borderlands/La Frontera. The New Mestiza*, San Francisco: aunt lute books, 1987.

87   Ochy Curiel, «CRÍTICA PÓS-COLONIAL A PARTIR DAS PRÁTICAS POLÍTICAS DO FEMINISMO ANTIRRACISTA», trad. Lídia Maria de Abreu Generoso, *RTH. Revista de Teoria da História. Universidade Federal de Goiás* Volume 22, Número 02, 2019/2006: 231-45.

88   Silvia Rivera Cusicanqui, *Ch'ixinakax utxiwa. Una reflexión sobre prácticas y discursos descolonizadores*, Buenos Aires: Tinta Limón, 2010.

constitutive outside to grow a space for technologies that instead of generating more and more, regenerates what we already have.

3. Compost Engineers as an alternative imagery to name feminist approaches to intelligent systems

Los niños del compost llegaron a comprenderse a sí mismos en tanto especie humana, más en términos de humus, que como humanos o no humanos.
Donna Haraway

La muerte es la pérdida clara de los límites del individuo. Con la muerte, el "yo" se disuelve. Sin embargo, después de la muerte la vida se mantiene de una forma diferente, en la forma de hongos o bacterias que corrompen los cadáveres, o de hijos y nietos que continúan viviendo. el yo muere por la desintegración de sus procesos metabólicos, pero el metabolismo no se pierde.
Lynn Margulis

Las bacterias pueden llevar a cabo todos los procesos biológicos conocidos en la biósfera, excepto hablar.
Lynn Margulis

Why does the prevailing notion of intelligence correspond exclusively to the human (and its possible replicas)? Are those technological imaginaries based on control still functional? To whom?

We already saw that the term artificial intelligence is embedded by imaginaries and world visions focused on being human centric, fast, efficient, linear, universalizing, bodiless, progress lead and extractivist, technosolutionist concepts that are leading us to surveillance and control of many by few, while also to the destruction of humankind and other species of this planet.

Can we conceive and reposition as intelligent technologies the ingeniousness that

are focused on regenerating instead of controlling humans and all the other beings that compose nature on this planet? Can we reverse the logics and imaginaries that have permeated conceptions of technology for centuries up to today? Can we contribute, as humans, to the collective processes in which living and non-living entities participate in non-destructive ways? Technologies that are situated, instead of universalizing, that are non-human centric and as such as connected with other rhythms? Slower than the sickening pace of capitalism requires?

The answer to this question has the potential to revert all the power dynamics established among humans since colonization and industrial revolution that we are bringing into technological design. As it repositions other intelligences and practices around technologies that have been historically depreciated by the dominant and western patriarchal capitalist worldview. And lead us to observe how a series of epistemologies that were annihilated by colonial processes are emerging in this moment of ecosocial crisis. It gives back the power to those who, in spite of century old-oppressions, have preserved ancestral and traditional knowledge.

In Brazilian Portuguese and Chilean Spanish, the languages these authors are acquainted to, we have the words "*saberes ancestrais*" e "*conhecimento tradicionais", in English, both words, "saberes*" e "*conhecimentos*" would be reduced to one single world: knowledge. And as we could observe in the previous chapters, from scientific imaginaries of future technologies to empirical technological production, Western science notion of knowledge "favors analytical and reductionist methods as opposed to the more intuitive and holistic view often found in traditional knowledge. It is positivist and materialist in contrast to traditional knowledge, which is spiritual and does not make distinctions between empirical and sacred"[89]. Western science, just like what is behind the proposition of artificial intelligence, is objective and quantitative, while traditional knowledge opens room for subjectivity. "Western science is based on an academic and literate transmission, while traditional knowledge is often passed on orally from one generation to the next by the elders. Western science isolates its

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89   Douglas Nakashima and Marie Roué, «Indigenous knowledge, peoples and sustainable practice», *Encyclopedia of global environmental change*, 5 (2002): 314-24.

objects of study from their vital context by putting them in simplified and controllable experimental environments—which also means that scientists separate themselves from nature, the object of their studies;-by contrast, traditional knowledge always depends on its context and particular local conditions"[90]. These are the notions that have been embedded into the concept of artificial intelligence, but as queer feminists aligned with the criticisms and propositions of decolonial thought and the demands of indigenous and black movements, we want to hack this trend.

In our previous exercise with the constitutive outside, we have listed a series of concepts that are central to the feminisms we relate to. Can we conceive technologies that reposition them at the center?

That idea is not even new. The UN multilateral treaty entitled Convention on Biological Diversity, signed during the Earth Summit held in Rio de Janeiro back in 1992, represented the first time when international law recognized that conservation of biodiversity is "a common concern of humankind". And in its Article 8 it establishes that parties *"shall respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge innovations and practices."*[91]

More than 30 years has passed and this hasn't happened substantially. We are reaching a climate collapse and indigenous land continues to be invaded for illegal mining. Just in the Amazon region, gold has been illegally extracted on Kayapó Munduruku and Yanomami indigenous lands traded by refiners supplying Apple, Microsoft, Google and Amazon.[92] And even worse, now AI industry leaders are selling

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90   Ibid.

91   Convention on Biological Diversity, accessible at: https://www.cbd.int

92   The map of internet territories is a project by Coding Rights with the goal to materialize "the cloud', so we can discuss the geopolitical dimensions of the

AI systems as the solution to the problems their own business model has caused. Technosolutionism applied as Greenwashing.[93]

As we have argued so far, feminism and the epistemes we embrace, from an ethical and responsible perspective with territories and people, brings to light the fact that everything is connected, like a tangle, human and non-human agents, living and nonliving, united in interdependence. This means that what is happening in our environment is also happening to us. In the book "Inflamed. Deep medicine and the anatomy of injustice"[94], the authors argue that in many cases, diseases are a response to structural issues that affect the environment surrounding human bodies, such as racism, extractivism, poverty, among others.

In this regard, Principle 9 of the Design Justice Network[95] suggests that "We work towards non-exploitative solutions that reconnect us to the earth and to each other".

Within this research we have sought to abandon human exceptionalism, understanding that it has led us to a state (especially in the so-called "global south" territories) of increasing environmental destruction, human and non-human exploitation and a very poor distribution of resources for life. Within a logic that does not consider human exceptionalism, turning to the observation of other types of intelligence is fundamental.

Intelligence, although difficult to define, is relational, and is activated and mobilized in the face of stimuli and interactions. In this sense, our urban and western ways of life are becoming more and more biased in relation to stimuli and interactions, which are progressively oriented towards the reduction of senses, while there is an

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technologies we use. It is available here: http://cartografiasdainternet.org

93   Camila Nobrega and Joana Varon, "Big Tech goes Greenwashing: feminist lenses to unveil new tools in the master's house", *Giswatch Technology, the environment and a sustainable world*, *APC*, 2020. Available at: https://giswatch.org/node/6254

94   Rupa Marya y Raj Patel, *Inflamed. Deep medicine and the anatomy of injustice*, New York: Farrar, Straus and Giroux, 2021.

95   https://designjustice.org/read-the-principles

overstimulation of one particular logic. Sometimes it seems we live in a lab, controlled, clean, where stimuli have a specific and planned purpose. But if intelligence is a relational element, and therefore a dynamic one, why not consider that intelligence expands as we interact with other beings, living and nonliving, in their most varied and multiple forms? Why not consider as highly intelligent all those systems that coexist in multiplicity and unpredictability, sometimes with elements that are even imperceptible to our eyes?

It is equally important not to "humanize" the other species or entities, not to expect translations into our language or our models of learning, knowledge and/or intelligence. Even so, from our human, low and partial understanding of the world, there are many species that have demonstrated high degrees of intelligence (basically those species whose intelligence, as humans we can "read" and validate, or those that if a human being were to execute them we would call intelligence). That is the case of spiders and their webs,[96] animals that predict earthquakes more accurately than any other instrument humans have ever created, mycorrhiza, trees. In the book "A árvore-mãe: Em busca da sabedoria da floresta", ecologist Suzanne Simard describes how she was able to proof with scientific methods what indigenous knowledge have long affirmed: "...trees have shown me that they perceive and respond, connect and converse. What began as a legacy - my land in western Canada, where I had found comfort and adventure as a child - has progressed into a fuller understanding of the intelligence of the forest, and more: into an investigation of how we can regain our respect for this wisdom and heal our relationship with nature."[97] Simard

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96   Vinciane Despret, *Autobiografía de un pulpo y otros relatos de anticipación*, trad. Miguel Alpuente Civera, Bilbao: consonni, 2022/2021.

97   Free translation by ourselves. From the edition in portuguese: "as árvores me mostraram que percebem e respondem, conectam-se e conversam. O que começou como um legado - a minha terra, no oeste do Canadá, onde na infância eu encontrara conforto e aventura - progrediu para uma compreensão mais completa da inteligência da floresta, e mais: para uma investigação de como podemos reaver nosso respeito por essa sabedoria e curar nossa relação com a natureza". Suzanne Simard, *A ÁRVORE-MÃE Em busca da sabedoria da floresta*, trad. Laura Teixeira Motta, Rio de Janeiro: Jorge Zahar Editor, 2022: 15.

has been recognized by her studies proving the existence of underground networks of forests composed of fungi and roots. In the same book she says: "I discovered that [trees] are part of a network of interdependence, linked by a system of underground channels through which they perceive, connect and relate to each other - with an immemorial complexity and wisdom that can no longer be denied [...] Today we know that this is rigorous, peer-reviewed and widely published science. It's not a fairy tale, nor a flight of imagination, a magical unicorn, Hollywood movies."[98]

The intelligence of the forest is symbiotic and regenerative, unlike the human-centered Western Cartesian proposition of intelligence which is embedded in the debates of artificial intelligence, which is extractivist and focused on controlling nature and its human and non-human beings. Intelligence is condensed in the collaboration between different species. It is in these interactions with the improbable, the unknown and the different that unsuspected intelligences appear. And perhaps it is this very exercise that we, as urban and technologically literate humans, part of a culture that has designed and developed a hegemonic technology (which has in turn been erasing ancestral technologies), must take up and redo. Reconnect with other environments, beings, entities, processes and systems that can make us part of a circuit of multiple intelligences greater than ourselves. We must take responsibility for the consequences of our lifestyles, seeking forms of territorial, technological, corporal and spiritual reparation.

Not only thinkers from native peoples throughout Latin America/Abya Yala have affirmed and demonstrated with their vital practice that the planet does not need human beings to subsist. "Many species, especially those of the four non-animal kingdoms, do not need humans to care for them and would not perish if our species

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98   Free translation by ourselves. Original in the publication we read: "Descobri que [as árvores] fazem parte de uma rede de interdependência, ligadas por un sistema de canais subterrâneos por meio dos quais elas percebem, se conectam e se relacionam - com uma complexidades e uma sabedoria inmemoriais, que não podem mais ser negadas [...] ...hoje sabemos que se trata de ciência rigorosa, revista por pares e amplamente publicada. Não se trata de conto de fadas, nem de voo da imaginacao, unicornio mágico, fica de filmes de Hollywwod". Ibid: 14.

were to self-destruct tomorrow. The claim by some politicians and propagandists that by preserving biodiversity we can somehow preserve the life of the entire planet is just one more example of unabashed human arrogance"[99].

In the book *The Mushroom at the end of the world: On the Possibility of Life in Capitalist Ruins*, anthropologist Anna Tsing, talks about the matsutake mushroom, which only grows in the ruins of capitalism, as an example of "contaminated diversity" that emerges in precarity as a survival strategy. She opposes the resilience and the restorative and regenerative nature of the matsutake in relation or contamination with its encounters to the individualistic, self-contained notion that rules capitalism and that rules our the notion of artificial intelligence, which requires an oversimplification and a blind view to the transformative processes that are always at place in our interactions with the world. A view that perfectly serves the notion of productivity embedded in capitalism:

"Consider the twin master sciences of the twentieth century, neoclassical economics and population genetics. Each of these disciplines came to power in the early twentieth century with formulations bold enough to redefine modern knowledge [...] While practitioners of each have had little to do with each other, the twins set up similar frames. At the heart of each is the self-contained individual actor, out to maximize personal interests, whether for reproduction or wealth [...] The assumption of self-containment made an explosion of new knowledge possible. Thinking through self-containment and thus the self-interest of individuals (at whatever scale) made it possible to ignore contamination, that is, transformation through encounter. Self-contained individuals are not transformed by encounter. Maximizing their interests, they use encounters—but remain unchanged in them [...] A [unchanged] "standard" individual can stand in for all as a unit of analysis. It becomes possible

99   Free translation by ourselves. Original: "Muchas especies, especialmente las de los cuatro reinos no animales, no necesitan a los humanos para cuidarlas y no perecerían si nuestra especie se autodestruyese mañana. La afirmación de algunos políticos y propagandistas de que preservando la biodiversidad podemos en cierto modo preservar la vida de todo el planeta es sólo un ejemplo más de la incólume arrogancia humana". Lynn Margulis, Ibid: 251.

to organize knowledge through logic alone. Without the possibility of transformative encounters, mathematics can replace natural history and ethnography. It was the productiveness of this simplification that made the twins so powerful, and the obvious falsity of the original premise was increasingly forgotten. Economy and ecology thus each became sites for algorithms of progress-as-expansion."[100]

Tsing also points out a path to escape from this erroneous assumption that is ruling mainstream economics, knowledge and science production and leading to the destruction of human and other beings on this planet. And it that proposition, we dare to say that feminists and other social movements emerging from the Global Majority that have been dealing with precarity as a challenge for survival have a lived experience to overthrow the dominant logic:

"Precarious survival helps us see what is wrong [with the assumption of self-containment]. Precarity is a state of acknowledgment of our vulnerability to others. In order to survive, we need help, and help is always the service of another, with or without intent [...] It is hard for me to think of any challenge I might face without soliciting the assistance of others, human and not human. It is an unselfconscious privilege that allows us to fantasize—counter-factually—that we each survive alone. If survival always involves others, it is also necessarily subject to the indeterminacy of self-and-other transformations. We change through our collaborations both within and across species. The important stuff for life on earth happens in those transformations, not in the decision trees of self-contained individuals. Rather than seeing only the expansion-and-conquest strategies of relentless individuals, we must look for histories that develop through contamination. Thus, how might a gathering become a "happening"? [..] that is greater than a sum of its parts? The answer is contamination. We are contaminated by our encounters; they change who we are as we make way for others. As contamination chan-

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100   Anna Lowenhaupt Tsing, *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*, Princeton: Princeton University Press, 2015: 24-25.

ges work-making projects, mutual words - and new directions - may emerge."[101]

In this sense, the proposal is that we become and listen to the "compost engineers". We consider compost; the interactions between species; the relationship among living and non-living beings; minerals, among others, as part of a choreography of the ecosystem. All this is taking place in different ways that are plural, diverse and "intelligent" (or wise), though absent from what is currently seen as artificial intelligence. As the ecofeminist Vandana Shiva in a talk at the Soil Regen Summit in 2023 entitled "Where reality is hope for the future" argued, while the soil has been one of the main victims of the violence of industrial agriculture, at the same time, the soil itself could be the solution to end the violence that has been perpetrated against it. The soil, Shiva points out, can be the place to repair the violent relationships we have established with and towards the earth, a place to repair carbon cycles and turn them into cycles of repair. An example is the fact that, metal contamination can be remediated mycologically, copper, zinc, iron, and other heavy metal waste can be attracted by biosorbents developed from mushroom mycelium or mushroom compost.

We are also inspired by the speculative narrative "The Camille stories: children of compost", written by the philosopher and scientist Donna Haraway, as chapter eight of the book "*Staying* with the *Trouble*". The story tell us about "communities of compost":

> "*The Communities of Compost worked and played hard to understand how to inherit the layers upon layers of living and dying that infuse every place and every corridor. Unlike inhabitants in many other utopian movements, stories, or literature in the history of the earth, the Children of Compost knew they could not deceive themselves that they could start from scratch. Precisely the opposite insight moved them; they asked and responded to the question of how to live in the ruins that were still inhabited, with ghosts and with the living too. Coming from every economic class, color, caste, religion, secularism, and region, members of the emerging diverse settlements around the earth lived by a few simple but transformative practices,*

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101   Ibid: 25

which in turn lured—became vitally infectious for—many other peoples and communities, both migratory and stable. The communities diverged in their development with sympoietic creativity, but they remained tied together by sticky threads. The linking practices grew from the sense that healing and ongoingness in ruined places requires making kin in innovative ways."[102]

Our compost engineers also move between the living and the dead, between the "healthy" and the rotten, between the various intelligences that come together to understand the soil. As indicated by Chilean biotechnologist Daniela Torres, director of the Chile office of the Fungi Foundation, whom we interviewed for this study, there are large amounts of intelligence lodged in the soil and in the microorganisms that inhabit it. When people think of reforestation, they think of trees, although the contribution of fungi, bacteria and microorganisms is key.

"I believe that one of the things that is not taken into consideration is the intelligence of the soil, the intelligence of the microorganisms that coexist in that place. Because it often happens that when we want to reforest, we think more about trees or plants. And we have a deep-rooted vision of a solitary tree, but that tree exists thanks to everything that happens in the soil, and the fungi have a lot to say there. In other words, the ecological successions necessary to develop into the forests we have now also go through a series of processes," Daniela told us.[103]

Daniela Torres also told us how humans tend to perpetuate the notion of plants being separate from a broader ecosystem that operates through interdependence and relationships that can produce mutual benefit:

"For example, when one arrives after a fire or any other environmental catastrophe, and to try to address that, simply replants the trees that were there before, one is ignoring and underestimating everything that has happened in that soil before it became the place

102   Donna Haraway, Ibid. 2019: 138.

103   Daniela Torres in online interview to the Compost Engineers in 29.08.2023.

where that tree could establish itself and live. That is also the case of the relationships between other organisms. In other words, randomly placing plants without having a vision of how they are connected and how they are, how they coexist, we are also underestimating what happens at ground level, in the soil. And much of the diversity in the soil is fungi, it is mainly microorganisms, bacteria and fungi. Most fungi live in just such places. So they are the ones that ultimately provide these connections, to the benefit of both the fungus and the other organisms.", said Daniela Torres in our interview.

There is therefore a need to focus our attention in the smaller processes that happen under our eyes but frequently without being noticed. Also an attention to the metabolic, that happens inside, even microscopically so we can be more tuned with the territories we inhabit. But we departure from a non romantic view of symbiosis, one that Daniela also highlighted in our conversation: "*When we talk about being all connected, we see it very much from a very surreal perspective, like everything is nice and it's coexisting and everyone is happy, but it's not like that. There is a harshness and rawness in nature that also must be considered, including because we also experience it as a society. We do not always agree, we do not always want to give in, our relationships are complex. Fungi observation reveals to us that everything is connected. Through the mycelium they connect, they transmit energy, molecules, water, nutrients, etc., but all this comes from chaos. It comes from competition, from parasitism, and it also comes from symbiosis. So everything that we often see as very separate, that is, competition versus collaboration, in reality happens all simultaneously. Different life strategies overlapping. An anthropic view would consider it something bad, mean, but that is how it is in nature, that's how it happens, it's a fact.*"

We want to recover and reclaim these wise and complex processes, technologies of life, that the figuration of the compost engineers offer us. We hope this knowledge and practices from compost can inspire human engineers to contribute to the slow systems that use technology to preserve life and reduce damage. Regenerative and bioremediation practices would not be necessary if measures had been taken to redu-

ce human damage to the Earth ("risk/harm reduction" is a term that comes from sex and gender dissident communities to refer to measures that could prevent or reduce the consequences of a practice that may be dangerous). As we have seen in the previous chapters, the production and excessive use of contemporary capitalist digital technologies result in practices that pose a high risk to the environment and to life. Mining, water pollution, intensive cattle ranching and many other activities that affect nature produce harm to the lives and territories we inhabit, especially in the so-called "global south". As the Metzineres collective[104] propose, harm reduction should actually be understood as a harm reaction, meaning not only a preventive action (which in many cases was definitely not done), but also a reparative action to the damage.

Healing, restoration and repair are, what researcher and editor Bárbara Santos considered as different kinds of technologies in her book "Curación como tecnología"[105], which features interviews with "*sabedores da Amazonia*" revealing diverse ancestral knowledge of the Amazon region that questions the Western division between humans and nature. The publication highlights the disconnection we have in urban environments, and how a series of practices (with beeswax, feathers or tobacco, among many other elements) can contribute to healing that broken relationship with nature. "In the city people go very fast, technology overthere is part of people's lives, Western technology dominates people and does not allow everyone to know their own life, the relationship with other people and nature".[106] These are words from Jesús León Muipu which invites us to align ourselves with the temporalities of slow knowledge, which we propose to cultivate with the engineers of compost.

The compost engineers are a figuration. A narrative technology that elaborates

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104   https://metzineres.org/es/inicio

105   Bárbara Santos, *Curación como tecnología. Basado en entrevistas a sabedores de la Amazonía*, Bogotá: Instituto Distrital de las Artes - Idartes, 2019.

106   Original quote: "En la ciudad la gente va muy rápido, la tecnología de allá es parte de la vida de la gente, la tecnología occidental domina a las personas y no permite que cada uno conozca su propia vida, la relación con otras personas y la naturaleza". Ibid: 34.

possible alternatives, opening up the stories or taking them to other places.[107] For Braidotti a figuration is "a thought that evokes or expresses alternative ways to the phallocentric view of the subject",[108] which is contained in the heteropatriarchal order. The figurations are "politically based images that portray the complex interaction of various levels of subjectivity"[109] and that could become more effective than theoretical or purely scientific positivist systems.

Figurations are therefore not theoretical instruments to explain reality, but symbolic and poetic figures that make it possible to locate a space that does not exist in the official narratives. Several feminist authors have used figurations to describe ideas and situations that cannot be expressed with the language and tools offered by Western thought[110]. Figuration is not the same as metaphors, they are narratives that give a situated explanation to a process and become an epistemic and political proposal for transformation. Figuration also allows us to move away from the language of corporate technology to propose new associations for technological development, that is the bet of the "the compost engineers".

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107   Ana Cristina Aguirre, «Figuras performativas de la acción colectiva: Una trayectoria con la Comisión Civil Internacional de Observación por los Derechos Humanos, desde las políticas de conocimiento feminista y la etnografía crítica», Tesis Doctoral, Universidad Autónoma de Barcelona, 2012.

108   Rosi Braidotti, *Sujetos nómades*, trad. Alcira Bixio, Buenos Aires: Paidós, 2000: 26. Our translation to the original quote: "un pensamiento que evoca o expresa salidas alternativas a la visión falocéntrica del sujeto".

109   Ibid: 30. Our translation to the original quote: "imágenes de base política que retratan la interacción compleja de diversos niveles de subjetividad".

110   We can find various figurations in the work of Gloria Anzaldúa, such as "la nueva mestiza" (1987), "la trojan mula" (2009a) and "el mundo zurdo" (1988b); in the work of Valeria Flores "la proletaria del lenguaje" (2010) or "la interrupción" (2013); in Donna Haraway "modest witness" (2011) or "the cyborg" (1995), among others. In the Latin American context, we could interpret as a figuration images such as the "punk sow" by Constanzx Álvarez (2014) or "la birlocha" by Silvia Rivera Cusicanqui (2015). These examples use figuration in a more poetic and less academic manner if compared to the examples from Anglo-Saxon feminist production quoted by Braidotti, in which the figuration is always related to a "subject".

The compost engineers and their slow knowledge, seek to imagine technologies that operate and perpetuate notions of responsible consumption, beyond circle economy and minimum waste, while recalling ancient knowledge and technologies. As a first step, we propose a rustic wild garden as the space of action to develop the compost engineers regenerative systems. It is an ecosystem that is simple and complex at the same time, that functions in an absolutely intelligent way, but whose intelligence is neither artificial nor patriarchal nor human-centric. Ultimately, the compost engineers we want to open space to imagine:

- Reverse hierarchies between high-tech and low-fi imaginaries
- Technologies that require a different temporality.
- Less extractivist technologies
- Predictive technologies that are not deterministic
- Technologies that reduce waste instead of reproducing it.
- Learn with living ecosystems to envision technologies of life
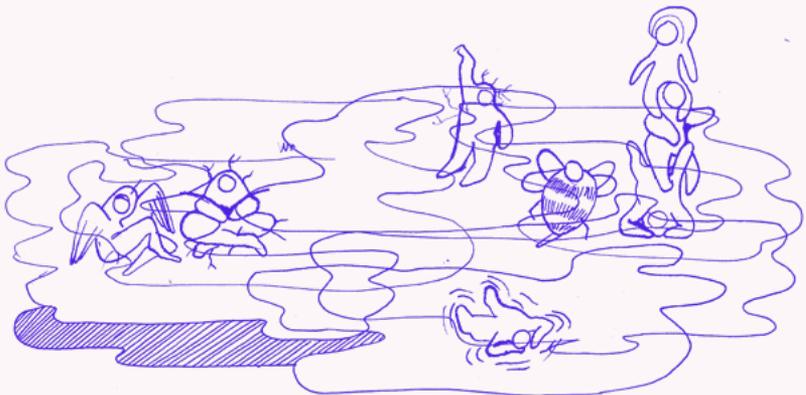
4. Prototype proposal: Compost Engineers' Regenerative Systems

Tengo la impresión de que nuestra cultura rebosa de ideas absurdas, creídas con fe inquebrantable por los científicos y todos los demás, y que algunas de éstas incluso vician nuestro posible interés por la Tierra.
Lynn Margulis

Evolutionary biologist Lynn Margulis,[111] who nowadays is known for her scientific breakthroughs for addressing the importance of symbiosis in the process of evolution, initially had her work heavily criticized and unrecognized, while being called "rebel scientist" from strongly opposing trendy and mainstream neo-Darwinism.[112] For her, symbiosis, the creative principle in evolution, has been interpreted in an anthropocentric way, as a relationship that benefits its participants. She define symbiosis as "prolonged physical associations between organisms of different species, irrespective of the outcome".[113] Recalling her hardships in being taken seriously by their male counterparts, she highlights how the term has been disqualified by Western scientists, either because it does not align with the principles of competition (one of the main readings around Darwin), or because it is relatable to the con-

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111   Lynn Margulis, *Una revolución en la evolución*, trad. Mercé Piqueras et al.,Valencia: Universitat de València, 2003/1997.

112   Unlike neo-darwinists, in an interview to Discovery magazine she argued that "natural selection eliminates and maybe maintains, but it doesn't create", while for her symbiosis was the major driver of evolutionary change. Dick Teresi, "Discover Interview: Lynn Margulis Says She's Not Controversial, She's Right", *Discover*, 16.06.2011. Interview available at: https://www.discovermagazine. com/the-sciences/discover-interview-lynn-margulis-says-shes-not-controver-sial-shes-right

113   Our free translation from Lynn Margulis, *Una revolución en la evolución*: 164. Original quote: "asociaciones físicas prolongadas entre organismos de diferentes especies, sin tener en cuenta el resultado".

cept of "mutual aid",[114] both incompatible with the logics centered in the individual self-contained. Initially, for most scientists, symbiosis and mutualism were seen as political slogans that should not be mixed with scientific objectivity (cellular, molecular and evolutionary biology). Symbiosis acquired positive and even feminine connotations, not to be centered in evolutionary theories. Many scientists averted paying attention to the phenomenon, and research around it was hardly funded.

This anecdote narrated by Lynn Margulis leads us to think about how a particular focus in one logic, in disregard of other approaches, have been modulating the fields of science and technology. It is not by chance that a series of ancestral techniques and technologies have been dismissed as useless, unsophisticated or primitive. Our prototype proposal we want to reclaim not only the sophistication of these technologies, but also highlights the fact that these are technologies that from the scratch are friendly to the environment and other ways of living. We want to reconnect with the concept of symbiosis, so necessary to understand our role in regenerating and restoring all the damages that a technosolutionist, colonial, capitalist, human centric approaches to nature have caused. We believe that this would open a promising path towards imaginaries and practices of feminist technologies. While resisting to oppressive AI systems, through audits, mapping biases, or even producing our own datasets is very important and needed, these are resistance strategies in an oppressive system. We need to have breathe and mental space also to imagine and start to implement radical structural change.

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114   Priotr Kropotkin, *El apoyo mutuo: Un factor de evolución*, trad. Luis Orsetti, Logroño: Pepitas de calabaza, 2020/1902.

What is it?

The Compost Engineers' Regenerative Systems is a technology that enables the creation of models and tools with pedagogical, restorative and regenerative purposes. It departs from the observation of intelligences that compose a wild rustic garden, as it serves to understand relations and operations that have been long forgotten in the development of conventional digital technologies. In that garden, we are the engineers, just as the soil, fungi and mycelium, bacteria, microorganisms, insects, plants and other beings that will be interacting in that piece of land, in symbiosis.

Goal of our prototype

Through this prototype proposal we seek to foster reconnection with other forms of intelligences/technologies that are restorative, regenerative, technologies of life. An alternative path, opposite to feeding discourses or imaginaries based on the technologies of war, oppression, surveillance and control. The intelligences in which we are centering our senses are not new, but more than necessary in the now. They have been historically erased or underestimated by the patriarchal colonial system, so, by reconnecting with them, we enter a process to decolonize both our imaginaries, visions and practices for tech development.

The Compost Engineers' Regenerative Systems have the ultimate goal to serve as a tool to change the course of capitalist technologies, as it starts not from the principle that technologies are created by humans to dominate nature, but that humans are part of and work with nature. These systems seek to reintegrate a semiotic and material vision around technologies, which includes taking into account how they are build, by whom, how they are used, what are the effects of these usages, always paying a special attention on the weave of interactions from humans and non-humans, so we can avoid the reproduction of human exceptionalism.

How does it work?

To envision how this prototype could work, besides the knowledge production of this paper, we have reached experts with concrete and situated experiences in initiatives that could be correlated or feed the development of the Compost Engineers' Regenerative Systems. We have conducted interviews and deep conversations with three inspiring Latin American researchers:

- Cinthia Mendoça (Brasil), director of Silo, a non-profit organization working in the interplay of science, art, technology and agroecology in rural areas and conservation units, through immersive experiences and transdisciplinary practices such as laboratories and residencies to prototype ideas;
- Denise Alves-Rodrigues (Brasil) queer technologist, maker, artist and educator whose work encompasses openness to error, to the undetermined, as something to be elevated through epistemological powers, sources and methods of knowledge as well as rational scientific methods.
- Daniela Torres (Chile), biotechnologist with focus on plant phytopathology and mycology, she is director from Fungi Foundation in Chile, an organization focused on envisioning a healthy planet in which Fungi are recognized as the interconnectors of nature. It explores Fungi to increase knowledge of their diversity, promote innovative solutions to contingent problems, educate about their existence and applications, as well as recommending public policy for their conservation.

From these conversations we decided that a good path to develop the Compost Engineers' Regenerative Systems, is to explore how we can go deeper on Design Justice Principles, to go deeper in the notion that technologies affect human and non-human internal and external. For doing that we will depart from **Design Justice Principle** number 9, which states "We work towards non-exploitative solutions that reconnect us to the earth and to each other", by extending it through the **Permaculture Principles** and the **Fungi Foundation Principles.**

Just like Design Justice Principles, Permaculture Principles are also focused on design, thus our ways of "doing". In this case, the design of spaces considers earth care, people care and fair share, practices that are also found in indigenous cultures. To go deeper in the notion of fair share, the Fungi Foundation Principles add a decolonial layer, also to the notion of non-exploitative solutions of Design Justice Principles. We believe that the attempt to relate these three models of principles build a substantial framework for the Compost Engineers to build and observe their regenerative systems. These principles are the following:

The Design framework of Compost Engineers' Regenerative Systems

Design Justice Network Principles[1]

1. We use design to sustain, heal, and empower our communities, as well as to seek liberation from exploitative and oppressive systems.

2. We center the voices of those who are directly impacted by the outcomes of the design process.

3. We prioritize design's impact on the community over the intentions of the designer.

4. We view change as emergent from an accountable, accessible, and collaborative process, rather than as a point at the end of a process.*

5. We see the role of the designer as a facilitator rather than an expert.

Permaculture Design Principles[2]

1. Observe and interact: Before you take action, start by taking some time to observe what's happening.

2. Catch and store energy: When resources are abundant, it's smart to store some of them to use later.

3. Obtain a yield: systems designed must guarantee the survival of the community without putting it at risk, and their productivity must be measured in terms of proportionality among the effort invested and the results obtained.

4. Apply self-regulation and accept feedback: Search for items that are in the place and could return to it.

Fungi Foundation Principles[3]

1.Self-Determination, Prior Rights and Responsibilities: Indigenous Peoples, traditional societies, and local communities have a right to self-determination, prior resource rights over, interests in and cultural responsibilities for all air,land, and waterways, fungal and the natural resources within where these peoples have traditionally inhabited or used, together with all knowledge, intellectual property and traditional resource rights associated with such resources and their uses

2. Respect to Pachamama and her Rights: Nature in all its life forms has the right to exist, persist, maintain, and regenerate its vital cycles.

1   Design Justice Network Principles. Available at https://designjustice.org/read-the-principles
2   Fundamentos de la permacultura. tierramor.org, Michoacán. Available at https://movimientotransicion.pbworks.com/f/MANUAL+DE+PERMACULTURA.pdf
3   Ethnomycology ethical guidelines. Fungi Foundation. May, 2023. Available at https://www.ffungi.org/campaign/ethnomycology-ethical-guidelines

6. We believe that everyone is an expert based on their own lived experience, and that we all have unique and brilliant contributions to bring to a design process.

7. We share design knowledge and tools with our communities.

8. We work towards sustainable, community-led and -controlled outcomes.

9. We work towards non-exploitative solutions that reconnect us to the earth and to each other.

10. Before seeking new design solutions, we look for what is already working at the community level. We honor and uplift traditional, indigenous, and local knowledge and practices.

5. Use and value renewable resources and services

6. Produce no waste: Do not generate waste, do not waste resources.

7. Design from patterns to details: Identify patterns present in nature and organize/design from them as structures. Then address the details.

8. Integrate rather than segregate: Contribute to the existence of mutually supportive relationships among the elements.

9. Use small and slow solutions: Small, slow solutions last longer and are more sustainable.

10. Use and value diversity: Diversity reduces vulnerability and generates protection against a wide variety of threats.

11. Use edges and value the marginal: Use and care for the wealth that lies in the margins.

12. Creatively use and respond to change:

3. Reciprocity, Mutual Benefit and Equitable Sharing: Indigenous Peoples, traditional societies and local communities have the right to be compensated for the utilization of their knowledge and their biological resources. Mutual benefit and equitable sharing may occur in ways that are culturally appropriate and consistent with the wishes of the community involved.

4. Conservation of Flora, Fauna and Funga: The international acceptance of the recognition of the macroscopic organisms of Sacred Earth as Fauna, Flora and Funga paves the way for substantial changes in educational and agricultural policies, amongst others. The insertion of the term Funga in legal environmental laws and other documents is essential to the awareness of the threatened fungal organisms that, just like all the Flora and Fauna, are also suffering with the world's loss of environments and changing climate.

5. Respect to the Elders: To show respect to the Elders includes attentive listening. Many want their voices to be heard. This knowledge needs to be preserved and used the best way possible, so the next generations will have an opportunity to live in a better world. The value of their words is inestimable and means the continuation of humanity, it is about the symbiotic relationship between people and their ecosystems.

7. Educated Prior Informed Consent: Indigenous Peoples, traditional societies and local communities have the right to make decisions on any program, project, study, or activities that directly affect them. Educated prior informed consent must be established before any research or program is undertaken, at individual and collective levels, as determined by community governance structures. In cases where the intentions of proposed research or related activities are not consistent with the interests of these peoples, societies, or communities, they have a right to say no.

8. Supporting Indigenous Projects: To recognize and support the efforts of Indigenous Peoples, traditional societies, and local communities in undertaking their own research – based on their own epistemologies and methodologies – in creating their own projects, programs, knowledge sharing mechanisms and related activities, and in utilizing their own collections and databases in accordance with their self-defined needs.

Other inspiring researchers in Latin America, like elyaneth mtz y la_jes[1], have already been working on attempts to overlap permaculture practices to build feminist approaches to technologies. In their investigation on Digital Communalities, they also seek to reconnect the land with digital technologies, and do so by holding dialogues with a number of permaculture activists and land defenders. Undoubtedly this work is an important precedent for the application of permaculture principles to the field of technologies from the perspective of people from the Global Majority.

Adding to that, the principles developed by the Fungi Foundation are also presented together with a series of practical recommendations for the application of the principles they describe. In this work we seek to interrelate all these principles and to apply them to the creation of an (eco)system that instead of destroying can be oriented towards regeneration.

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1   elyaneth mtz y la_jes, *Comunalidad Digital: una aproximación desde la ética permacultural.* Chiapas: Sursiendo, 2022.

The Infrastructure of the Compost Engineers' Regenerative Systems

The idea is to merge these principles in practice, having the wild rustic garden as the main infrastructure and platform to transform our proposed model of thought into a tangible prototype. Using the rustic garden as an infrastructure is the way we have envisioned to materialize the hypothesis carefully crafted in this paper: in our previous exercise with the constitutive outside, we have listed a series of concepts that are central to the feminisms we relate to. Can we conceive technologies that reposition them at the center? Can we develop feminist technologies that, instead of the oversimplification proposed by AI, is focused on allowing us to perceive complexities, technologies that add up, as opposed to reducing our visions and

perceptions, that reconnect us as living parts of a wider system? Can the Compost Engineer's Regenerative System help us expand what kind of intelligences we observe, recognize and learn with? What happens in the soil? What are the interactions fostered by compost? Which species are acting when we resignify waste?

The complexity of different species interacting, affecting and being affected or, in the words of Anna Tsing, observing and being part of this "contaminated diversity" will allow us to see in practice and empirically document empirical examples of the arguments we have been making in this paper so far, hoping that "contamination |indeed] changes world-making projects." Can we build tech by recovering what is left outside when we use the term AI? The Compost Engineers' Regenerative System cannot be just a theoretical exercise, we must jump to an empirical phase. Artificial intelligence is operating on a logocentric sphere of language and image, to change this structurally, we must go into practice, to the material.

CONSTITUTIVE EXTERIOR

ARTIFICIAL INTELLIGENCE

Inside:
Promises "solutions", Mathematics, Objectivity, Isolates problems, Fascination/Enchantment, Mechanic, Computation, Big data, Universalizing, Heterocisnormativity, Binary, Stigmatizing, Surveillance/Control, Automation, Dependent on mining, Predictio/Pattern, Present itself as bodyless and wasteless, Speed, Efficiency, Intensive water and energy consumption, Facilitates work/Replaces humans?, Progress and Future synonym, Human-centered, Linear vision of time, Relies on precarious human labor

Outside:
Natural ingeniousness, Emotions, Spirituality, space for doubts, subjectivity, Intimacy, Intuition, Multiplicity, Organic, Complexity, Generous skepticism, situated, Gender and Sex Dissidence, Short-lived, Non-binary, Freedom, Diversity, Chaos, Regeneration, surprise, Symbiosis, fleeting, Wilderness, slow, Raw, Non-capitalist, Ancient knowledge, Collectivity, non-linear time, Non separation of human and nature, Elasticity of thought

The Models to train the Compost Engineers' Regenerative Systems

During a recent workshop, we rolled a quick survey through which we consulted 25 women and trans persons from different Latin American territories in order to detect the technologies they had inherited from their mothers, grandmothers, aunts or other lineages and relatives. From these surveys we were able to extract a list of ancestral technologies, knowledgeable practices that were excluded or delegitimized as science by the capitalist and patriarchal technological production system. But that until today have low environmental impact and ancestral connections:
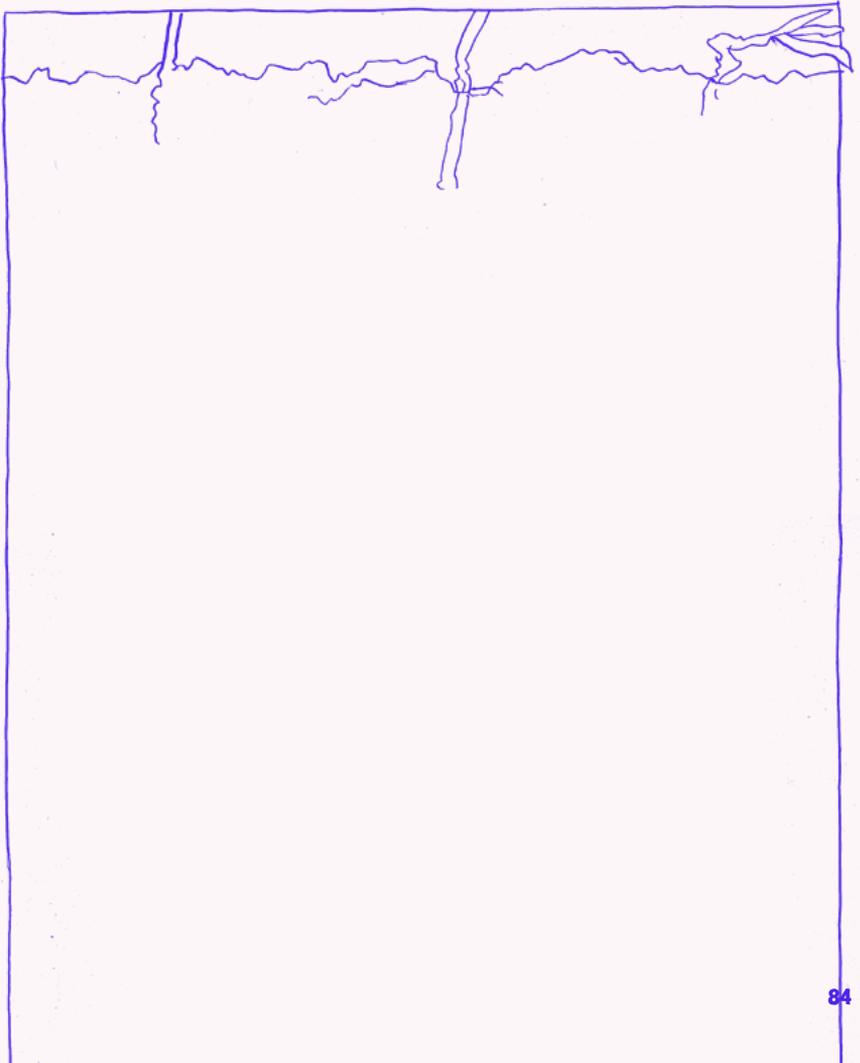
Ancestral Technologies

Codes and language:
reading, writing, calligraphy, storytelling, learning a language

Cooking:
kitchen chemistry, food preparation, fermentation (rot management), make a cake, prepare mate, knead

Agriculture:
planting, sprouting, harvesting, fertilizers, irrigation systems, prune, water, take cuttings, make compost

Cosmetics and selfcare:
hairstyling, grooming, makeup

Body & health:
medicine, home remedies, care, swimming

Transportation:
riding a bicycle, driving cars, fixing boats

Textile:
knitting, embroidery, sewing, sewing machine, pattern making, fabric with vegetable fibers

Astronomy and cycles:
observing moon cycles, observing constellations, attend to the cycles of the moon, observe the changes of seasons

Music:
singing, dancing, playing instruments

Games:
table games, card games, chess,

Sports:
swimming, ball games, skating, surfing

Arts:
painting, singing, dancing, crafts, pottery, ceramics, drawing

Construction and crafts:
clay, papiermâché, make candles, make fire

Witchcraft, magic, spirituality:
spells, prayers, oral stories, rituals, playing with oracles

These ancestral technologies do not have to be sought in an archeology museum, as they are still present in our lives and we often know them, thanks to the knowledge that is transmitted many times in a non-institutional way, in domestic or community environments. They are technologies that do not necessarily depend on electronic devices and are in tune with the principles of Design Justice, Permaculture and the Fungi Foundation. They are also low environmental impact technologies that often have restorative effects.

Therefore, the model for the Compost Engineers' Regenerative Systems will depart from some of these ancient technologies that will be implemented in relation to the rustic garden, recovered as central to the development of technologies of life, technologies that work towards the collective. They will serve as the model of the regenerative systems we want to develop.

Stages of implementation

Prototype phases

1) Build up the initial infrastructure of the Compost Engineers' Regenerative Systems

Our take on infrastructure is that it includes not only the tools, but also all the work of humans and non-humans to keep it up and working. For the CERS, our infrastructure will start with assembling a wild rustic garden at SILO, located in Serrinha do Alambari, an Environmentally Protected Area in Serra da Mantiqueira, a mountain range on the triple border of the states of Rio de Janeiro, Minas Gerais e São Paulo.[2]

There are many places and human practices that don't wish to be aligned to the ways of living the narratives embedded in the concept of AI are promoting. Very often, these territories haven't historically contributed so drastically to climate change like the places where the notion of progress now encompasses AI. Communities whose ways of living are more integrated and in symbiosis with their environment (with all the chaos embedded into it), not only haven't contributed as much to the climate emergency, but might also be helping to mitigate it. Another reason why these communities need to be valued as developers of future technologies. Therefore, local farmers and people from the SILO community will be the center of the process to co-design the infrastructure of the Compost Engineers Regenerative System, so it can depart from their needs. Is a garden needed in the community? Why? What will be part of the human intervention in that garden? What governance and care infrastructure do we want to establish in the community? What are the

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2   Silo is dedicated to create and promote Art, Science and Technology in rural, peripheral and environmental protection areas, stimulating exchange between intuitive techniques and scientific knowledge. More is available here: https://silo.org.br/en/

intelligences and ancestral knowledge that everyone already brings to the design of the garden? Which non-human intelligences are operating in that land. These are some of the questions we will be addressing together as well as having in mind and debating how to put in practice our three sets of design principles.

Besides the people, some of the other components that are likely to be part of that infrastructure include:

◊   **Compost** of organic waste, excrement and garden waste (branches, leaves, etc.): This is a natural benefit resulting from the action of bacteria, fungi and worms on organic waste, which is commonly used to improve soil fertility and as food for plants. Working with compost shows that there is no progressive linear time, as the relationship between death (waste) and life (for example, a living plant) is cyclical. It is a regenerative process in which collaboration between different species and agents is presented in an interdependent way. It is possible to produce gas from a composite of different materials.

◊   **Fungi Kingdom:** We want to highlight the presence of fungi and the fungi kingdom because it has been little considered. It is a kingdom composed of eukaryotic organisms belonging to the fungi classification, within which we can count up to approximately 144,000 different species. The presence of fungi in the system shows the integration of the binomial restoration/destruction since there are fungi that can transform and regenerate materials (there are even some that consume and transform plastic). It is also possible to include the communication networks presented by mycelia in symbiosis with other agents, such as mycorrhizae that connect trees and plant species.

◊   **Water storage and liquid accumulation:** It is important to be able to have spaces for storing water and other forms of resources to be used at another time, thus avoiding waste and disproportionate consumption. A water source makes it possible to maintain the resource and obtain it from different sources.

◊　　**Irrigation systems and water reuse:** In line with the previous point, we will develop ways of designing irrigation systems that can take advantage of water already used, seeking to ensure that the water fulfills several functions at the same time and promoting reciprocity, mutual benefit and equitable distribution, according to the needs of each species and agent. On the other hand, water reuse makes it possible to apply solutions that are chained, so that they can be used successively. For example, water that has been used to clean one area will later be used to irrigate another.

◊　　**Plants of different kinds:** Unlike monoculture logics that favor the presence of a single species, we seek cooperation among a diversity of plant species. This encourages cooperation and the use of their different characteristics following the principle of "relative location", for example, bringing a species that uses less water and produces shade closer to others that do not benefit from direct sunlight.

◊　　**Vegetable gardens and sowing:** The species planted and cultivated will respond to the ecosystem where this infrastructure is located. This means incorporating local knowledge into the cultivation methods, understanding that this traditional knowledge brings with it local and ancestral epistemologies adapted to their own needs.

◊　　**Solar energy:** The use of solar panels that can capture and then store the energy that comes from the sun, although not composed of organic materials, can be used to harness that energy and store it for later use. It provides autonomy by allowing us not to depend on electricity suppliers, and also allows us to plan a more efficient use of resources and to be aware of the different energy cycles.

◊　　**Low-fi lab**: A biolab can have many forms and components. We envision a low-environmental impact home laboratory that can serve as a structure for analysis and observation for learning-oriented purposes. This lab will have microscopes, sensors, cameras, microcontrollers to emphasize the observation of microorganisms that as humans we cannot easily perceive because we have lost that ability. The

idea of the pedagogical tools is to increase communication and horizontal connection with other species and agents.[3]

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3   In relation to the sensors, for example, in the dialogue with Cinthia Mendonça during our interview, said: "Our own bodily sensors have become more blurred; in big cities we barely see the moonlight because everything is illuminated all the time. [...] If a person lives in a place, they read that place. This happens with the city and with the countryside. In the countryside, people read the weather and the places. You, coming from an urban context, tend to need the sensor. Sensors can complement but not replace a capability. But sensors can be used as a pedagogical tool to discuss how we read the world. That could be interesting. So sensors can be used even in a playful way to show people how to read certain things in a slightly more scientific and precise manner. But the reading of the territory, which is more empirical, will not be precise, but it doesnt need to be. Science is not exactly precise, medicine either, this notion of precision is deceiving. Pandemics have shown us so, right? Of course, to conduct a controlled scientifical experiment, precision is needed. But beyond that, it is not necessary. So, I think sensors can be interesting as educational devices to help people who do not have a reading of that universe gain access to it. [...] I have a funny story about this: When I worked with garden sensors and once showed them to my parents, who are farmers, they thought it was absolutely useless. Plus, they were expensive. I worked with various sensors to capture: moisture, temperature, soil and air quality. I even had galvanic proximity sensors. Each time I worked with a different type of sensor. And then I produced images that were degenerative, based on these sensors projected in their place. This work was super beautiful, but my parents thought it was completely useless. And it was very funny, because for me, it was educational. I understood. I understood some things during this process, so I don't dismiss it. I think it's interesting, but not for solving problems, because if it were, there would be sensors everywhere."

2) Compost Engineers at work: decoding what could be our role in a regenerative system

Having the basic infrastructure established, we will conduct two months of immersive experiences with four collaborators. The idea is to invite people with mixed profiles that have different backgrounds, with special focus on experiences of biologists, makers, technologists, people from the agroecology movement, indigenous and quilombola movements and artists. Attentively, we wish to invite our interviewees Denise Alves-Rodrigues, Daniela Torres, someone from the Brazilian Association of Black Researchers (ABPN) and Articulação de Povos Indígenas do Brasil (APIB). Together with Cinthia Mendonça and the Silo community, and ourselves, the authors of this paper, we will engage with the other compost engineers that are already at work in the rustic garden: plants, fungi, bacteria, insects, animals, minerals…

In this phase of the prototype, through the observation of the rustic garden in which we will be interacting with, we will sketch the methodologies, procedures and approaches to develop the Compost Engineers Regenerative Systems. At hand we will have:

* **The Infrastructure:** the garden, its beings and us all operating as compost engineers
* **The Design framework**, mixing the three sets of principles
* **The Models of ancient technology**, which could be further detailed accordingly to the experiences and ancestralities of the people who join this phase

We believe that through that experiment, we could start to envision collective tools and work in symbiosis with the non-human compost engineers towards helping in the regenerative system. Tools and practices of technologies that instead of destruction promotes socio-environmental restoration and regeneration, for instance: regenerative agriculture systems where different living and "non-living" species (minerals, animals, plants) coexist with the aim of regenerating a specific space

affected by human intervention; bioremediation practices, such as those implemented through the presence of fungi or the use of certain microbes to clean water; pedagogies to redirect the production of digital technologies departing from components that are organic, renewable and whose production does not involve extraction and/or socio-environmental destruction, such as a bacteria computer or an internet of plants.

In this first immersion observing the Compost Engineers infrastructure we will develop methodologies, procedures and approaches to the production of tools to be implemented in the pilot. Based on the design principles of compost engineering, we will seek to develop working models and systematization of tools. The residents will seek to define procedures, models and forms of documentation, as well as identify infrastructural needs for their development.

3) Pollinator Capsules

Another task of these immersions will be to design a system of pollinator capsules that could be implemented in the pilot. The pollinator capsules are inspired by pollen grains that facilitate the fertilization of plants through the formation of seeds, fruits or new plants. The transfer of pollen can occur through various means (wind, water, animals, among others) which in turn often benefit by their own participation in the diffusion process. In this sense, we imagine the pollinator capsules as resources for the expansion and replicability of the practices, initiatives and tools developed within the framework of Compost Engineers Regenerative Systems. So implementation in other territories is also possible, but always in an adapted, respectful and situated way, without imposing practices or tools in a decontextualized way. The residences will be themselves pollinator capsules, but at the same time they will be able to return capsules of the project through "seeds" of the compost engineers.

Pilot phase

1) Decoding symbiosis and integrating regeneration

Based on the methodologies and procedures designed in the prototype phase, hold a second immersion, with a bigger group composed by people from the region and from outside, such as biologists, mycologists, herbalists, mães de santo, astrologers, people who have specific sights about herbs and gardens and could help us rethink the garden and technology. Plus, technology experts (programmers, hardware producers, administrators, etc) to learn from other technological models, to develop:

a. tools that compose the regenerative system of the compost engineers
b. produce the pollinator capsules
c. hold workshops with the Compost Engineers where the principles of this investigation and practices are shared
d. Implement one or two of the experiments in other contexts, testing its replicability.

2) Archive of Compost Engineers Technologies

We want to affect the field of AI by incidence through contamination, through symbiosis, that is why documenting, pollinating, hosting spaces and communicating the ideas, processes and practices developed by and with the compost engineers. Contamination through symbiosis is different from, lets say, going to tech companies to explain to the programmers that they have to be more inclusive, because its based on practice, on situated experiences in which other intelligences are valued and, by that, relations are changed. Specifically the archive will be composed by at least 5 tools/programs/apps inspired by the principles of the compost engineers. A platform for documentation and exchange of experiences.
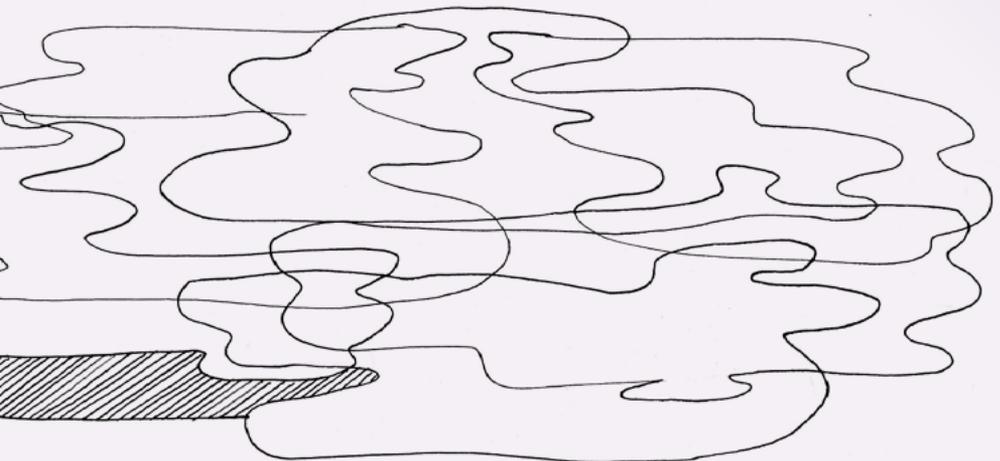
About the authors

Joana Varon is Brazilian, with Colombian ancestry, Founder-Directress and Creative Chaos Catalyst at Coding Rights, is a feminist organization that contributes to the debates about the development, implementation and regulation of technologies from a collective, transfeminist, decolonial, and antiracist perspective of human rights, through creativity and hacker knowledge it seeks to stimulate imaginaries and actions that challenge power inequalities. Alumni at the Berkman Klein Center for Internet and Society at Harvard University. Former Technology and Human Rights Fellow at the Carr Center for Human Rights Policy from Harvard Kennedy School and Mozilla Alumni as former Media Fellow. Feminist and human rights advocate, she has more than 15 years of experience in influencing debated on internationals arenas of tech governance, from diplomatic to technical foras, like the Internet Engineering Task Force (IETF), where she was part of the group of researchers who kick-started the working group on Human Rights Considerations for Standards and Protocols. She is also co-creator of several projects operating in the interplay between activism, arts and technologies, such as transfeministech. org, cartografiasdainternet.org, museamami.org, chupadados.com, #safersisters, Safer Nudes, protestos.org, Net of Rights and freenetfilm.org.

Lucía Egaña Rojas studied Art, Aesthetics and Creative Documentary, and has a PhD in Audiovisual Communication. As an artist she works on projects that problematize the construction of social imaginaries and the sources of hegemonic knowledge. Her projects are formalized through artistic production, writing, research, pedagogy and self-institutional practices. Her artistic work cannot be circumscribed to a specific medium and can be consulted at http://luciaegana.net. In the educational field, she circulates between academic spaces and informal pedagogies. She has been a teacher and part of the academic direction of the Independent Studies Program, PEI, of the Museum of Contemporary Art of Barcelona (MACBA), associate professor at the Faculty of Fine Arts of the University of Barcelona, guest lecturer at the Master of gender at the University of Chile and the master MUECA (UMH). Wi-

thin the transfeminist activism, she has been an organizer of the Muestra Marrana postpornography festival and in 2011 she made the documentary "Mi sexualidad es una creación artística" and currently co-directs the *Instituto de Estudios del Porno*. Her writing work explores different formats, from fiction to essay, through poetic prose, manifesto and academic text. She has published Enciclopedia del amor en los tiempos del porno (Cuarto propio, 2014; Trío editorial, 2020), Atrincheradas en la carne. Lecturas en torno a las prácticas postpornográficas (Bellaterra, 2018), Acá soy la que se fue (tictac ediciones, 2019), Una cartografía extraña (Metales Pesados, 2021), La cultura no es una autopista, los museos podrían ser jardines (ASM, 2024), La dimensión material de las nubes (Pluri Ediciones, 2024), among others. Her artistic work is expressed a lot in collective, where she participates in the Musea M.A.M.I, the Centro de Estudios de la Naturaleza Extractiva (*CENEx*) and *Pluriversidad* Nómada, a project promoted together with Quimera Rosa. Her main interests have to do with feminisms, methodologies, technology, north-south power relations, colonial and migratory processes, extractivism and error.