# MÁQUINAS DE *INGENIO*

ARTEA, ZIENTZIA,
TEKNOLOGIA
ETA GIZARTEA

ARTE, CIENCIA,
TECNOLOGÍA
Y SOCIEDAD

ART, SCIENCE,
TECHNOLOGY
AND SOCIETY

# *JAKINTZEN* BIDEGURUTZEAN

2023.11.24 → 2024.02.04

*Máquinas de ingenio. Jakintzen bidegurutzean* presents a series of prototypes resulting from intense work processes that Tabakalera has driven around the Art, Science, Technology, and Society (ACTS) focus in recent months. These are projects that have been spearheaded by artists and developed in close collaboration with scientists from the leading research centres in our environment and citizen communities associated with Tabakalera.

The exhibition presents a series of prototypes that, in the form of an art installation, show a new way of working at the intersection between art, science, and technology to jointly address questions linked to the challenges of our time that so deeply impact society, including touching on sustainability and technology's impact on our lives.

This area of work started three years ago at Tabakalera and is aligned with STARTS (Science, Technology and Arts), the European initiative that "intends to more closely connect technology and artistic practice to address the social, environmental, and economic challenges Europe is facing by focusing on the idea that art, science, and technology can benefit from shared perspectives, opening up new channels of research and business." ("Culture and Creativity", 2021. European Commission).

The idea behind these collaborations is that, in the face of increasingly complex challenges, the search for solutions does not remain solely in the hands of techno-scientific spheres, but is shared by artists and different sectors of society that must also participate.

With its firm mandate to encourage innovation and artistic production, in constant contact with different social groups, and in a context that highlights top-tier research centres, Tabakalera emerges as an exceptional platform for driving this interactive research between the areas of art, science, technology, and society.

This was the reason why Tabakalera was selected as one of the sites for CIRCE (Creative Impact Research Center Europe), the German Federal Government-backed project for experimentation and research around cultural innovation.

CIRCE's support has been fundamental to the development of these prototypes, as has the generous collaboration of Tekniker, DIPC, BCBL, and BCC Innovation.

We at Tabakalera would like to thank these organisations for their involvement, with special mention to the artists and citizen groups that have participated in the SummerLab meeting and to the exhibition's curator, Maria Ptqk.

# MÁQUINAS DE *INGENIO*

# *JAKINTZEN* BIDEGURUTZEAN

The title of the exhibition, "máquinas de ingenio" (ingenious machines), is a reference to the name given to the inventions incited by the advancement of science after the Renaissance. These devices, which represent the technical avant-garde of their time, are very much experimental in nature: they are prototypes, trials in the testing phase that today we call "permanent beta". They are also practical and localised, as they provide specific responses to the needs of their social context. And they are also the fruit of combined talents: collaborative works, created in "workshop mode", involving artists, craftsmen, scientists, designers, philosophers, poets, engineers and mathematicians. Or perhaps people who bring together all these skills, known as "polymaths" (from the Greek *polumathēs* meaning diverse knowledge).

In a similar vein, the prototypes in this exhibition are products of the meeting point between four artists and four scientific research projects. Thus, the exhibition brings together four prototypes developed during 2023 in the CIRCE (Creative Impact Research Centre Europe) programme.

Alongside the newly produced pieces, also on display are the works and documentation from previous projects, promoted by Tabakalera in the ACTS (Art/Science/Technology/Society) line of work, initiated in 2020.

In this context, the exhibition *Máquinas de ingenio. Jakintzen bidegurutzean* shows the enormous diversity of the ACTS field. Studies on robotics, neuroscience, nutrition, data visualisation and engineering dialogue with the languages of art and speculative design, resulting not in a sum of specialities but in a flow of connected practices, not in a work or final product but in an environment of encounter and reflection on contemporary technoscientific culture, its power and challenges.

# *EXOGRAFÍAS*

## AMAIA VICENTE
in collaboration with Gogoa and Tekniker



Video frame. Credit: Gheada

Exoskeletons, like the one shown here, are prostheses used for the controlled activation of the body's motor functions. They are used in neurophysical therapies, for example in patients with multiple sclerosis like Amaia Vicente, who was diagnosed in 2002. Creative experimentation around the boundaries between machine and organism, like this piece and many other artworks, raise questions about what is considered a "normal body", as well as about technology's ability to influence the plasticity of the brain and learning processes.

The exoskeletons work with pre-designed software, connected to sensors on the soles of the feet. For people diagnosed with multiple sclerosis, these signals are interpreted as a "lack of strength" or "lack of balance", which generates an algorithmic response that shows the exoskeleton "the right way to walk". The robot thus guides the patient's body, using a fixed and previously established body pattern, unique for each individual. The video, made using augmented reality glasses, shows this interaction between the patient-artist and all the hardware and software that brings the exoskeleton to life.

The familiar idea around human-machines, represented first by robots and then by cyborgs, has been a common theme throughout cultural history since the beginning of the 20th century, often seen in science fiction cinema and literature, but also in performing arts, as

well as in the vast array of media practices that are nowadays grouped together under the broad label of HCI (human-computer interaction). These approaches propose a critical reading of the material and semiotic boundaries between body, mind, culture, nature and technology – permeable categories that can be hacked, subverted and rewritten. Who decides the "right gestures" that will become code? What criteria defines the differences between strength and weakness, balance and imbalance, functionality and dysfunctionality, healthy body and sick body? What model of body and subject inspires them? Amaia Vicente, who uses exoskeletons for therapeutic but also artistic purposes, experiments with the possibilities of negotiation between these categories, a negotiation that is as much scientific as it is technical and political.

The memory contained in gestures, sensory perception, processes of imitation that sustain learning and the symbolic systems that make up culture enter into dialogue with a whole visible and invisible machinery made up of biosensors, microelectronic boards, programming languages, mathematical algorithms and augmented reality devices, which blend and merge into one another. If the history of robotics shows how humans project ourselves onto objects of our own invention, the development of increasingly complex systems of human-machine interaction shows that the influence is reciprocal. We are creators of our machines at the same time as we are created by them, in a dynamic and thriving loop. This leads more and more artists, thinkers and scientists to question

the autonomy of these potentially intentional systems, their agency, their status as "actants" or even their subjectivity. This is what Amaia Vicente calls "the fictions of the (im)material body".

For citizen science, the use of exoskeletons also raises questions about privacy and surveillance, about the use of biodata obtained in therapies and medical research projects, and about the need to distinguish between uses intended, on the one hand, for the advancement of scientific knowledge and the development of public health policies and, on the other, for the design of commercial products, regulated by patents and proprietary licences. Collaborative design practices, based on open-source ethics and DIY-DIWO (do-it-yourself, do-it-with-others) methodologies, point to new horizons for research with robots and other artificial devices, at the crossroads between artistic experimentation and biotechnological activism.

CREDITS

Work produced by Tabakalera

Artistic direction and research:
Amaia Vicente

Collaboration Tekniker:
Ane San Martin, Johan Kildal, Jesús Alonso

Collaboration Gogoa:
Carlos Fernández Isoird, Guillermo Asín Prieto,
Galder Arego Isoird, Miguel Aguilar Sanchez.

Director's assistant and video director:
Pablo M. Garrido

Scenography, mapping and hologram:
Raquel Durán, Rut Briones (Gheada)

Design of the space, interface, video, lighting,
mapping, hologram:
Raquel Durán, Rut Briones (Gheada), Pablo M.
Garrido, Santiago Noreña Sobrado, Medialab
Tabakalera

Hairdressing:
Ana Marcos Meno (Mínima Ana)

Makeup:
César del Arco (Háptica Bilbao)

Costumes:
Alberto Etxebarrieta (Sinpatron)

# C. EL PUNTO JUSTO DEL CONFLICTO COGNITIVO

## LAURA MM

in collaboration with the Basque Center on Cognition, Brain and Language (BCBL)



This installation questions the infancy of C, an AI or artificial intelligence entity, which, driven by the desire to be an artist, converts the signals created by users into a generative work of art. The starting point is research into the brain's reactions to visual stimuli, which in neuroscience are called "incongruent images" and are commonly used in advertising to capture people's attention as well as in some of the works of the surrealist movement. According to the study, the response to these images is similar to that in situations of "cognitive conflict".

In the research carried out at the BCBL by Manuela Ruzzoli and her team, cognitive conflict is defined as "the simultaneous activation of incompatible competing representations". This is what happens in the famous "This is not a pipe" –

the famous painting by René Magritte depicting a pipe accompanied by a sign stating that it is not one – and in a multitude of advertising campaigns that exploit the communicative power of strangeness. These strategies have a neuroscientific basis. At any given moment, depending on the circumstances, our brain predicts what is most likely to happen next. But when that expectation is contradicted, there is an increase in brain oscillations in the Theta frequency band (4-8 Hz) and an activation of the anterior cingulate cortex (ACC) and other areas of the brain associated with attention and learning.

C, the artificial intelligence entity that welcomes us in the installation, is inspired by the protagonist of the fairy tale *Goldilocks*, the girl who has to choose between three bowls

of porridge and chooses the one at the right temperature, neither too cold nor too hot: the optimum. The artist Laura MM questions if an optimum in cognitive conflict that could guide the learning of a young artificial intelligence exists. Little C, who dreams of becoming an artist, is trained to create images with the help of the exhibition audience, who are invited to participate in three types of behavioural games, similar to those used in neuroscience. The public's responses are processed by image-generating software, programmed by the artist in collaboration with the open group on neurohacking that has accompanied the research in Tabakalera's Medialab, which creates a new image for each visitor. Each new visualisation adds to the previous ones in the same way that each experience creates a new layer in our personality. Visitors thus contribute to the *mothering* of this growing AI, installed in a domestic, caring and nurturing environment.

The work uses artificial intelligence systems, such as generative software, to reflect on these technologies that are now in their first years of life and that we, the users, are helping to educate. Like any type of learning, AI learning is based on the copying and repetition of previous models, which raises questions about the perpetuation of stereotypes in programming languages. The rhetoric of the "artificial" nature of AIs also hides the fact that their training relies on huge amounts of human labour, precarious and outsourced through online platforms. As with human intelligence, the nurturing of artificial intelligence involves monotonous,

tiring, undervalued and invisible tasks that, behind the veil of automation, naturalise cultural patterns and the division of labour. But the future of AIs is not set in stone: other training models lead to other evolutions, other stories of artificial life.

CREDITS

Work produced by Tabakalera

Artistic direction and research:
Laura MM

Collaboration Basque Center On Cognition, Brain
and Language (BCBL):
Manuela Ruzzoli, Marta la Pietra

Collaborator group:
Grupo abierto Neurohacking Medialab
Tabakalera

Design, editing and production of pieces:
Laura MM

Design of neuronal games:
Manuela Ruzzoli, Marta la Pietra

Software development:
Creative Bravo MM

3D Design and production:
Jose Luis Martínez, Medialab Tabakalera

Video voice-over:
Lisa Armstrong Lallier

Collaborators:
Egoitz Aulestia, Mikel Malagón

## ELSA YRANZO
in collaboration with the Basque Culinary Center (BCC Innovation)



*Sugar Detox Clinic* is a detox clinic that treats sugar addiction, a piece that lies between a parody of the therapy industry and a futuristic dystopia of a society controlled by sweetness. The treatments, tailored to various consumer-addict profiles, are based on sensory studies that show that the perception of taste is influenced by the five senses: taste and smell as well as hearing, touch, and sight. The aim of this research is to design foods that taste sweet but have less added sugars.

This prototype is based on Elena Romeo's thesis "Cut down on sugar, not on taste!". Directed by the sensory department of the BCC Innovation, it focuses on the so-called "multimodal interactions" which explain that the perception of taste depends on the combined activation of the five senses. We have all noticed that food tastes different depending on the context, depending on whether we eat alone or in company, in one environment or another, in a certain light or at a certain temperature. Now, thanks to these studies, we know that there is a scientific explanation for this. The sweetness in particular is perceived more combined with high-pitched sounds, soft textures, colours in the range of reds from pink to orange, and aromas of fruit, vanilla or cinnamon. Even geometry influences taste: right angles diminish sweetness while round shapes emphasise it. For the food industry, this discovery makes it possible to design products that, without losing flavour, reduce the

added sugars in almost all ultra-processed products.

Human beings have an innate preference for sweetness. Myths abound with tales of fruit, honey and sugary delicacies symbolising desire and prohibition. With the development of industrial food, sugar has become a popular and ubiquitous product, present in almost everything we put in our mouths. Our relationship with it is also cultural and psychological, an aspect present in *Sugar Detox Clinic* through the different experiences it provides to the patient. Inspired by ideas of diet as a control mechanism, sweets as reward, the association between sweets and childhood regression or compulsive behaviour, the fears linked to the image of the body and health, and so on, this clinic takes the confusion between remedy and disease to the extreme. In *Sugar Detox Clinic*, addiction is treated with the product that probably best represents our complicated relationship with sugar, the most perverse of sweets: the gumdrop.

Designed in collaboration with the BCC Innovation and the Food Hack Lab collective, the five gumdrops offered as a treatment plan, that correspond to each type of diagnosis, are both a prototype of food innovation and a smaller piece within the work. As a sensory experience, gastronomy is hailed as an art that combines creative skills and scientific knowledge. The kitchen is a social place as well as a domestic laboratory. In *Sugar Detox Clinic*, this multiplicity is approached through speculative design which, in the words of the Dunne and Raby collective, is characterised by the fact that it does not work with objects but with ideas. If industrial design creates artefacts for the market, products that respond to a problem or a need, speculative design investigates concepts, and provides questions or experiences that broaden the points of view on this problem.

CREDITS

Work produced by Tabakalera

Artistic direction, conceptualisation and design:
Elsa Yranzo

Collaboration BCC Innovation:
Nahuel Pazos, Elena Romeo

Collaborator group:
Grupo abierto Food Hack Lab

Video editing and director's assistant:
Luis Garí

Visual concept design and copy:
Max Altés

Sweet prototyping:
Varsha Lai, Jon Aldalur, Andoni Munduate (Food
Hack Lab)

Technical production:
Genialidades

Design implementation:
Makeat

# COMPOST COMPUTACIONAL

## MARINA OTERO VERZIER

in collaboration with the Donostia International Physics Center (DIPC)

This project addresses the present and future environmental impact of data storage. Although the metaphor of the cloud leads us to believe that digital information is volatile, in reality it is supported by gigantic physical infrastructures that demand more and more energy, water and raw materials.

*Compost computacional* explores the architectures of data centres through two devices: a vermicomposting system that works with the energy produced by astronomical simulation software; and a film whose protagonist is the quipu MCHAP 0780, a pre-Columbian calculating machine and technological fossil that offers some ideas on how to imagine another digital future.

"We were promised a cloud and yet we are now faced with a heavy, resource-hungry structure," is how Marina Otero

Verzier defines the contrast between the idea of data as an ethereal entity and the reality of the infrastructures that store it. In addition to energy, data centres need large amounts of water for their cooling systems, which strains the water resources of the areas in which they are located, especially in places already affected by drought and global warming (such as Talavera de la Reina in Toledo, where Meta wants to build a data centre with an estimated consumption of 4,800 million litres of water per year). These facilities also emit heat and $CO_2$, and often cause population displacement and imbalances in economies and ecosystems.

The question underlying *Compost computacional*, which continues the *Future Storage* research for which Otero Verzier received the 2020 Wheelwright Prize for architecture,

is how this type of infrastructure, which is already stretching existing resources to the limit, will be able to sustain the future deployment of artificial intelligence, the metaverse and the Internet of Things. This project investigates alternatives for storing data on the ocean floor, in outer space or in synthetic DNA molecules (an option also explored by the *Clouds of Pollen* prototype, produced by Tabakalera in 2020). But *Compost computacional* also questions the relationship between data storage and collective memory. If the growth of data centres is unfeasible on a finite planet, what part of this immense archive deserves to be considered as digital heritage and passed on to future generations? And how will we deal with the mourning of collective memory lost in the promise of the cloud?

In collaboration with the Donostia International Physics Center, *Compost computacional* explores these questions through two devices that function as gateways to the system. On the one hand, the team has developed a vermicomposting machine that is powered not only by organic waste, but also by the heat of the software used by the DIPC to simulate the origin and expansion of the universe. It is an example of macro-processing of information in every sense: the use of huge amounts of data in an attempt to comprehend the incommensurable nature of the cosmos. On the micro side of the system, earthworms and micro-organisms feed on this computational energy to create fertile soil, the humus that sustains life in its most primordial form. Astronomical simulations coexist with processes of metabolisation and fermentation, decomposition and regeneration, and celestial bodies and unicellular beings become united by the metamorphosis that runs through all the cycles of matter.

At the same time, the work also includes a film starring a singular entity: the quipu MCHAP 0780, currently exhibited at the Museo Chileno de Arte Precolombino in Santiago. The quipu is a data recording technology used by the Incas, which was based on a writing system with knotted strings according to a binary and decimal code. We do not know exactly how they worked or what data they contained, but we do know that they could store a lot of information (MCHAP 0780 has 586 strings that can hold more than 15,000 pieces of data) and that they were also used as astronomical instruments. Vestiges of an extinct technology that we can no longer decipher, the quipus have survived to this day with all their enigmas and warnings. Through this combination of narrative and technical experimentation, *Compost computacional* explores data storage, ighlighting the political dimension of infrastructures, the ecological and cultural impact of design decisions, and the urgency of critically rethinking the narratives of the digital future.

## CREDITS

Work produced by Tabakalera

Artistic direction and investigation:
Marina Otero Verzier

Collaboration Donostia International Physics Center (DIPC):
Txomin Romero, Silvia Bonoli, Raúl Angulo, Jens Stücker, Fernando Álvarez González (UPV-EHU)

Collaborator group:
Summerlab Medialab Tabakalera

Project coordination and research:
Claudia Paredes Intriago

Film direction:
Francisco Lobo & Romea Muryń (Locument);
Marina Otero Verzier

Editing:
Francisco Lobo & Romea Muryń (Locument)

Additional cinematography in Chile:
Diego Cabezas

Sound design:
Gaspar Cohen

Prototype design:
Marina Otero Verzier

Prototype development:
Claudia Paredes Intriago, Fernando Fernández Sánchez, Pablo Saiz del Río

Technical consultancy, digital systems design and vermiculture:
Fernando Fernández Sánchez

Technical consultancy, exhibition design and structural systems:
Pablo Saiz del Río

3D modelling:
Claudia Paredes Intriago, Jacinto Moros Montanes, César Arenas, Xabier Abel Martínez
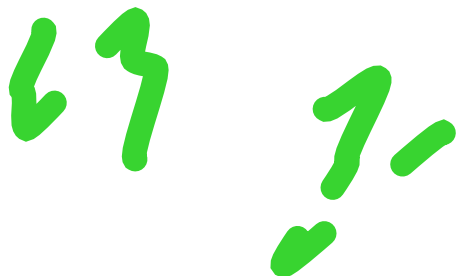
Technical consultancy:
Felix Casanellas

Technical production:
Rocco Roncuzzi

Advisors:
Ibai Zabaleta, David Pello, Eduardo Bendek, Arantzazu Luzarraga, RISE

Other collaborator institutions:
Barcelona Supercomputing Center - Centro Nacional de Supercomputación; Museo de Arte Precolombino de Santiago, Chile

Along with these new productions, the exhibition shows a broad perspective of Tabakalera's line of work at the crossroads of art, science, technology and society, and the various ongoing collaborations between artistic collectives and scientific organisations since 2020.

One of these prototypes is *Clouds of Pollen*, by the Grow Your Own Cloud collective (Monika Seyfried and Cyrus Clarke), in collaboration with physicist Steen Rasmussen and the Donostia International Physics Center (DIPC),

Tabakalera, consisting of a robotic arm that translates the dreamlike narratives of the participants into pictorial representations. Another is *Holobot. Social Garden* by VR Kommand in collaboration with Kuka, in which the device creates an installation with holograms and light components based on people's behaviour on social media.

In the exhibition, these previous prototypes are shown through audiovisual documentation, except for one of them, which is also exhibited



*Supraespectives*, Quadrature. Tabakalera, 2020

Aiming to address the same problem as *Compost computacional*, this work explores one of the most innovative lines of research for the future of digital storage: the conservation of data in synthetic DNA molecules.

In addition to the previously mentioned *Exografías*, two other prototypes have been developed with the company Tekniker that explore the field of HCI (human-computer interaction) for innovation in the design of industrial machinery. One is *Dream Painter* by the Varvara & Mar collective (Varvara Guljajeva and Mar Canet) in collaboration with Medialab

in an installation format. This is the work *Supraspectives*, produced by the Quadrature collective (Juliane Götz and Sebastian Neitsch) in collaboration with the Donostia International Physics Center (DIPC) and the Ars Electronica Festival. Using data from 590 spy satellites, a third of which are space junk because they are obsolete or damaged, the work calculates their trajectories in real time and speculatively reconstructs the images of the Earth that the satellites could be capturing.

**TABAKALERA**

**CENTRO
INTERNACIONAL
DE CULTURA
CONTEMPORÁNEA**

Plaza de las Cigarreras, 1
20012. Donostia / San Sebastián

EXHIBITION HALLS
Tuesday to Sunday
12:00-14:00 / 16:00-20:00
Closed on Mondays

INFORMATION
T. +34 943 118 855
E. info@tabakalera.eus

OFFICES
T. +34 943 011 311
E. tabakalera@tabakalera.eus

tabakalera.eus