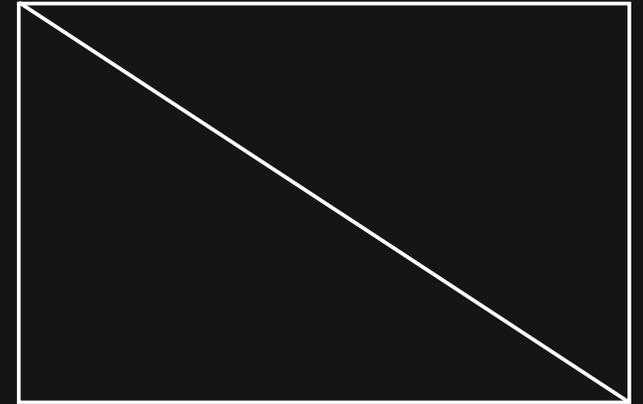
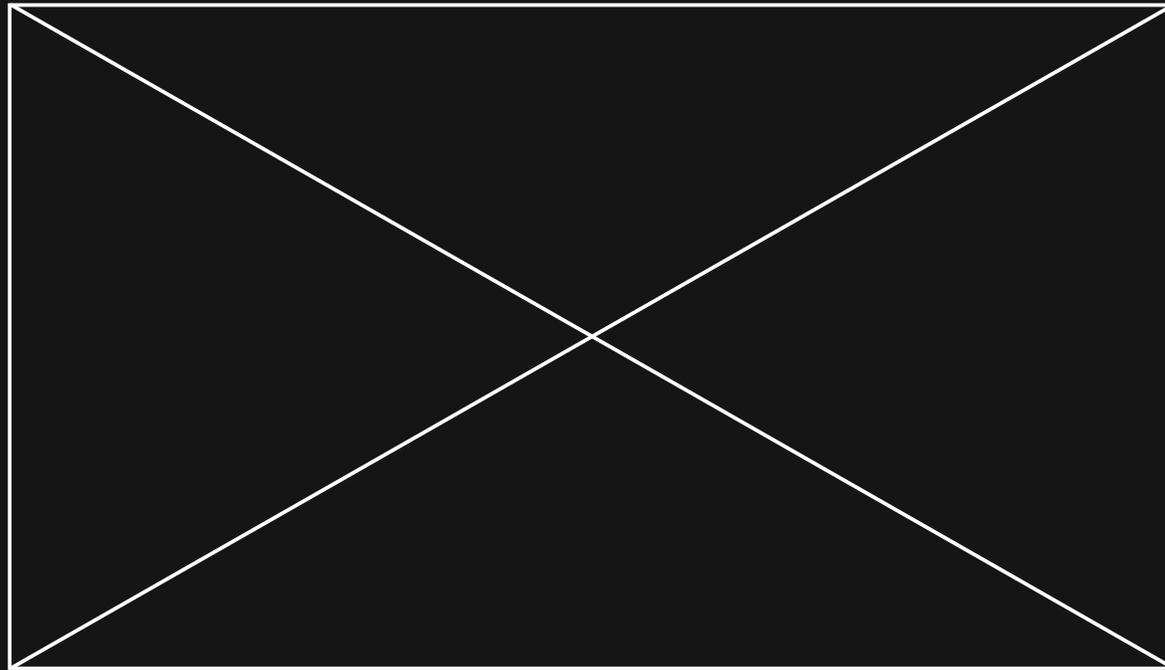


Elisava Insights

75 Challenges Faced
by Humans and the Planet



An
Innovation
Report by
Elisava
Research

Table of Contents

01. Foreword	04
02. Insights	08

 Human	10
 Information	42
 Materials	80
 Technology	128
 Society	162

03. Dialogues	210
04. Overview	240
05. Experts	264
06. References	254

01. Foreword

Hello.

We are a team of design and engineering university researchers. Our role is to generate and transfer knowledge to inspire, educate, instigate change and shake the system. We act as a blend of a research-driven studio, a creative think & do tank, and a research training programme. We deliver academic excellence, strategic resilience, quality engagement and creative attitudes.

Design and engineering research are transdisciplinary agents for innovation, and more than ever creativity is a driver for purposeful transformation. We understand the design and engineering disciplines not only as research fields in their own right, but also as being intrinsically in dialogue with other areas of knowledge, that we have appointed as Human, Information, Materials, Technology and Society. The interaction between design and engineering and these knowledge areas can make an impact in the following ways:

Design/Engineering + Human

Towards improving the quality of life and integral well-being of individuals.

Design/Engineering + Information

Towards innovative and meaningful ways of communicating.

Design/Engineering + Materials

Towards environmental and cultural responsibility through materials development and new production processes.

Design/Engineering + Technology

Towards meaningful applications of technology and extended intelligence.

Design/Engineering + Society

Towards social and systemic innovation and critical thinking that supports emerging cultural megatrends.

As researchers, we are constantly asking ourselves the question: What role do design and engineering have in responding to present and future challenges? And which are those challenges?

This Elisava Insights report precisely addresses our 75 identified challenges faced by humans and the planet. Each Insight sheds light on a specific context, its challenge, and references in terms of agents, existing projects and existing literature, where you can dive deeper on. We have identified challenges such as: Can we increase the potential to empathise with not just other humans, but perhaps other species and ecosystems? How do we raise awareness on the importance of empathic communication in the digital era? Which materials can help us mitigate climate change? How to promote sense-making relationships with automated machines? How to explore and experience different realities? How can design help de-growth? How can design promote democratic values and fight misinformation?

You will find in this report 15 Insights per each Elisava Research knowledge area (Human, Information, Materials, Technology, Society), identified by our Elisava Research experts: Luis Fraguada, Pau García, Clara Guasch, Varvara Guljajeva and Toni Llàcer respectively. As part of the content, we have included the transcriptions of the five Elisava Insights Dialogues, a series of live conversations with these experts, performed during our global lockdown, and addressing the challenges and their impact on our daily lives.

This report is a knowledge package that can be activated by using it as a co-creation toolkit:

→ within the Elisava ecosystem for the formulation of future innovative undergraduate and graduate students' projects and the identification of topics for research.

→ with our current and future stakeholders (such as international university partners, technological centres, companies and institutions) for creative strategic foresight and as a starting point for collective dialogue and transdisciplinary synergies.

→ with the wider public for societal awareness on what are the challenging transformations for humans and the planet, since these 75 insights represent the emerging signals for new lifestyles and provide visions of the new and next.

The Elisava Insights project is just a manifestation of our role to generate and transfer knowledge in order to instigate change, providing a tool for creatively driven economical, societal or even political transformations beyond our ecosystem.

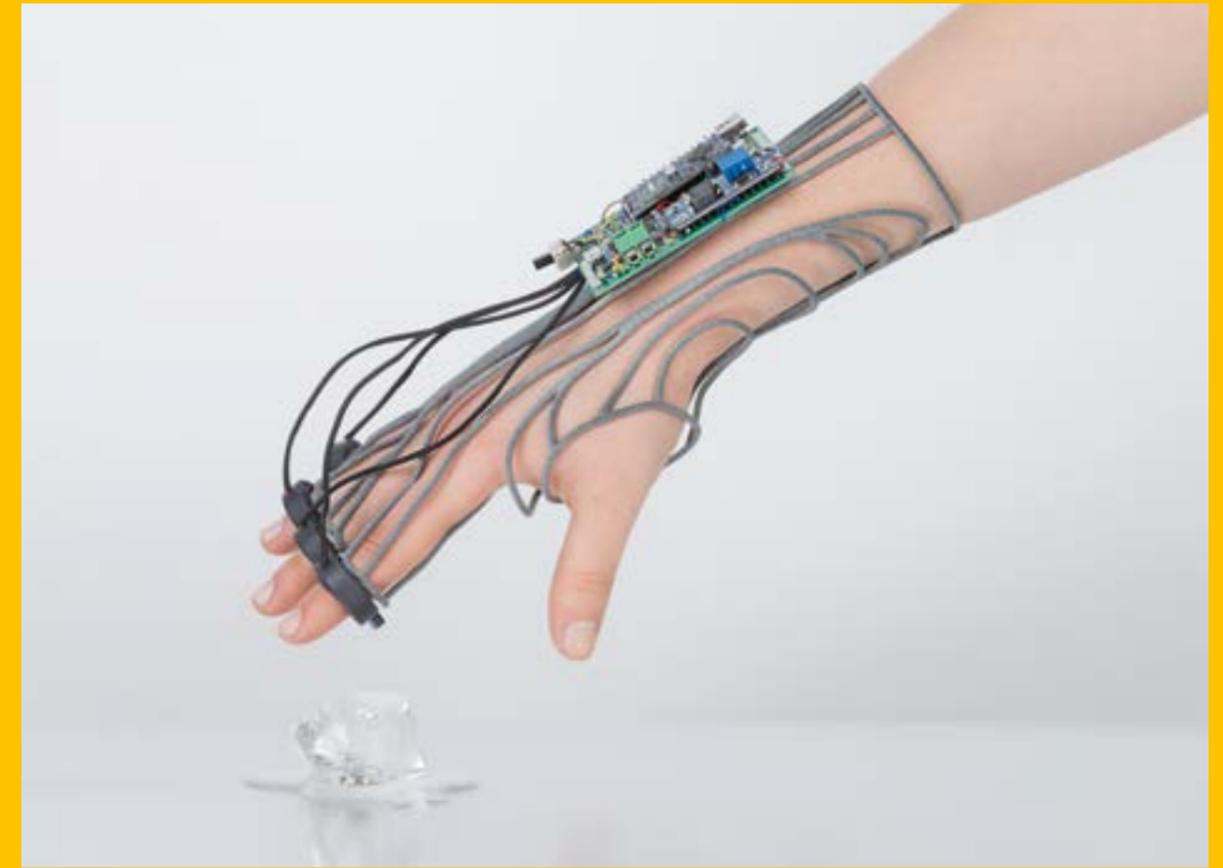
Looking forward to your feedback and hoping to co-create soon.

Laura Clèries
& Elisava Research team.

02. Insights

-  Human
-  Information
-  Materials
-  Technology
-  Society

Ⓜ Human



H#00

Are humans equipped to deal with the societal and existential challenges of our era?

There is a shift from interpreting or regarding the world in terms of human values and experiences (anthropocentrism) to a philosophy or perspective that places intrinsic value on all living organisms and their natural environment, regardless of their perceived usefulness or importance to human beings (ecocentrism).

We can increase the potential to empathise with not just

other humans, but perhaps other species and ecosystems by redesigning our biology. Moreover, in face of a technological takeover, humans strive to make a statement of our intrinsic, differentiating and valuable emotional nature. Mental health and emotional imbalances are unveiled and embraced as part of our existence, recognised and un-tabooed. With the rise of the 'mindfulness' movement, we demonstrate our inner power to achieve a somehow holistic consciousness of our being in this world.

INSIGHTS

- #01 Intergalactic Empathy
- #02 Post Earth
- #03 Post Fashion
- #04 Near Space
- #05 Augmented Senses
- #06 Remote Interaction
- #07 Dermal Interfaces
- #08 Healthy
- #09 Spiritual
- #10 Emotive
- #11 Self-Design
- #12 Morphing
- #13 Phygital universes
- #14 Adaptive survival
- #15 Anonymous in public

Insight #01

Intergalactic Empathy



H#01

Context

Our technology for the first time has travelled outside of our local solar system (Voyager 1 and Voyager 2 Space Probes). We are developing instruments that allow us to look farther out in space than ever before, discovering many new stars, planets, black holes and other celestial bodies.

Challenge

Can a personal connection with a distant celestial body help us to appreciate the uniqueness of our own ecosystem?

Hashtags

#AugmentedEmpathy

#IntergalacticEmpathy

Agents

→ [Agustina Palazzo](#). Artist who in free fall inhabits digital uncertainty; interested in human behaviour, their desires and misunderstandings.^{H#01}
→ [Afroditi Psarra](#). Multidisciplinary artist and an Assistant Professor of Digital Arts and Experimental Media (DXARTS) at the University of Washington.
→ [Audrey Briot](#). Cofounder of DataPaulette, a multidisciplinary collective focused on research and development in textiles and digital technologies.

Reference Projects

→ [Listening Space, by Afroditi Psarra and Audrey Briot](#). To explore transmissions ecologies as raw material for artistic exploration, while regarding knitted textiles as a physical medium for memory storage and archiving.

Reference Literature

→ [“Listening space: Satellite Ikats,”](#) article by Afroditi Psarra and Audrey Briot.

Insight #02

Post Earth



H#02

Context

While there are attractive and inspiring reasons for humanity to aspire to become an interplanetary species, there are also some significant challenges and realities which might push that endeavour to become a reality. While it will be years or decades before humanity steps on another planet, designers today are starting the work of creating the habitats we will need to keep us alive when we arrive.

Challenge

Are we prepared to move our societies and become an interplanetary species?

Hashtags

#PostEarth

#InterplanetarySpecies

Agents

→ [Xavier De Kestelier](#). Head of Design Technology and Innovation at Hassell studio.

→ [Daniel Inocente](#). Architectural innovation through the building sciences and computational design, currently at SOM.

Reference Projects

→ [NASA 3D Printed Habitat Challenge, by Hassell](#). If there was life on Mars, where would people live – and what would it look like?

→ [Moon Village, by Skidmore, Owings & Merrill \(SOM\)](#). Together with the European Space Agency (ESA) and faculty at the Massachusetts Institute of Technology (MIT), SOM is implementing new methods for master planning, designing, and engineering the settlement. ^{H#02}

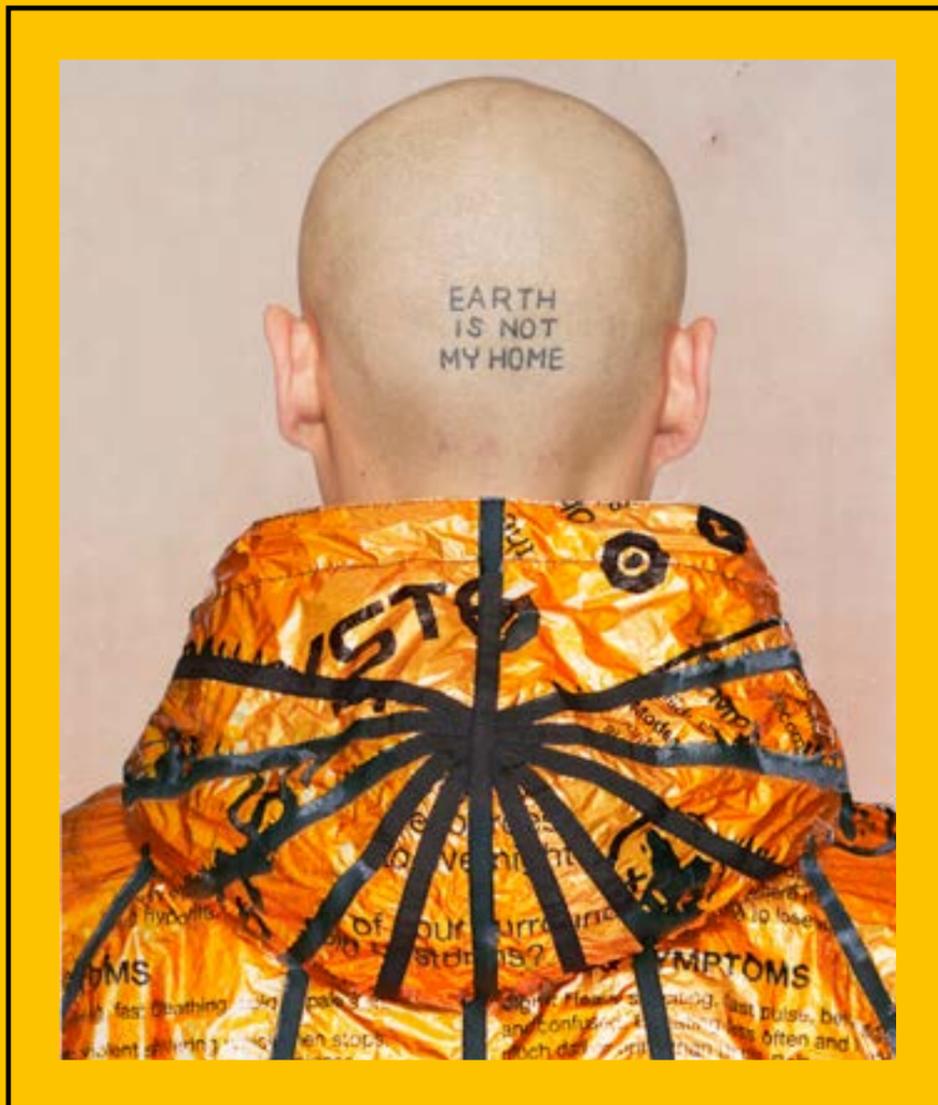
Reference Literature

→ [“Engineers and Architects Are Already Designing Lunar Habitats,”](#) article by Matthew Hutson.

→ [“Master Planning and Space Architecture for a Moon Village,”](#) article by Daniel Inocente, Colin Koop, Georgi Petrov, et. al.

Insight #03

Post Fashion



H#03

Context

Functional clothing differs from what we wear every day in that it usually needs to meet specific performance criteria. Thus, the endeavour to design functional clothing typically starts as an engineering challenge rather than an aesthetic one. This challenge becomes even more critical when coupled with limited or scarce material resources.

Challenge

What will we use as a interface to new ecosystems and what are the fashion aesthetics of necessity and post consumerism?

Hashtags

#PostFashion

#PostConsumer

#PostConsumerism

Agents

→ [Dava Newman](#). Professor at the Massachusetts Institute of Technology (MIT) and a Harvard–MIT faculty member.

→ [Christopher Ræburn](#). A collaborative, creative fashion studio where daily design meets responsible production.

Reference Projects

→ [The MIT BioSuit™](#), by [Dava Newman](#). A skintight spacesuit that offers improved mobility and reduced mass compared to modern gas-pressurised spacesuits.

→ [New Horizons SS20 collection](#), by [Ræburn](#) in collaboration with [Xavier de Kestelier](#). Inspired by the make- do-and-mend approach on Mars; an opportunity to rethink our approach to making, living and consuming. ^{H#03}

Reference Literature

→ [“Materials and Textile Architecture Analyses for Mechanical Counter-Pressure Space Suits using Active Materials,”](#) article by Bradley Holschuh, Edward Obropta, Leah Buechley and Dava Newman.

→ [“What will humans wear on mars?,”](#) article by Danielle Wightman-Stone.

Insight #04

Near Space



H#04

Context

The overview effect represents a cognitive shift in awareness reported by some astronauts during spaceflight, often while viewing the Earth from outer space. The term and concept were coined in 1987 by Frank White author and founder of the Overview Institute.

As humans endeavour beyond our planet and commercial spaceflight becomes financially viable for more people, it can be assumed more humans will experience this profound cognitive shift which has the potential to spark ecocentric sympathies.

Challenge

How can we inspire humanity to become stewards of our ecosystem?

Hashtags

#OverviewEffect

#NearSpace

Agents

→ [José Mariano López Urdiales](#). Aeronautical engineer; CEO and Founder of Zero2Infinity.

→ [The Overview Institute](#). Researching and educating both the space community and the general public on the nature and psychosocial impact of the space experience.

Reference Projects

→ [Bloon, by Zero2Infinity](#). An experience trip in a pleasant environment, to enjoy of a spectacular view of our planet and learn about Earth in the most unique way. ^{H#04}

Reference Literature

→ [“The Overview Effect,”](#) definition at Wikipedia.
→ [“How satellites saved the world: Scientists hail past observations from space —and worry about the future,”](#) article by Alan Boyle.

Insight #05

Augmented Senses



H#05

Context

Our given senses shape our perception of reality. These signals from these organs give us many senses, including the sense of space. In our peripersonal space we can feel the presence of objects even without necessarily seeing them, possible by a change in temperature sensed on our skin. We can expand this sense by adding capacitive sensors to effectively feel any object that has some electrical charge. So instead of seeing a forest of trees, you can feel each and every tree. Non-living objects with electrical charges, such as a statically charged blanket or active vacuum cleaner, can also be felt.

Challenge

How can we empathise with other species and other objects?

Hashtags

#AugmentedSenses

Reference Projects

→ [DualSkin, by Doruk Yildirim](#). An electric field sensing wearable, developed during Augmented Senses studio. ^{H#05}

→ [\(No\)Where \(Now\)Here, by Ying Gao](#). Robotised clothing that reacts to the surroundings by moving as if they were alive skins.

Reference Literature

→ [“DualSkin: Ambient Electric Field Sensing Wearable,”](#) article by Doruk Yildirim, Luis Edgardo Fraguada, and Elizabeth Esther Bigger.

Insight #06

Remote Interaction



H#06

Context

With the ever-increasing ways to connect with other humans and communities and a growing need for personal intimacy exploration, what are the opportunities for self- and remote physical connection?

Challenge

How do we maintain intimacy in a situation when we cannot be physically together?

Hashtags

#RemoteInteraction

#TeleDildonics

#RemoteIntimacy

Agents

→ [Lucy Dunne](#). Co-Director of the Wearable Technology Lab at the University of Minnesota.

Reference Projects

→ [R.O.S.P - Ritual of Sexual Pleasure, by Coby Huang](#). Tools and kits that can make a woman understand and explore her body. ^{H#06}

→ [Mod, by Comingle](#). A vibrating dildo that you can customize to your heart's content, using open-source sex technology.

Reference Literature

→ "[Preliminary study of the subjective comfort and emotional effects of on-body compression](#)," article by Esther Foo et. al.

→ "[Teledildonics gave me the gift of long-distance sex with a stranger](#)," article by Christopher Trout.

Insight #07

Dermal Interfaces



H#07

Context

Wearable technology continues to be developed in smaller form factors and be more intimately connected to us. Eventually the distinction from device to our body will fade, leaving behind a tightly coupled set of sensors and interfaces that will be just as much part of our bodies as our hair.

Challenge

How do we embrace new material potential to develop more natural and intuitive interfaces?

Hashtags

#DermalInterfaces

#SecondSkin

Agents

→ [Cindy Hsin-Liu Kao](#). Director of the Hybrid Body Lab, and assistant professor at Cornell University.

Reference Projects

→ [DuoSkin, by MIT Media Lab and Microsoft Research](#). A fabrication process that enables anyone to create customized functional devices that can be attached directly on their skin.

→ [Finely Grafted Jewellery, by Raluca Grada](#). An ornamental sample of synthetic skin on the actual skin of the body that questions the relevance of the material. ^{H#07}

Reference Literature

→ [“Artificial Skin That Senses, and Stretches, Like the Real Thing,”](#) article by David Talbot.

→ [“DuoSkin: Rapidly prototyping on-skin user interfaces using skin-friendly materials,”](#) article by Hsin-Liu Kao et. al.

Insight #08

Healthy



H#08

Context

There is so much we don't know about what is going on inside ourselves, yet each day we are able to function in spite of that lack of knowledge. The medical industry is trying to address situations where people might not be able to operate without some extra information about their physiology. On the other hand, our built environment and accessories are going to influence our physical (and also emotional) health, so special attention should focus on understanding the nature of protective materials and materials beneficial to our well-being.

Challenge

Can technology help to get us more connected to ourselves and our bodies? Which materials are protective? Which materials are safe for our health?

Hashtags

#HealthTech

#ProtectiveMaterials

#HealthyMaterials

Agents

→ [Rosalind Picard](#). Director of the Affective Computing Research Group at MIT Media Lab. Co-founder of Affectiva, and Empatica.

→ [Sonoviatech](#). Ultrasonic fabric finishing technology using naturally antimicrobial zinc and copper oxide.

Reference Projects

→ [Embrace2, by Empatica](#). A wrist-worn wearable that makes it easier for people with epilepsy to detect seizures and let others know when they need help. ^{H#08}

Reference Literature

→ [“Wellbeing and design: materials for healthy interiors,”](#) article by Brad Turner.

Insight #09

Spiritual



H#09

Context

Technology and Spirituality are often at odds with each other. It is not a popular topic on scientific journal sites such as the ACM DL, IEEE, etc. It seems taboo to discuss spirituality in the context of technology, perhaps because spirituality is often conflated with faith and religion.

Challenge

Can design and technology actually help to enhance our sense of spirituality?

Hashtags

#SpiritualTech

#SpiritualDesign

Reference Projects

→ [The 10,000 Year Clock, by the Long Now Foundation](#). A clock designed to run for ten millennia with minimal maintenance and interruption, powered by mechanical energy harvested from sunlight as well as the people that visit it.

→ [You Are Magic, by 29 Rooms and The HoodWitch](#). Installation in an enchanted crystal cave to awaken the deepest part of visitors and tap into their own inner magic.

→ [Time Rock Stacks, by Dawn Bendick](#). A collection of cairns that addresses natural transience. Cast stones and relics gathered from a medieval church in dichroic glass embedded with metallic particles. ^{H#09}

Reference Literature

→ [“Spiritual life and information technology,”](#) article by Michael J. Muller et. al.

→ [The Age of Spiritual Machines: When Computers Exceed Human Intelligence](#), book by Ray Kurzweil.

Insight #10

Emotive



H#10

Context

We can now measure the signals which our brains emit to understand a small part of our emotional state. While it is difficult to pinpoint if a person is angry or happy from the signals measured through an EEG device, we can tell with some certainty whether we are in a positive or negative mood, whether we are aroused or not interested, or concentrating or aloof. This insight, while slight, could have a profound effect on how we ourselves approach personal relationships.

Challenge

Can we use neural technology to interface with our own thoughts and emotions? How will relationships be affected when we can share our direct neural signals?

Hashtags

#NeuroTech

#EmotiveTech

#EmotionalInterfaces

#EmotionalData

Agents

→ [Rain Ashford](#). Inventor, designer of responsive and emotive wearable technology, electronic interactive artworks and e-textiles.

Reference Projects

→ [EEG Data Visualising Pendant, by Rain Ashford](#). A wearable with live, record and playback functions, displaying EEG (Electroencephalography) signals.
→ [Facing emotions, by Huawei](#). App developed in partnership with the Polish Blind Association, that helps the blind and visually-impaired to 'see' and sense emotions through the power of sound.
→ [Eunoia, by Lisa Park](#). A performance that uses a commercial brainwave sensor (EEG) to manifest the artist's current states into sounds. ^{H#10}

Reference Literature

→ ["The EEG visualising pendant for social situations,"](#) article by Rain Ashford.
→ ["Responsive and emotive wearables: devices, bodies, data and communication,"](#) article by Rain Ashford.

Insight #11

Self Design



H#11

Context

An augmented sense enabled as a wearable device is a stepping stone towards a full integration of technology and biology. Today, there are brave pioneers such as Kevin Warwick, Lepht Anonym, Neil Harbisson, Moon Ribas, Manel Muñoz and Stelarc, who are designing themselves to have the senses and abilities they choose.

This radical approach to self-expression is in jeopardy of being commoditised, as was witnessed at the 2019 4YFN conference in Barcelona, where Sabadell Bank implanted a volunteer with an RFID chip useful for validating bank transactions.

Challenge

What are different strategies to implement self-design in ways which are not inherently harmful and ultimately useful? How to design on a first-person perspective?

Hashtags

#SelfDesign

Agents

→ [Lepth Anonym](#). A faceless, genderless self-modifying H+, biohacker, humanist.

→ [Kevin Warwick](#). Emeritus Professor at Coventry and Reading Universities. His research areas are artificial intelligence, control, robotics and biomedical engineering.

→ [Dangerous Things](#). A biohacking company focused on human augmentation through implantable devices, led by Amal Graafstra. ^{H#11}

Reference Projects

→ [North Star, by Grindhouse Wetware](#). A planned implant which features gesture recognition, can detect magnetic north, and mimics bioluminescence with subdermal LEDs.

Reference Literature

→ [“Human Enhancement—The way ahead: The technological singularity \(Ubiquity symposium\),”](#) article by Kevin Warwick.

Insight #12

Morphing



H#12

Context

In face of agender movements, ecocentric and trans-humanist philosophies, creative domains rethink the human form. Zoomorphism and animal behaviour are achieved through prostheses, and the redesign of the human body is inspired through fashion collections or through speculation on technological advances.

Challenge

How and why human body is redesigned?

Hashtags

#SoftCyborgs

Zoomorphism

#RedesignTheHumanBody

#HumanOrganDesigner

Agents

→ [Agi Haines](#). Her work is focused on the design of the human body.

Reference Projects

→ [Skin heels, by Fecal Matter](#). Shoes that create an appearance of a mutated foot.

→ [Project Graham, by Towards Zero](#). An interactive sculpture of the only person designed to survive a car crash.

→ [Squishy flesh suits, by Daisy Collingridge](#). Fleshy, fabric bodysuits as a joyful representation of the human form.^{H#12}

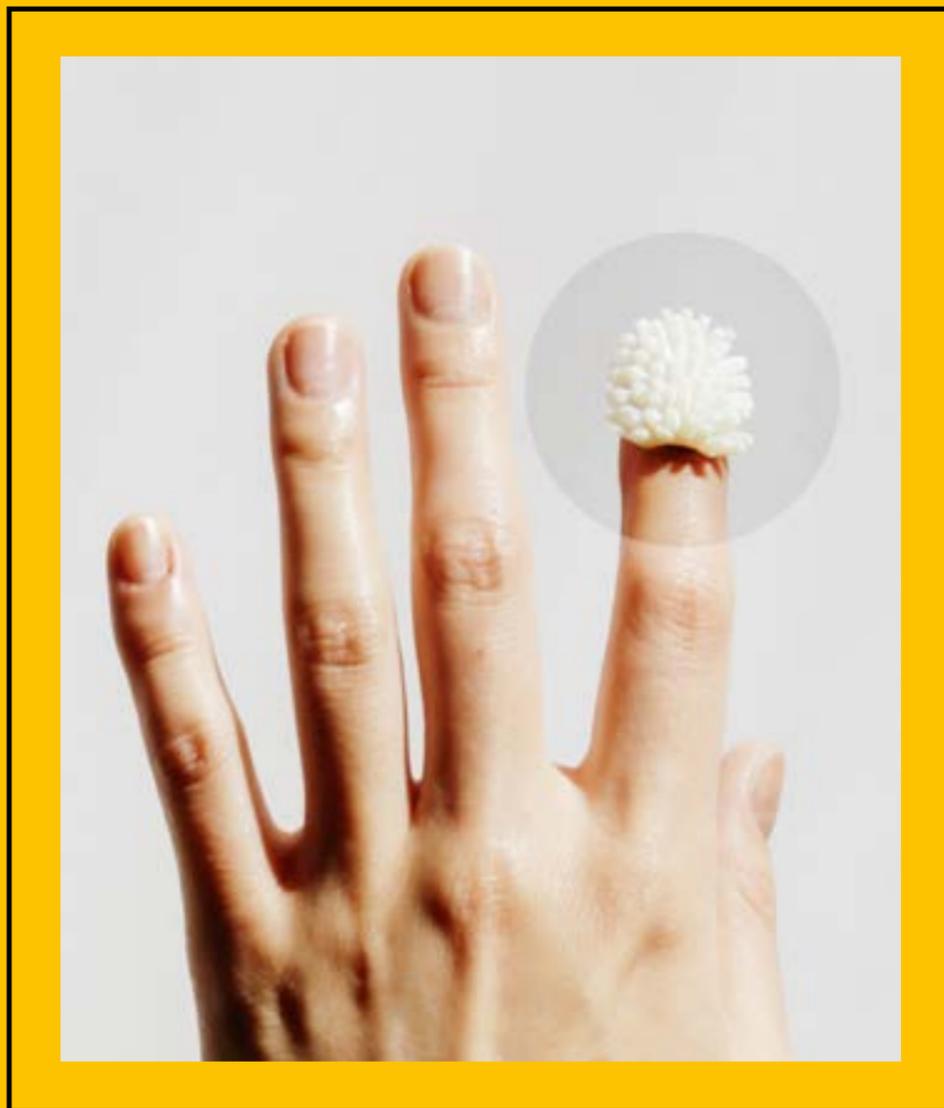
→ [A holiday from being human \(GoatMan\), by Thomas Thwaites](#). Prosthetics to take on characteristics from other animals.

Reference Literature

→ [“Agi Haines, speculative artists that wants to redesign the human body.”](#) interview by Ruben Baart.

Insight #13

Phygital Universes



H#13

Context

Human centred experiences are transiting to more holistic manifestations using tools such as wearables, providing more bodily emotional sensorial immersions and gamified phygital experiences. Haptic technologies are gaining significant traction, empowering companies to offer a tactile experience for virtual environments. Designers and engineers are reimagining the relationship between technology, design products, immersive environments and human interaction by applying humanist values, humour, magic, emotion and sensory and gamified experiences.

Challenge

How can we provide more immersive, emotional and tactile experiences?

Hashtags

#Haptic

#Tactile

#Phygital

#EmotionalMaterials

Agents

→ [Tanvas](#). Tactile Experiences through Multi-Touch and Haptic technologies.

Reference Projects

→ [Tools for therapy, by Nicolette Bodewes](#). Tactile toolkit designed to be used in psychotherapy sessions.

→ [FULU, by Ryo Tada](#). Haptic fingernail for augmented reality that brings the sense of touch to everyday digital communication. ^{H#13}

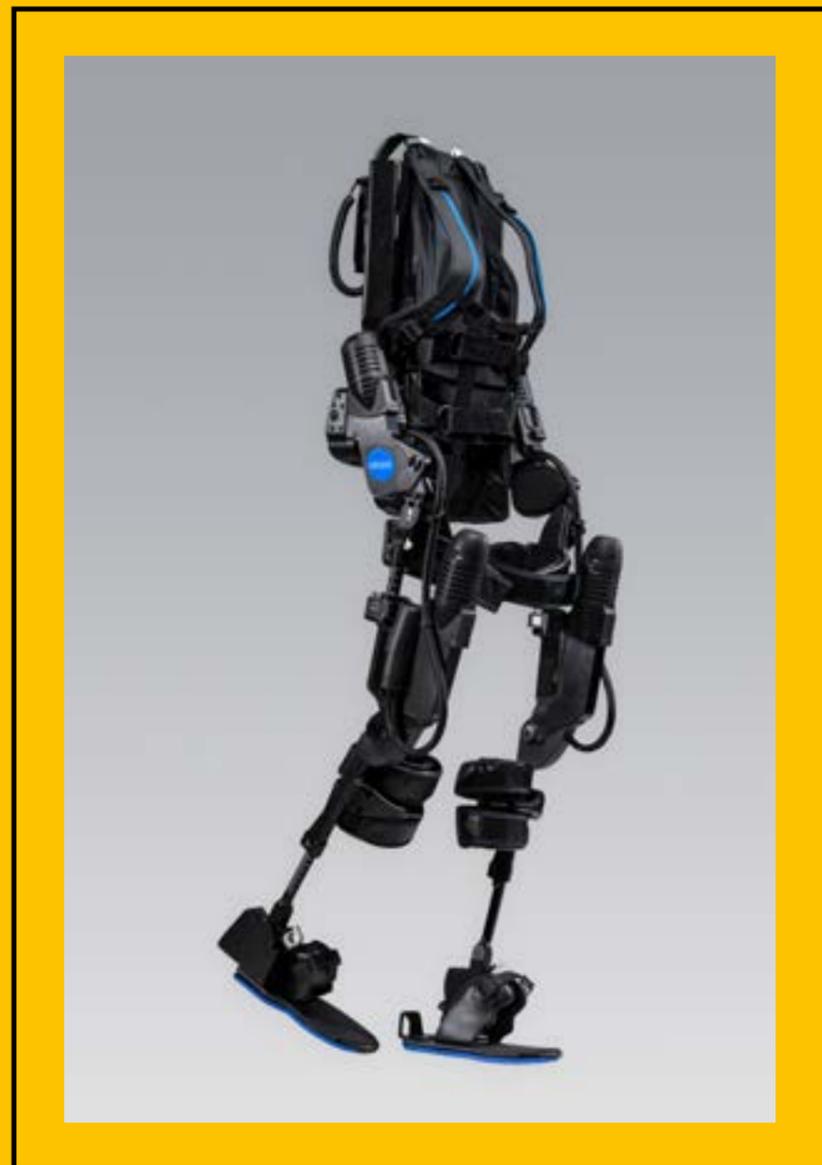
→ [Sensory fiction, by Felix Heibeck](#). Wearable tech vest that allows the user to feel the emotions of the main character in a story.

Reference Literature

→ [“Virtual gatherings. What does social distancing portend for the future of cultural experiences?,”](#) article by Emily Safian-Demers.

Insight #14

Adaptive Survival



H#14

Context

Humans need to adapt to their environment, either by amplifying or regaining certain capacities. Enhanced pollution resistance or enhanced mobility can be achieved through the design of wearable pieces.

Challenge

How can we adapt to harsh environments or regain lost capacities?

Hashtags

#Survival

#ExoSkeletons

#AdaptiveTech

#EnhancedCapacities

Reference Projects

→ [Climate Change Couture, by Catherine Sarah Young](#). Artists, researchers and local communities collaborate to design city-specific garments that its inhabitants might wear in possible scenarios under climate change.

→ [Aegis parka, by Nieuwe Heren](#). A jacket that counters pollution effects.

→ [Ekso-Suit by Ekso Bionics](#). A hybrid Exoskeleton robotic suit.^{H#14}

→ [The BCI \(Brain Computer Interface\) project, by Clnatec](#). A mind-controlled exoskeleton.

Insight #15

Anonymous in Public



H#15

Context

You are being tracked. By websites, by governments, by your friends, by your enemies. Now that being constantly surveilled is part of our reality, how do we protect our anonymity?

Challenge

How can we remain anonymous in public in a world where we are constantly monitored?

Hashtags

#Anonymous #PhygitalPrivacy

Agents

→ [Adam Harvey](#). Researcher and artist focused on computer vision, privacy, and surveillance.

Reference Projects

→ [CHBL Jammer Coat, by Coop Himme\(l\)blau](#).

An electromagnetic shielding lining jacket that prevents digital traceability and also hides the individual physicality.

→ [CV Dazzle, by Adam Harvey](#). How fashion can be used as camouflage from face-detection technology, the first step in automated face recognition.

→ [Stealth Wear: Anti-Drone Fashion, by Adam Harvey](#).

A vision for fashion that addresses the rise and powers of surveillance, and the growing need to exert more control over privacy.^{H#15}

Reference Literature

→ [“Facilitating Fashion Camouflage Art,”](#) article by Ranran Feng and Balakrishnan Prabhakaran.

Information

Insights

- #01 Infinite Game & Long Term Thinking
- #02 Post Death Communication
- #03 Perception Switching
- #04 Truth vs Fake
- #05 AI Communication
- #06 New Forms of Empathy
- #07 Gamified Communication
- #08 Data Visualisation
- #09 Aesthetic Evolution & Adaptation
- #10 Language Evolution & Adaptation
- #11 Intercultural Connections
- #12 Identity Transmission
- #13 Opinion Creation & Destruction
- #14 Hypercommunication Consequences
- #15 (New) Communication Tools
and Emotional Impact

Through history power has been described in so many ways but there are three that are the most extended. The power of force — the one most of us learn very early, whether it's in your house, in your school or the movies that you watch — is the power of violence, the most primitive way of power and today only states are empowered to use it legally without punishment. Through the industrial revolution new actors appeared in the power arena, the middle class was ready to use their economical and productive power to build change, we discovered the power of wealth, the economic power was more flexible and

extensive as it could somehow buy or trump the power of force. It could also be accumulated and transferred easily. Still both would be regulated by state at some point. Finally with the computing revolution appeared the power of knowledge, the third one, unlike the other two, information is not finite, it doesn't end, it's mostly free to share and multiply, it gives to whoever has it the potential of choice and with it the scarce feeling of freedom, the challenge is how we became fluent in the use of this new power, how we distribute it in a way that answer to the values and re-establish and erase old forms of power.



I#00



Insight #01

Infinite Game & Long Term Thinking



I#01

Context

In their definition, short- and long-term thinking include a finish line, an endpoint. Because of this, these ways of thinking are becoming obsolete. Companies that will successfully survive the constant changing of the world are the ones that clearly define the way they want to disrupt society, no matter the terms, and consequently act to get there. The goal is to encourage local and international leaders to make more strategic decisions with the highest potential of impact.

Challenge

How can we stimulate companies/organisations to start thinking in infinite terms?

Hashtags

#InfiniteGame

#InfiniteThinking

Agents

→ [Simon Sinek](#). Unshakable optimist writer.

→ [Wander](#). Creative research studio, strategic laboratory and training programme, by Soulsight Design Strategy.

→ [Service Design Days](#). Conference about product and service innovation, organisation transformation and value creation through design.

Reference Projects

→ [Kreyon City: the ideal city made of LEGO bricks, by Sony CSL](#). An installation and an experiment on the evolution of a city.

→ [Block by Block](#). Workshops using Minecraft as a community engagement tool.^{I#01}

Reference Literature

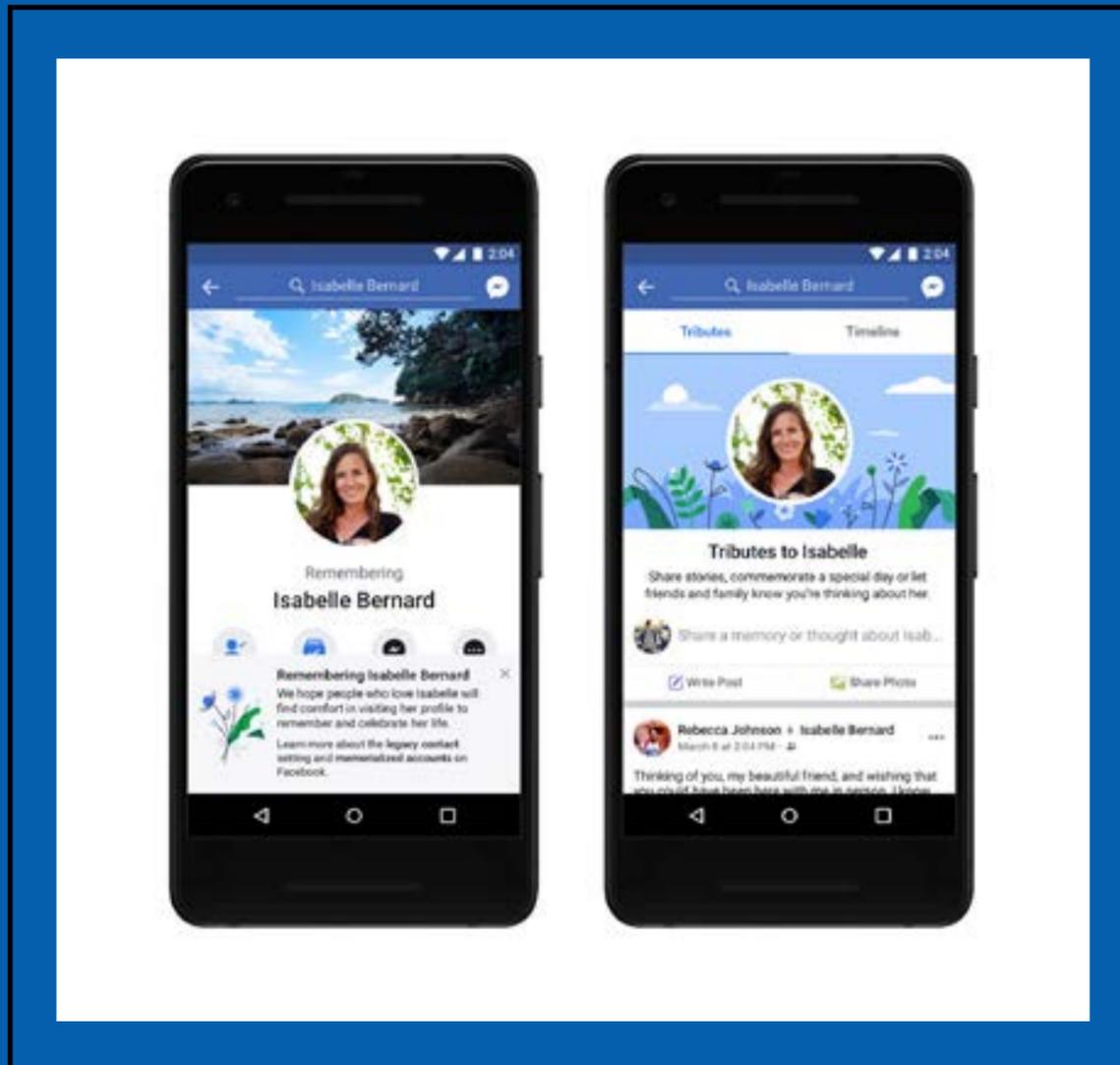
→ [The infinite game](#), book by Simon Sinek.

→ [“Simon Sinek: Applying the infinite game mindset to business,”](#) article by Greg Thomas.

→ [“The infinte game: how to lead in the 21st century,”](#) talk by Simon Sinek.

Insight #02

Post Death Communication



Context

We are living in an era where the physical world represents just a side of it. The “intangible” digital world is getting deeper and deeper in our lives and we are designing complex systems and behaviours with the aim of being purely digital. Death is physical but, in this context where the physical is not the whole, what happens to the digital life of someone who is leaving the physical world?

Challenge

How can we design an ethical digital way of dying?

Hashtags

#DigitalLife #DigitalDeath

Agents

→ [Digital Death](#). How we manage our digital assets after death?
→ [Mario Santamaria](#). Founder of Internet Tour, a tourism experience on the physical Internet infrastructure.

Reference Projects

→ [“Be right back,”](#) *Black Mirror* series episode, written by Charlie Brooker. A film exploring the theme of grief, in relation to social media and AI.

Reference Literature

→ [“Memorialized Accounts,”](#) at Facebook.^{I#02}
→ [“The digital selves we leave behind,”](#) article by Sean Mulholland (IDEO).
→ [Digital afterlife: death matters in a digital age,](#) book edited by Maggi Savin-Baden and Victoria Mason-Robbie.
→ [“Death in digital spaces: social practices and narratives,”](#) article by Stefania Graikousi and Maria Sideri.
→ [“On Facebook, the dead will eventually outnumber the living. What does that mean for our histories?”](#), article by Rachel E. Greenspan.
→ [“Request to Memorialize a Deceased Person’s Instagram Account,”](#) at Instagram.

I#02

Insight #03

Perception Switching



I#03A

Context

The distance between reality and information is one of the main challenges that we face today as society. Thanks to new information technologies, we are overwhelmed with data coming from different sources and expressing different opinions on the same topics. It became difficult to consume information and not to be consumed by information.

Challenge

How can we get people closer to an intelligent consumption of information?

Hashtags

#InformationTurmoil

Agents

→ [Worldometers](#). Real time world statistics provided by an international team of independent and self-financed developers, researchers, and volunteers.
→ [Aza Raskin](#). Recreational weirdo who brings things to life, co-founder of the Center for Humane Technology and the Earth Species Project.
→ [Mario Santamaria](#). Creator of “Fog <script>,” a software application that generates and disseminates meetings in public places.
→ [NØ School Nevers](#). International summer school around the social and environmental impacts of information and communication technologies.
→ [Disnovation.org](#). A working group that develops situations of disturbance, speculation, and debate, at the crossroads between contemporary art, research and hacking. [I#03A](#), [I#03B](#)

Reference Projects

→ [Time slip](#), by [Antoine Schmitt](#). A visual artwork anchored into philosophical questionings on destiny, its potential pre-written nature or its causal determinism.

[Reference Literature](#)

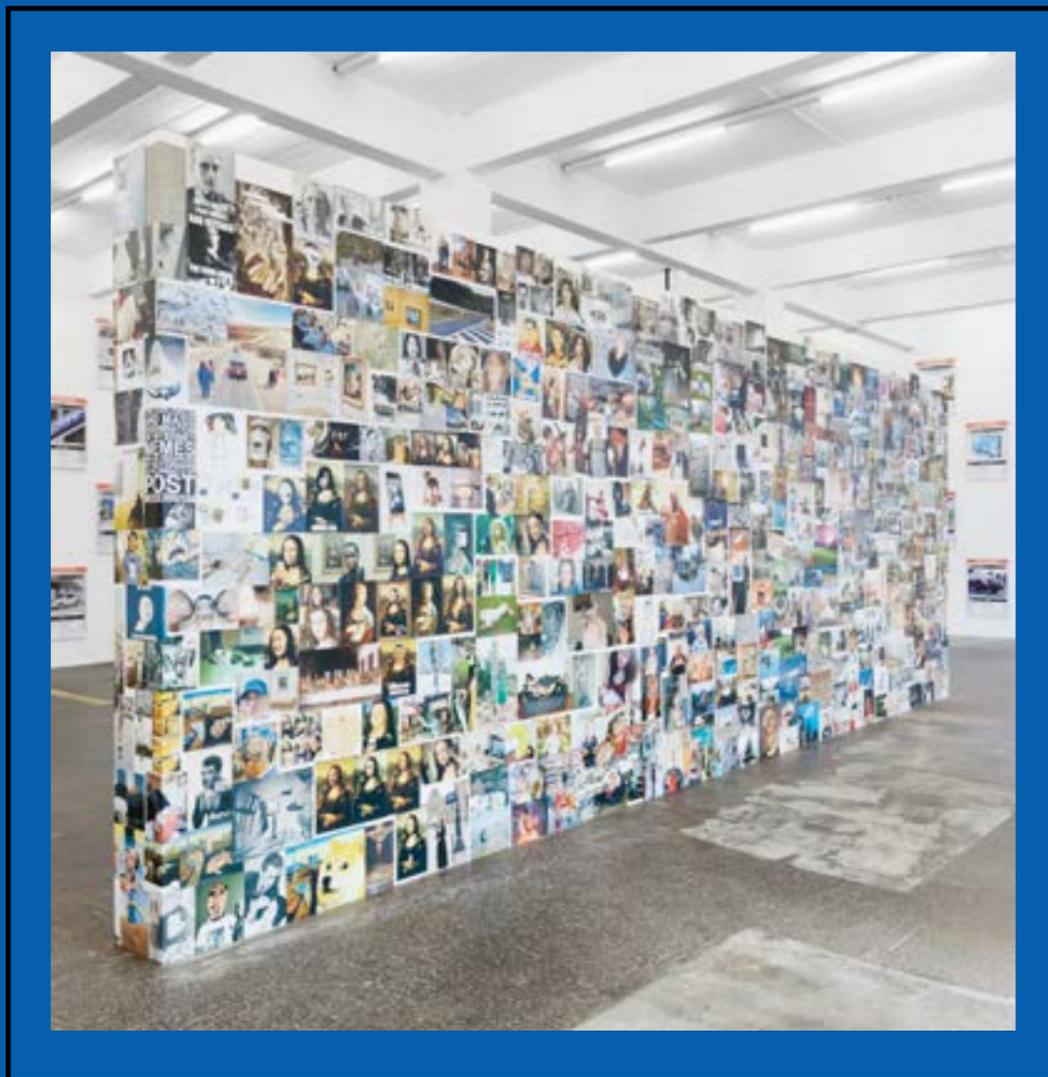
- [“The digital attention crisis,”](#) talk by Aza Raskin.
- [The Perception Gap: How False Impressions are Pulling Americans Apart,](#) report by Daniel Yudkin, Stephen Hawkins, and Tim Dixon.
- [“The perception gap: how well do you know your country?”](#), interactive by The Guardian.
- [“Mr. Harris Goes to Washington,”](#) a podcast with Aza Raskin and Tristan Harris.
- [“‘Flood the zone with shit’: How misinformation overwhelmed our democracy,”](#) article by Sean Illing.



I#03B

Insight #04

Truth vs Fake



I#04A

Context

The digital environment allows anyone who wants to create contents that can be shared and consumed. It is not possible to control the truthfulness of them and everything can become viral, even fake news or stories. Apart from that, fake news propagation uses to rely on fake people (bots) who are in charge of spreading the news all over the web. Being scared of what in reality can happen, among other things, we now have to deal with a complex system based on *the fake*. Drive a social consciousness about how information is moving today.

Challenge

How can we understand the *fake infrastructure*?

Hashtags

[#FakeComplexity](#)

Agents

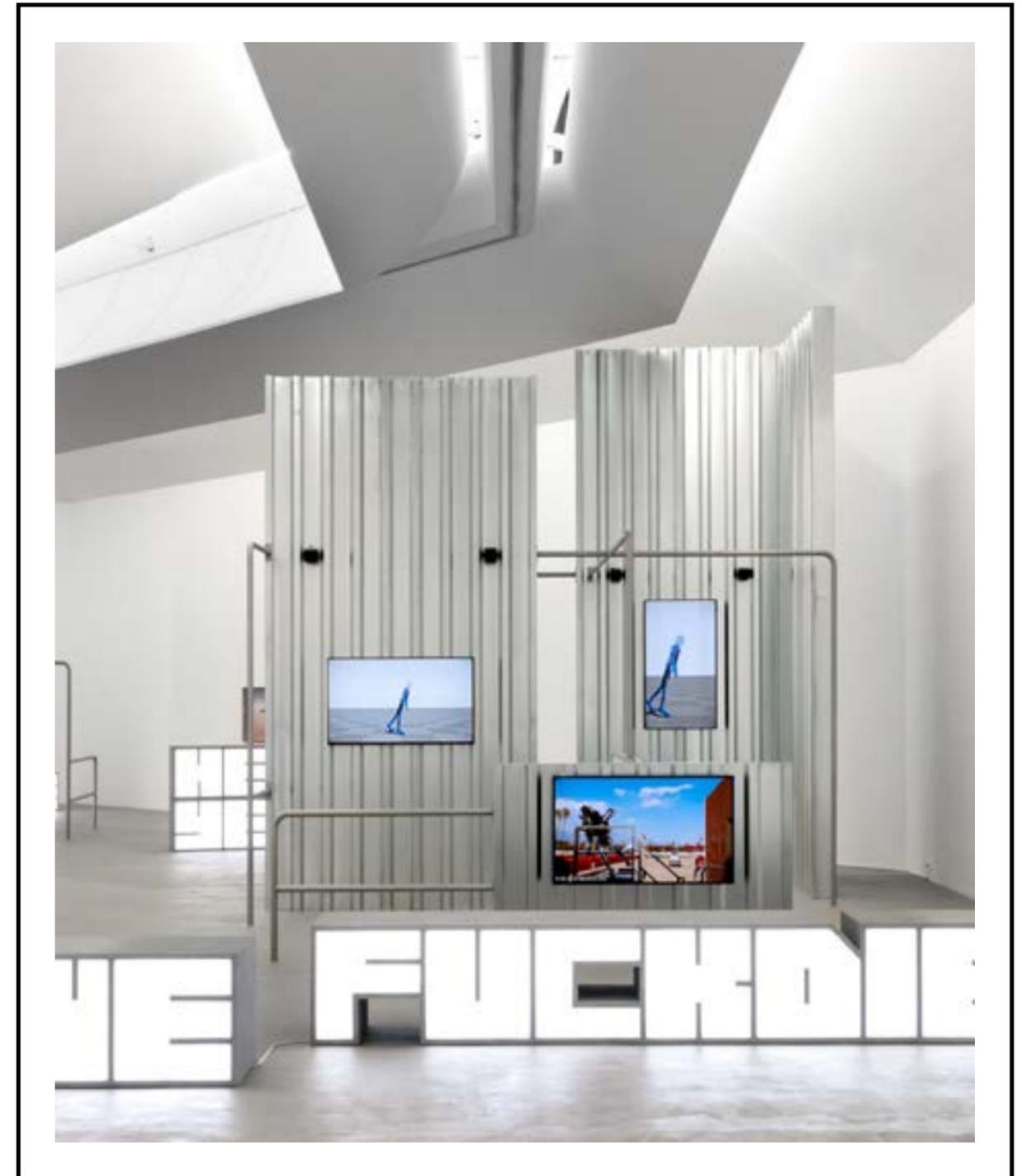
- [Valentina Tanni](#). A contemporary art critic and curator with focus on Internet culture. ^{I#04A}
- [!Mediengruppe Bitnik](#). A contemporary artist group working on and with the Internet.
- [Hito Steyerl](#). Video-artist working on the topics of media, technology, and the global circulation of images. ^{I#04B}
- [MIT Media Lab](#). One of the world's leading research and academic organisations, unconstrained by traditional disciplines.
- [Center for Humane Technology](#). An independent nonprofit organisation whose aim is to drive a comprehensive shift toward humane technology.

Reference Projects

- [Synthesizing Obama: Learning Lip Sync from Audio](#), by University of Washington. Artificial intelligence was used to precisely model how Mr Obama moves his mouth when he speaks, and put any words into synthetic Barack Obama's mouth.
- [iReporter](#), by Aardman Animations for the BBC. A "choose your own adventure" game, about sources, political claims, social media comments and pictures that should be trusted.

[Reference Literature](#)

- [Elections approach – are you ready? Fact-checking for educators and future voters,](#) publication by FactBar EDU.
- [“Finland is winning the war on fake news. What it’s learned may be crucial to Western democracy,”](#) article by Eliza Mackintosh.
- [“Bots Are Destroying Political Discourse As We Know It,”](#) article by Bruce Schneier.
- [“How Much of the Internet Is Fake? Turns Out, a Lot of It, Actually,”](#) article by Max Read.
- [“The spread of true and false news online,”](#) article by MIT Media Lab’s Soroush Vosoughi, Deb Roy and Sinan Aral.
- [“Truth Decay and the Technology Threat,”](#) a conversation between Yuval Noah Harari and Tristan Harris.



I#04B

Insight #05

AI Communication



I#05

Context

AI has endless applications and one of them is related to the way we, as humans, communicate. AI can help us, from one side, to become smarter in the generation of messages and to forecast the impact of our communication actions but, from the other, AI might standardise our languages and subtly lead to homogenisation and very predictable ways of communicating.

Challenge

How is AI affecting the way we, as humans, communicate?

Hashtags

#NewLanguages

#ArtificialCommunication

Agents

→ [Iris.ai](#). AI tools and applications to allow humans to make sense and use of all of the world's scientific knowledge.

→ [Ars Electronica AI Prize](#). The world's most time-honored media arts competition. ^{I#05}

→ [AI for Good summit](#). Connecting AI Innovators with problem owners to solve global challenges.

Reference Projects

→ [F'xa, by Feminist Internet and Comuzi](#). Your feminist guide to AI bias.

→ A Feminist Alexa, by Feminist Internet and the Creative Computing Institute at UAL. An experiment in feminist conversation design. Report: [Designing a Feminist Alexa](#). Workshop Guide: [Coding a Feminist Alexa](#).

Reference Literature

→ ["Siri, define patriarchy: We tested bots like Siri and Alexa to see who would stand up to sexual harassment,"](#) article by Leah Fessler.

→ [I'd blush if I could: closing gender divides in digital skills through education](#), publication by UNESCO for the EQUALS Skills Coalition.

→ [“The future of human communication: how AI will transform the way we communicate.”](#) article by Noah Zandan.

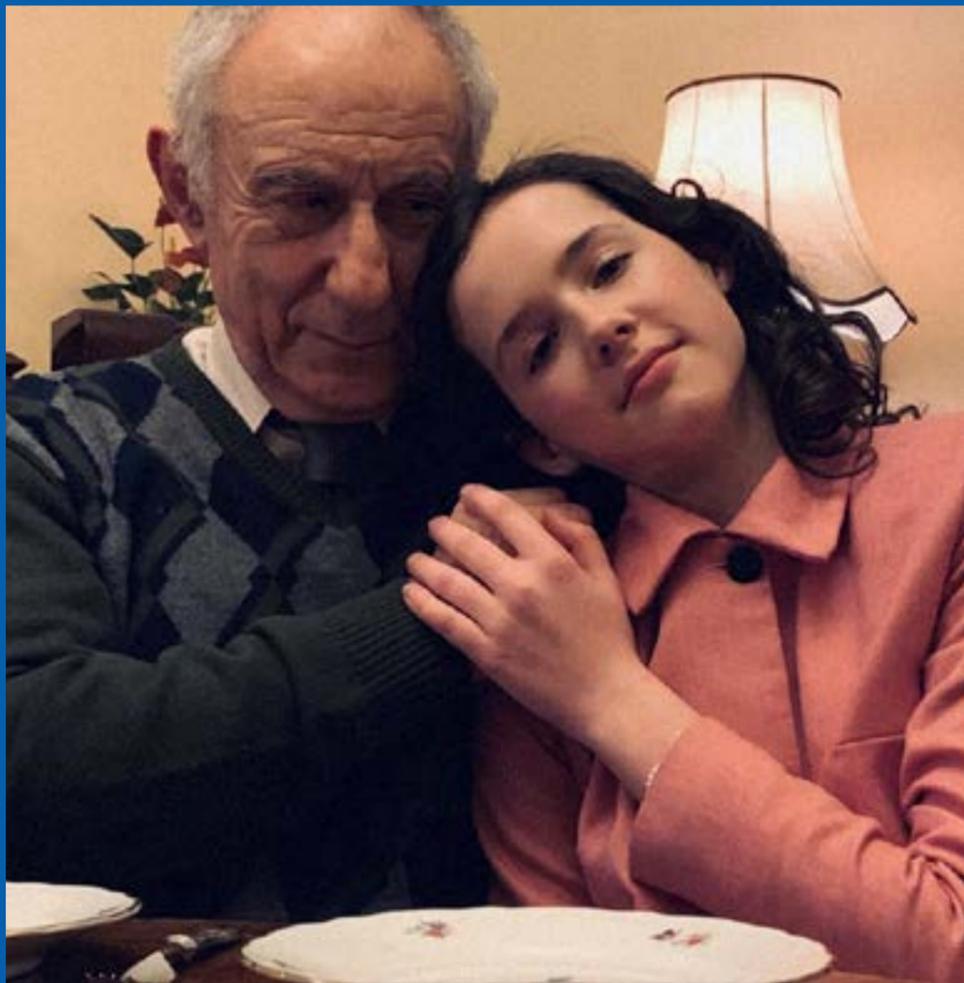
→ [“Artificial intelligence and communication: A Human-Machine Communication research agenda.”](#) article by Andrea L. Guzman and Seth C. Lewis.



I#05

Insight #06

New Forms of Empathy



I#06

Context

Empathy, as one of the main elements that makes humans humans, needs to be a central topic in the study and design of our societies. Empathy evolves and can be learned differently depending on the contexts where it happens. The internet and digital era generated a new scenario where humans are not the only players, but where empathy still has its relevance. Always more, to machines, as well as to humans, is required an empathetic “way of doing”.

Challenge

How do we raise awareness on the importance of being empathetic in the digital era?

Hashtags

#DigitalEmpathy

Agents

→ [MIT affective computing group](#). Bridge the gap between human emotions and computational technology.

Reference Projects

→ [Eva \(@eva.stories\)](#). What if a girl in the Holocaust had Instagram? ^{I#06}

→ [Live tweets from 1942 \(@RealTimeWWII\)](#), by [Alwyn Collinson](#). Livetweet of the Second World War as it happened on this date in 1942, for 4 years to come (2nd time around).

→ [The Machine to be Another](#), by [BeAnotherLab](#). Embodied VR system on the challenge of empathy.

Reference Literature

→ [“Can Virtual Humans Teach Empathy?”](#), book chapter by Benjamin Lok and Adriana E. Foster.

→ [“AI ethics backed by Pope and tech giants in new plan,”](#) article by Jen Copestake.

→ [“Empathy in artificial intelligence,”](#) article by Jun Wu from Cognitive World.

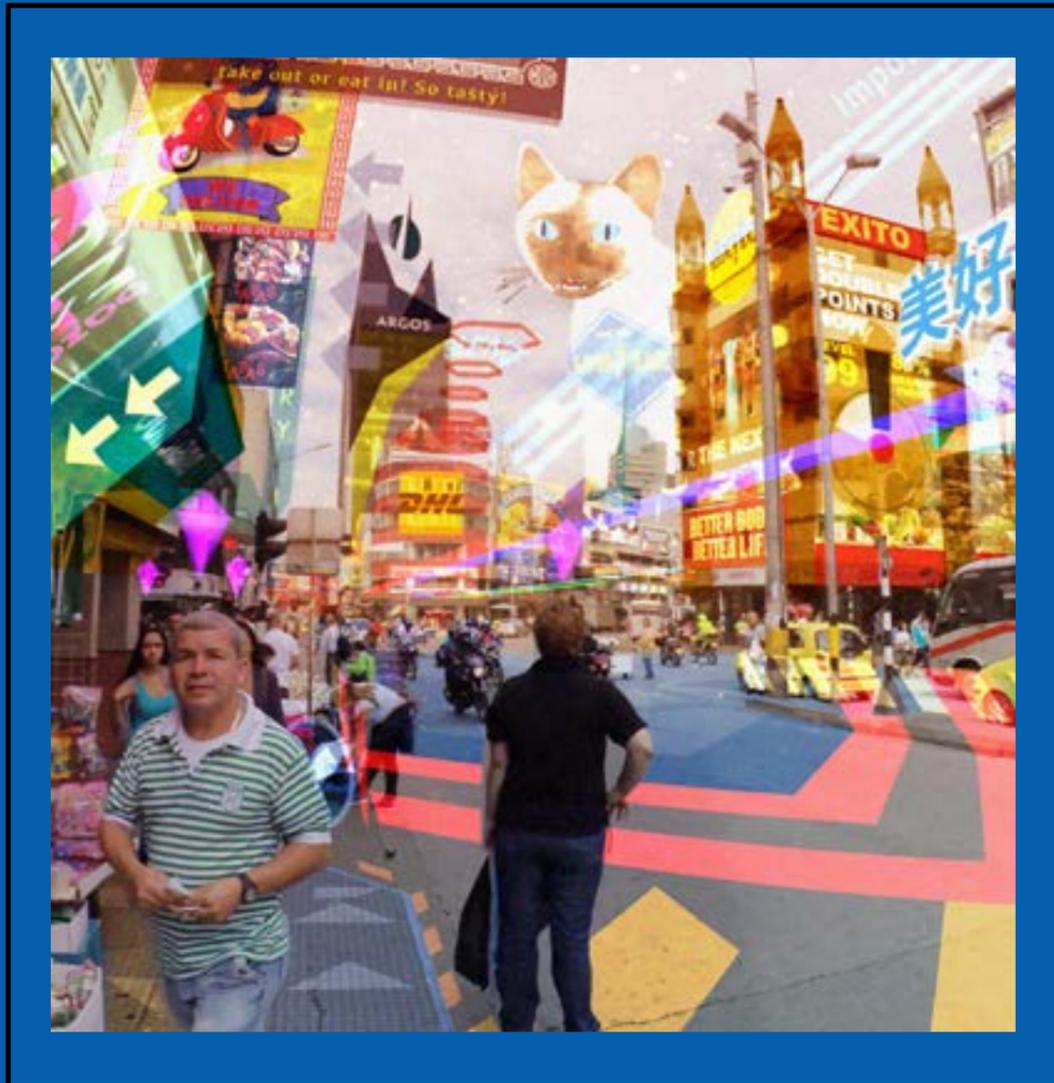
→ [“Artificial empathy improves communication skills of AI-machines,”](#) article by Peter Rudin.

→ [“How emojis can be the tool to creating a more empathetic digital healthcare service,”](#) article by Derisa Chiu.

→ [“Emoji Intelligence= Emotional Intelligence,”](#) article by Vasudha Badri-Paul.

Insight #07

Gamified Communication



I#07

Context

Gamification has the power to actively involve the user in the consumption of information. As scientifically demonstrated, thanks to interactive systems based on games, the user is able to learn and retain more and in a more solid way than with passive consumption of information (e.g. reading a newspaper article). As gamification itself is exponentially growing -not only applied to information/communication- this field is getting bigger and bigger and deserves to be explored.

Challenge

How can design help the development of gamified communication systems?

Hashtags

#GamifiedCommunication

Agents

→ [Tristan Harris](#). Design ethicist, co-founder of the Center for Humane Technology.
→ [Unitat d'Investigació Barcelona en Imatge Digital Interactiva \(IDI\)](#). Interactive Digital Image is a research unit of the Universitat Pompeu Fabra devoted to the development of image technologies.

Reference Projects

→ [Hyper-Reality, by Keiichi Matsuda](#). A concept film with a new vision of the future where physical and virtual realities have merged. ^{I#07}

Reference Literature

→ ["Incorporating gamification into website design to facilitate effective communication,"](#) article by H.C.L. Hsieh and H.H. Yang.
→ ["How gamification and social networking impact learning: communication is the key,"](#) article by Edward Roesch.

Insight #08

Data Visualisation



I#08

Context

Data Visualisation used to be seen as big and coloured infographics on online or printed newspapers. Today, Data Visualisation, and with it all those fields that somehow are related to it (e.g. Data Analysis, Storytelling, Information Design etc.), has a constant presence in our lives. In this scenario, it is important to understand how Data Visualisation can really improve people's lives.

Challenge

How can we improve people's life with Data Visualisations?

Hashtags

#DataStories

Agents

→ [Nicolas Feltron](#). Designer, entrepreneur and artist whose work focuses on translating quotidian data into meaningful objects and experiences.
→ [Encode](#). A festival to debate, share and explore the future of data-driven stories.
→ [Data Visualization Society](#). A community that collects and establish best practices in data visualisation.

Reference projects

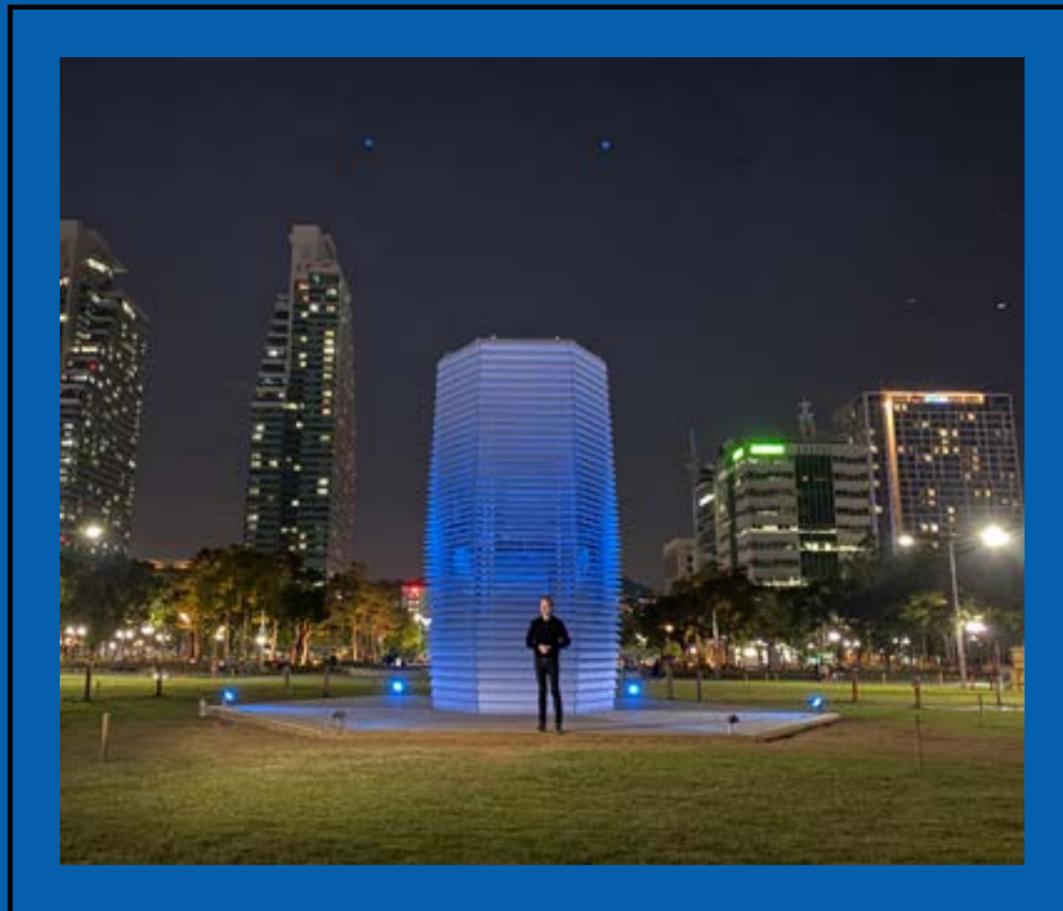
→ [Daytum, by Nicholas Felton and Ryan Case](#). A tool to collect, categorise and communicate your everyday data.
→ [Air Transformed: Better with Data Society Commission](#), by Stefanie Posavec and Miriam Quick. What if we could really see and feel the burden that air pollution places on our bodies?^{I#08}

Reference Literature

→ [Effective data visualisation: The right chart for the right data](#), book by Stephanie Evergreen.
→ [The Power of Data Storytelling](#), book by Sejal Vora.

Insight #09

Aesthetic Evolution & Adaptation



I#09

Context

Aesthetic plays a central role in the communication world. How things look like does not only represent the first way to engage with users, but it also has the power to add a tangible value to the stories we want to tell. On the other hand, we are subjected to an ongoing flow of contents that constantly changes what we consider (or not) as aesthetic.

Challenge

How are aesthetics changing?

Hashtags

#AestheticRevolution

Agents

- [Domenico Quaranta](#). Contemporary art critic and curator, focused on the way arts respond to the technological shift.
- [Pau Waelder](#). Independent art critic and curator, researcher in contemporary art and new media.
- [NRG COSIA Carbon XPRIZE](#). Breakthrough technologies to convert CO₂ emissions into usable products.
- [Studio Roosegaarde](#). Daan Roosegaarde and his team works towards the liveability of our future landscapes.

Reference projects

- [Smog Free Project, by Studio Roosegaarde](#). A campaign to reduce air pollution and provide an inspirational experience of a clean future. Includes the Smog Free Tower, The Smog Free Ring and the Smog Free Bicycle. ^{I#09}
- [Space Waste Lab, by Studio Roosegaarde and the European Space Agency](#). A living lab to visualise, capture and upcycle space waste into sustainable products.

Reference Literature

- [Overwhelmed: Literature, Aesthetics, and the Nineteenth-Century Information Revolution](#), book by Maurice S. Lee.

Insight #10

Language Evolution & Adaptation

How is this work?

I#10

Context

Communication tools define the language to be used. When tools change, language changes accordingly. Most of the time, contemporary ways of communication tend to synthesise but aim to not lose in richness. At the same time, being language a way to transmit our identity, we are able to use the same tool in different ways.

Challenge

How is language changing?

Hashtags

#LanguageRevolution

Agents

→ [Unitat de Rercerca en Lingüística \(UR-Ling\)](#). The Linguistics Research Unit brings together the research done in linguistics at Universitat Pompeu Fabra.
→ [European Association For Digital Humanities](#). EADH brings together disciplines that research, develop and apply digital humanities methods and technology.

Reference projects

→ [Sheboard, by Hasan & Partners](#). A keyboard for boosting girl and women's confidence, using predictive text input.
→ [BlindWrite, by Heroku](#). An online app that blinds the typing for a determined time span.^{I#10}

Reference Literature

→ [“The origins and evolution of language,”](#) talk by Michael Corballis.
→ [“Free Writing Software: 15 Tools to Help You Create Better Content, Faster: find the best brainstorming, researching, writing, and editing tools,”](#) article by Jessica Greene.

Insight #11

Intercultural Connections



I#11

Context

In order to maintain a sort of uniqueness, different cultural groups rely on new media and communication tools to maintain and express their own identities. At the same time, new media and communication tools can be considered as drivers for cultural change and cultural connectors.

Challenge

How do different cultures communicate thanks to new media and technologies?

Hashtags

#CulturalConnection

Agents

→ [Scalable cooperation](#). Research group at MIT Media Lab, reimagining human cooperation in the age of social media and artificial intelligence.
→ [Planetary](#). A network for people who want to come together and connect even when the internet goes out.

Reference projects

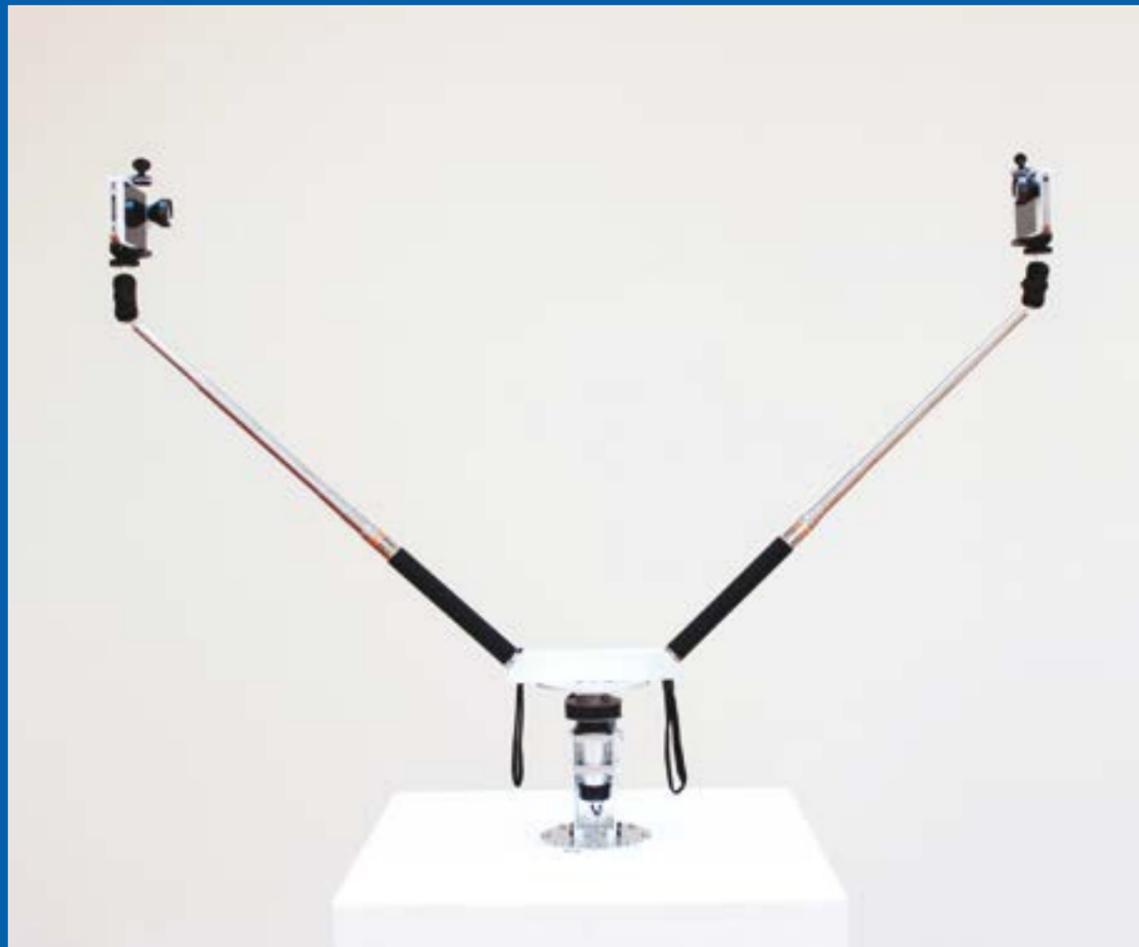
→ [Ars Electronica](#). Winners within Digital Communities category.^{I#11}

Reference Literature

→ [“Intercultural communication,”](#) encyclopedia entry by Milton J. Bennett.
→ [“Intercultural Communication in a globalised world: the case of Spanish”](#), book chapter by Rosina Márquez Reiter and Raquel Hidalgo Downing.
→ [Cross-Cultural Design: Designing for diverse audiences](#), book by Senongo Akpem.

Insight #12

Identity Transmission



I#12



Context

In relation to Vision #11, we understand new media and communication tools not only as a place where to maintain and express identities, but also as a place where new identities can be created.

Challenge

How is identity evolving?

Hashtags

#IdentityEvolution

Agents

→ [European Association For Digital Humanities](#). EADH brings together disciplines that research, develop, and apply digital humanities methods and technology.
→ [MIT Media Lab](#). One of the world's leading research and academic organisations, unconstrained by traditional disciplines.

Reference projects

→ [Data Dating, exhibition curated by Valentina Peri](#). Explorations on new directions in modern romance.^{I#12}

Reference Literature

→ [“Digital identity in the migration & refugee context: Italy case study.”](#) report by Mark Latonero et al. for Data & Society.
→ [“Transnational digital identity as an instrument for global digital citizenship: the case of Estonia’s e-residency.”](#) article by Piia Tammpuu and Anu Masso.

Insight #13

Opinion Creation & Destruction



I#13

Context

Opinion creation processes have changed. Now it is relatively easy to generate debate and to find space for the spreading of new opinions. Digital era has somehow democratised these phenomena. At the same time, as new opinions are easy to create, they are very easy to destroy. Creation and destruction are two phenomena that go hand in hand.

Challenge

How does opinion mutate?

Hashtags

#OpinionMutation

Agents

→ [Poetic Justic Group](#). Research group at MIT Media Lab, exploring new forms of justice through art.

Reference Projects

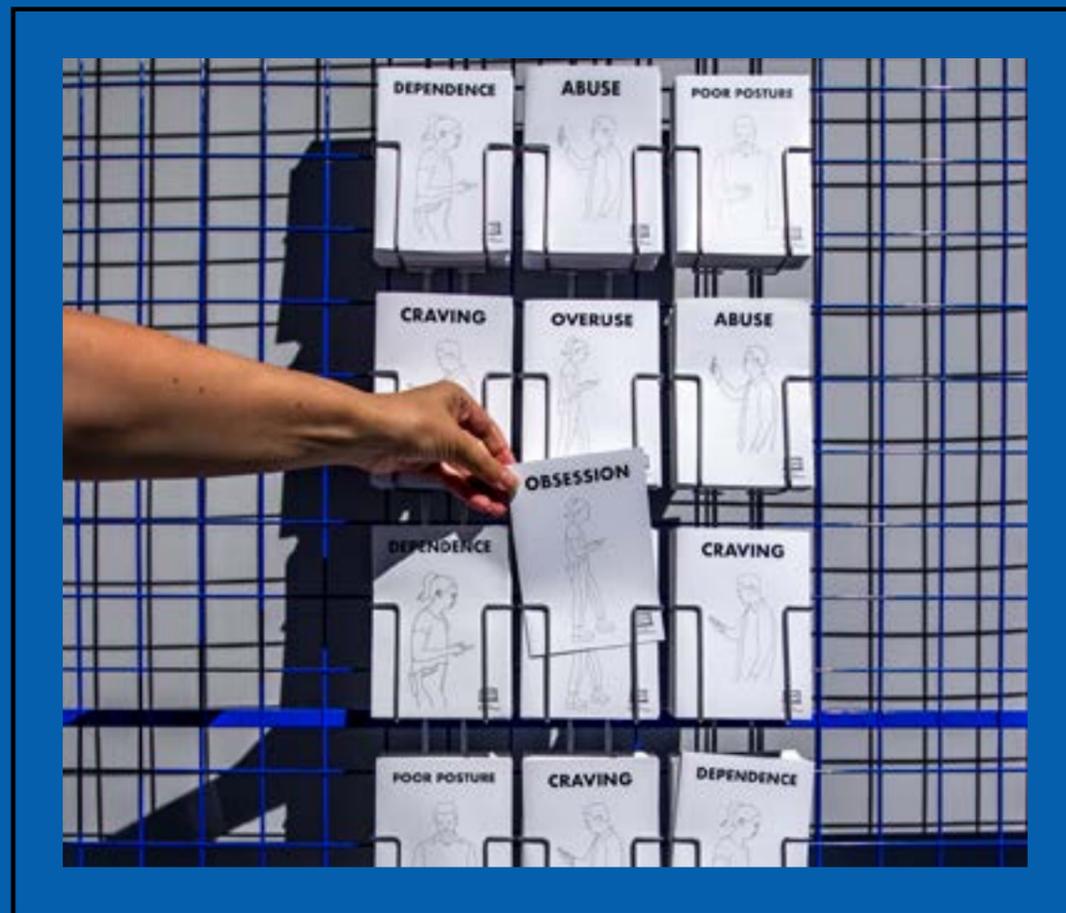
→ [Predictive Art Bot, by Disnovation.org](#).
An algorithm that turns the latest media headlines into artistic concepts. ^{I#13}

Reference Literature

→ [“The Effects of Social Communication Dynamics on Opinion Change,”](#) article by Niccolo Pescetelli and Nick Yeung.

Insight #14

Hyper-communication Consequences



I#14

Context

The intensification of our communication possibilities has created a hyperconnected World. In this scenario, even if better connected, we are suffering a process of banalisation of human relations.

Challenge

How does hypercommunication affect people?

Hashtags

#HyperCommunication

Agents

→ [Centre For Mental Health](#) A charity providing life changing research, economic analysis and policy influence in mental health.
→ [Center for Technological Pain](#) DIY solutions to health problems caused by digital technologies.

Reference Projects

→ [DIY and Open Source objects, by Center for Technological Pain](#). Objects to relieve pain caused by digital technologies such as smartphones and laptops.^{I#14}

Reference Literature

→ [“Revisiting the cosmological bias due to local gravitational redshifts,”](#) article by Zhiqi Huang.
→ [“Understanding the Effect of Social Media Overload on Academic Performance: A Stressor-Strain-Outcome Perspective,”](#) article by Lingling Yu, Chenling Shi and Xiongfei Cao.

Insight #15

(NEW) Communication Tools and Emotional Impact



I#15

Context

Yet people rely on very different tools to communicate and connect with others (e.g. text, words, music, VR etc.), depending on contexts and communication goals. Each tool is able to transmit the same message provoking different emotions. Emotional impact is part of the game and must be considered in the study of communication.

Challenge

How does communication impact our emotions?

Hashtags

#CommunicateEmotions

Agents

→ [Offscreen magazine](#). An independent print magazine that examines how we shape technology and how technology shapes us.

→ [MEDIUM](#). Research Group at Universitat Pompeu Fabra, interested in the study of popular media culture.

→ [Affective Computing](#). Research group at MIT Media Lab, that aims to bridge the gap between human emotions and computational technology.

→ [Unitat de Recerca en Lingüística \(UR-Ling\)](#). The Linguistics Research Unit brings together the research done in linguistics at Universitat Pompeu Fabra.

Reference Projects

→ [Voltaic Realism, by Fujita Keisuke](#). Real-time installation that materialises suicide tweets.^{I#15}

Reference Literature

→ [“Digitality, virtual reality and the ‘Empathy Machine’,”](#) article by Robert Hassan.

→ [“Measuring Emotions in the Digital Age,”](#) article by Daphna Motro, Bohan Ye, Tamar Kugler and Charles N. Noussair.

→ [“The medium is the message”](#), a phrase by Marshall McLuhan introduced in *Understanding Media: The Extensions of Man*.

M Materials

Insights

- #01 Material Solutions for Decarbonisation
- #02 Materials Capture and Store Carbon
- #03 Hydrogen for Clean Energy Storage
- #04 Semi-life is a Key Circular Design Dimension
- #05 Cellulose Matters
- #06 Bio-Chars as Engineered Carbon Sink Materials
- #07 Material Accountability
- #08 Waste Archaeology and Futurology
- #09 Plastic and Microplastic Waste
- #10 Agricultural and Food Waste Stream Materials
- #11 Art calls for Material Significance
- #12 Hemp Multiverse
- #13 Biofabrication: Algae, Mushrooms and More
- #14 Cultured and Crafted Materials
- #15 Data as Raw Material

Footprint and circularity of materials are known concepts by now. However, according to science, we are not succeeding at systemic transformation at the pace that is needed. Let us not forget the past emissions. It is not about becoming carbon neutral, it is about becoming carbon negative. Negative here means removing and cleaning up the previous mess to the best possible extent.

Materials are essential design choices. They contain the seed for change. We live in crisis and the Greek word *crisis* entails a process of change. Hence, it is crucial to understand that materials in their broader context are enablers of

change. Material as transformed matter is a powerful design element, a powerful ingredient for change.

We need to shift from a linear mind-set to a sustainable one, more circular-like. Natural or engineered, we need to foster and develop material solutions that can have a positive impact.

We need to support a systemic transformation towards sustainability through materials by focusing on more systemic material approaches, as well as on specific material streams and human related aspects.



M#00

Insight #01

Material Solutions for Decarbonisation



M#01

Context

CO₂ is cumulative and persistent. This is why decarbonisation is essential to mitigate the impacts of climate change. We have an excess of CO₂ and we are in need of strategies that allow us to reduce our past and present CO₂ emissions, whilst keeping up with life. The ability to capture excess CO₂ and store it is key to be able to remove past emissions and move towards neutral and negative carbon scenarios.

Challenge

How can we foster better material choices from the design stage? Which materials can help us mitigate climate change? How do we enable decarbonisation and systemic transformation through material design and material choices?

Hashtags

#Decarbonisation

#MaterialsForCarbonStorage

Agents

→ [Future Earth](#). A global network of scientists, researchers, and innovators collaborating for a more sustainable planet.

→ [Project Drawdown](#). A nonprofit organisation that seeks to help the world stop global warming by achieving Drawdown.

→ [William Nordhaus](#). Sterling Professor of Economics and Professor of Forestry and Environmental Studies at Yale University.

Reference Projects

→ [After Ancient Sunlight, by Charlotte McCurdy](#). A petroleum-free, algae-based plastic that is carbon negative.^{M#01}

Reference Literature

→ [“Can we control carbon dioxide?”](#) article by William Nordhaus.

→ [“Natural climate solutions,”](#) article by Bronson W. Griscom et. al.

Reference Literature

→ [“New Insights Climate Science: a 2017–2019 summary”](#), report by Future Earth and the Earth League for the United Nations Climate Action Summit.

→ [“A European Green Deal: Striving to be the first climate-neutral continent”](#), an European Commission priority for 2019-24.

→ [“To become CO₂ negative, our civilisation’s current challenge”](#), article by Josep Rebollo Pericot.



M#01

Insight #02

Material Capture and Store Carbon



M#02

Context

We are in need of carbon capture and storage capabilities (permanent or temporary) in order to safely withdraw CO₂ created by the fossil fuel age. We need both natural and engineered materials to capture and store CO₂.

Challenge

Which materials can support our capture and storage needs? How do we embed them into systemic transformation?

Hashtags

#Decarbonisation

#MaterialsForCarbonStorage

#WasteAsRawMaterial

Agents

→ [Green Charcoal Research](#). A practice-based research by the Indian School of Design and Innovation that addresses the issue of rising pollution and temperature by developing healthy materials. ^{M#02}

→ [Climate CoLab](#). An open problem-solving platform that work on and evaluate plans to reach global climate change goals.

→ [ClimateWorks Foundation](#). A global platform for philanthropy to innovate and accelerate climate solutions that scale.

→ [Carbon180](#). A climate-focused NGO that brings together scientists, policymakers and businesses to fundamentally rethink carbon.

→ [Resilience Science for Transformation](#). Research stream by the Stockholm Resilience Centre that aims to use and develop resilience thinking for social-ecological innovations and transformations.

Reference Literature

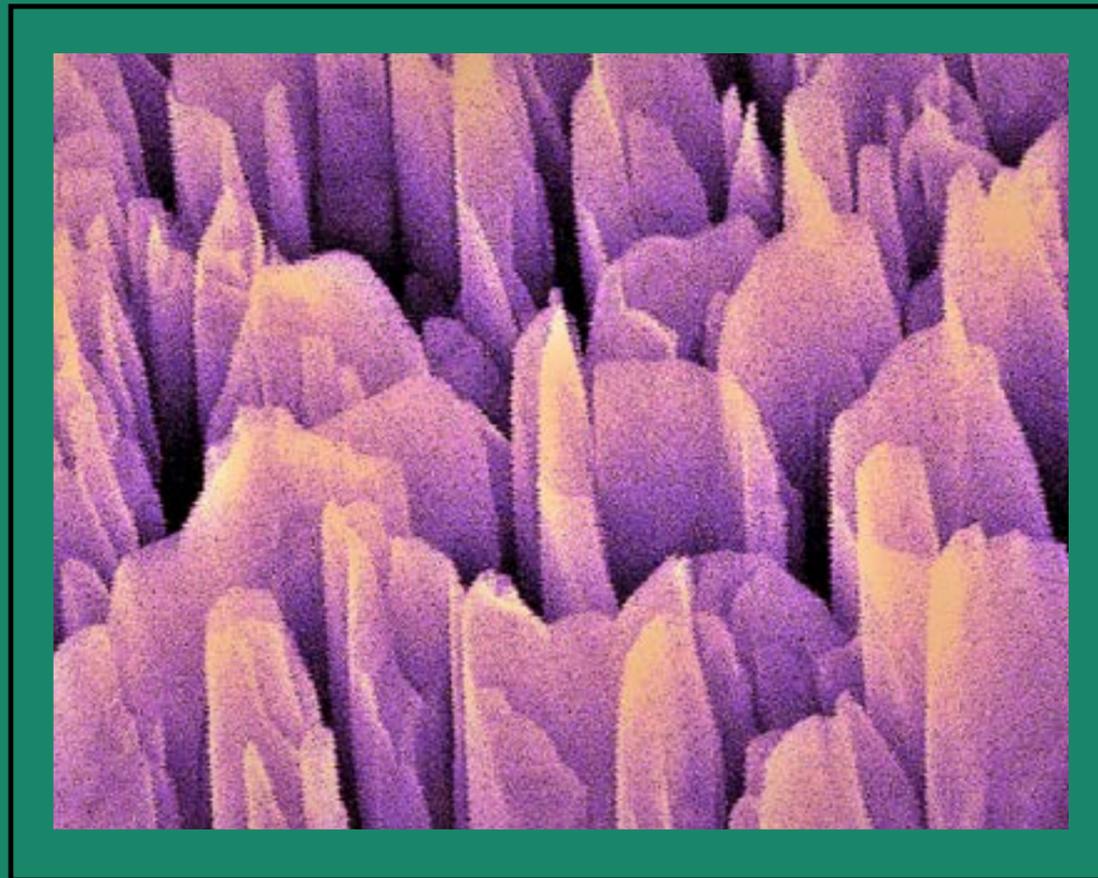
→ [“Sustainable material for carbon dioxide capture,”](#) article by Jenny Jernberg.

→ [“The technological and economic prospects for CO₂ utilization and removal,”](#) article by Cameron Hepburn, Ella Adlen, et al.

→ [Getting to Neutral: Options for Negative Carbon Emissions in California,](#) report by ClimateWorks Foundation.

Insight #03

Hydrogen for Clean Energy Storage



M#03

Context

Most of the emissions come from the use of non-renewable energy sources. Alternatively, renewable energies are developing at exponential rates. We need available energy storage otherwise it is difficult to match energy production with energy demand. We need clean and affordable storage capacity to speed up transition to renewable, carbon-neutral energy generation for all fields of use. Hydrogen is the most common element in our planet and has proven a perfect energy source and storage “place”. Unlike batteries, it does not require scarce and valuable resources to build up and store energy. Neither does it generate waste or other externalities. Hydrogen is leading the way to clean energy on demand.

Challenge

How can we integrate hydrogen technologies to speed up transition to a decarbonised economy? and beyond mobility applications, can hydrogen lead 4IR?

Hashtags

#Decarbonisation

#CleanEnergyStorage

Agents

→ [Medeas: EU Framework Program for Research and Innovation actions \(H2020 LCE-21-2015\)](#). A new open-source energy model to guide the transition to a low carbon European socio-economy.

Reference Literature

→ [“Harvesting clean hydrogen fuel through artificial photosynthesis”](#), research by University of Michigan and McGill University. ^{M#03}

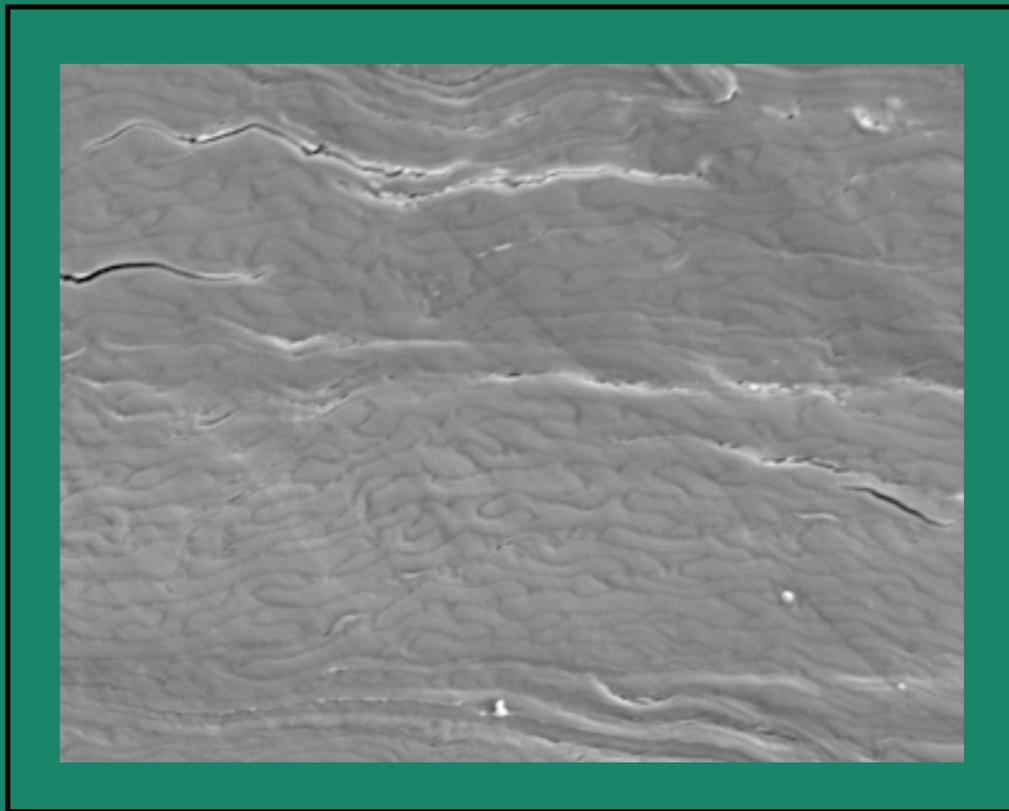
→ [“The Circularity Gap Report 2020,”](#) by Circle Economy for the Platform for Accelerating the Circular Economy (PACE).

→ [“Límites minerales de la transición energética,”](#) article by Alicia Valero.

→ [“Límites a la disponibilidad de minerales,”](#) article by Alicia Valero.

Insight #04

Semi-life is a Key Circular Design Dimension



M#04

Context

To reduce CO₂ stress we need to prioritise materials that can help keep CO₂ stored and out of circulation for as long as possible, whilst being in use. It is the lifespan before the materials release CO₂ back into the nutrient cycle. It is a very relevant material dimension, called material semi-life.

Challenge

Consider semi-life from the early stage of the design process. How to choose materials with better semi-life potential? How do we visualise this material dimension in design to inform better choices?

Hashtags

#Decarbonisation

#MaterialsForCarbonStorage

#CircularDesign

#SemiLife

#CelluloseMatters

Reference Literature

→ [“Global socioeconomic material stocks rise 23-fold over the 20th century and require half of annual resource use,”](#) article by Fridolin Krausmann et al.
→ [“European regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework,”](#) by the European Parliament.
→ [“IKEA Climate Action Study,”](#) report by GlobeScan.
→ [“UMD Researchers Create Super Wood Stronger Than Most Metals,”](#) communication by the University of Maryland. ^{M#04}

Insight #05

Cellulose Matters



M#05

Context

Cellulose is the most common polymer on earth. And it is the great player in the carbon cycle as it uses it to build up. That is why materials based on cellulose keep carbon trapped before releasing it back into the cycle when discarded to biodegrade. Materials with cellulose content contribute to offset carbon temporarily. Abundant (big share of the green chunk in the graph) and versatile, cellulose-based materials support most of our needs. Besides wood, we can find cellulose in a plethora of plant-based materials that offer endless possibilities. Most well-known are the fibres widely used in the textile, paper, construction and composite industries. Developments also include nanocellulose and other synthetic paths for cellulose engineered materials with outstanding properties.

Challenge

How do we raise awareness on material cellulose content? And how do we support the choice of materials with cellulose content over other choices?

Hashtags

#Decarbonisation

#HealthyMaterials

#MaterialsForCarbonStorage

#CircularDesign

#SemiLife

#CelluloseMatters

Agents

→ [Materials and sustainable use of natural resources.](#) Research area at Aalto University.

→ [Honext.](#) Designers and producers of a natural and always recyclable material made from cellulosic waste.^{M#05}

Reference Literature

→ [“New Insights Climate Science: a 2017–2019 summary.”](#) report by Future Earth and the Earth League for the United Nations Climate Action Summit.

Insight #06

Bio-Chars as Engineered Carbon Sink Materials



M#06

Context

On the one hand, linear economy has led us to bury waste in landfills for many years. All the waste piling up turns into high emission sources over time (cooking and decomposing out of control). On the other hand, we generate tons of organic waste daily. Not all organic waste can be handled in a circular flow. A big share of these two wasted flows could be turned into biochar. Char is an inert material that captures carbon without releasing it until we need it to.

Challenge

How can we eliminate waste emissions from difficult but common waste streams? How can we use and develop char into different applications??

Hashtags

#Decarbonisation

#MaterialsForCarbonStorage

#WasteAsRawMaterial

#CircularDesign

#SemiLife

Agents

→ [Natural Material Studio](#). A materials research and design studio led by Bonnie Hvillum that explores the possible future of discarded or overseen raw matter.^{M#06}
→ [Future Earth](#). A global network of scientists, researchers and innovators collaborating for a more sustainable planet.

Reference Projects

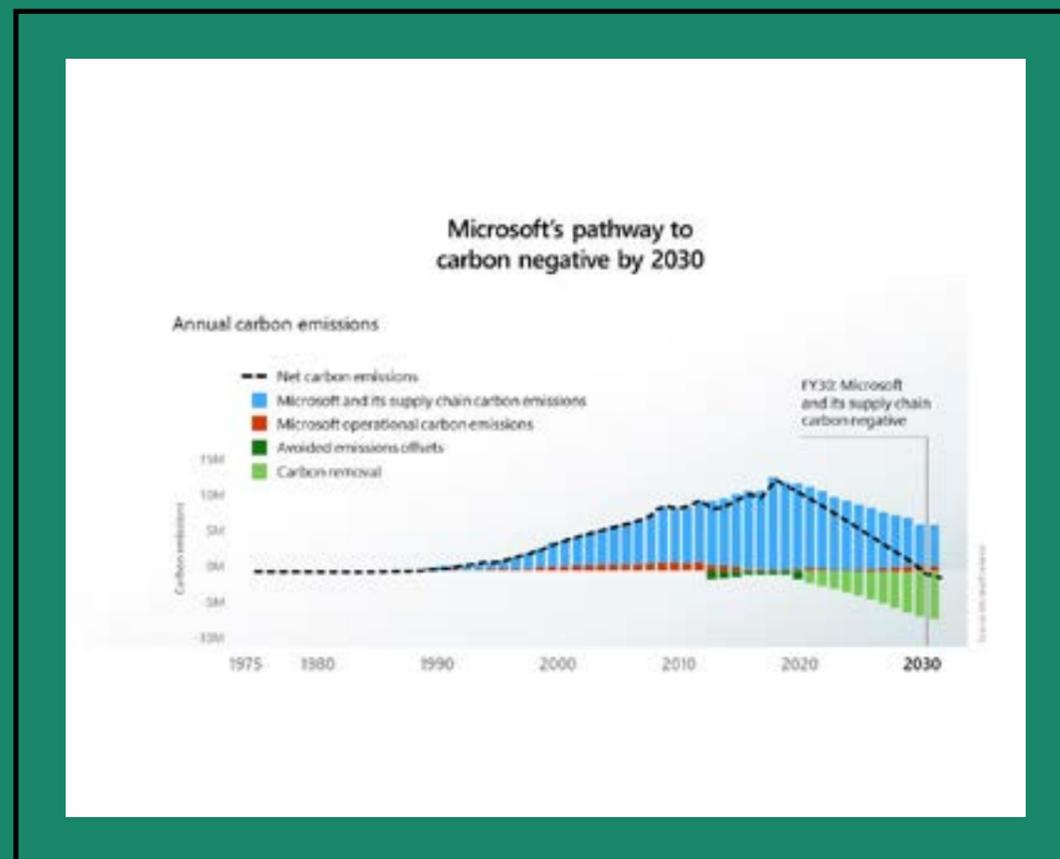
→ [Biochar Production, by Project Drawdown](#). An alternative to disposing of unused biomass through burning or decomposition.

Reference Literature

→ [“Restoring soils could remove up to ‘5.5bn tonnes’ of greenhouse gases every year.”](#) article by Daisy Dunne.
→ [“The Green Charcoal at the Future of Architecture and Building Biennale.”](#) article by Shreyas More.
→ [New Insights Climate Science: a 2017–2019 summary](#), report by Future Earth and the Earth League for the United Nations Climate Action Summit.

Insight #07

Material Accountability



M#07A

Context

Materials that manage carbon will be managing value as well. The price of CO₂ will eventually be the equivalent cost of CO₂ removal. Today carbon accountability is limited to few industries. Compensation and offset projects are common, but no value indicator (price tag) has yet been associated with general materials, products and services. Carbon footprint is a starting point to visualising embedded CO₂. However, there is an invisible price tag and it will keep increasing until it reflects reality. The cost of removing CO₂ from the environment will be rewarded. That value will make things change radically. Material life span will be prolonged. And material ownership throughout the material life span will be a valuable natural asset.

Challenge

How do we visualise the externalities of our material life? How long will it take to set the carbon price at the right level? How do we foster material choices that include carbon cycle appreciation in a visible manner? When will cities be accountable for their CO₂?

Hashtags

#Decarbonisation

#MaterialsForCarbonStorage

#CircularDesign

#SemiLife

Agents

→ [William Nordhaus](#). Sterling Professor of Economics and Professor of Forestry and Environmental Studies at Yale University.

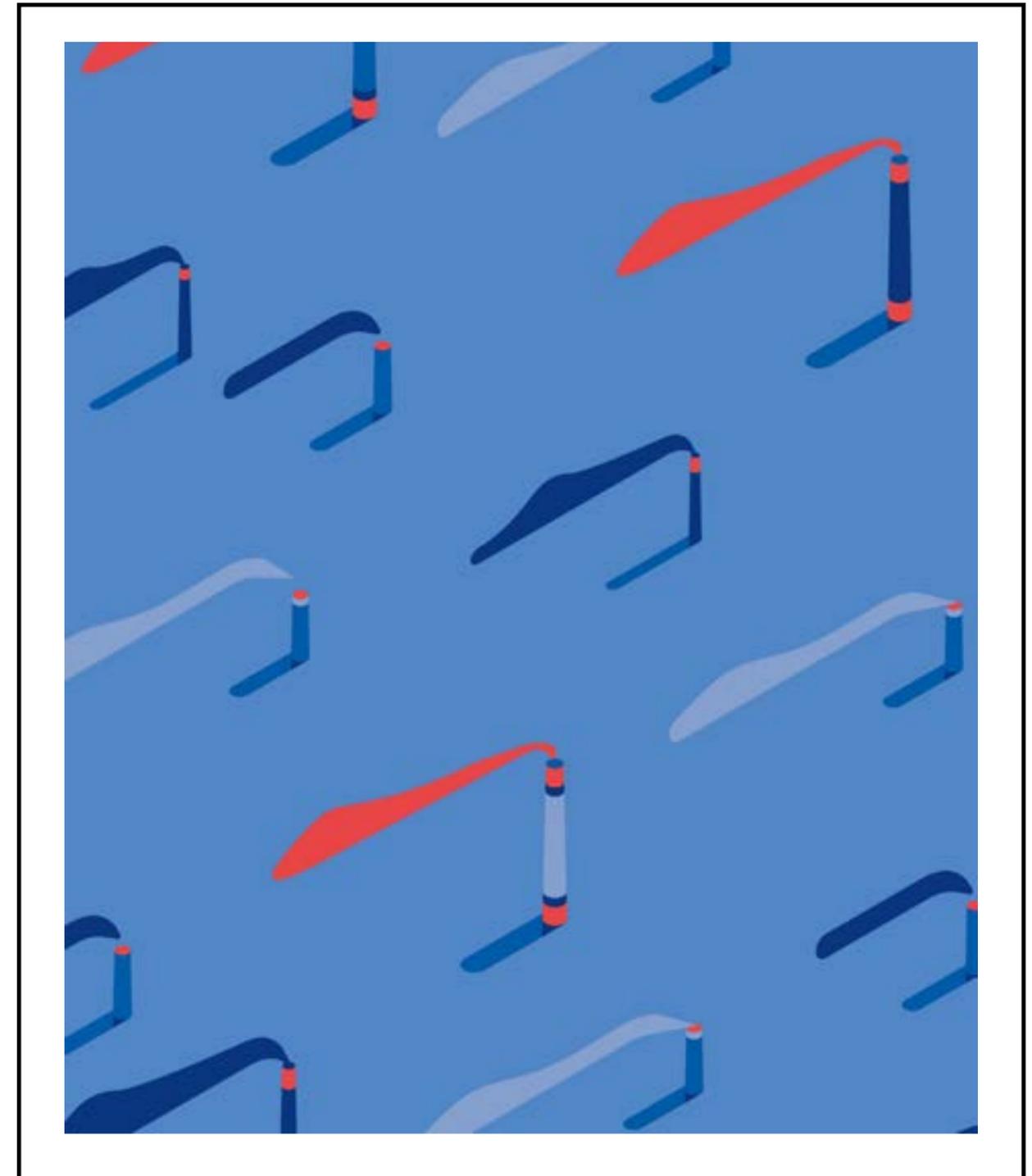
→ [Microsoft](#). One of the first corporations to be carbon negative by 2030. ^{M#07A}

Reference Projects

→ [World Climate Simulation](#), by [Climate Interactive](#), the [MIT Sloan Sustainability Initiative](#), and [U-Mass Lowell's Climate Change Initiative](#). An in-person role-playing exercise of the UN climate change negotiations.

Reference Literature

- [“Can we control carbon dioxide?”](#) article by William Nordhaus.
- [“How much CO₂ is embedded in a product?”](#) article by Paolo Natali, Suzanne Greene, and Perrine Toledano.
- [Life Cycle Assessment Comparing Ten Sources of Manmade Cellulose Fiber](#), executive summary by Tobias Schultz and Aditi Suresh for SCS Global Services.
- [Apparel Industry Life Cycle Carbon Mapping](#), report by Business for Social Responsibility.
- [Emissions Gap Report 2019](#), by United Nations Environment Programme. ^{M#07B}



M#07B

Insight #08

Waste Archaeology and Futurology



M#08

Context

We now embrace waste as a resource. Nature has shown us repeatedly that there is no such thing as waste. Everything can be turned around into a new resource. Still we discard a lot. We discard them maybe in an organised way or maybe not. We abandon the resources and that is when they become waste, as Product Life org points out. We have spent most of the time neglecting waste in a linear system that did not take into consideration any of the externalities generated. Waste has been for a long time an invisible externality of the industrial age. Now, waste has become part of the future archaeological landscape. Future is full of polyester ambers in colourful schemes to be found in remote places, sunk, piled up, melted and mixed in amazing shapes and who knows, perhaps breath-taking aesthetics for the future generations.

Challenge

How do we understand plastic? How much beauty is embodied in abandoned resources? Oil-based plastics are dead material. From a post-humanism perspective, does this make them the preferred choice over plant and animal originated materials?

Hashtags

#WasteArcheology

#MaterialsCulture

#WasteAsRawMaterial

#CircularDesign

Agents

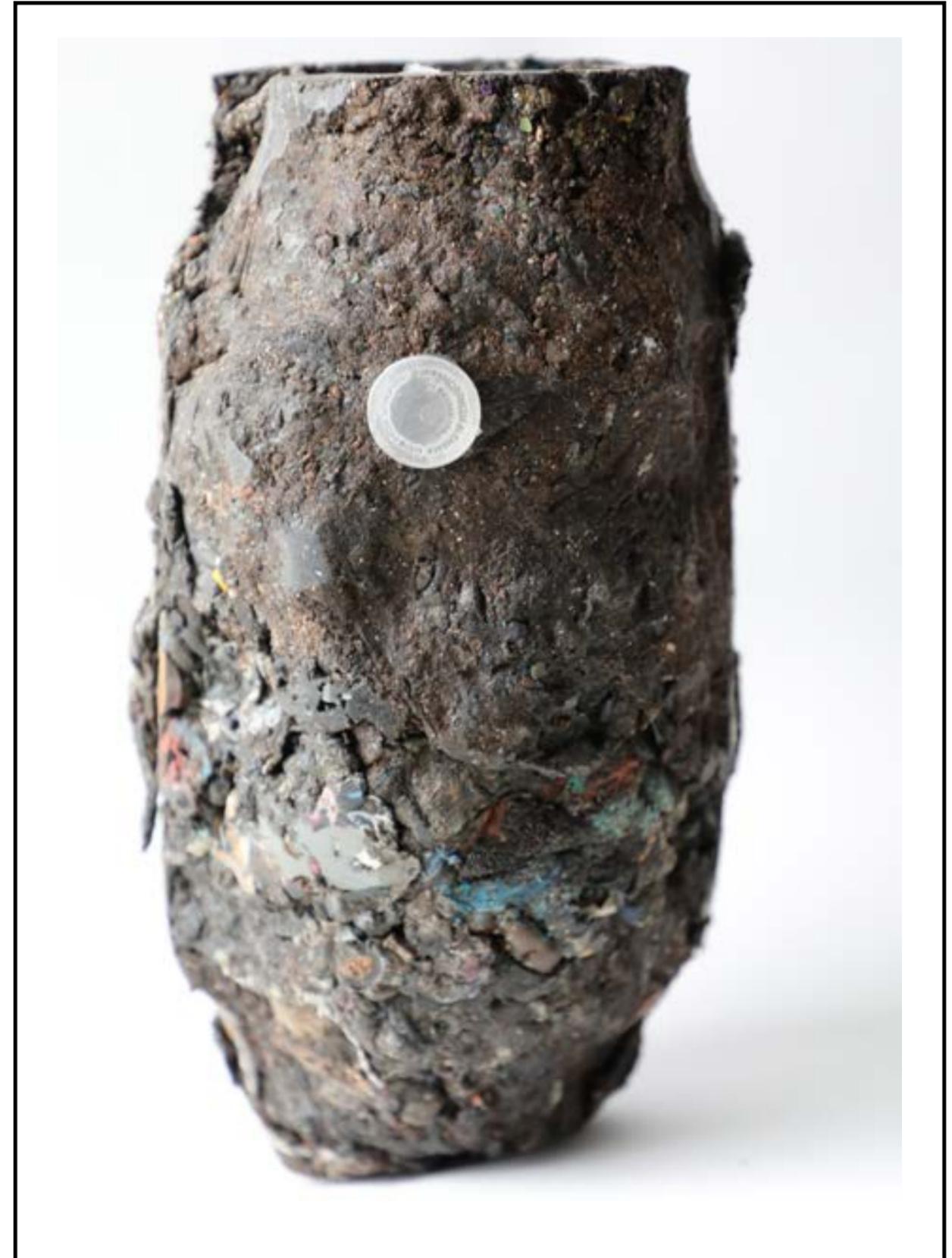
→ [Shahar Livne](#). Atelier for Bespoke Conceptual Material Based Design.
→ [The Product-Life Institute](#). A virtual not-for-profit consulting organisation devoted to developing sustainable strategies and policies, founded by Dr. Walter Stahel.

Reference Projects

→ [Metamorphism, by Shahar Livne](#). A speculation on a future in which plastic waste further permeates Earth's surface and its natural systems. ^{M#08}

[Reference Literature](#)

- [“End of Waste,”](#) proposal by Walter Stahel.
- [The Posthuman,](#) book by Rosi Braidotti.



M#08

Insight #09

Plastic and Microplastic Waste



M#09

Context

We acknowledge the problem of uncontrolled plastic waste. Particularly macro plastic waste: visible, collectable and sortable to some extent. It harms the environment in different ways and there are different successful initiatives addressing the challenge of collecting these plastics adrift in the ocean or on shore. These initiatives are preventing macro plastics from eventually becoming microplastic pollution. Microplastics are by size not always visible, hence much more difficult to capture. A big portion of them are generated by use and degradation of larger plastic items such as tyres, paints, bottles or synthetic textiles. And most of it ends up in the air or in water bodies entering the trophic cycle.

Challenge

How can we tackle plastic applications to prevent plastic waste from the design phase? How can we prevent microplastic pollution? What can we do with collected microplastic?

Hashtags

#WasteAsRawMaterial

#CircularDesign

#MicroPlastics

Agents

→ [Precious Plastic](#). An alternative and open-source plastic recycling system to provide a global solution to the plastic waste problem.

→ [Evo & Co.](#) A group of brands that focuses on providing solutions to end plastic pollution.

→ [Seaqual Initiative](#). A collaborative community fighting plastic pollution. ^{M#09}

Reference Projects

→ [Son of the soil, exhibition by Moffat Takadiwa](#). Artworks composed from the discarded remains of consumer waste, woven together in the language of traditional Zimbabwean textiles.

Reference Literature

- [“Upcycling the oceans,”](#) talk by Javier Goyeneche (Ecoalf).
- [A circular economy for plastics: Insights from research and innovation to inform policy and funding decisions,](#) report by Maurizio Crippa et. al. for the European Commission.



M#09

Insight #10

Agricultural and Food Waste Stream Materials



M#10A

Context

We generate a constant flow of organic waste, mostly food and agricultural. This waste is usually considered biomass for energy valorisation. As the population grows and more people turn towards a more vegetarian diet, these waste streams will increase accordingly. The streams have the potential to become new materials before going back to the nutrient cycle. These large feedstock streams are perfect sources of biodegradable material that can be turned into new material applications with engineering skills. The most convenient applications could be for products with short lifespan.

Challenge

How do we divert agro-waste streams from energy valorisation into other valuable applications? How much oil-based plastic are we able to erase from daily life by doing that?

Hashtags

#Decarbonisation

#EngineeredNaturals

#WasteAsRawMaterial

#BioFabrication

#CircularDesign

Agents

→ [Feltwood](#). New technologies for the development of environmentally friendly biodegradable materials. ^{M#10A}

→ [Natural Material Studio](#). A materials research and design studio that explores the possible future of discarded or overseen raw matter.

→ [Circular Systems](#). Transforming waste into valuable fiber, yarn and textile products for the fashion industry.

→ [Piñatex](#). An innovative natural textile made from waste pineapple leaf fibre. ^{M#10B}

Reference Literature

→ [Plastic Atlas: Facts and figures about the world of synthetic polymers](#), report by Heinrich Böll Foundation.

→ [Products that Flow: Circular Business Models and Design Strategies for Fast-Moving Consumer Goods](#), book by Siem Haffmans, Marjolein van Gelder, Ed van Hinte and Yvo Zijlstra.

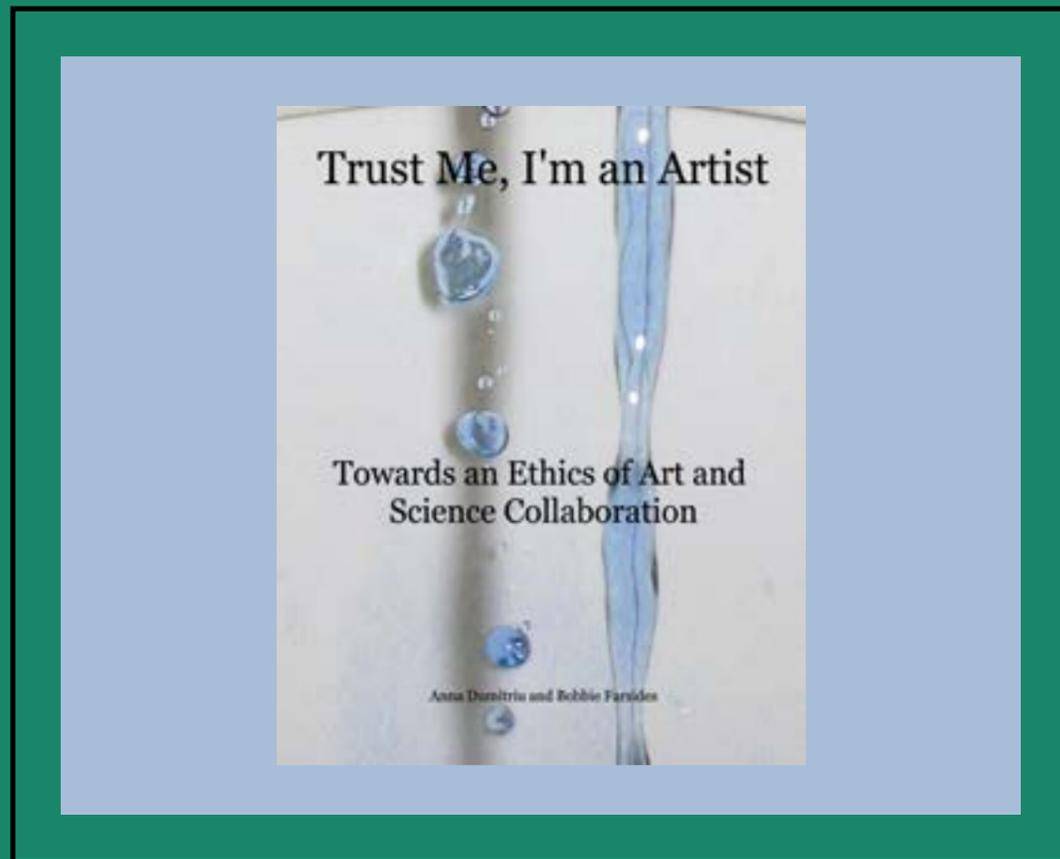
→ [“Raw Material Profile for Biomass.”](#) visualisation by WU Vienna.



M#10B

Insight #11

Art calls for Material Significance



M#11

Context

Our culture, our material, our human approach. Artists are rethinking the significance of materials. Pointing at a flawed system that neglects the values embodied in them. Putting material in the forefront to unveil the human ingenuity embodied in it.

Challenge

Raise awareness regarding human footprint. Enhance material beauty. Raise awareness about neglected material flows and our unsustainable way of life.

Hashtags

#MaterialsCulture

#CircularDesign

Reference Projects

→ [Son of the soil, exhibition by Moffat Takadiwa.](#) Artworks composed from the discarded remains of consumer waste, woven together in the language of traditional Zimbabwean textiles.

→ [The Allure of Matter: Material Art from China, exhibition by the Smart Museum of Art.](#) Material transformations and explorations, transforming seemingly everyday objects into large-scale artworks.

Reference Literature

→ [Plastic Atlas: Facts and figures about the world of synthetic polymers,](#) report by Heinrich Böll Foundation.

→ [Trust me, I'm an artist: Towards an Ethics of Art Science Collaboration,](#) book by Anna Dumitriu and Bobbie Farsides. ^{M#11}

Insight #12

Hemp Multiverse



M#12A

Context

Hemp! Hemp is an outstanding source of material benefits. It heals the environment, grows quickly and densely, capturing and storing large amounts of carbon. Requires very little to grow and gives plenty of resources in return. Long lasting with plenty of good properties and zero waste. From food to construction, from textiles to composites, from medical applications to bioplastics as well as supercapacitors for batteries. Low-tech or high-tech hemp can be 3D printed into houses, woven into healthy, functional and beautifully ageing fabrics, braided into strong cording, moulded into different geometries, mixed into board, concrete or insulation materials, pressed for nutrients and much more... Hemp is the multiverse material.

Challenge

How can we speed up hemp adoption across the board? How can we lift it up among material choices for quick returns in environment healing and human well-being?

Hashtags

#Decarbonisation

#MaterialsCulture

#HealthyMaterials

#MaterialsForCarbonStorage

#CircularDesign

#SemiLife

#CelluloseMatters

Agents

→ [Hemp the climate](#). Accelerating the use of industrial hemp for soil regeneration, CO2 sequestration and climate resilience.

→ [EIHA: European Industrial Hemp Association](#).

The only pan-European membership organisation in the industrial hemp sector.

→ [Michael Carus](#). Physicist working in the field of bio-based products; one of the founders and Managing Director of nova-Institute.

Reference Projects

→ [Flat House, by Practice Architecture](#). A family residence using prefabricated panels made with hemp. ^{M#12A}

- [“The Role of Industrial Hemp in Carbon Farming.”](#) article by James Vosper.
- [“Mirreco 3D Prints Houses With Hemp-Based Material.”](#) article by Rawal Ahmed. ^{M#12B}
- [“The Age Of Hemp: Global Advanced Industrial Applications.”](#) article by Giadha Aguirre De Carcer.
- [Le chanvre industriel: production et utilisations.](#) book edited by Pierre Bouloc.



M#12B

Insight #13

Biofabrication: Algae, Mushrooms and More



M#13A

Context

In the quest of new renewable material sources, algae and mushrooms are being explored in many ways with very appealing aesthetic and functional outcomes. Natural yet engineered, those materials grow intertwined with designs offering new creative possibilities.

Challenge

Scale and widen actual applications. Can we biofabricate flexible structure functions? Can we mimic natural photosynthesis? From a non-anthropocentric perspective, is biofabrication acceptable?

Hashtags

#EngineeredNaturals

#Decarbonisation

#BioFabrication

#CircularDesign

Agents

→ [Werewool](#). A fiber development platform to create biodegradable fibers with tailored aesthetic and performance properties.

→ [Ecovative design](#). Growing materials that are compatible with Earth; creators of the Mycelium Foundry.

→ [Evo & Co.](#) A group of brands that focuses on providing solutions to end plastic pollution.

→ [Atelier Luma](#). A think tank, a production workshop and a learning network to co-develop new ways of producing and caring for Arles city and its bioregion.

Reference Projects

→ [Algae Platform, by Atelier Luma](#). New values for wetlands as incubators for locally grown bio-materials. ^{M#13}

→ [Carbocycene, by Atelier Luma](#). Prototyping of a distributed model for the upcycling of lignocellulosic waste resources using mycelium technology.

→ [The Department of Seaweed Prototyping Workshop, by Julia Lohmann](#). A seaweed structure installed during the World Economic Forum in Davos, and a seaweed workshop.

→ [Algae Cultivation for Carbon Capture and Utilization Workshop Summary Report](#), by the Office of Energy Efficiency & Renewable Energy.

→ [“Dutch designers convert algae into bioplastic for 3D printing.”](#) article by Ali Morris.



M#13B

Insight #14

Cultured and Crafted Materials



M#14

Context

Materials that put humanity at the core. We reconnect with nature through hand crafted materials and imprint our heritage and know-how. A revaluation of culture, craft and technology together in the material process. Industrial technologies can then add another layer to our hand work. We are capable of extreme beauty and function when we let our hands and technology align.

Challenge

How can we lift those materials and the stories they carry without destroying their very nature? How to scale cultured crafted materials and the beauty of the uneven?

Hashtags

#MaterialsCulture

#HealthyMaterials

#CircularDesign

Agents

→ [Studio Nienke Hoogvliet](#). A design studio for material research, experimental and conceptual design.

→ [Buro Belén](#). Studio established by Brecht Duijf and Lenneke Langenhuijsen, working on material and colour concepts in the field of product design, interior design and exhibition design.

→ [Green Nettle Textile](#). Makers of a linen-like natural eco-fabric from converting nettle stalks, and employers of thousands of artisans across the globe.

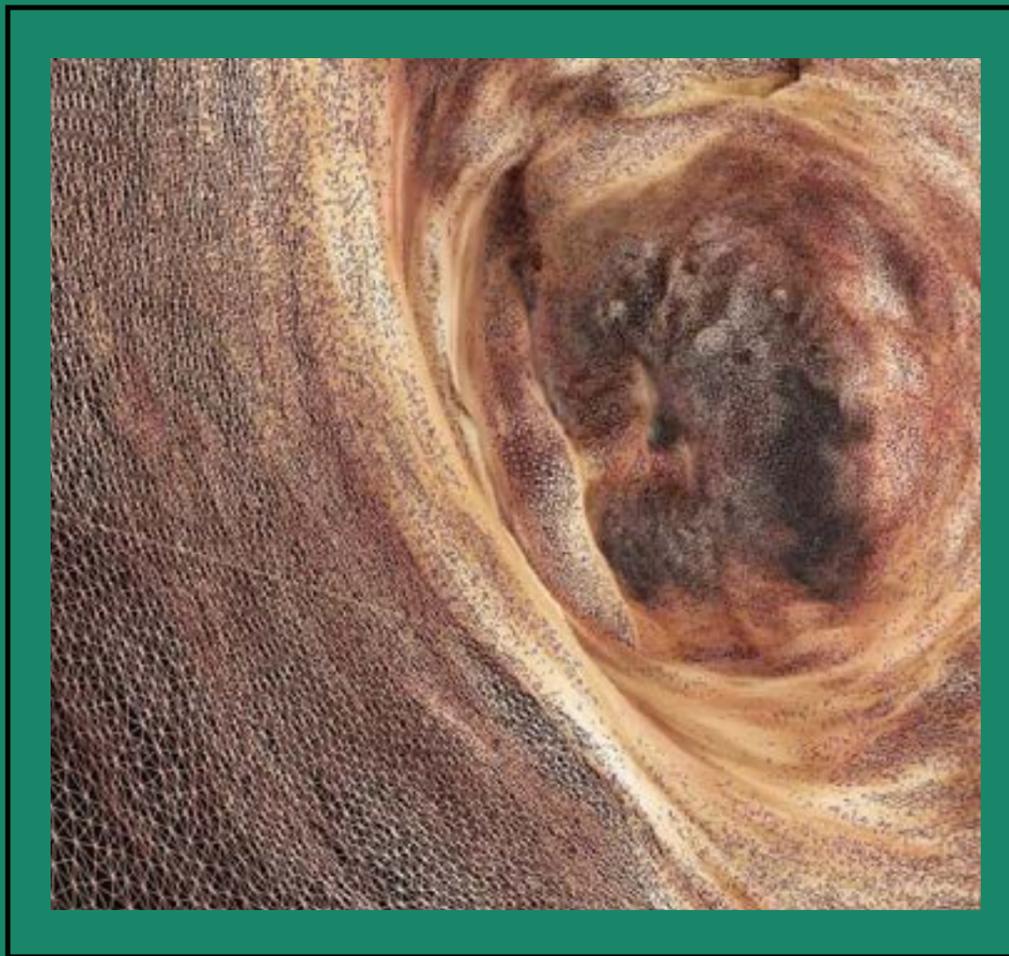
Reference Projects

→ [Wooden textiles, by Buro Belén](#). A wooden textile material that combines a layer of traditional crafting with a layer of technology. ^{M#14}

→ [Sea me, by Nienke Hoogvliet](#). A rug made of sea algae yarn, knotted by hand in an old fishing net.

Insight #15

Data as Raw Material



M#15A

Context

Data is ubiquitous. Generated endlessly, constantly harvested from every single source, move, interaction, field, dimension, emotion, dream, etc. Data configurations and its multiple outcomes can support decarbonisation. Data can create human engagement and help achieve change faster. Material can take data and transform it into physical visualisation of equations.

Challenge

How can data inform material choices? Can data improve material functionality during use phase? How can materials and data interact for the planet and people's well-being? How can data translate into material forms that do not exist otherwise?

Hashtags

#HealthyMaterials

#BioFabrication

#DataAsRawMaterial

Agents

→ [Joana Moll](#). Artist and researcher critically exploring the way techno-capitalist narratives affect the alphabetisation of machines, humans and ecosystems.

→ [Julia Jansen](#). Design researcher, artist, and public speaker about digitalisation and society.

→ [Linda Worbin](#). Design researcher about how dynamic textile expressions change with use and over time, using a combination of IT and textiles through practice based design research.

→ [Anna Dumitriu](#). Artist working with BioArt, sculpture, installation, and digital media to explore our relationship to infectious diseases, synthetic biology and robotics. ^{M#15}

→ [Institute For Figuring](#). An organisation dedicated to the poetic and aesthetic dimensions of science, mathematics and engineering.

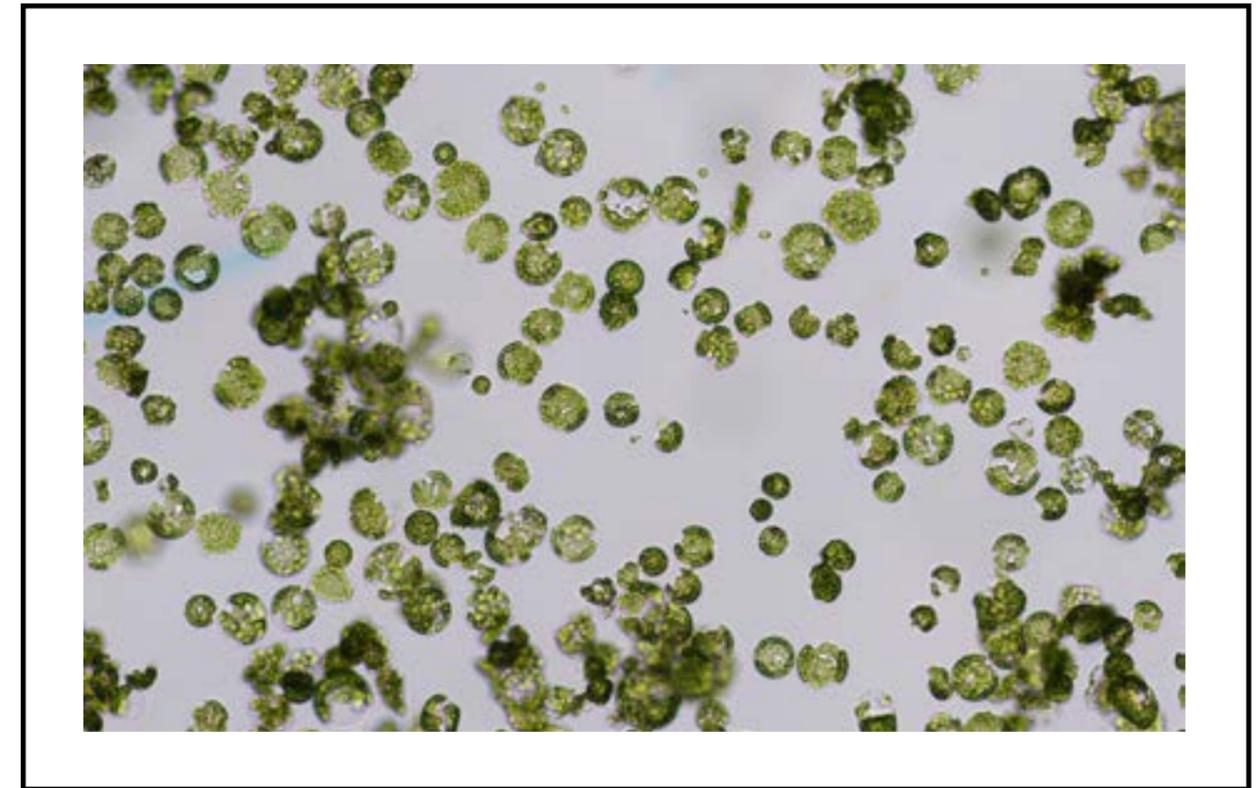
→ [Collective Intelligence Design Lab \(CIDL\)](#). A MIT lab that helps groups design innovative new kinds of collectively intelligent systems (superminds) to solve important problems.
→ [Project N95](#). Helps healthcare and frontline organisations source critical and personal protective equipment (PPE) from vetted suppliers.

[Reference Projects](#)

→ [Trust Me I'm an Artist, research project led by Anna Dumitriu and Bobbie Farsides](#). A series of practical and discussion-based participatory workshop activities investigating the new ethical issues arising from art and science collaboration.
→ [Crochet the Coral reef, by Christine Wertheim](#). An artwork responding to climate change, an exercise in applied mathematics, and a wooly experiment in evolutionary theory.
→ [DEFOOOOOOOOOOOOOOOOOOOOOOOOOOREST, by Joana Moll](#). A net based piece that shows the amount of trees needed to absorb the amount of CO₂ generated by the global visits to google.com every second.
→ [Disrupting systems for global sustainability, by Futures CoLab](#). Activity to generate ideas about leverage points for systems-level changes that could steer the world toward global sustainability.

[Reference Literature](#)

→ [“DDW Trend: Data as material,”](#) article by Dutch Design Week.



M#15B

T Technology

Our relationships with technology are so deep that we are not aware of all the impacts and traces we produce. Hence, we are talking about post-internet and post-human where we are networks and networks are us. Like Chris Dancy states, we are the apps that we use. Adding to this, we are predictable and trackable data bodies. On the other hand, technology has empowered and broadened the creativity level of humans enormously. We are capable of creating complex solutions and mind-blowing experiences.

Hence, it is important to push the development of technology but also to be able to contextualise it and be able to see the total picture. Like reclaiming personal and local data. Quoting the headline of the Economist: “The world’s most valuable resource is no longer oil, but data.” Hence, a part of creating and designing with new technologies is understanding and contextualising the implications of technological age, its political and anthropological aspects and the effects on our society and environment.



T#00

Insights

- #01 Critical Interfaces
- #02 Technology and Climate Crisis
- #03 AI and Design
- #04 Hacking AI Systems
- #05 Technology and Control
- #06 Networks Politics
- #07 Different Realities
- #08 Data Visualisation and Augmenting Materiality
- #09 Robots: our Competitors or Companions?
- #10 Alternative Displays
- #11 Extended Interaction
- #12 Biometrical Data
- #13 EEG Interfaces
- #14 Soft Digital Fabrication
- #15 Digital Manufacturing

Insight #01

Critical Interfaces



T#01

Context

We need interfaces that help us to relook existing technology and act against the systems and regain the control over our data and the invention of new design strategies that questions existing devices and systems is crucial.

Challenge

What are the future interfaces? What does it mean to live in an app-driven society coexisting with AI systems managing our lives?

Hashtags

#CriticalInterface #Interface #Hacking #HCI
#Surveillance #ContraSurveillance #Dataveillance
#Activism #DataPollution #Profiling

Reference Projects

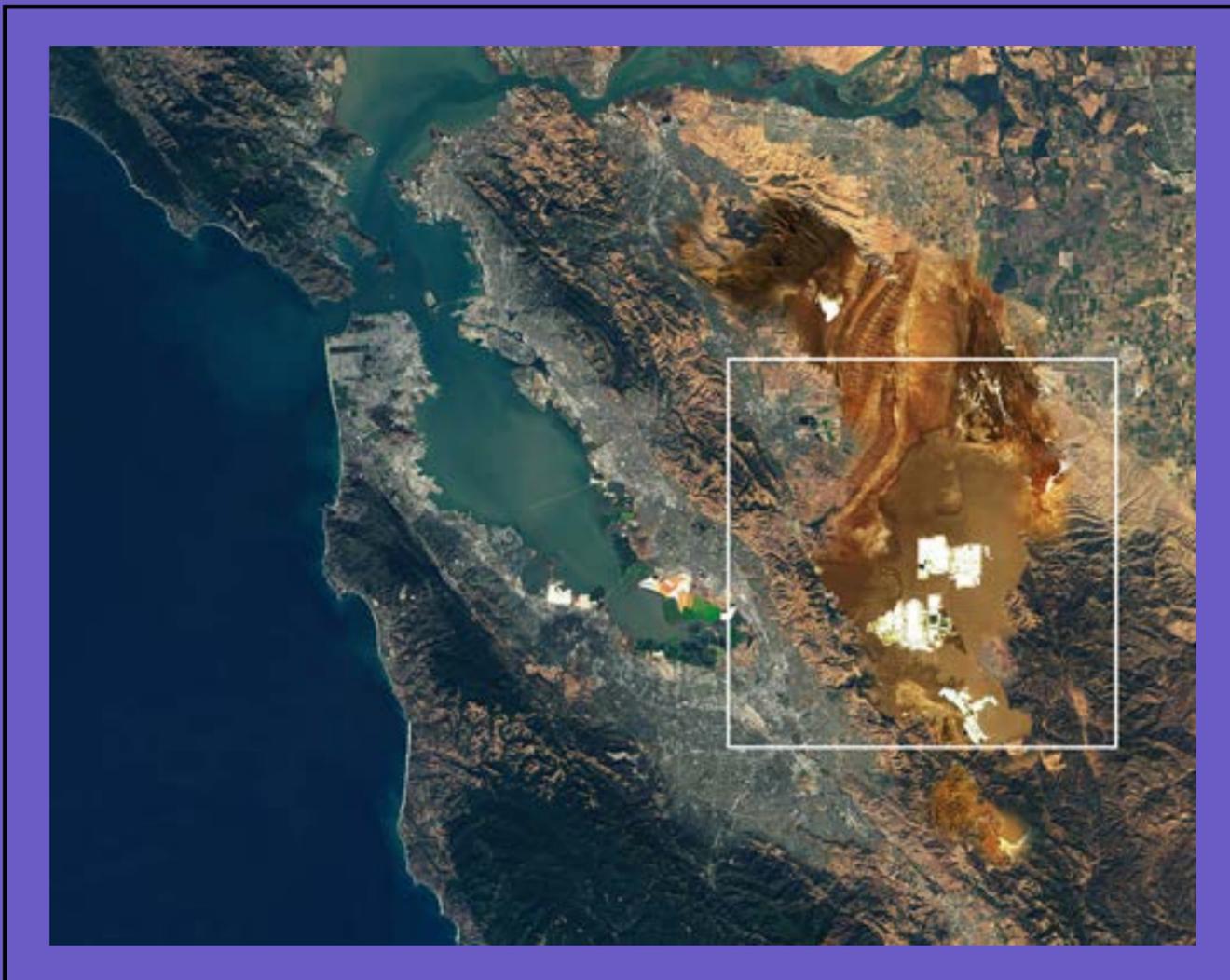
→ [Unfit Bits](#), by Tega Brain and Surya Mattu. DIY fitness spoofing techniques to allow you to create walking datasets without actually having to share your personal data.^{T#01}
→ [Inter fight](#), by César Escudero. A series of physical untraceable bots that behave as intruders fighting against Surveillance Capitalism.
→ [The Web Never Forgets](#), by Jasmine Guffond. An immersive sound installation that exposes the proliferation of ubiquitous online surveillance.
→ [Constraint City: Pain of everyday life](#), by Gordan Savicic. Public walking performance for literally feel the pain of network access-restrictions through a worn chest strap.
→ [BitterCoin](#), by Martin Nadal and César Escudero Andaluz. An old calculator machine hacked to be used as a miner validating the pending bitcoins transactions in the Blockchain.

Reference Literature

→ [“The House That Spied on Me.”](#) article by Surya Mattu and Kashmir Hill.

Insight #02

Technology and Climate Crisis



T#02

Context

Environmental crises and climate change are the critical keywords of today. When working with technology and designing new services, interfaces, products, we need to question what does it cost in terms of environment. How green is the technology and new innovations?

Challenge

What are the expenses in resources and physical implications of data-driven design?

Hashtags

#GreenAI #GreenTechnology #Environmental
#Crisis #DataViz #EnergyViz #ClimateChange

Agents

→ [Kyle Mcdonald](#). Media artist working with code.

Reference Projects

→ [Harvest, by Julian Oliver](#). Wind energy used to mine cryptocurrency to fund climate research.

→ [DEFOOOOOOOOOOOOOOOOOOOOOOOOOOOREST, by Joana Moll](#). A net based piece that shows the amount of trees needed to absorb the amount of CO₂ generated by the global visits to google.com every second.

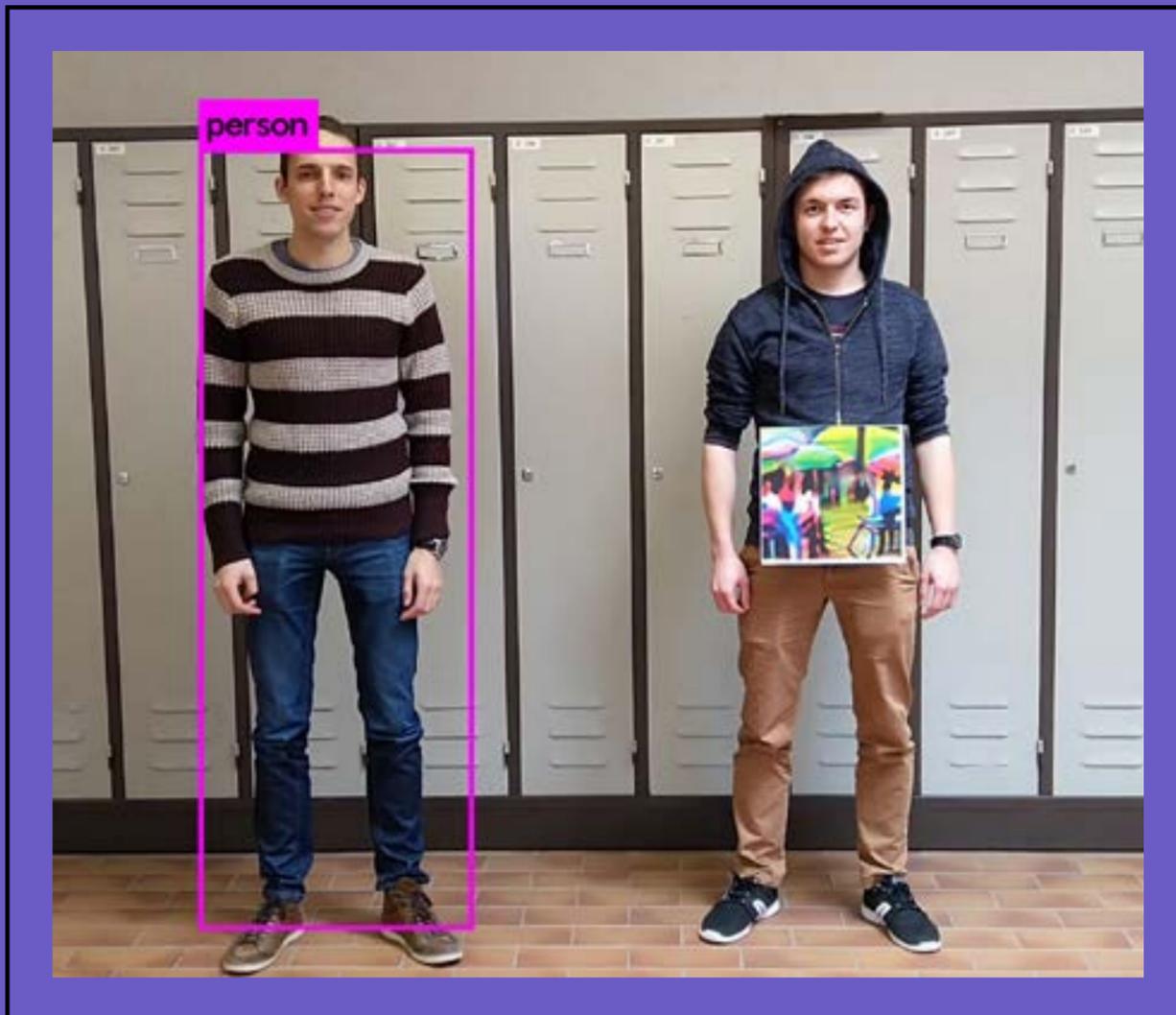
→ [Asunder, by Julian Oliver, Tega Brain and Bengt Sjöln](#). A fictional 'environmental manager' that proposes and simulates future alterations to the planet.^{T#02}

→ [Western Flag, by John Gerrard](#). A flagpole bearing a flag of perpetually-renewing pressurised black smoke, depicting the world's first major oil find.

→ [The Hidden Life of an Amazon User, by Joana Moll](#). The journey Moll undertook inside the intricate labyrinth of interfaces and code to make a purchase from Amazon.

Insight #03

AI and Design



T#03

Context

New forms of creativity can be enabled if we treat data and AI as the new digital material from where to explore disruptive territories for digital and artistic expression.

Challenge

What are the future digital design materials and tools for creatives?

Hashtags

#FastFashion

#FastDesing

#AI&Design

#Gan

#DeepLearning

#NeuralNetworks

Reference Projects

→ [Surveillance Speaker, by Dries Depoorter](#). How do you look in the eyes of a surveillance camera that can speak? An installation about surveillance and artificial intelligence.

→ [Seattle Crime Scene Cams, by Dries Depoorter](#). Using the location of the latest 911 calls, the closest live online traffic camera are showed, turning us into long-distance disaster tourists.

→ [#EpicGanGuy2019, by Memo Akten](#). Using state-of-the-art Deep Learning algorithms to react to the hype discourse in the post-internet age.

→ [Segmentation.Network, by Sebastian Schmieg](#). Makes visible the hidden manual labour that goes into building neural networks and artificial intelligence.

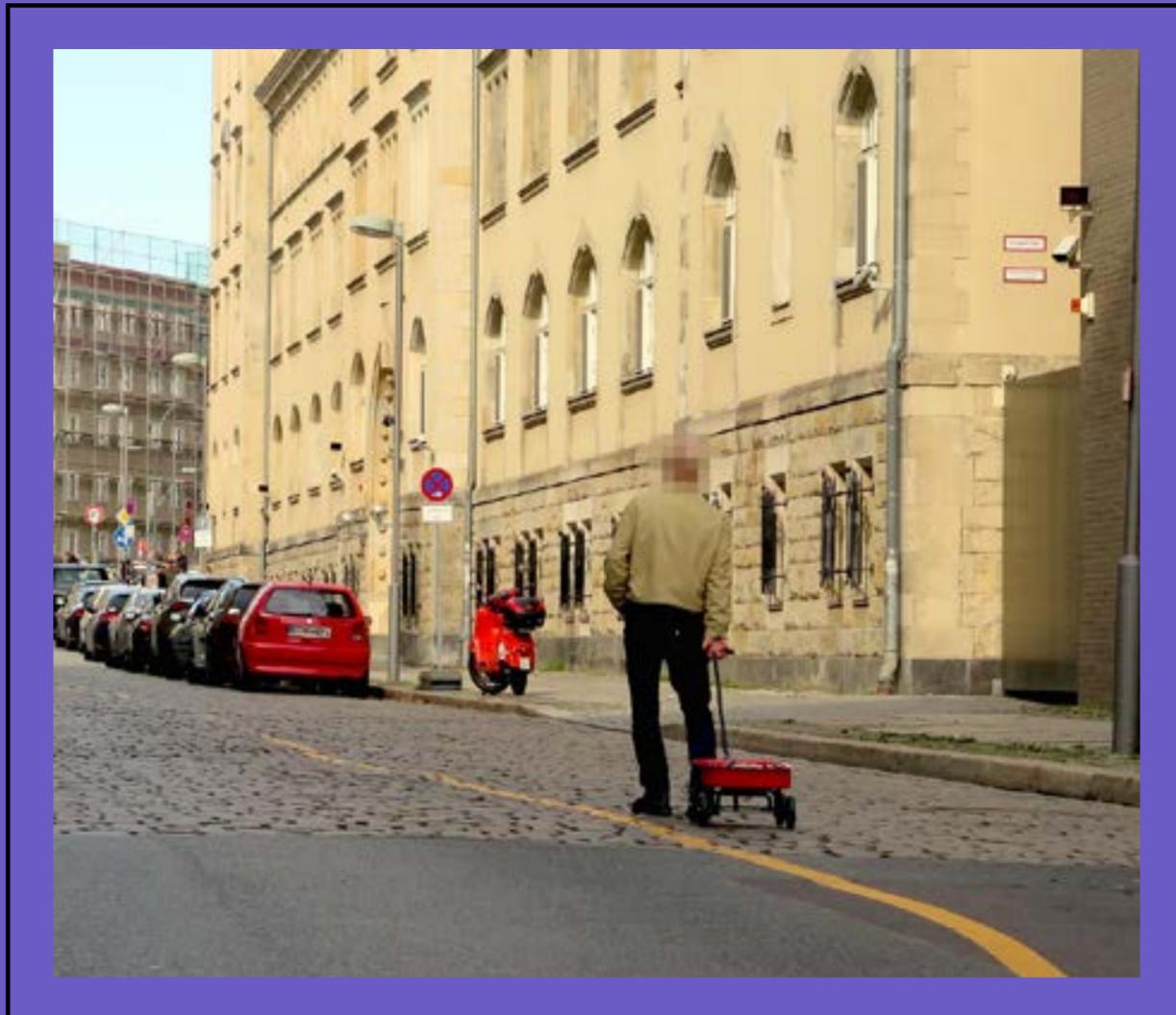
Reference Literature

→ [“Fooling automated surveillance cameras: adversarial patches to attack person detection,”](#) article by Simen Thys, Wiebe Van Ranst, and Toon Goedeme.^{T#03}

→ [“Do Androids dream of Balenciaga SS29? Robbie Barrat Imagines a Future in Which the Creative Director is a Computer,”](#) interview by Arabelle Sicardi.

Insight #04

Hacking AI Systems



T#04

Context

In the high tech society we need to understand technology and analyse complex AI systems. Knowledge can bring the opportunity to be critical about them, being also able to hack and fool them.

Challenge

How to track, analyse and hack AI systems?

Hashtags

#AI

#GANattack

#FoolingAI

#FacialDetection

#AdversalAttacks

#UnderstandingTechnology

Reference Projects

→ [Wearable face projector, by Jing-Cai Liu](#). A small beamer projects a different appearance on your face, giving you a completely new appearance.

→ [Wearable Microphone Jamming, by SAND Lab \(University of Chicago\)](#). A wearable microphone jammer that is capable of disabling microphones in its user's surroundings.

→ [Google Maps Hacks, by Simon Weckert](#). 99 second hand smartphones are transported in a handcart to generate virtual traffic jam in Google Maps. ^{T#04}

→ [Autonomous Trap 001, by James Bridle](#). Ground markings to trap autonomous vehicles using “no entry” and other glyphs.

Reference Literature

→ [“Fooling Facial Detection with Fashion,”](#) article by Bruce MacDonald.

→ [“Model Hacking ADAS to Pave Safer Roads for Autonomous Vehicles,”](#) article by Steve Povolny and Shivangee Trivedi.

→ [“Computers are Stupid: Protecting “AI” from Itself,”](#) talk by Katharine Jarmul.

Insight #05

Technology and Control



T#05

Context

The information age has come with extreme levels of control and monitoring. It is important to investigate contra strategies and reclaim their own privacy and right to be untraceable and unprofiled.

Challenge

How to address a rising level of control and surveillance?

Hashtags

#Surveillance #DataVeillance #Camouflage
#FaceDetection #SelfHelp #Tracking #Control
#FashionTech #Colonialism #Profiling #Privacy
#FaceRecognitionAlgorithms

Reference Projects

→ [CV Dazzle, by Adam Harvey](#). How fashion can be used as camouflage from face-detection technology, the first step in automated face recognition.

→ [FaceValue, by Simone C. Niquille](#). An exploration of the human face as an interface, and its new value in the advent of facial recognition technology.

→ [Stealth Wear: Anti-Drone Fashion, by Adam Harvey](#). A vision for fashion that addresses the rise and powers of surveillance, and the growing need to exert more control over privacy.

→ [Facebook Algorithmic Factory, by Share Lab](#). Investigation trilogy to map and visualise a complex and invisible exploitation process hidden behind a social network black box.

→ [Megapixels: Faces, by Adam Harvey and TacticalTech](#). Exploring the databases used to train facial recognition algorithms.

→ [My little piece of Privacy, by Niklas Roy](#). A small but smart curtain that locates pedestrians and positions itself to create privacy inside a workshop.

→ [Decisive Mirror, by Sebastian Schmieg](#). An algorithm behind a mirror which analyzes you based on less conventional traits such as your “aliveness” or “imaginariness”.^{T#05}

Insight #06

Networks Politics



T#06

Context

Networks are not neural, they are highly politicised and often used for manipulation. On the other hand, technology can provide new platforms and worlds in which direct democracy and software agents are a viable form of participation.

Challenge

How to deal with fake-news, bots, and other fakes? How to provide more democratic systems through technology?

Hashtags

#PostTruth #DeepFake #FakeNews #Networks
#Politics #Activism #AI #AlgorithmicSociety
#Bots #Privacy #TechEmpowerment

Agents

→ [Cambridge Analytica](#). A political consulting firm that combined data and misappropriation of digital assets with strategic communication during the electoral processes.

Reference Projects

→ [Vote-Auction, by Uebermorgen](#). A Website which offered US citizens to sell their presidential vote to the highest bidder during the Presidential Elections 2000.
→ [Face to Facebook, by Paolo Cirilo and Alessandro Ludovico](#). Posting of 1 million stolen Facebook profiles on a custom-made dating website, filtered and sorted by face-recognition software.
→ [Newstweek, by Julian Oliver and Daniil Vasiliev](#). A device for manipulating news read by other people on wireless hotspots.
→ [048 Thero, by Román Torre and Ángeles Angulo](#). A device that blocks and/or encrypts our digital communications by direct manipulation of the subject with the object. ^{T#06}

→ [Vending Private Network, by The Critical Engineering Working Group](#). In the form of a condom vending machine, it 'protects' you by changing your device's Virtual Private Network (VPN) destination.

→ [Trump Is Over - If You Want It, by The Yes Men](#). Thousands of commuters were handed fake Washington Post newspapers.



T#06

Insight #07

Different Realities



T#07

Context

The world has become one economy, one society with two worlds: the physical and the virtual. Alternative realities, immersiveness, telepresence and phygital experiences are allowed through AR VR, MR and RR technologies. Virtual realms can also enable new forms of participatory democracy.

Challenge

How to explore and experience different realities?
How to empower citizens in virtual realms?

Hashtags

#AR #VR #MR #RR #PhygitalExperiences
#TechEmpowerment

Agents

→ [Jeremy Bailey](#). Self-proclaimed “Famous New Media Artist” and Head of Experience at FreshBooks.

Reference Projects

→ [Data Pools](#), by [Adam Harvey](#) and [Anastasia Kubrak](#). A geolocation spoofing project about big tech CEOs, data collection and pools.
→ [Advertiser](#), by [Julian Oliver](#). A software platform for replacing billboard advertisements with art in real-time.
→ [Dust](#), by [Andrej Boleslavský](#) and [Mária Júdová](#). A virtual reality experience to transform the way people see and experience contemporary dance.^{T#07}

Reference Literature

→ “[Meet Andrew Thomas Huang, The Filmmaker Behind Björk’s Stunning VR Videos](#),” article by [Jeremy D. Larson](#).

Insight #08

Data Visualisation and Augmen- ting Materiality



T#08

Context

There is a need for good projects that visualize data, help us to understand it, feel it and also interact with it. There is so much data that without using it as creative material, we cannot get a grasp on it.

Challenge

How to make the invisible, visible and/or sensible?

Hashtags

#DataVisualisation

#AugmentedMateriality

#Data

#SystemInteraction

#AI

#ML

Reference Projects

→ [Flight Patterns, by Aaron Koblin](#). Paths of air traffic over North America visualised in colour and form.

→ [Speed of Markets, by Varvara & Mar](#). Visualisation of stock markets' volume in real-time using 7 custom-made metronomes.

→ [The Sheep Market, by Aaron Koblin](#). A collection of 10,000 sheep created by workers on Amazon's Mechanical Turk.

→ [Tōhoku Japanese Earthquake, by Luke Jerram](#). Sculpture to visualise the 2011 earthquake and tsunami in Japan.

→ [Bit.Fall, by Julius Popp](#). A waterfall creating a cascade of words sourced from live news feeds.

→ [Social Soul, by Lauren Lee McCarthy and Kyle McDonald](#). An immersive digital experience inspired by the question: How does it feel to be inside someone else's social stream?^{T#08}

Insight #09

Robots: our Competitors or Companions?



T#09

Context

We live in a world increasingly automated by machines. The rise of the information age is the second largest revolution in automation. An increasing number of jobs, which used to be done by humans, are taken over by machines. Apart from handing over repetitive tasks to robots, we ask machines to give answers and solve problems by applying AI and machine learning.

Challenge

How to promote sense-making relationships with automated machines?

Hashtags

#Robotics #Machine #HumanisingMachine
#HCI #Automats #RoboticsAndEthics
#Automatisation #Industry4.0 #AI #ML
#AgingSociety #PhysicalComputing

Reference Projects

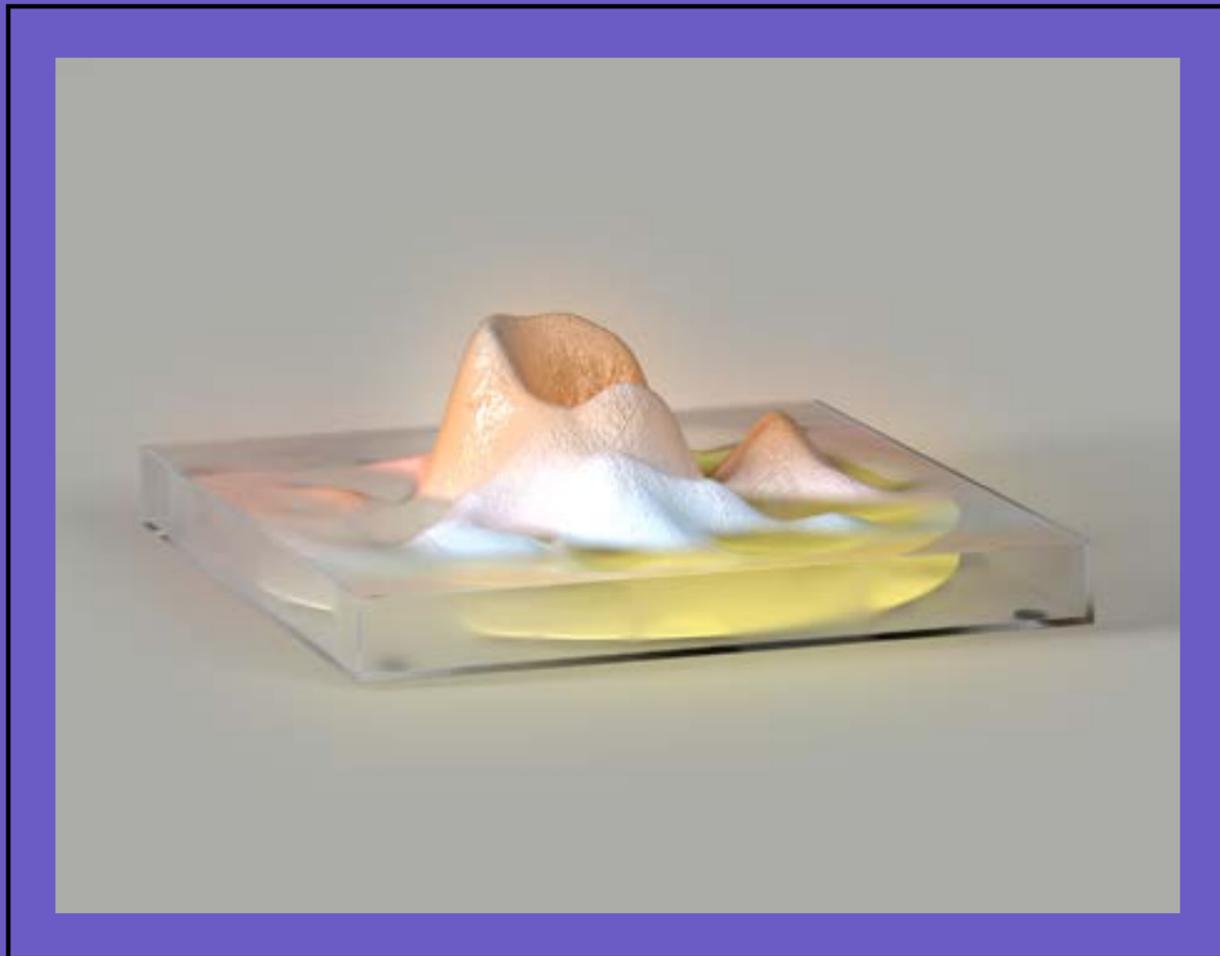
→ [Pinokio, by Shanshan Zhou and Adam Ben-Dror.](#) It challenges our perceptions and emotional response towards what we know as “robots”.
→ [Can't Help Myself, by Sunyuan and Pengyu.](#) It engages AI robotics and a visual sensor control system, evoking the idea of surveillance and warfare surrounding border control and land disputes.
→ [Minimum Wage Machine, by Blake Fall-Conroy.](#) It allows anybody to work for minimum wage, for as long as they turn the crank.

Reference Literature

→ [“The Making of Sh*tty Robots,”](#) talk by Simone Giertz.
→ [“The Center for Counter-Productive Robotics – Human-centric approach to automation,”](#) article by Filip Visnjic about a workshop at ECAL led by Thibault Brevet. ^{T#09}

Insight #10

Alternative Displays



T#10

Context

Low-energy and slow displays, kinetic displays, haptic technologies will allow for new visualisations and interactions of traditional screen interfaces.

Challenge

What will be the new screen?

Hashtags

#Display

#AlternativeDisplay

#KineticDisplay

#FutureScreen

#HapticTech

Reference Projects

→ [Chameleon, by Varvara & Mar](#). Interactive light installation; a white flag made of a fabric with embedded LEDs that allow it to become the flag of any country.

→ [Screens of the Future, by Universal Everything](#). CGI prototypes, based on the emerging technologies of flexible displays, shape-shifting materials and context-aware functionality.^{T#10}

→ [Halo, by Kimchi and Chips](#). 99 robotic mirrors continuously move throughout the day to follow the sun like sunflowers.

→ [Police Flag, by Blake Fall-Conroy](#). The merger of red, white, and blue police beacons into the American flag motif to reinforce the flag's symbolism.

→ [Cloud Display, by Rafael Lozano-Hemmer](#). A vertical water fountain consisting of 1,600 ultrasonic atomisers, controlled by a machine-learning voice recognition system.

→ [Wooden Mirror, by Daniel Rozin](#). This piece explores the line between digital and physical, using a warm and natural material to portray the abstract notion of digital pixels.

Insight #11

Extended Interaction



T#11

Context

Practices and contextualisation of new interaction methods that go beyond classical notion of interactivity. It is important to be able to expand beyond direct interaction methods and, at the same time, contextualise new ideas.

Challenge

What are the new forms of interaction, participation and design practices caused by the development of technology?

Hashtags

#HCI #Interaction #HybridInteraction

#PostParticipation #ExtendedInteraction

#SystemInteraction #ComputerVision

#ImmersiveEnvironments

Reference Projects

→ [Desire of Codes, by Seiko Mikami](#). The “individual” visitor in a double role as a subject of expression and observation.

→ [Zoom Pavilion, by Rafael Lozano-Hemmer](#). An immersive projection on three walls, fed by 12 computerised surveillance systems trained on the public.

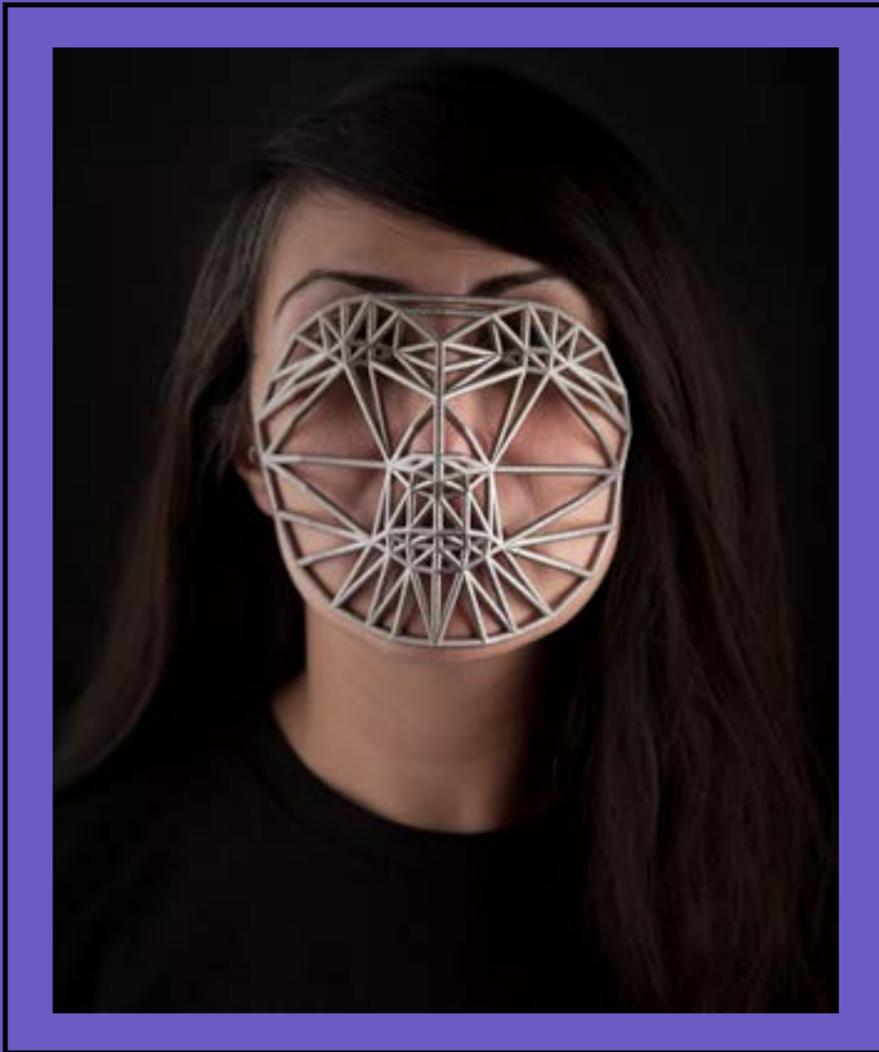
→ [Murmur study, by Christopher Baker, Márton András Juhász and Kitchen Budapest](#). A live Twitter visualisation and archive.

→ [Wishing Wall, by Varvara & Mar](#). Re-imagining how we share our innermost wishes with the world.

→ [Lauren, by Lauren Lee McCarthy](#). An attempt to become a human version of a smart home intelligence for people in their own homes. ^{T#11}

Insight #12

Biometrical Data



T#12

Context

Technology that is able to provide user's biofeedback is widely available, which makes us as designers and practitioners wonder what kind of new interfaces could be produced and how ethically right they are.

Challenge

How close do we allow technology to us?

Hashtags

#BiometricalData #Biofeedback #Body
#Surveillance #Control #HCI #PhysiologicalData
#Biosensors #Ethics #PhysicalComputing

Reference Projects

→ [Stranger Visions, by Heather Dewey-Hagborg.](#) 3D-printed life size full colour portraits of individuals, based on extracted DNA from collected objects from public places.

→ [Face Cages, by Zack Blas.](#) Biometric diagrams of four queer artist's faces, fabricated as three-dimensional metal objects, evoking structural violence. ^{T#12}

→ [Reading My Body, by Dmitry Morozov.](#) A sound controller that uses tattoo as a music score.

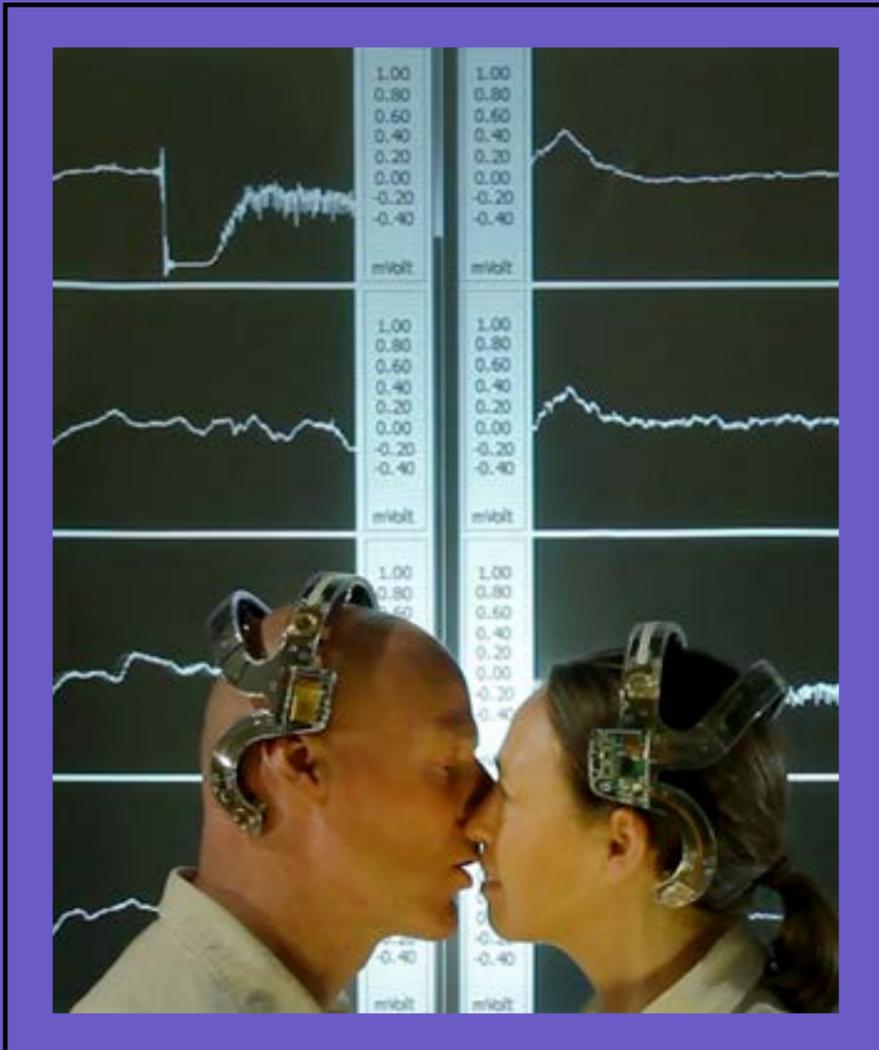
→ [Pulse Spiral, by Rafael Lozano-Hemmer.](#) 400 lightbulbs arranged according to Fermat's equations that records and responds to the heart rate of participants.

→ [Pulse Index, by Rafael Lozano-Hemmer.](#) An interactive installation that records participants' fingerprints at the same time as it detects their heart rates.

→ [Zoom Pavilion, by Rafael Lozano-Hemmer.](#) 3D-printed life size full colour portraits of individuals, based on extracted DNA from collected objects from public places.

Insight #13

EEG Interfaces



T#13

Context

Brain-computer interfaces gain importance and reliability, and become affordable. What it means creating right out of your mind, integrating emotional and brain state into design, performance, visuals, material?

Challenge

What does it mean to create using new cognition technologies?

Hashtags

#EEG

#Neurotechnology

#BCI

#FashionTech

#BiologicalData

#BioFeedback

#EmotionalStudies

#DataViz

Agents

→ [Anouk Wipperecht](#). Designer and Innovator working in the emerging field of “FashionTech.”

Reference Projects

→ [E.E.G. Kiss](#), by [Karen Lancel](#) and [Hermen Maat](#). The artists investigate how a kiss can be translated into bio-feedback data.^{T#13}

→ [NeuroKnitting](#), by [Varvara & Mar](#). Plotted brainwave activity into a knitted pattern.

→ [Melting Memories](#), by [Refik Anadol](#). Interdisciplinary projects that translate the elusive process of memory retrieval into data collections.

→ [Eunoia II](#), by [Lisa Park](#). An interactive performance and installation that attempts to display invisible human emotion and physiological changes into auditory representations.

Reference Literature

→ [“Ellen Pearlman: brain opera, telematic performance and decoding dreams,”](#) article by Irina Yakubovskaya.

Insight #14

Soft Digital Fabrication



T#14

Context

Digital fabrication can be much more than hard-surfaced object production. It is important to integrate also textile production into the field of digital manufacturing.

Challenge

What are the new soft-goods technological tools, materials and disruptive applications?

Hashtags

#Knitting #SoftDigitalFabrication #3Dknitting
#Prototyping #DemocratisationOfProduction
#TechnoCouture #TechnoCraft

Agents

→ [Kniterate](#). An affordable and compact digital knitting machine that turns your digital designs into knitted garments automatically.^{T#14}
→ [Unmade](#). Developers of an end-to-end digital solution for on-demand fashion production.

Reference Projects

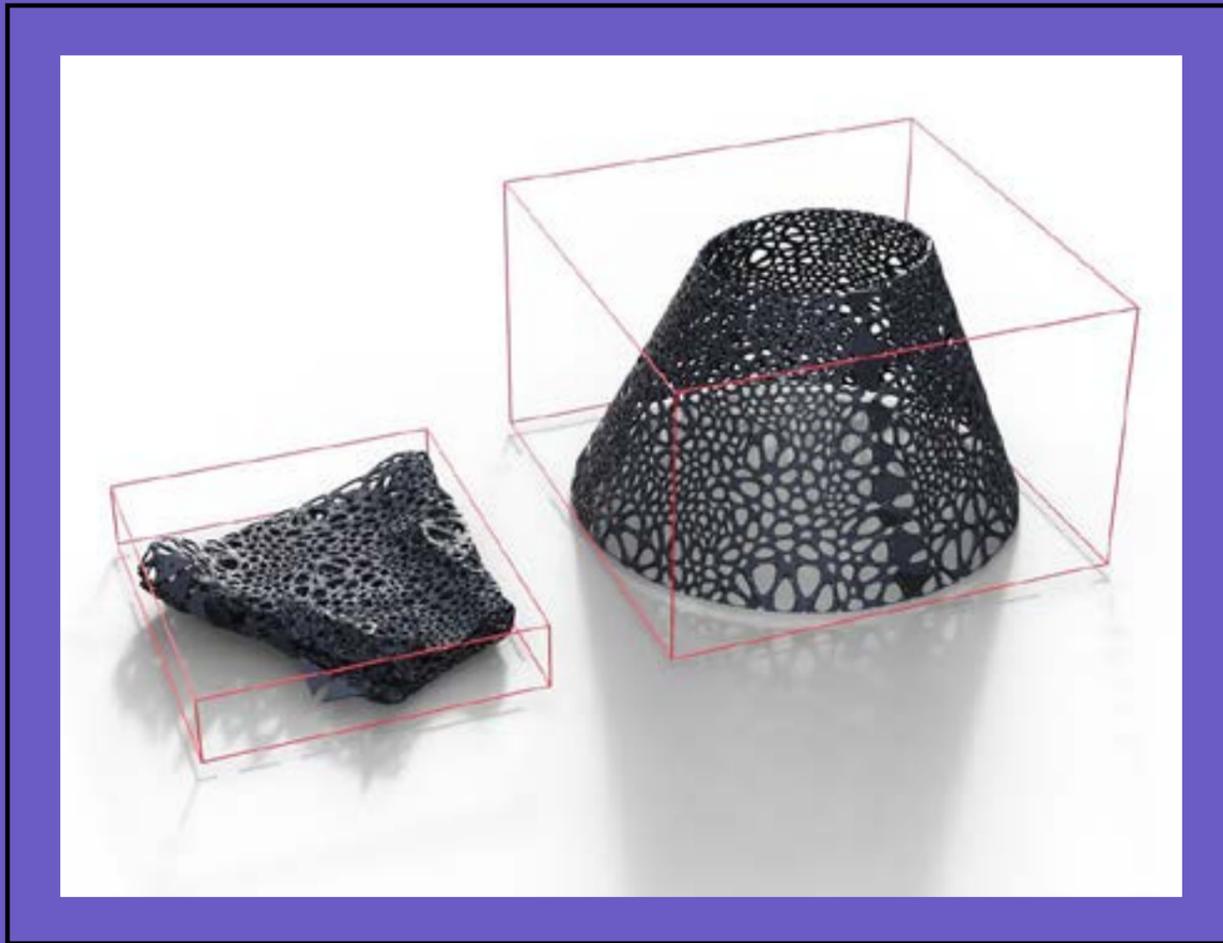
→ [Circular Knitic, by Varvara & Mar](#). An automated and replicable open hardware circular knitting machine.
→ [Wind Knitting Factory, by Merel Karhof](#). A wind-powered knitting machine.
→ [RailReed, by Kadi Pajupuu](#). A weaving reed that enables to change the warp density and fabric width while weaving.

Reference Literature

→ [“3D knitting machines will be in every home,”](#) article by Mark Miodownik.

Insight #15

Digital Manufacturing



T#15

Context

Technological advances allow for the invention of new fabrication processes, machinery and distributed production models.

Challenge

What are the future fabrication tools for creatives and makers? What are the new modes of production?

Hashtags

#DigitalFabrication #DigitalManufacturing #3D
#4D #3Dprinting #Prototyping #Machinery
#TechnoCraft #DistributedManufacturing

Reference projects

→ [Kinematics, by Nervous System](#). A system for 4D printing that creates complex, foldable forms composed of articulated modules. ^{T#15}

→ [3D weaver, by Oluwaseyi Sosanya](#). A loom specially designed for weaving in three dimensions.

→ [The Fabulous Tufting Machine, by Fab Academy](#). Instructions for building a CNC tufting machine.

→ [Turm2, by Bastian Beyer](#). Investigates the potential of sustainable composites in regards to their manufacturing and morphological potential.

→ [Filament Sculptures, by Lia](#). 3D printed sculptures created after exploring the behaviour of a 3D printer and its filament.

→ [Pooprinter, by Fabricio Lamoncha](#). An analog generative typography printer using the bird-poo as the particle substance.

S Society



S#00

Global capitalism in its neoliberal shape is threatening human and non-human life on the planet. It has deeply eroded the way in which we interact with the environment, with each other and also with ourselves. The starting point is that design should counteract these processes aiming at societal resilience, finding ways to revert the consequences that predatory capitalism and the development of consumer society have produced in the last decades.

There is a need to reverse socio-economic, gender and cultural capital inequalities via strategies of inclusion, non-discrimination, solidarity, social protection and social investment. Economic de-growth and a systemic approach to territory and social innovation are key.

Culture, creativity and activism are the drivers for new imagined futures. The new digital paradigm is settling, generating a creative historical revolution.

Insights

- #01 Degrowing the Economy
- #02 Fighting Economic Inequality
- #03 Fighting Gender Inequality
- #04 Fighting Ethnic Inequality
- #05 Democratic Values
- #06 Building Communities
- #07 Work-life Imbalance
- #08 Defining Social Design
- #09 Territory
- #10 New Built Environments
- #11 Tourism Redefined
- #12 Digital Transformations
- #13 Life-long Learning
- #14 Enlighten
- #15 Hypercreativity

Insight #01

Degrowing the Economy



S#01

Context

In the midst of the COVID-19 crisis, we are tempted to forget that economic growth has proven to be unsustainable per se. The 'sustainability paradigm' has been substituted in the last years by the so called 'Green New Deal'. However, scientific evidence shows that even this new paradigm may be insufficient to address the environmental and social crisis. In this context, the degrowth movement appears as the only true alternative. Some locally rooted initiatives in this direction are referenced.

Challenge

How can design help de-growth?

Hashtags

#Capitalism #Anthropocene #Sustainability
#GreenNewDeal #Postgrowth #Degrowth
#SocialEconomy #ResponsibleProduction
#ResponsibleConsumption

Agents

→ [Open Food Network](#). A global network developing open and shared resources, knowledge and software to build a better food system.
→ [Pocket City Farms](#). A not-for-profit association passionate about urban farming and sustainability, working to bring urban farms to Australia's unused city spaces.
→ [La colmena que dice sí](#). European network of communities that connects citizens with local food producers.
→ [Opciones Magazine](#). A magazine on conscious consumption.
→ [Pam a Pam Map](#). The map of the social and solidarity economy in Catalonia.
→ [REAS. Red de Redes de Economía Solidaria](#). More than 800 entities grouped to respond to the dehumanisation of the economy, the deterioration of the environment and the loss of social values.

- [Schumacher College](#). An international college for ecological studies offering masters programmes, short courses and a horticulture residency.
- [Xisqueta](#). Wool brand and craftsmen collective that supports a project of local dynamisation, paying a fair price to shepherds who protect the Xisqueta breed, from the High Pyrenees.
- [Right to Repair](#). A coalition of European organisations active around the cause of repair.
- [Fairphone](#). A fairer electronics company, making a positive impact across the value chain in mining, design, manufacturing and life cycle. ^{S#01}
- [Saving Food](#). An innovative solution to tackle food waste through the collaborative power of ICT networks.
- [Espigoladors](#). A non-profit organisation which fights against food waste and losses, while empowering people at risk of social exclusion.
- [Gratix App](#). App where you give away what you don't need and ask for what you need.

Reference Projects

- [APROP \(Close Proximity Temporary Housing\), by Ajuntament de Barcelona](#). Temporary proximity accommodations to combat gentrification.
- [Bottle-Up, by Hubert and Elisabeth van Doorne and Dutch Design Foundation](#). Collection made from tourist glass waste, transformed into locally made in Zanzibar, up-cycled and appealing to tourists.

Reference Literature

- [Escenarios de trabajo en la transición ecosocial 2020-2030](#), report by Luis González Reyes et al., for Ecologistas en Acción.
- [Risky business: the climate and the macroeconomy](#), JP Morgan Special Report by David Mackie and Jessica Murray.
- [“Is Green Growth Possible?”](#) article by Jason Hickel and Giorgos Kallis.

- [On Fire: The \(Burning\) Case for a Green New Deal](#), book by Naomi Klein.
- [The Green New Deal: why the fossil fuel civilization will collapse by 2028, and the bold economic plan to save life on earth](#), book by Jeremy Rifkin.
- [¿Qué hacer en caso de incendio? Manifiesto por el Green New Deal](#), book by Héctor Tejero and Emilio Santiago.
- [Degrowth: A Vocabulary for a New Era](#), book by Giacomo D'Alisa, Federico Demaria, and Giorgos Kallis.
- [Transitioning to a Post-Carbon Society: Degrowth, Austerity and Wellbeing](#), book edited by Ernest Garcia, Mercedes Martinez-Iglesias, and Peadar Kirby.
- [Liberation from excess. The road to a post-growth economy](#), book by Niko Paech.

Insight #02

Fighting Economic Inequality



S#02A

Context

Since the 1970's, the implementation of neoliberal recipes all around the globe (austerity measures, privatisations, financial deregulations, labour market flexibilisations and so on) have produced a growing income inequality. The rich get richer, the middle class is disappearing and precarity is accentuated. In this scenario, governments must take a welfare turn and provide social security, with a special focus on universal benefits as Basic Income. For this purpose, behavioural social sciences provide useful tools (such as framing or nudging) to help fiscal policies to be more effective and efficient. The huge public deficit and poverty rates that COVID-19 crisis is bringing about intensify these needs.

Challenge

How can design foster fairness?

Hashtags

#Inequality #Fairness #Progressivity #Poverty
#Universality #TaxEvasion #BasicIncome
#BehaviouralInsights #Framing #Nudging
#FiscalPolicies #PolicyMaking

Agents

→ [GSADI: Analytical Sociology & Institutional Design](#). Research group at the Autonomous University of Barcelona, that promotes the use of innovative theories and methods in Analytical Sociology.

→ [I Nudge You: The Applied Behavioural Science Group](#). A pro-social company specialised in applied behavioural research.

→ [The Behavioral Insights Team](#). Generation and implementation of behavioural insights to inform policy, improve public services and deliver results for citizens and society.

→ [eMBeD: Mind, Behavior, and Development Unit](#). A World Bank program that uses the behavioural sciences to fight global poverty and reduce inequality.

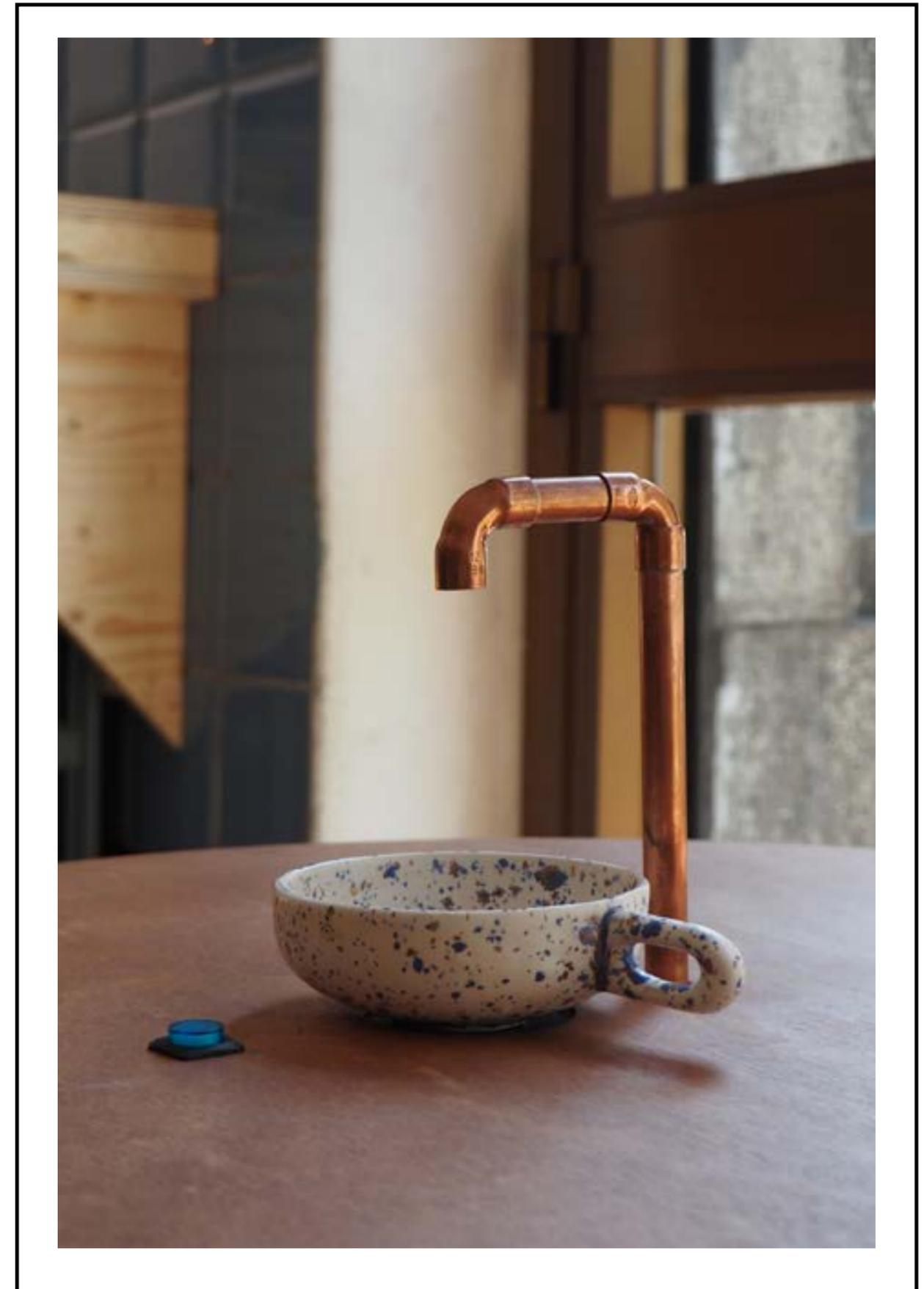
- [Fundació Arrels](#). Foundation that provides accommodation, food, guidance and social care to homeless people.
- [BIEN: Basic Income Earth Network](#). A link between all individuals and groups interested in basic income and to foster informed discussion on this topic throughout the world.
- [Red Renta Básica](#). Spanish association and blog for the the promotion and dissemination of studies and scientific research on Basic Income.

Reference Projects

- [B-MINCOME, by Ajuntament de Barcelona](#). A pilot project for combating poverty and inequality in Barcelona’s deprived areas.
- [Basic Income Café, by Martina Huynh](#). An interactive installation where visitors can experience two different basic income economies, using coffee to visualise the flow of money. ^{S#02}

Reference Literature

- [Capitalism, alone : the future of the system that rules the world](#), book by Branko Milanović.
- [Capital et idéologie](#), book by Thomas Piketty.
- [The Triumph of Injustice: How the Rich Dodge Taxes and How to Make Them Pay](#), book by Emmanuel Saez and Gabriel Zucman.
- [The Spirit Level: Why Equality is Better for Everyone](#), book by Richard G. Wilkinson and Kate Pickett.
- [Behavioral Science Around the World: Profiles of 10 Countries](#), report by Zeina Afif et. al. for the World Bank Report.
- [Nudge: Improving Decisions about Health, Wealth, and Happiness](#), book by Richard H. Thaler and Cass R. Sunstein.
- [“¡Mamá, puedo ser artista!” Renta Básica y trabajo cultural,](#)” article by Hans Laguna.



S#02B

Insight #03

Fighting Gender Inequality



S#03A

Context

Feminism has become mainstream and is the most powerful movement in the past years. And so must be in the future, because gender discriminations are still pervasive in most social contexts, and because some macho counter-reaction can be observed. This challenge is even bigger, insofar feminism is very heterogeneous and different sensitivities must be harmonised.

Challenge

How can we foster gender inclusivity?

Hashtags

#Feminism #GenderPerspective #GenderGap #8M
#GenderedDivisionOfLabour #Patriarchy #LGTBI+

Agents

- [CruCruCru Festival](#). A series of discussions on the use of social values for marketing, communication from a gender-based point of view.
- [Depatriarchise Design](#). A non-profit research platform born out of frustration with a design discipline that is deeply interwoven with discriminating structures.
- [Las Oblicuas](#). Critical and plural collective with the aim to re-think Design and Engineering with a gender perspective.
- [Col·lectiu Punt 6](#). Rethinking cities from daily experience and feminist practices and theories.
- [The Institute of Queer Ecology \(IQUECO\)](#). A collaborative organism looking to find and create alternatives, guided by queer and feminist theory and decolonial thinking. ^{S#03A}
- [Feminist Internet](#). A non-profit organisation on a mission to make the internet a more equal space through creative, critical practice.
- [Arvida Byström](#). A digital native exploring feminities and its complexities, traveling in an aesthetic universe of disobedient bodies, selfie sticks and fruits in lingerie.
- [Thinx](#). Inclusive period underwear brand. ^{S#03B}

Reference
Projects

→ [Feminist Data Set](#), by [Caroline Sindere](#). A critical and artistic view on software, that interrogates every step of the AI process that includes data collection.

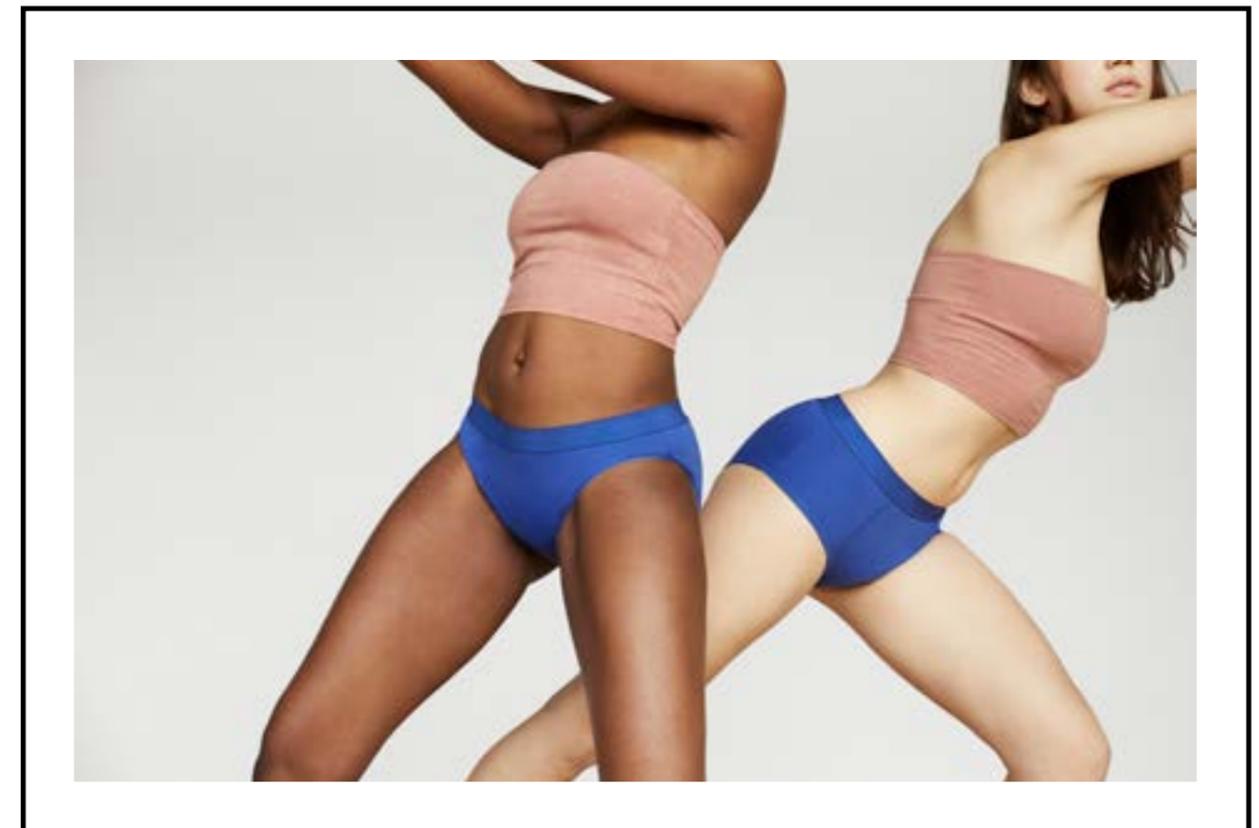
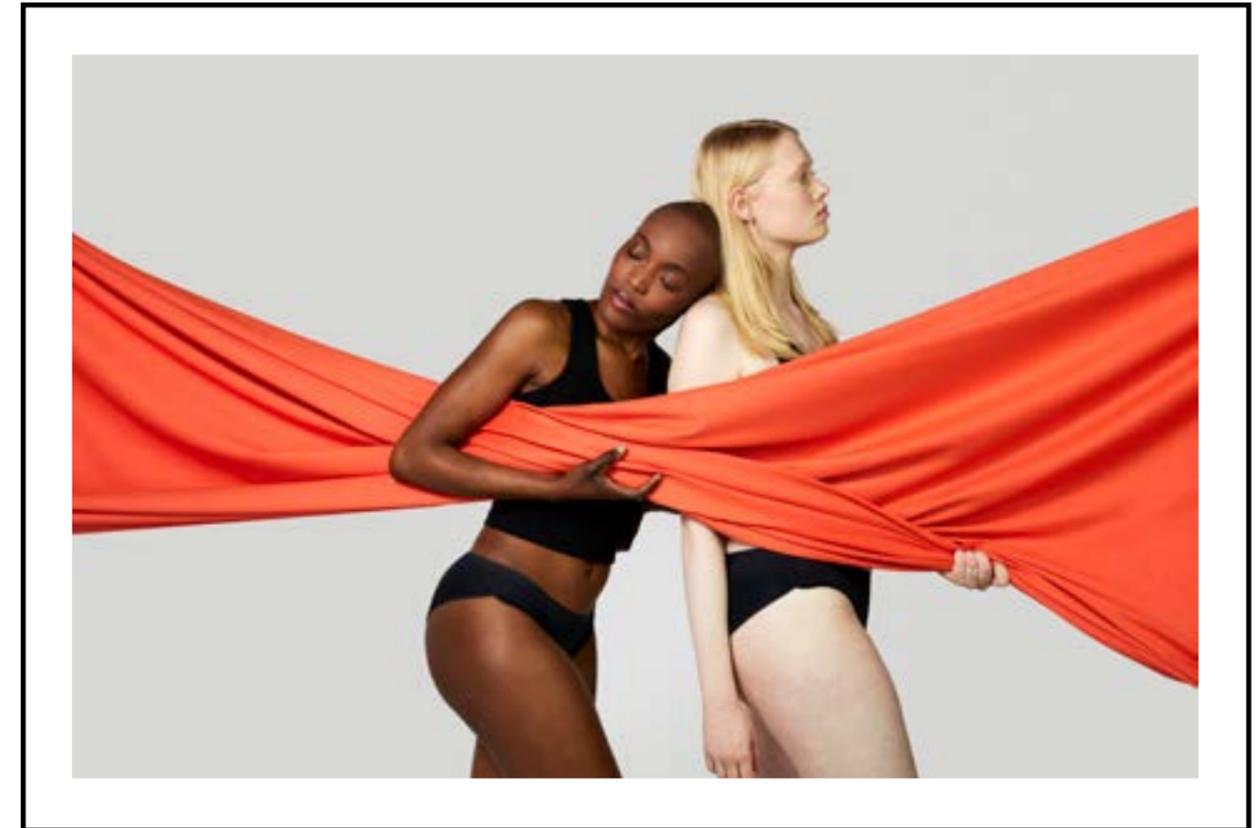
Reference
Literature

→ [King Kong théorie](#), book by Virginie Despentes.

→ [El patriarcado del salario: críticas feministas al marxismo](#), book by Silvia Federici.

→ [“Social justice in the age of identity politics: Redistribution, recognition, participation,”](#) article by Nancy Fraser.

→ [Why Women Have Better Sex Under Socialism: And Other Arguments for Economic Independence](#), book by Kristen Ghodsee.



S#03B

Insight #04

Fighting Ethnic Inequality



S#04

Context

All over the world, exclusive nationalist and far-right populist speeches have taken its place in the public opinion. Thus, racism and xenophobia are proliferating. For its part, Europe is living a refugee crisis and its response is highly condemnable. In this context, an integrative, open and multicultural perspective has become more necessary than ever

Challenge

How can design boost diversity?

Hashtags

#Racism #Xenophobia #Prejudice #Migration
#Refugees #HumanRights #Whiteism #Equality
#Diversity #Inclusivity #SocialIntegration
#PostColonialism

Agents

- [Tot Raval Foundation](#). A network of social entities, schools and citizens who work to improve social cohesion, coexistence and quality of life in Barcelona's Raval neighbourhood.
- [Xarxa BCN Antirumors](#). A network that works collaboratively, and together with the Barcelona city council, to dismantle rumors and stereotypes about cultural diversity.
- [Afroféminas](#). A community for Afro-descendant and racialised Spanish-speaking women.
- [CIEs No.](#) Campaign for the closing of the immigration detention centres (CIEs), in favour of Human Rights, and against racism and xenophobia.
- [Asociación Gitanas Feministas por la Diversidad](#). Association that promotes equality between male and female gypsies and combat the triple invisibility syndrome of gypsy women.
- [Top Manta](#). Fashion brand by the Popular Union of Street Vendors in Barcelona, that denounces the racism, the persecution and the punishment lived by this collective.

→ [Forensic Architecture](#). A research agency, based at Goldsmiths, University of London, undertaking advanced spatial and media investigations into cases of human rights violations.

→ [The Center for Afrofuturist Studies](#). An initiative to re-imagine the futures of marginalised peoples by generating dynamic work-spaces for artists of colour.

→ [Gugu Peteni](#). Fashion Designer, in-house at Mohair South Africa. Design Indaba Emerging Creative 2018. ^{S#04}

→ [Videos nas aldeias](#). A cinema school and a production centre for indigenous peoples, that strengthen identities and territorial and cultural heritages.

[Reference Projects](#)

→ [Refugee Republic, by Submarine Channel](#). An interactive transmedia documentary about everyday life in Domiz Camp, a Syrian refugee camp in northern Iraq.

→ [Twitter Tongues, by Ed Manley, James Cheshire, and Oliver O'Brien](#). Map of the languages of tweets in London in summer 2012.

→ [This land will never be fertile for having given birth to colonisers, exhibition curated by Valentín Roma](#). The first anthological review to be held on Daniela Ortiz's work.

[Reference Literature](#)

→ ["Mapping Invisibility,"](#) article by Naomi Bueno de Mesquita and David Hamers.

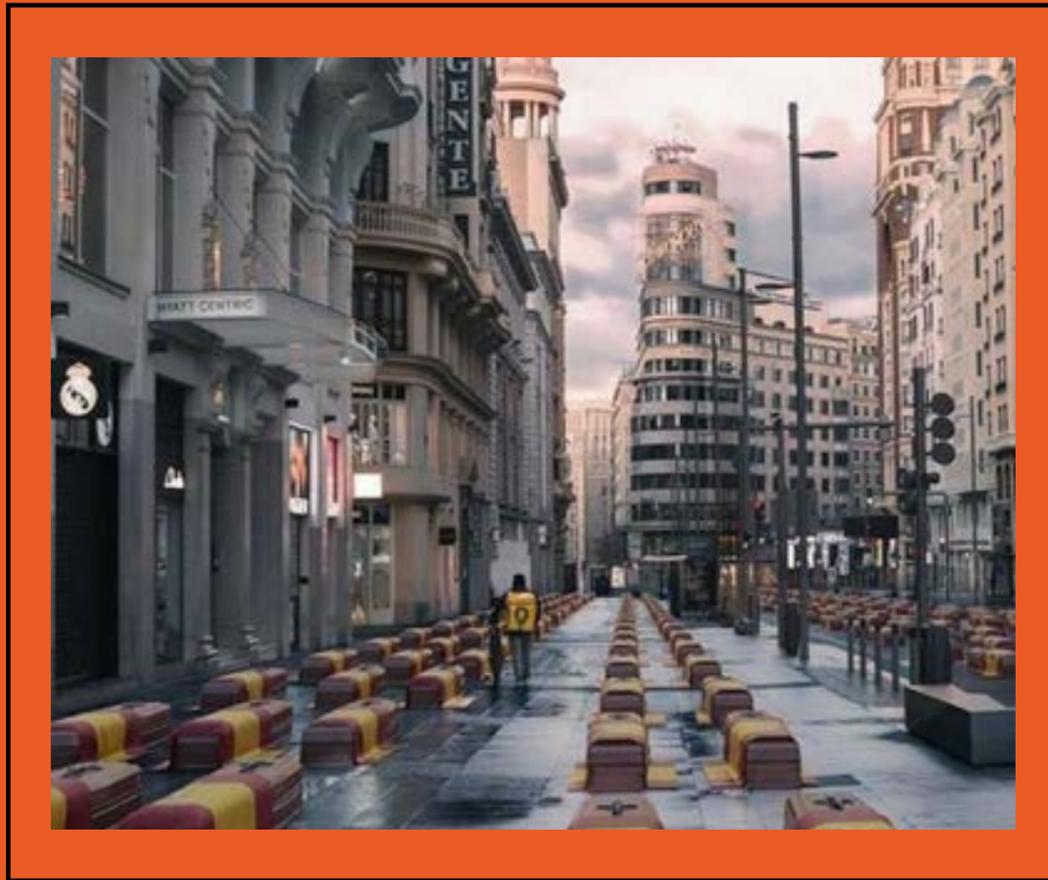
→ [Diversity, Inc.: The Failed Promise of a Billion-Dollar Business](#), book by Pamela Newkirk.



S#04

Insight #05

Democratic Values



S#05A

Context

Information is more valuable than ever -and it is more under suspicion than ever ^{S#05A}. In the post-truth and fake news era, our right to be informed is being violated. At the same time, we live in a big data era in which our right to privacy is also being violated. As a result, core citizenship values such as transparency, accountability and governance are in danger and must be protected.

Challenge

How can design promote democratic values and fight misinformation?

Hashtags

#FightMisinformation #Democracy #CivilLiberties
#Privacy #Transparency #Accountability
#Governance #FakeNews #PostTruth #BigData
#Oligopoly #GAFAM

Agents

- [FaktaBaari](#). A Finnish factchecking service bringing accuracy especially to the public election debates.
- [Electronic Frontier Foundation](#). A nonprofit organisation defending civil liberties in the digital world.
- [Civio Foundation](#). Organisation which monitors public authorities, reports to all citizens and lobbies to achieve true and effective transparency within our institutions.
- [Reasons to be cheerful](#). A non-profit editorial project that is tonic for tumultuous times.
- [Mastodon](#). A free and open-source self-hosted social networking service.
- [Jitsi](#). A set of open-source projects that allows you to easily build and deploy secure video conferencing solutions. ^{S#05B}
- [Duck Duck Go](#). The search engine that doesn't track you.
- [MyData.org](#). A non-profit organisation that empower individuals by improving their right to self-determination regarding their personal data.

Reference
Projects

→ [Inside Airbnb, by Murray Cox](#). An independent, non-commercial set of tools and data that allows you to explore how Airbnb is really being used in cities around the world.

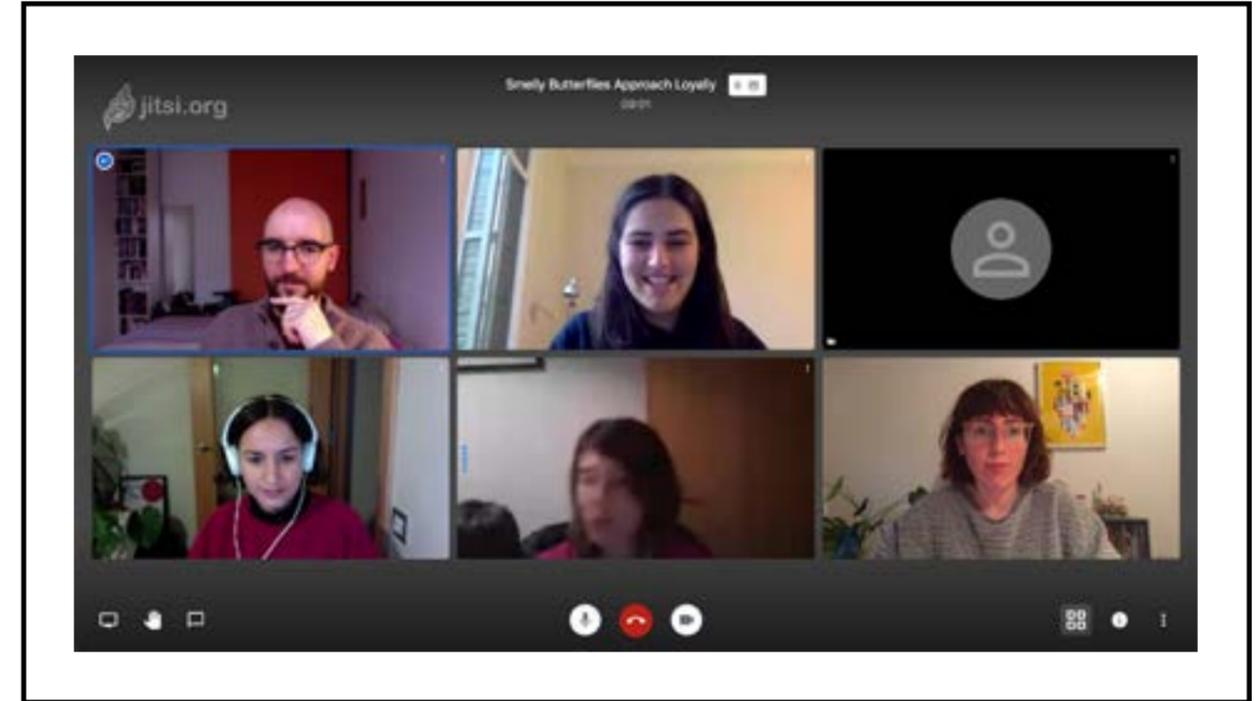
→ [Million Dollar Blocks, by Center for Spatial Research](#). Maps of “million dollar blocks” and of the city-prison-city-prison migration flow, using rarely accessible data from the criminal justice system.

Reference
Literature

→ [El enemigo conoce el sistema: Manipulación de ideas, personas e influencias después de la economía de la atención](#), book by Marta Peirano.

→ [How Fascism Works: The Politics of Us and Them](#), book by Jason Stanley.

→ [The Great Hack](#), documentary by Karim Amer, Jehane Noujaim.



S#05B

Insight #06

Building Communities



S#06

Context

Social media gives us the impression of being connected. However, the truth is that our lives have been increasingly individualised as isolated consumers and anonymous inhabitants of large cities. Fortunately, we can also find a growing awareness of the power of local communities. The old motto 'unity makes strength' can be heard in more and more neighbour yards and workplaces, where the virtues of participation, horizontality and decommodification are (re)discovered.

Challenge

How can design strengthen social ties?

Hashtags

#Community #Cooperation #MutualSupport
#SocialInnovation #CivicEngagement
#SocialResilience #SocialCohesion

Agents

→ [The Carelab](#). An international network of designers-turned-activists working to transform our world of Care.
→ [Dalberg Design](#). Human Centred Design and consulting for organisations and communities scaling social change.
→ [Holon](#). Aligning organisations goals with the needs of people they serve and its social and environmental context.
→ [The Decorators](#). A multidisciplinary design collective that work on spatial design projects that aim to reconnect the physical elements of a place with its social dimension.
→ [Maraka](#). Design of responses to the new realities to which public institutions and companies must be oriented.
→ [TAMassociati](#). Designs, builds and tells small and large architecture with social, sustainable and eco-simple values all over the world.
→ [La Casa de Carlota & friends](#). Design studio that includes people with Down's syndrome, autism and intellectual disabilities.
→ [Artists Series - Lotería Mantera](#), by Top Manta. Collection of limited edition fashion garments to support the Barcelona street vendors collective. ^{S#06}

→ [Desis Network \(Design for Social Innovation towards Sustainability\)](#). An association that promotes design for social innovation in higher education institutions, and generates useful design knowledge and meaningful social changes.

→ [CSM Public at Central Saint Martins](#). Turn the studio ethos 'inside-out' working with a variety of organisations to actively engage with societal issues and co-design more optimistic futures for all.

→ [Lab for Social Design](#). Lab at Design School Kolding that works with and participates in projects that focus on prevention and welfare technology.

→ [Urban Future global conference](#). Gathers CityChangers from all over the world; passionate people who drive change towards more sustainable cities.

→ [CRIT \(Creativitat, Innovació i Transformació Urbana\)](#) Universitat de Barcelona research group that analyses social and economical transformations of cities and metropolitan areas.

→ [Fundación de los Comunes \(the Commons Foundation\)](#). A Spanish network of culturally and politically driven groups working for a process of social democratisation.

→ [Cultura Coop](#). Barcelona's cooperative projects that understand culture as a social relationship, as a community bond, form of expression, craft, passion, criticism.

→ [Lacol – Arquitectura cooperativa](#). A cooperative of architects working toward social transformation and in the environments that are closest to them.

→ [REAL Foundation](#). A cultural institute and architectural practice that promote inclusivity and social equality through the built environment.

→ [Sostre Cívic](#). Entity promoting an alternative, fairer, model of access to housing.

→ [Cooperativa Obrera de Viviendas \(COV\)](#). A housing cooperative that offer services and support to its partners, providing access to decent housing for working families in El Prat.

→ [Elemental](#). Housing and social architecture practice, led by Alejandro Aravena.

→ [Las Kellys](#). Spanish association of chambermaids.

→ [Cuidadoras Sin Papeles](#). Spanish association of migrant, without papers, and working women in the care sector.

→ [Sindicat de Llogateres](#). Union for fair rents, for the right to housing.

→ [Precarity Pilot](#). An online platform and a series of nomadic workshops that aim at addressing in inventive ways issues faced by precarious designers.

→ [COVID-19 Mutual Aid UK](#). A support network for people organising in their communities.

Reference Projects

→ [Decidim.Barcelona, by Ajuntament de Barcelona](#). A participatory online platform to democratically build a more open, transparent and collaborative city.

→ [Cultura Viva, by Ajuntament de Barcelona](#). An open programme of research and project development aimed at recognising and promoting participation, circulation and cultural co-production spaces in Barcelona.

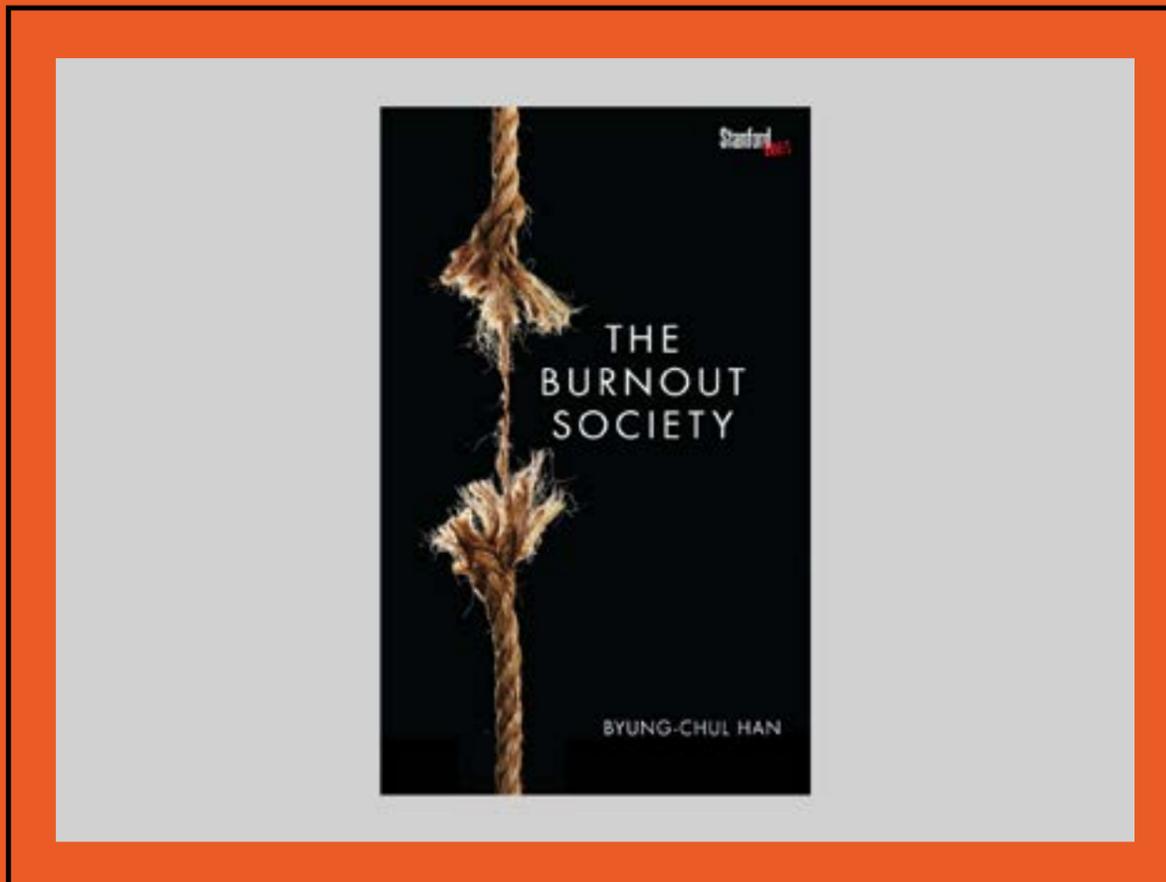
→ [Proyecto MOVICOMA, by Universitat Oberta de Catalunya and Fundación BBVA](#). The first study of the collaborative housing movement for older people in Spain.

→ [Barcelona des de casa, by Ajuntament de Barcelona](#). Open platform to suggest activities, and share community initiatives of mutual support during the COVID-19 lockdown.

→ [Supervecina, by Comunitaria](#). Free services to neighbourhood communities.

Insight #07

Work-Life Imbalance



S#07A

Context

We are obsessed with personal fulfilment. However, we are more and more stressed and tired. The new entrepreneur paradigm pushes us to be always proactive and available. Borders between life and work are increasingly blurry. And this situation is being worsened by the coronavirus lockdown, as far as it has accelerated working from home and digital dependency. Moreover, companies around the world are adopting avatars and AI software for recruitment purposes, with its subsequent ethical implications. New work cultures need to be adopted.

Challenge

How can design improve our quality of life?

Hashtags

#Happiness #LifeSatisfaction #Wellbeing #Precarity
#Entrepreneurship #Employability #Neoliberalism
#Burnout #Medicalisation #Availability #Teleworking
#Newworkcultures #Alrecruiting

Agents

→ [GNH Center Spain](#). A non-profit organisation to promote the philosophy based on the concept of Gross Inner Happiness (Gross National Happiness or GNH) originated in Bhutan.

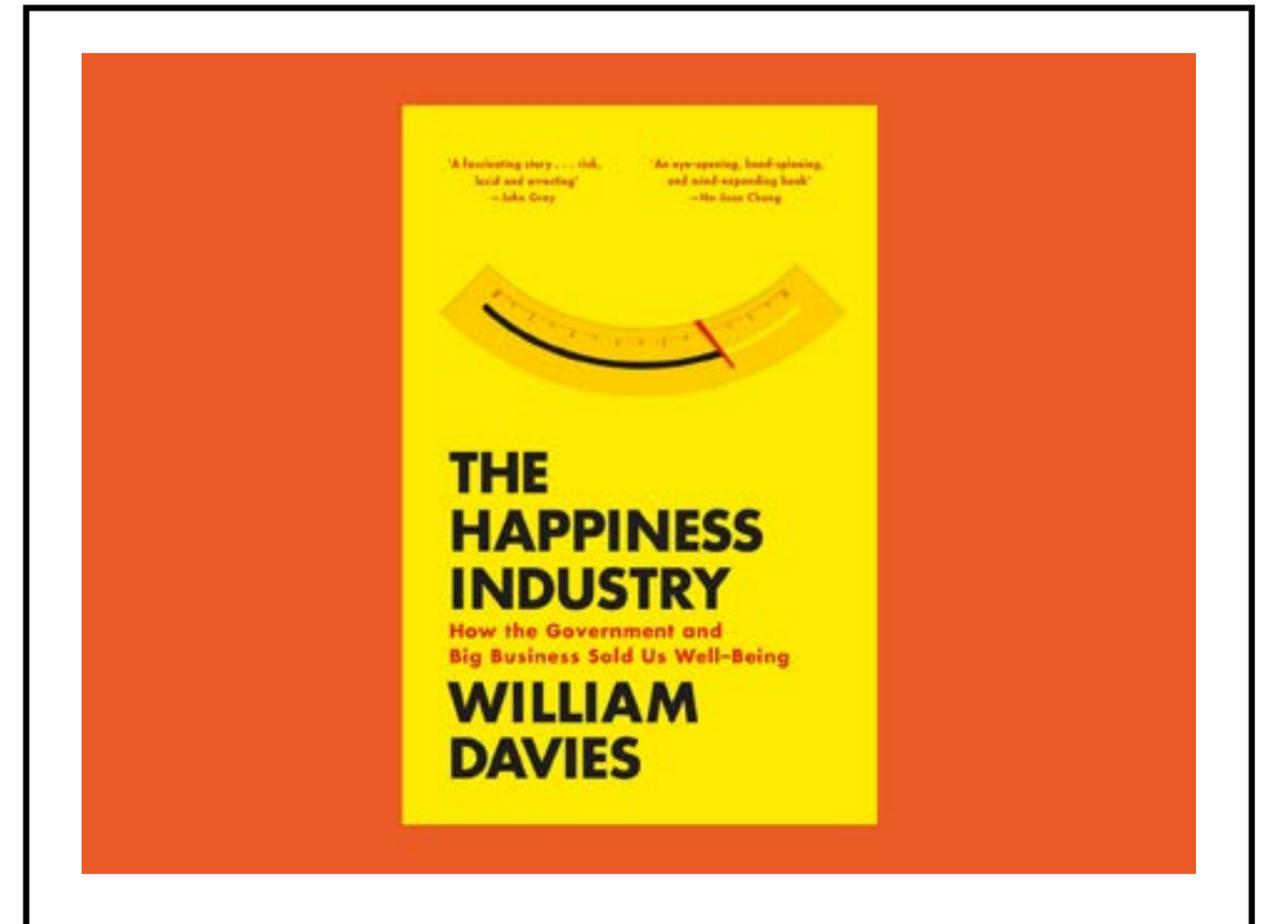
Reference Projects

→ [Better Life Initiative: Measuring Well-Being and Progress, work programme by OECD](#). Are our lives getting better? How can policies improve our lives? Are we measuring the right things?
→ [Sorry, we missed you, movie by Ken Loach](#). A powerful exploration of the contemporary world of work, the gig economy and the challenges faced by one family trying to hold it all together.
→ [General Indisposition: An essay about Fatigue, curated by Martí Peran](#). Exhibition about production, experiences and identity.

References Literature

→ [World Happiness Report](#), annual reports by the Sustainable Development Solutions Network.

- *Happycracia: Cómo la ciencia y la industria de la felicidad controlan nuestras vidas*, book by Edgar Cabanas and Eva Illouz.
- *The Happiness Industry: How the Government and Big Business Sold Us Well-Being*, book by William Davies. ^{S#07B}
- *The quantified self in precarity: work, technology, and what counts*, book by Phoebe Moore.
- *No tengo tiempo: Geografías de la precariedad*, book by Jorge Moruno.
- *El entusiasmo: Precariedad y trabajo creativo en la era digital*, book by Remedios Zafra.
- *The Burnout Society*, book by Byung-Chul Han. ^{S#07A}
- *Exposure*, book by Olivia Sudjic.
- *“Los ojos cerrados.”* article by Hans Laguna.



S#07B

Insight #08

Defining Social Design



S#08A

Context

On the one hand, design has contributed to the crisis of civilisation in which we are involved. On the other hand, design can help solve all the challenges we must face. It's thus a good time for self-criticism.

Challenge

How can designers reflect on its social role?

Hashtags

#Ethics #Politics #SocialDesign #CriticalDesign
#TransitionDesign #AdversarialDesign #DesignTheory

Agents

- [PhD in Transition Design](#). Program at the Carnegie Mellon University, for people committed to making a positive change in the world.
- [Het Nieuwe Instituut](#). It aims to increase the appreciation of the cultural and social significance of architecture, design and digital culture.
- [University of the Underground](#). A free, pluralistic and transnational university with an explicit focus on political theory and philosophy, design of experiences, music, theatrical practices, film, social actions, and social dreaming.
- [School of Speculation](#). An independent and nomadic critical design school that aims to challenge current models of delivering higher education. ^{S#08}
- [Escola Lateral](#). Educational project that aims to be a complement to current design teachings.
- [Design Justice Network](#). Rethinking design processes so that they center people who are too often marginalized by design.
- [Critical Futures Lab](#). It occupies the liminal spaces between critical social science theory and generative design methods.
- [Colectivo Enmedio](#). A group of image professionals who explore the transformative power of images and stories through spectacular interventions.

Reference
Projects

→ Fixperts, by FixEd. An education programme which challenges young people to create ingenious solutions to everyday problems.

Reference
Literatures

→ “The Critical Engineering Manifesto,” by Julian Oliver, Gordan Savičić, and Danja Vasiliev.

→ Adversarial Design, book by Carl DiSalvo.

→ Design Act: Socially and Politically Engaged Design Today – Critical Roles and Emerging Tactics, book edited by Magnus Ericson and Ramia Mazé.

→ The Politics of Design. A (Not So) Global Manual for Visual Communication, book by Ruben Pater.

→ The Social Design Reader, book edited by Elizabeth Resnick.

→ Developing Citizen Designers, book by Elizabeth Resnick.

→ The Responsible Object: A History of Design Ideology for the Future, book edited by Marjanne van Helvert.



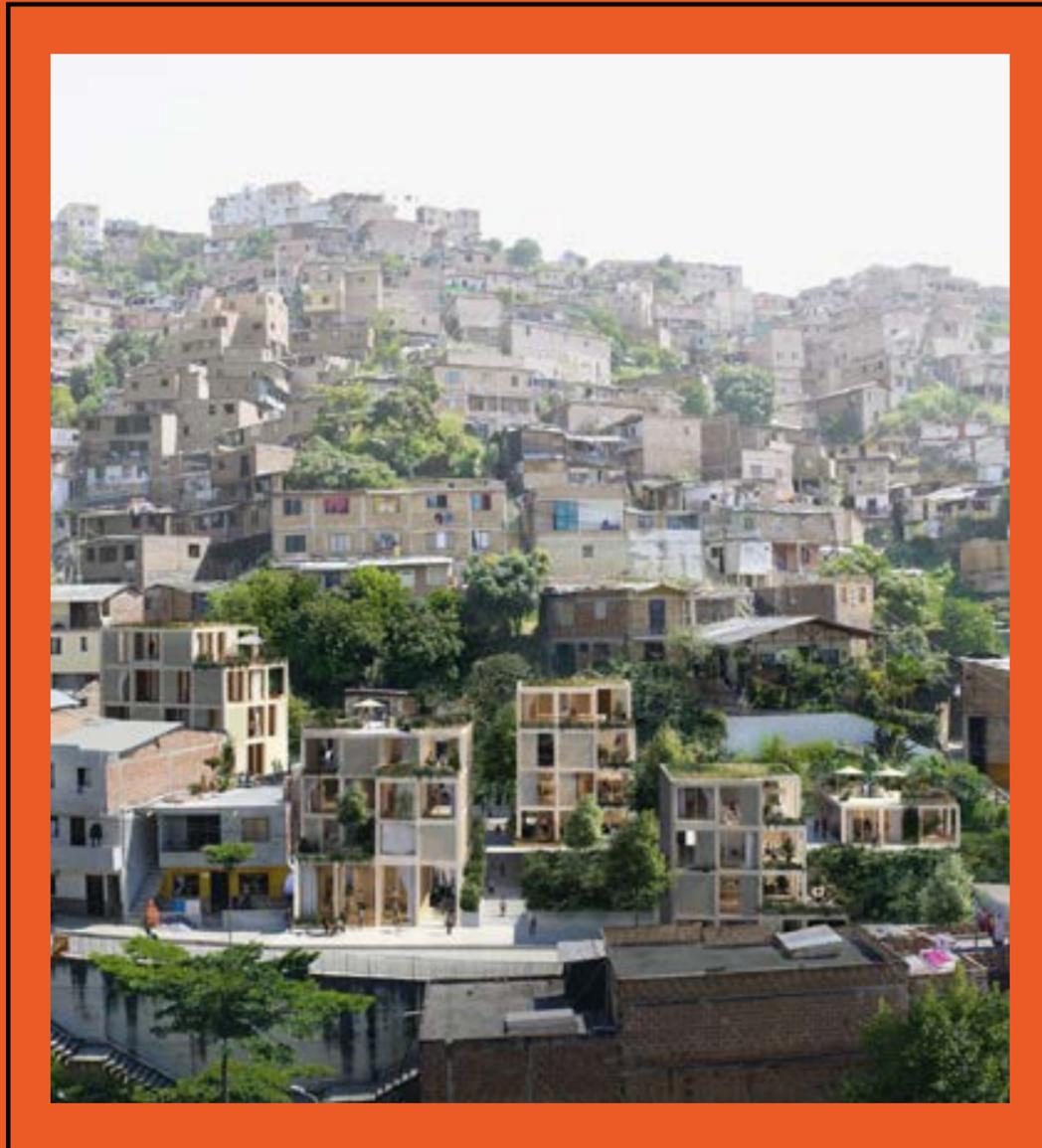
S#08B



S#08C

Insight #09

Territory



S#09

Context

Decentralised remote work, digitalisation and the current health crisis are going to have profound implications and changes on territory, mobility, city and rural life. There is a need to take a systemic approach and consider not only cities, but also territories in understanding social innovation, as well as the adoption of city preparedness and self-sufficiency through ephemeral installations and urban tactics, and the consideration of the civic aspects and wellness of cities and neighbourhood units.

Challenge

How to systematically explore social territories and flows? How to promote more civic cities and urban and interurban social wellness?

Hashtags

#UrbanWellness #Civicities #Interurbanmobility
#Decentralised #SystemicApproach
#EphemeralArchitecture #EmergencyDesign
#Urbantactics #Neighbourhood

Reference Projects

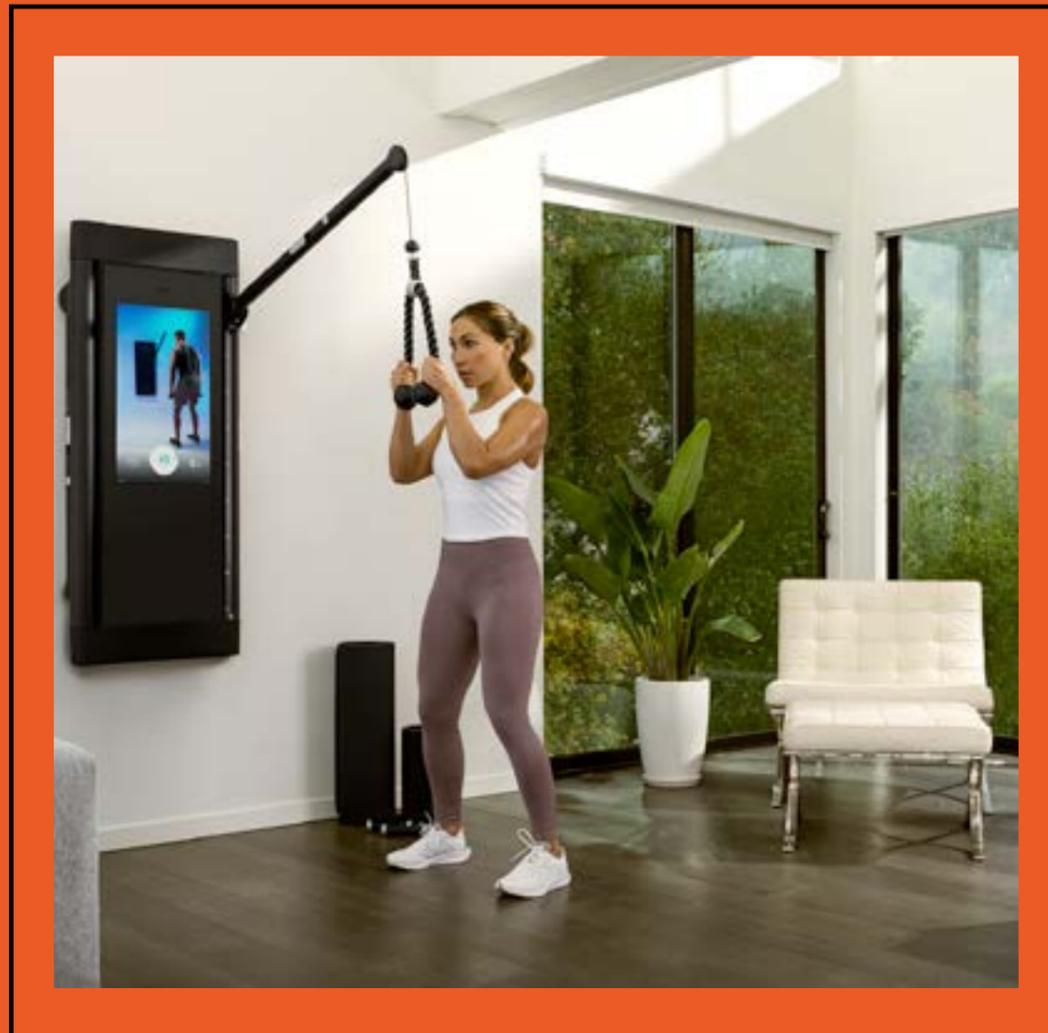
→ [Superblocks, by Ajuntament de Barcelona](#). A new model of mobility that restructures the typical urban road network.
→ [The Urban Village Project, by Space10 and EFFEKT](#). A vision for liveable, sustainable and affordable homes. ^{S#09}
→ [Housing Research and Practical Experimentation Laboratory, by Infonavit](#). 32 architects and studios were commissioned to create housing designs to improve living conditions of Mexico's low-income workers.

Reference Literatures

→ [“Why Is Facebook for Remote Work? It Wants Pay Cuts,”](#) article by Conor Sen.

Insight #10

New Built Environments



S#10

Context

Demographic, economic and health drivers will force towards new uses and distribution of our work and living spaces. There is a need to reassess the spaces and equipments where we live and work, in order to accommodate and promote new social behaviours and healthier living.

Challenge

How to explore the new living and working environments and equipment for better social resilience and healthy living?

Hashtags

#SocialSpaces

#SocialResilience

#HealthyEnvironments

#EducaitonalFurniture

Agents

→ [Tonal](#). Intelligent home gym & personal trainer. ^{S#10}

→ [Formafantasma](#). Design studio building critical approaches to sustainability and the significance of objects as cultural conduits.

→ [SevilPeach](#). Architecture and interior design studio rethinking new work built environments.

Reference Projects

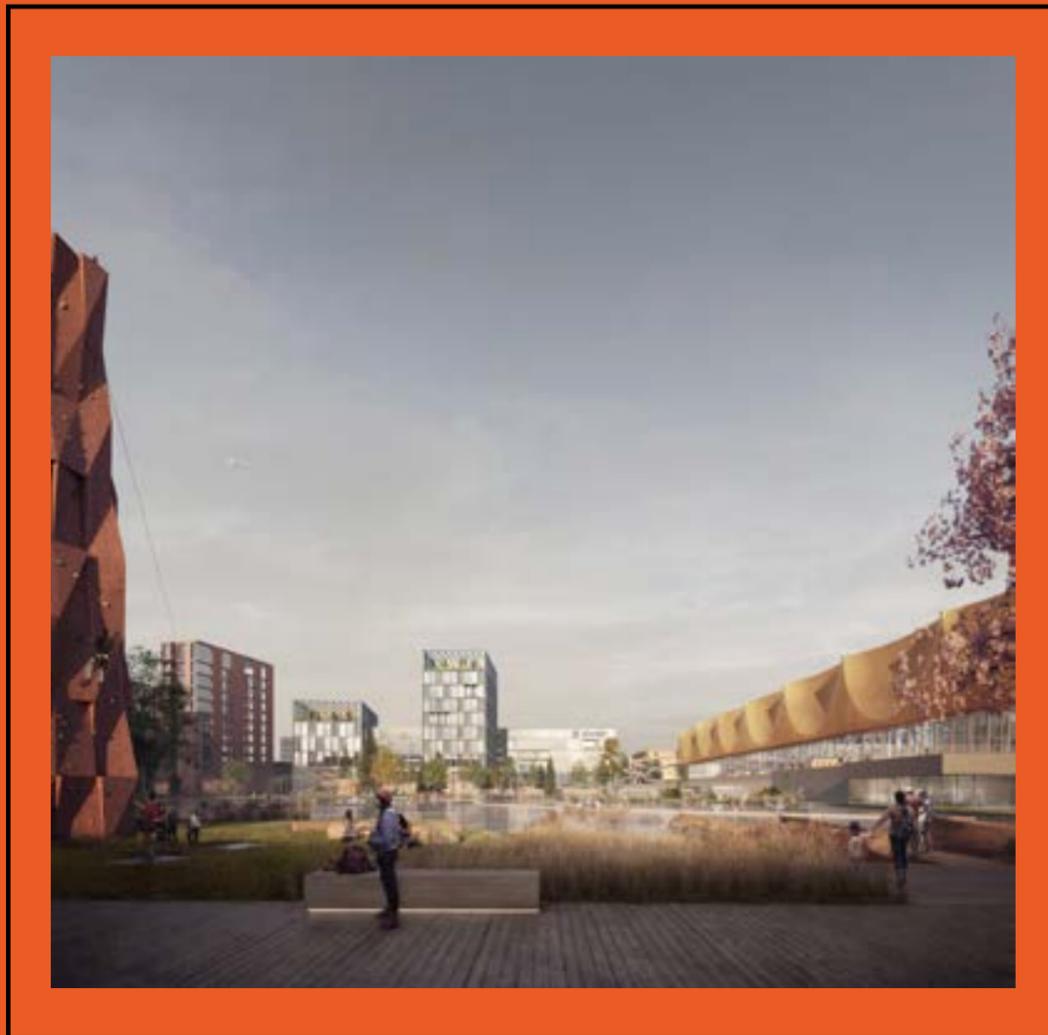
→ [Food storage, by Friday Project](#). Furniture designed based on the principles of the food guide pyramid to push people to eat in a healthy way.

Reference Literature

→ [“¿Cómo serán las casas tras el coronavirus?”](#), article by Juli Capella.

Insight #11

Tourism Redefined



S#11

Context

Along with conscious movements in economy and carbon footprint score economics, conscious tourism addresses a tourism that prioritises social good, cultural heritage and environmental conservation.

Challenge

How to promote more conscious tourism?

Hashtags

#ConsciousTourism

#Carbonomics

#SocietalTourism

#LocalGems

Agents

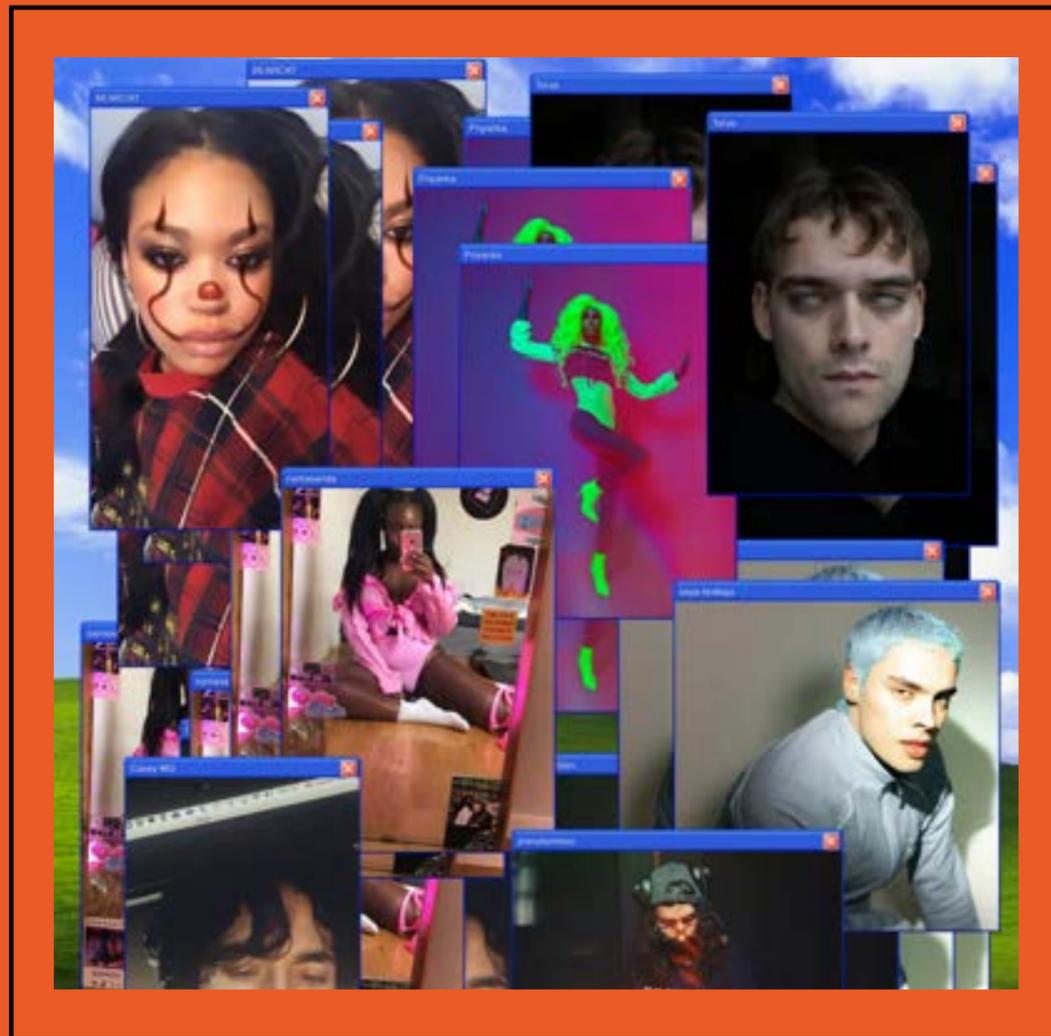
→ [The Travel Foundation](#). A charity to help ensure tourism brings greater benefits for people and the environment.

Reference projects

→ [Oslo Airport City, by Vedral](#). An urban development project that aims to create synergies between already existing entities in the area for more responsible tourism. ^{S#11}

Insight #12

Digital Transformations



S#12

Context

Better appreciation for the role of technology in helping culture and society has risen. Digital communities can allow for meaningful human connections and virtual spaces allow for new collective experiences. Social media has evolved in its role, and community can be built through gaming.

Challenge

How to develop meaningful digital communities for meaningful human connection and engagement?

Hashtags

#DigitalTransformations

#DigitalCommunities

#TechForCulture

#VirtualVenues

#CollectiveExperiences

#GamingCommunities

Agents

→ [Club Quarantine](#). A queer online dance party, online every day of the Covid-19 quarantine. ^{S#12}

Reference Projects

→ [Astronomical, concert by Travis Scott in Fortnite](#). A musical journey and other-worldly experience, built from the ground up in Fortnite.

Reference Literature

→ [“I recreated my local pub in VR,”](#) article by Tristan Cross.
→ [“Survey: 9 in 10 Americans have ‘better appreciation’ for tech during the pandemic,”](#) article by Stephanie Mehta.

Insight #13

Life-long Learning



S#13

Context

Education is in complete transformation. The role of university and life-long learning is dramatically being redefined, both in its formats and its contents, exploring the connections between people, places and learning and responding to new skills, tools and job prospects.

Challenge

How to provide new educational pedagogies through the use and design of new digital tools and physical environments?

Hashtags

#LifelongLearning

#NewEducation

#NewSkills

#DigitalEducation

#StudentEngagement

Reference Projects

→ [The Community Classroom, by O'DonnellBrown.](#)

An outdoor Community Classroom: an adaptable, demountable learning environment for schools and community groups.

→ [Blossom School, by Karv One Design.](#) A school to stimulate new people-to-people and people-to-space interactions from the perspective of space and environmental aesthetics.

→ [Wal\(l\)tz: Lebanon Pavilion, by Tessa and Tara Sakhi.](#)

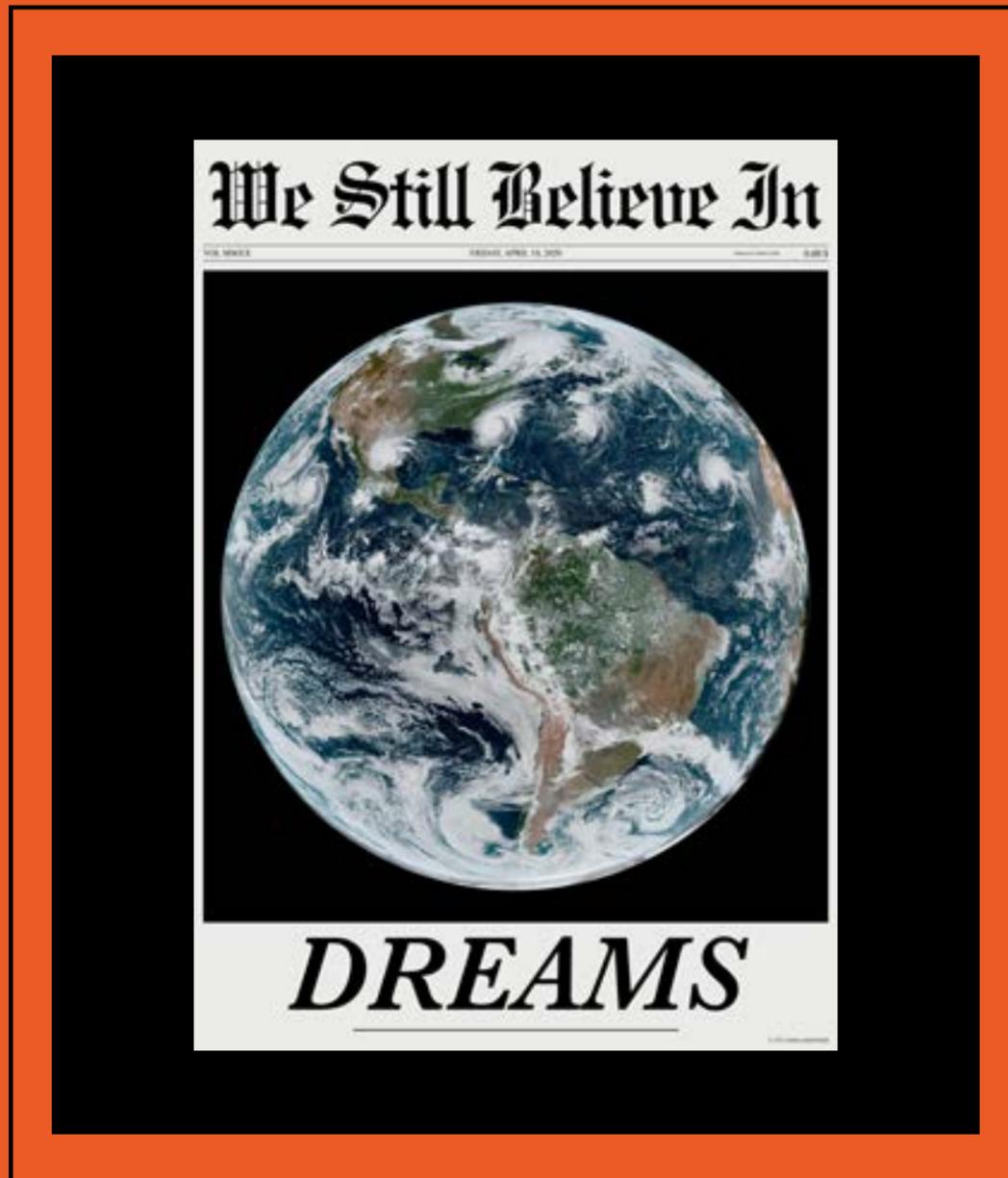
A wall as an activator for awareness and sociability, under the topic 'Ways of learning'.^{S#13}

Reference Literature

→ ["Shifts in Education and Learning,"](#) second episode of the Dialogues on Transforming Society & Self, hosted by Otto Scharmer with guest speakers Professors James Martin and Eva Pomeroy, organised by Presencing Institute.

Insight #14

Enlighten



S#14

Context

Critical but at the same time constructive forms of activism can promote optimistic visions for a new collective imaginary providing an image of the future we want to go, also demanding greater authenticity from our role models. This type of 'activism and creative drivers can be the seed for innovation and the tools for untabooing and loosening up social constraints.

Challenge

How to promote optimistic visions and values towards new collective imaginaries that can foster meaningful innovations?

Hashtags

#OptimistFutures #Enlighten #ConstructiveActivism
#Untaboo #Inauthenticity

Agents

→ Some Good News. Youtube channel by John Krasinski, a source for good news stories from around the world.

Reference Projects

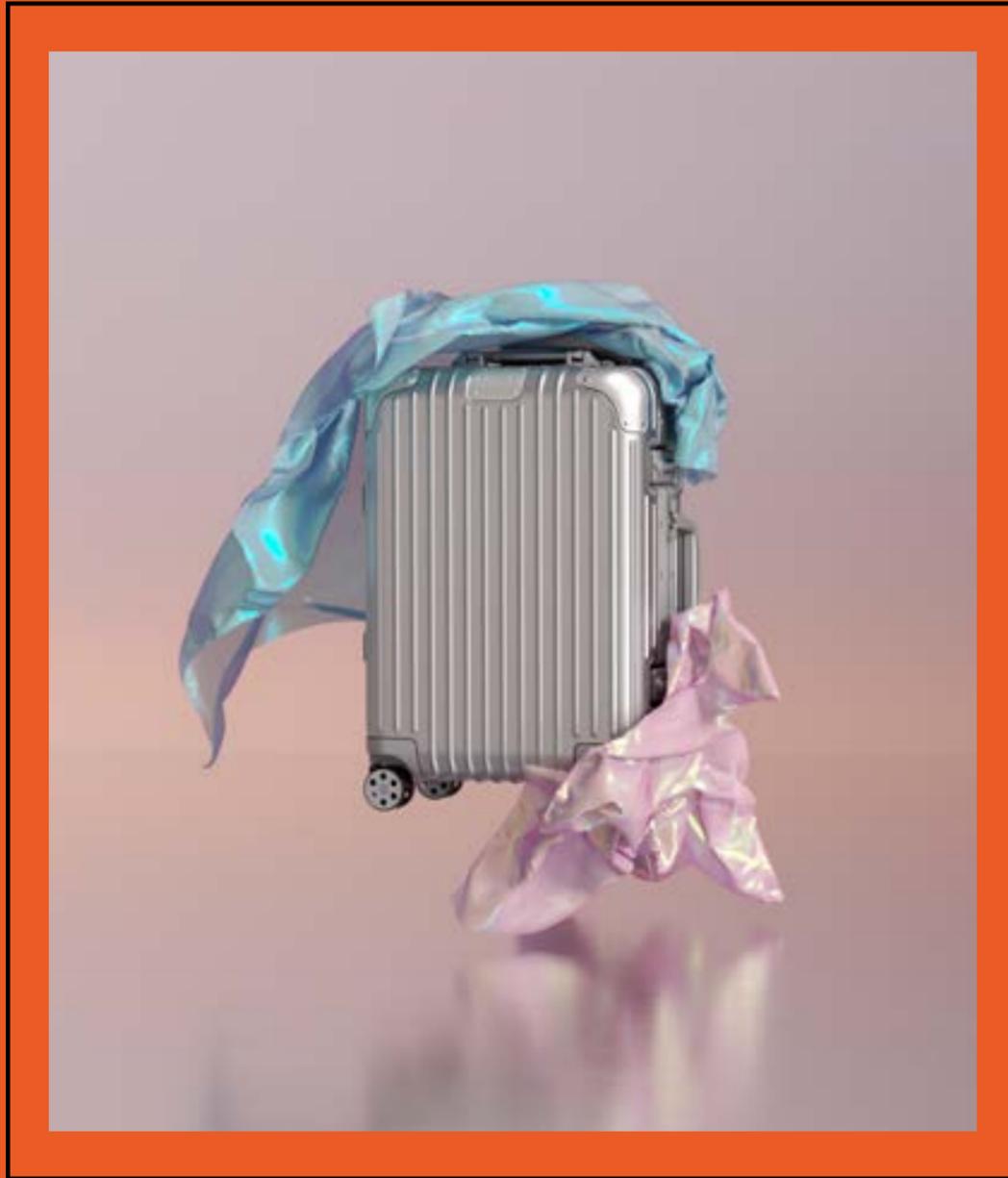
→ #AloneTogether, by Dazed. Call on a community of artists, musicians and designers to create artworks that inspire and imagine the possibility of new worlds and the power of art as a medium for political message. ^{S#14}
→ Optimist Rhythm, by Prada. Spring/Summer 2020 Menswear campaign, using Prada as acronym to spark thought.
→ Rebuild the World, by Lego. Campaign including live action films and vignettes that send positive political messages about the power of creativity to enable change.

Reference Literature

→ "Heroes of the Front lines," stories of the courageous workers risking their own lives to save ours, by Time.

Insight #15

Hyper-creativity



S#15

Context

We are at a turning point in creative expression. Digital tools united to creativity propose new cultural languages and generate alternative realities and multiverses that defy the conventional scientific and cultural orders.

Challenge

How to promote new cultural and creative languages?

Hashtags

#HyperCreativity #SuperCreatives #DigitalMateriality
#NewCulturalLanguages

Agents

→ [Six N. Five](#). Studio specialising in still life visuals and videos, and legitimising CGI as a new medium for creative self-expression.^{S#15}

Reference Projects

→ [Alice: Curiouser and Curiouser, exhibition at V&A](#). Immersive and theatrical show that charts the evolution of Alice's Adventures in Wonderland.
→ [ZeroSpace, by Jordan Lejuwaan and Jon Kreutzer](#). A full immersive art playground showcasing a collection of large-scale installations from new-media artists.

03. Dialogues

-  Human
-  Information
-  Materials
-  Technology
-  Society

What does it mean to be human today?

Laura Clèries (LC) in conversation with Oscar Tomico (OT), design researcher.

1/4

We don't own the earth, we don't own the planet and the solar system. We're just inhabiting it and it's the time to rethink what it means to be with AI, with animals, with other species or even with the planet itself.

I hope that this kind of idea of human against nature will change, and becomes an idea of human with nature.

2/4

If humans are not in the centre of everything, if humans are not anymore like the main character that rules everything, if we are just anyone else, if we are just another species, if we are just you and me... I think that this completely changes the way that we relate to things.

This subjective component is this idea that we are all people, we all have feelings, we all are different. Diversity.

3/4

The design process needs to be personal, the way we are tackling things needs to be tackled from ourselves, not from our position or from our responsibility. In design we should take a first-person perspective.

4/4

Humanity doesn't exist without the things we have around. The most interesting part is to understand that we always will be changed by the materials and technology we have around.

Progress, doesn't mean new anymore, super technological anymore, but it means more meaningful and sense making.

LC: Today is the turn for human. Today we are welcoming Oscar Tomico. He's a design researcher, I'm particularly interested in his novel humanistic perspective on design and engineering. Oscar, welcome to the digital room.

OT: Hi Laura!

LC: My first question is the big one. Recalling the title of the dialogue, what does it mean to be human today?

OT: Well, Laura you are indeed starting with the big question! But I think that this is a really important question these days, because we see that in all different areas, the way that humans used to live and to be is being questioned. So, for example, machines might take over our work, these days we see animals walking on the streets and reclaiming their space, we also see that artificial intelligence might be more powerful than we can do as a collective mind. I think that you can see it in a threatening position, but at the same time, maybe it's the time to actually let it go. We are not gods, we are just yet another species in the planet and maybe now it's the time to actually accept it and explore a different role, a different way of being. We don't own earth, we don't own the planet and the solar system, we're just inhabiting it and maybe it's time to rethink what it means to be with AI, with animals, with other species... or even with the planet itself.

LC: Wow, that's a big challenge for all of us. We're certainly going from the idea of anthropocentrism to ecocentrism, what are the implications of what you have developed in terms of changes in our built environment?

OT: I think that the most important part to think about it's this posthuman approach that we are having in research, for example. So, yesterday I was talking with Ron Wakkary, who was in a class together with me. It's really important to understand that if we are just one more in this new system with animals, plants, things... then, suddenly not being on top of

the ivory tower, and just being with others, I think it can really, really help us to understand new relations that we can have with others. So, the way we work with sustainability, the way that we treat other animals, the way that we look at farming, the way that we look at other kind of things... I'm always really annoyed, when we are talking about farms, about using biomaterials because what comes to my mind it is always the image of this kind of person from America cutting a sequoia that it's more than thousand years old and has this picture in the middle of the living room. So, I hope that finally this kind of things, of trophies, this kind of idea of human against nature will change and becomes an idea of human with nature. So, that we look at different ways of producing food, we look at different ways that can somehow in the same way, that we want animals to have a better life and some people are vegan. Are we going to do the same with plants? Or with crops that we are actually farming? This is a really important topic to think about these new relations, these new symbioses, collaboration with animals, plants, artificial intelligence, machines... I think this is really important because sometimes there's a lot of problems and situations that we have not been able to solve now, because we have been trying to do it alone (as species, as humans), but now we don't need to do it alone. It might sound a bit strange, because even in my own culture, thinking that with plants and animals we will solve some situations, makes me feel a bit strange. This shows that this idea of being equal to others feels so wrong in our minds because in our culture doesn't really relate to it at all. So, there's a lot of work to do in this field.

LC: You were mentioning culture, can those new cultures be related to the way we are and react? I believe that this is going to have more impact also on ourselves, rights? The way we do things and we feel things... what's your point on that?

OT: Exactly. If humans are not in the centre of everything, if humans are not anymore like the main character that rules everything, if we are just anyone else, if we are just another species, if we are just you and me... I think

that this completely changes the way that we relate to things. So, now humans are all about numbers, about economies, about progress... but I think that if we want, for example, Europe to work, it's not going to be about numbers or progress anymore. It's going to be about people, cultures, how you relate to others, how we can understand each other's' points of view, how can we share things together, how can we strengthen our point of view, having a multiplicity of visions. So, I think that this subjective component is this idea that we are all people, we all have feelings, we all are different. This diversity. It's really important to take this into account these days. And this is really related to the idea of design but also of healthcare, wellbeing. We can't really cut everybody with the same pattern, it just doesn't work. Some of us we have 20 fingers, but it doesn't mean that we all walk, cry, drive... in the same way. It's really important to understand this subjective point of view. Specially if we want to design for people, for things becoming personal.

Also, the design process needs to be personal, the way we are tackling things needs to be tackled from ourselves, not from our position or from our responsibility. At the end of the day we are all human. I think it's really important that we take that into account. What I mean by that is, for example, in design we should take a first-person perspective or, in healthcare we should talk about person-centred healthcare, rather than user-centred healthcare. If we talk about crafts, we should talk about tacit knowledge, about culture behind, about that the information comes from the experience. If we talk about social design, we will talk about interventions, about being there, about collaborating with others. Even if we talk about like programming, human computer interaction, software development... we will talk about how we interact with it, how we feel when we are doing it. One of the main problems with software and AI is actually that it's all done by specific profiles of people and, does it make sense that all software is generated by 30-year old male? Is that something that is going to help the world? I don't think so. I think that if we want to have this richness of being this complexity

of lives that design process and the way we manage, educate and, at the same time, govern countries needs to be done from this perspective too.

LC: Wow, that's overwhelming and really exciting at the same time. This more emotional, person-focused aspect is really disruptive for many design processes.

OT: Laura, maybe I would add something else. What we see these days also, the idea of managing groups of people, the idea of a country as one entity, these are things also changing. We see more and more that it's about having communities and each community is managing ourselves. It's the power of the community, their diversity and their richness of possibilities that can help us to act quickly. This big institutions with one person on top, that's also a big responsibility. I think being human is also being a group of people, not just numbers, 0, 1, 0, 1....

LC: Last week, Toni Llàcer was also mentioning the idea of branded person. We as people who have to be brands, that shouldn't happen anymore. He was supporting the idea that we can de-brand ourselves, that we can connect to our inner selves... and also the idea of tabooing sense. Another important thing related to health and well-being, certainly human health and well-being approaches, have dramatically changed. What is the new perspective on health and the evolution of our species? How do we relate to health?

OT: I think that the most interesting thing is always to understand that human doesn't exist without the things we have around. So, we always have been working together in a system with all the things around. You can call it like we are already all cyborg, in multiple ways, but even just clothing transforms the way we can be, our house, contact lenses, using some communications things allows us to actually collaborate and do things with others. We always have been shaken by technology and things we have around and this will continue happening. I don't know, these days it seems that the most important thing is the mask that you are wearing or

the gloves that you can get. But, in a way, these are things that always have been there. Either from the paracetamol pill that you take... The idea of being a cyborg, of using wearables... for instance the glove that I'm wearing. Cotton is a super interesting fabric, it's a super interesting fibre, and so is wool. Not to say all the synthetic ones that we have. For me, the most interesting part is to understand that we always will be changed by the materials and technology we have around. If there is something that stays is that human is continuously evolving, and it's evolving and changing depending on what we have.

So, this would have never happened a few years ago, we would never thought that we had to be locked at home and we would be actually having these discussions online, but now it is our everyday. I think that, for me, it is very important, related to healthcare, because new developments and technologies will appear. For example, what was before a big machine that you had to go to the hospital to use, now it can become a portable device that has some intelligence on it... It's never going to be perfect, and always there are going to be problems. Technology will never solve our lives, it's our lives that need to be solved by ourselves in a way. This is really important to understand. I would say that we shouldn't follow technology determinism, when technology will make everything better, because that is not the case. It can also make everything worse. It will change us. We have to be open to these changes and continuously adapt to what it means to be healthy, to be happy, to be a human.

LC: Good. Big thought for all of us. I'm really interested in the concept of Mars, the idea that Mars can be a metaphor for living with constraints such as scarcity and air health and liveability. Could Mars be a good example on how we need to live here?

OT: I mean, I would say, putting constraints in our thinking always helps, so we were talking with people from Zero 2 Infinity, and what they said is that actually working on space travel, that sounds a bit strange, is actually the best way to create sustainable systems: it's all going to be circular there, we'll need to reuse

everything there. I would say that any leap in humanity history will actually provide us with a different set of knowledge, but what it is really important, again, is that we look at it from a personal perspective.

What do I mean by that? We can look at going to Mars as calculating trajectories, building rockets... but we can also look at going to Mars from the perspective of what it means to be closed in a room for a specific moment of time, what it means to be separated from the people that you love, what it means to be not knowing when you are going to go back to where you were... These are things to help us to understand migration issues. Even the moment we are living these days, all these questions I think that all relate to them. I think that taking this embodies perspective, as engineers, designers, social scientists, scientists... all people should think about what it would mean for them, how would they relate to it. That would really help us to make this trip to Mars more human, more personal and more enjoyable. It's not about getting there, it is about how we get there and how we are going live there.

LC: Now it is time for questions from the audience. By human are you talking about designers?

OT: By humans we mean ourselves as species, you, me, others... it doesn't mean if we are designers or not. I think it's everyone. It's really important to understand that designers are just one person more. There's no difference between you and me, Laura, others... we are just all the same. At the end of the day, we are all going to die. I know it sounds sad, but it is really important. Sometimes when we are designing or making decisions for others, we sometimes don't relate that we are going to be in the same situation later on. Or, that, maybe, we already are. I think that it is really important to, rather than to try to objectivise our thoughts or to separate ourselves from our profession, I think that we are actually who we are and doesn't matter what clothes you put on, you still are going to be the same, doesn't matter the company you come from... you still have to deal with everyday matters.

LC: Another question. Do you feel optimistic about the future?

OT: I would like to say yes, but that is not my answer. At the same time, I think that a lot of things are changing, and changing really quickly. I'm talking about myself. I can see a really big difference on what design engineering is now and a few years ago. In our Bachelor Programme we talk about advanced materials, and before this used to be carbon fibre composites. And now Laura, you know too, for us advanced materials are also the materials that are done at home, the ones that are circular, the ones that create no waste and can be compostable. So, this for me is an advanced material. I think that these changes in terms of what it means advancement, what it means progress, which doesn't mean new anymore, super technological anymore, but it means more meaningful and sense making. I would say this is a really big change. I would think that if we all start doing these things, maybe, just maybe there is hope.

LC: Which industries lack design and engineering the most? Agriculture?

OT: In most of all. I think agriculture is really an interesting case. There are projects going on that are exploring how robotics can actually really support farming, and how having a more controlled and a systematic analysis of data coming from the fields, can actually help us to understand, predict and even influence the way that crops are working. And I think that's really interesting, not just because of the situation we are now, because actually we can anticipate on what's going to happen when the climate changes. There are actually students in the Masters' Programme who are addressing these ideas.

You know that I have been working quite a lot in terms of wearables. And the reason why I have been working so much into bringing technology close or on the body it's because there a first person-perspective is key and it is really important. It's not about what the garment does, it's about how it does it. And then in textile design and fashion design everybody understands it. But I think in

fashion there's really something to work on, and it's the idea of combining this subjective, personal experience with also the conceptual cultural image that it's there. I think that there is very interesting work done, for example by Pauline van Dongen, who tries to combine these two things also with philosophical concepts. Fashion needs to do something, but also fashion also as a movement that it's critical, can also make a really big change these days. It's already moving into sustainability and other topics. We don't have to underestimate the power of fashion and how it really arrives to everyone and every house.

The power of knowledge

Laura Clèries (LC) in conversation with Pau García (PG), designer of info-experiences.

1/4

The platforms that create the arena for fake news in the digital world have to be the same towards killing them. At least, they should give the society tools to be critical with all these realities.

If we are not able to create platforms that fight fake realities, we are like naked.

2/4

How we relate each other is starting to be gamified. I think it is more on how design can be critical about what can be gamified and what not.

3/4

I really believe that the next generation of data visualisation will be much connected to feelings, empathy and to switch perceptions, rather than to tell what's going on. It's not about explaining the facts anymore, it's about changing minds. Not only minds, but also behaviours.

4/4

I don't believe that the problem that we have with borders and with cultural differences in the physical world is shared on the digital part. I think that it is itself intercultural on the digital side, because it has born that way.

LC: You are writing in the report that through history, there have been three main powers: the power of force, the power of wealth and the one that we're experiencing now, which is the power of knowledge. Unlike the other two, information is mostly free to share, it multiplies, it gives to whoever who has it the potential of choice and, with it, the scarce feeling of freedom. One of the biggest challenges, as you said in the report, is how we distribute it in a way that answers to the values, re-establishes and erases all forms of power. This is an enlightened bigger insight. My first question is more related to politics and ethics, and the challenges we find in truth and fake in terms of information. How can we understand the fake infrastructure and how do you see this?

PG: First of all, I would say that whatever I will say it will be my opinion. I want to read a tale that I heard two weeks ago. A friend sent me this story about truth and lie. The truth and the lie met on the road one day. The lie says to the truth: "It's a marvellous day today". The truth looks up to the sky and says: "The day is very beautiful". They walk for a while and they see a beautiful river. The lie tells the truth: "The water in the river is very nice, we can swim together". The truth, once again suspicious, tests the water itself and says: "Indeed, it is very nice". They enter together to the water and make a race. Suddenly, the lie jumps out of the river and goes towards a nearby village. The truth wanted to find the lie and also goes to the town, but naked. The villagers see the naked truth and all are horrified. From that day on, people prefer to rely on a lie than a naked truth.

I think somehow, it's a very lovely story to talk about at the present moment. We're somehow consciously rejecting a lot of truth. And a lot of truth has to do with our personal life. Things like, for example, financial issues, the concept of beauty, struggles with faiths or addiction, or whatever... Spain is also brutally divided among ideological lies and people can't be presented with irrefutable truth regarding society thoughts, including terrorism or global warming. All of them are

kind of segmented in very simple stories, this is a simple thing to believe. That's why some people believe one thing or the other. That's why it's so easy to get people go to the extremes, because the extremes are easy.

From this tale what we can learn is, obviously, the nature of lying and how complicated is to accept the truth. But what it doesn't talk about is that it is the future of it. For us it has been quite a challenging thing and a lot of discussions have been made on Twitter, Facebook, Google itself on how they, as platforms, have the responsibility because they are the context where this fake realities and narratives come to life and get through society. We believe that the same platform that creates the arena for the fake news in the digital world has to be the same towards killing them. At least giving the society the tools to be critical, with all these realities.

I read a week ago a paper from the Becker Friedman Institute and they did such a crazy experiment, they interviewed more than 1,000 people, audience from two main TV cable programmes from the US. One of the TV channels was totally immigrationist about the dangers of COVID-19 and the other one was pointing out the contrary. There was a 20% more in one audience than in the other. If this is not Darwinism, I don't know what it is. For me, somehow these TV channels, Facebook or whoever it is spreading this information, is creating an impact on people. We can see in these studies that, what happened in Brexit or what happened with general elections, from all that things that had happened already.

If we are not able to create platforms that fight these fake realities, we are naked. I would point that no platform can thrive without a control and fake censorship. I have seen actually, in YouTube they have already starting to enter some filters, whenever you watch a video that has not been approved. For example, "The Earth is flat". This kind of statement... or a small quote on the bottom of the video saying: "Hey, we don't know if this video tells the truth". There is this small sentence remembering you that everything that is on the Internet is not true. For our generation is easier, but there are lots of

people that, when they see something on TV, at the same moment for them it becomes truth...

LC: We are in a new paradigm of knowledge. And we need to educate also in complexity and in critical thinking, so that we understand what we're reading or consuming as information. In relationship to social and human behaviours, we're seeing that the concept of gamification is attracting different sectors. My question is, how can design help the development of gamified communication systems?

PG: I think it's already happening, at all levels. I remember from the time I was studying at Elisava, there were always this historic quote that form follows function. We created beautiful and entertainment forms for a very pragmatic and supposedly economical function, right? It is quite the evolution of the apps that we are using, such as Glovo, Uber or even Tinder. How we relate each other it's starting to be gamified. I think that it's not about if design can help gamification, that for me it's obvious and it's going on and it's happening at so many levels. It's more that how design can be critical about what can be gamified and what not. Because us, as designers, we have the responsibility with this kind of thing. It's not about making it beautiful or making things easy, it's about also why you would like something to be easy if it's something bad, right? For you, for your values. So, I think you have to always have this critical thinking in ways gamification is used, because it can be used for lots of wonderful things but also it can be used for bad purposes.

LC: Again, design has a responsibility in making things, in doing things and applying in this case, gamification. So, understanding also that information is key and a powerful tool. How data visualisation creates an impact? How can we improve people's life with data visualisations?

PG: Data by itself is very tricky, because whenever you put some numbers or facts, people tend to believe that it is true. And it is not, obviously. Because it's just a segment

of the truth, it's a symbolic truth because it is represented by numbers. It cannot be really a knowledge, right? I always use this example of last year when 41,000 people were killed in Afghanistan. It was even more than in the Syrian war, and we didn't see that on the news, right? Would be understanding the reality of this, or would be carrying us for that? I believe not. I believe that because we cannot care for numbers, because it's a very abstract representation of the reality. These are not things that we can somehow connect and understand. Even if we could understand, it is a very far reality, we cannot really get a human acknowledgment of what's going on.

There is this physician, called Hans Rosling and he has a wonderful quote, that is very hopeful. I would like to repeat that the war must be understood with numbers but not with numbers alone. And I think this is where data visualisation has a lot to say. It is not only for representation information in a very tactical way, because we already know how the scientific way of representation has been somehow solved, at different levels. Obviously, there's a room for improvement. What we we're facing today and what we are actually fighting against is a lack of empathy. A global lack of empathy, because we don't care about global warming, it's something very... it's so big the problem... that we don't care. We cannot do anything to stop it... What kind of visualisation is using gamification, experience, small examples of our own information to really connect us, with that? I really believe that the next generation of data visualisation will be much connected to feelings, and to switch perception to tell what's going on. It's not anymore about explaining the facts or representing numbers that you get from a science guy by charts. Now it's more how you can communicate something in a way that people can actually change their mind, but not only their mind, but also their behaviour. By making people feel something, they will actually want to change that reality.

LC: Again, when we talk about production or consumption, normally we associate it with goods. But, can we also get people closer to an intelligent consumption of information?

We're constantly eating information. How can we be more smart or intelligent, in terms of how to consume it?

PG: I have this app that it's called Yuka. It's quite good, you can go to the supermarket and scan all the barcode's products. This kind of app, but there are a lot of apps like this, actually what they do is that you go with the phone, you scan the product you want to check and they actually extract all the marketing and bullshit stuff from the product and they say: "hey, it's good or bad for your health". That's it. It is surprising, I was very amazed by how the marketing actually changes our perception of things. For very long time I was buying an orange juice that it looked healthy, but then I discovered it was terrible for my health. I think that there are a lot of apps that are starting to help us.

Also, I saw this report from a university in the United States that were working out in how to limit the electric consumption and to lower it in some communities, blocks of buildings. For example, the elevator of the building block. They measured every week the consumption levels of the each of the flats, so all the neighbours can see the consumption of each other's, and they were actually giving "stars" on people that were doing great or improving their curve. And they were giving bad reviews to people that were consuming more, it was a very patronising way to deal with information, but actually they had also contributed to downsize the curve of consumption of a 30%. It's a lot! Imagine that it can be extended to a whole country. Obviously, it was a pilot and it was a very experimental exercise, but I think it is not anymore about having the data or information, is about how you explain it and in which places that will change actually the behaviours of people.

In intelligent consumption it has a lot, because we don't care that the big brother is monitoring us, surveilling us, checking on us. Most of the people don't care because they don't "see" the big brother, but knowing that your neighbour will actually know that you consume a lot of energy... And obviously there is a lot of different discussions around privacy and freedom... but I think that there is

a space there and actually it could change a lot of things in terms of public consumption.

LC: Really interesting. I have a question related to our own research. Megatrends show that we are going towards more social and cultural values, but also emotional, as you were mentioning before. Communication has to be more human. Do you have an example on how we can make communication more emotional and how to be empathetic in digital times? How do we do it, is it more storytelling or storyproving? What does it stand for an emotional type of communication?

PG: I think it's already happening. Companies like Spotify, they have been working with an empathic way of connecting with people. Your 'weekly discoveries' or your 'favourites'. They're not thinking about what is more purely functional, they are thinking at an emotional level. I think there are a lot of examples in the physical world, that they have been worked in how they emotionally connect with the people, with the user journey. It won't be that much different in the digital world from the physical one, because, at the very end, it's the same journey. It can set a limit between the companies that will thrive and, even society will thrive, that is, the ones that are really emotionally intelligent compared to all those companies that really don't care on how they feel about things. These companies' systems are going to fail at some point.

LC: I hope it's not another superficial move such as green-washing, that it's for real, and that they really want to make a difference in engaging in a more human way.

PG: Green-washing has a lot to do with... ok, we want to be close to you, so we want to be part of your values. If your values are green, then we will also be green. They are adapting the values in order to make closer to you. In terms of empathy, it is different because they are doing it directly with their consumer or with the people they are working with. Obviously, there is a final function that is 'sell more' or 'connect better' or 'improve something', but I think there's not a middle step, it's less complex.

LC: My last question revolves around culture. We live in a multicultural mixed world, where each and every culture should be empowered in some way. How new media and technologies allow for these different cultures to communicate? Are there any differences in here?

PG: I don't think there is any difference like from now, it started when Internet became really mainstream, some borders were erased. We were working with a foundation to generate an intercultural trans-report. We were already talking in this report on how we co-build an intercultural in the digital sphere. I think on the digital side, it's itself intercultural because it has born that way. It's not an elite space, it's not a space with specific borders and obviously there are all this big companies but you can use Internet in so many ways that are not defined, and every day the borders of Internet are being defined again and again. So, I don't believe that the problem that we have with borders and with cultural differences in the physical world it's shared on the digital part. Obviously, there are differences but there are more bridges on the digital side than in the physical one. I think we should focus on how we can solve the physical ones.

LC: So, let's see if anyone is interested in sharing a question with us and address it to you, Pau. There's one on machine-learning.

PG: We're now starting on an exhibition on violence, we have been working on it for a month or so. And one of the main problems or the issues that we wanted to work with was how humans are violent to machine-learning, to AIs or personal assistants, like Siri. This is a very interesting space because there are a lot of families or parents that they don't treat well this devices or robots, right? They mistreat them. They will never do that to a person, but they do to a robot because it's not human, they don't have to behave in a human way. I think that this is one of the dangers of not establishing which are the limits when a machine-learning algorithm works as a personal assistant. More than ever they are becoming very close, they are starting to feel quite close, it's starting to be

hard to differentiate them. I think it would be a good space for discussion on how machine-learning will start to face violent acts from human behaviours.

LC: Another question from our audience. What is the relationship between ignorance and truth?

PG: It's a very deep question. Obviously, society needs somehow to be educated, even to have the tools to educate themselves. It's not something easy. Obviously, with the access to digital world, it is easier than ever to educate people. Still, what I think it's more important it's not about educating in the way on our generation was educated: you have to study history, mathematics... all these basic parts of cultural background. It's more educating people how to find this information and how to be critical with this information. Right? It's not anymore about collecting knowledge, it's more about how you can actually use this knowledge for a certain and specific purpose.

LC: Another question. Can digital bridges help us in the physical space? Is empathy truly possible in a digital data environment?

PG: Obviously. But the problem with the digital bridge is that you cannot actually send food to a digital bridge. There are lots of things that need from physical reactions. At the very end, the enforcement of law is very physical, like people going to prison or to immigrant camps... there are physical barriers that cannot at any point be changed by connecting with digital. Because there are real differences between one side of the world and the other. Obviously, you can live in Mexico and work for the USA, but you still will be in Mexico under Mexican laws and with a social reality, that is much different from one place to the other. Still, I'm very hopeful that digital world is changing so many things.

LC: What advice would you give to designers in order to contribute to the new world and in which field we could specialise, in which areas of design?

PG: I was saying health... for obvious

reasons. It really depends, I remember when I was studying at Elisava, actually designers were quite heroes somehow. We have these figures, a momentum of celebrities of design, right? I think it's changing a bit now. This area is switching. It's something I wanted to reflect, it has a lot on how design can amplify other disciplines because something that I learned from studying design is that what is more powerful is not the skills or knowing how to work with After Effects or using any kind of software that you can learn from university... it's more about the logic way you think about solving problems. We have realised how a small portion of budget and time they invest in thinking experiences, the design part of the whole space and product, that is life. So, my answer would be taking the design skills you have and go to another discipline, rather than working in design brands or agencies, advertising and communications. Obviously, there is a lot of work to do there but the future is in other places, I guess.

LC: Another question. What is the perfect balance between sharing personal data in public and still having some private digital space? Does it exist?

PG: This is very interesting. I think all data should be private and you should only make public the ones that you own, with your consent. Your consent to give your data is not about saying okay to a privacy policy from Facebook. There are easy ways to understand or consent to get other people exploring your information. It's also about on governments and societies on creating laws protecting users. I don't see myself cutting out all my social media and all the different patrons that I used to work, to not letting these big corporations use my own information, but I do see myself working for a party that will actually create better laws for myself.

LC: The last one. How do you see gender-bias in the digital world?

PG: It's everywhere, it's the same than in the physical world. I think that you can look up in Wikipedia and see the amount of historical facts about men and women. You would realise. The other day I found a really

good website on book recommendations from twelve curators. And there was only one by a woman, and of course all white people! So, I think it's a like a mirror of societies. Pointing out, this is changing. Just sending an e-mail to this platform saying: "Hey, have you realised that from the twelve recommendations, there is only one woman?", "Do you realise that there are thousands of people visiting this website and you are making a claim by placing just one woman?".

Materials in crisis.

Laura Clèries (LC) in conversation with Clara Guasch (CG), multidisciplinary specialist focused on materials, processes and sustainability.

1/4

There's an immediate need for change, we need to go renewable and we need to do it fast. Without decarbonisation we will never be 100% circular.

Hemp is an outstanding material because it captures a lot of CO₂ and grows very fast without the need for irrigation or pesticides.

3/4

I definitely think we need to culturise people about materials through the arts. I think there is an inherent ability in artists to communicate complexity, making it available for anybody. Art is the answer!

We need to generate a shared common knowledge; we need to bring it on. So that people can recognize and have a very clear criteria on the choice of materials.

2/4

Cities are great actors and have the capacity to act on certain levels to move steps forward into decarbonisation.

I think cities are perfect actors to trigger this systemic change. We don't need to wait anymore for government and high hierarchies, let's move on at the level that we can.

Barcelona has the potential to be a prototype for a post-carbon metropolis. It just has to capture it and realise it.

4/4

Materials contribute to our well-being. Materials like copper, bamboo or hemp are naturally anti-microbial and anti-fungal, which are, by default, going to create a naturally more hygienic environment.

LC: I'm sure this is going to be a really food-for-thought session for everyone. The first block is about global and planet actions and politics. You advocate for a systemic change addressing materials, that are one of the key issues in this new paradigm of not only addressing carbon neutral, but about becoming carbon negative, where negative means removing and cleaning up the previous mess to the best possible extent. We have seen in the news a very dramatic drop of the emissions in this global lockdown period, but my question goes to what is the meaning of decarbonisation?

CG: Yes, that's pretty broad. I'm going to try to answer it in the best possible way. Maybe I'll build up on concepts. But first to your comment that we are seeing a dramatic drop in emissions. It's clearly not our choice, right? I mean, this dramatic drop in emissions that we are living these days is because of the unfortunate situation with the virus and with the almost global lockdown. And it's not a choice that we've made a conscious shift of mindset and a sudden change of policies regarding renewable. Regarding decarbonisation, I mean it is about removing and reducing, but not only reducing also removing previous past emissions because we have not peaked carbon emissions yet. That means that we have to be helping the emissions, that we still need to produce in order to become renewable. Let me explain it. Due to its persistent and cumulative nature, historical emissions that we have had over the 20th century, half of them at least are still here. So, we need to remove some of these emissions in order to be able to produce more. Because otherwise we're just increasing the total amount of CO₂ in the atmosphere and in the soil, oceans... everywhere. That is speeding up global warming. So, the point is if we can help restoring some of this balance that we have lost, I think we have some natural solutions to capture, decarbonise, and store it. Natural solutions could be carbon sinks, as a forest, which is usually considered a

natural way of capturing carbon and storing it, which is great, but it is not the only thing we can do.

We also have technological solutions, engineered solutions and materials that can help also as carbon sinks. An interesting engineering solution is pyrolysis which allows us to capture carbon and transform it into inert material, which is char and we can explore it to different applications.

Then, what I'm really interested is in other natural materials apart from forestry materials, that could really support and move towards decarbonisation and help us in this transition time that we are living. Among these natural solutions, I think that hemp is an outstanding material because it is growing very fast, much faster than a forest, it is a material that captures a lot of CO₂. All the materials that grow under the sun use carbon as part of the cycle to build up, and they do that to build up the cellulose, which is the most common polymer of the planet, and with the cellulose we create our own structures. And hemp is one material which does this, but in a very high speed and with very good rates of carbon sequestration. On top of that, hemp is also offering endless properties which are good for multiple applications and it offers us, like the biomass, that hemp can be produced much higher than any other group because it's very resistant and it can grow in very dense populations without needing irrigation, water or any type of chemistry like herbicides or pesticides or any additional input. Which makes it even better, because it helps to clean the soil and its rotation crop allow for the next crops to have better outcome. Apart from the growing face, and the fact that it captures so much carbon, it also has endless applications, we can use the hemp for medical applications, it's the strongest fibre and natural textile fibre that has ever been. It's very durable, it allows different textile applications, you can find it in different fields, such as automotive in composites because it's very strong and flexible fibre at the same time. You can also find it in the food industry, which is amazing. And you can find it in cosmetics or even in architecture.

Now we're seeing 3D printing hemp houses, for instance. It's a very versatile and very good material from all perspectives, because it offers lots of properties, lots of applications and at the same time, it captures carbon. So, it's helping us to decarbonise the environment and it keeps carbon sequestered within the material application until the end of the life cycle of this material, which means that it's taking a way for the environment that char of carbon for a very long period of time.

That is helping us to move forward into a transition to renewable energies. But it's important to consider materials. I know we have been working with carbon footprints and, of course circularity and all this new trends and new paradigms which are great, but we need to think always from these dimensions. How much does this material contribute to sequester carbon and actually keeping out for circulation and how long?

LC: That could be one of the metrics for selecting materials. How much carbon they can store, right? There's another question related to decarbonisation that I wanted to ask you. In which scale should we act? Should we do more as individuals or more as territories? What's the politics and dimension of decarbonisation?

CG: When we have systemic ambitions –and I think we do have them– we all see that there's a need for change, that we need to go renewable and we need to do it fast. I think a systemic approach is needed. In that sense I think that cities, despite the pandemic is putting cities into question from some perspectives now, cities are the great actors still and will be for the 21st century. They concentrate most of the population globally, they generate most of the economic exchange and they produce and, at the same time, abandon pollution and waste. I think cities have the capacity to actually act on certain levels that could already mean both steps forward, without waiting for government, so to speak. Such as dealing with their own waste, pollution, as if it is a new asset. Because it is. If cities are now putting in place to capture and

store carbon, they can handle their own waste streams in this way, like making their own chart with pyrolysis, so that we could eventually use later into the gardening of the metropolitan area, that could be one way of handling waste and pollution into very valuable resources and therefore generating resources for the city. This is what the cities want, and what the cities need. I think the cities are perfect actors to begin or to trigger this systemic change. We don't need to wait anymore for government and high hierarchies, let's move on at the level we can.

From the same perspective, I think that some corporations are doing it already. At the beginning of the year we have seen that Microsoft, for instance, did an announcement through the MIT, they announced that they will be carbon negative. It's the first time that I heard a corporation saying that. That sets everything into a completely different level. In the same way, a corporation that is doing that, will them extremely be competitive and sustainable because the price of the carbon, remember, it's going to go up. I think that cities could also do that, even if they are triggered from a different angle. It doesn't matter. I think that it's the move that counts.

LC: That is a good motivation for cities and city mayors to start creating creative policies towards decarbonisation. My next block of questions goes to social behaviour. We have seen in the news scientific information for the wider public regarding how long the virus can stay in different materials (from three days in plastic, card box...). Do you think we need to culturise society in terms of surrounding materials and in some way how can we do that when it's not only scientific?

CG: Every time there is a crisis, not the pandemic only, but any type of crisis we learn a lot. I think crisis is the trigger knowledge because we are putting situations that we are not expecting for some reasons and that forces us to learn at speed. It's the same now with the pandemic, but I definitely think we need to culturise about materials. I think materials knowledge is more and more relevant also in this century because we are having an exponential innovation and

that refers a lot to materials. And I think the more we know, the better we will be. And I think that there is more interest also from every actor into material knowledge as well. Materials contribute to our well-being. It is really important that we learn more and gain knowledge about them.

It's also important to have an artistic view of communicating knowledge about materials, right? Because there's certain perspective of what is natural and what is synthetic, plastics are good or bad... I absolutely think that art is the answer. I really think that artists can help us to unfold all these layers of complexity that when we speak science or materials or more technical questions, tend to be far away from the common understanding and I think the artistic approach is always very revealing. I think there is an inherent ability in artists to actually communicate complexity in a different way that makes it more available for anybody, which is great, but the most important thing and specially when it comes to science and materials is that artists actually, by unfolding this complexity, they are actually facilitating public debate and we all participate in this public debate. I would like to mention one project that I really love, Ana Dumitriu. She's part of this project called 'Trust me, I'm an artist', I think she's brilliant at doing that. She unfolds this complexity into ways that produce debate and connect with people. This is helping to increase the knowledge about materials, as well as all scientific innovations. Art!

LC: Art is the answer! This question allows me to deepen into the connection of health and well-being, we are going to be in a more hygienic environment and with accessories that protect us from the virus, but as you advocate there's an important frontier between what we call healthy materials and safe materials. Can you develop on that? I feel it's an important issue right now.

CG: Yes, it's important that we make a distinction between healthy materials and materials that are protecting us from some kind of agent or condition. Healthy materials are materials that provide well-being, these are materials really relevant in architecture

or textiles, for instance. These materials do not convey toxicity of any kind, are fine to leave with and leave by, and are close with your skin, to your breath. Those are healthy materials.

And a different thing is materials for safety. We are seeing in this pandemic all these discussions about which materials should be better to use, in order to prevent us from the virus, contamination or from microbial. These are another level of materials. Usually they are materials which require kind of complex chemistry, in order to protect us. It's not always the best, but they fulfil the aim of protection in a medical environment, which is essential. It's not that it's good or bad. It has to be put in the right context. That's what matters.

But healthy materials are, to me, materials that are generating well-being and that we can easily live with, they are friendly to us. I mean they are not toxic in any way; they are nice and friendly to us and to the planet too. It's a big difference.

LC: There's another concept that we have been discussing and that it is really important. There's a key or top material related to that. There is the concept of engineered materials. This leads us to new ways of consumption and production of materials. Normally we talk about either natural or synthetic materials, but as said new ones emerged, as engineered materials. Could we think that we need to promote this type of materials, could you mention an example of these new materials, and what are the advantages of using them?

CG: It's not about good or bad, when we are referring to engineered material. There's sometimes a confusion now, due to plastics. A confusion that synthetic materials are bad by definition, and I think that it is more a cultural perception. It's not necessary a reality. What is clear is that natural materials by definition belong to the natural cycle. So, they are friendlier by default because you grow cotton or hemp or a forest. And then you have plenty of material that belongs to nature. When you are done with them you know they are going to biodegrade, and you know they

are going to go back in the carbon cycle. There's an intuition, even if you don't know it.

A different thing is synthetic materials, they can be also coming from natural sources. That is something not well understood. The important point is if it is a renewable or a nonrenewable source. That's the most relevant part.

LC: We have questions from the audience. The first one is Do you think that Barcelona has potential to be a prototype for a post carbon metropolis?

CG: Yes, definitely. It has a potential. It has a very good size, a metropolitan area. It has a potential; a different thing is if it will do it. Creative policies take all steps and sometimes I have the feeling that nobody wants to be the first. I don't know.

LC: But you mentioned that Los Angeles is kind on the forefront...

CG: Yes, indeed. Los Angeles is on the forefront but it's California in general, globally speaking. They are taking super big steps and they are really investing in technologies and ways to make a paradigm shift. But, specifically in California, LA is really doing a good job in that sense. They are really taking the lead. But maybe it is not so well-known outside of our field. I think it should gain more and more interest, also from an urbanistic and cultural behaviour point of view. And all the consequences that decarbonisation will bring together with it. That's going to be interesting. But Barcelona has potential. It just has to capture it and realise it.

LC: Another question. What could be a good solution to promote the use of eco-materials, for people in order to know it better or for those who don't think it as their first option?

CG: More art, more communication. That's a difficult question. But I think that we need to build up from arts and from the comms perspective. So that more and more knowledge is gained, and then the decisions are made naturally after a while. Because otherwise is difficult. Because I know that

there's people that don't want to know all the details about the materials, they are not interested in details of course, technical details... but we need to generate this knowledge, we need to share this knowledge, we need to bring it on. So, that people can recognise and have a very clear criteria on the choice of materials.

LC: Next question. What should be the initial measures, any architect or designer should take post pandemic to become more environmental and respectful?

CG: Yes, architecture should do that. Definitely, for instance you have materials like copper, bamboo or hemp, which are naturally antimicrobial and antifungal, which are, by default, going to create a naturally more hygienic environment. That is a plus from that perspective in the choice of materials for an architectural environment, considering a pandemic.

LC: Next one. In second season of series 'Abstract', was one film about a professor at MIT. She's a bio-architect. Is this kind of profession going to be on demand in the future?

CG: I don't know about demand, honestly. But I really think it's going to be a very natural crossing of fields, biology and architecture, and environmental architecture, yes.

LC: Next and last one is... Do you think that decarbonisation is a way to take over a circular economy?

CG: To take over... no. I think that it's part of the same. I just think circularity as it is being deployed now, it's great. Still, it is in deep need of having fully decarbonised energy sources and taking care of the externalities, which is the pollution. We are seeing a lot of circularity in design... which is improving designs in many ways. And we are seeing a lot of shifts and changes in this direction from companies, designers and products. Still, the larger frame needs to be fixed. And that's decarbonisation. Without decarbonisation we will never be 100% circular.

Technology embedding society.

Laura Clèries (LC) in conversation with Varvara Guljajeva (VG), academic, artist and professional working with technology.

1/4
It's amazing how local makers manage to mobilise themselves, commonly sharing knowledge and designing their own products. This has an enormous value towards society.

Companies need to reinvent their services and productions not to depend in overseas production.

2/4
I have nothing against open data, if it is used for the social good, for developing new good services for citizens, open data for research... what I am against is that big companies just take this free data to use it for their services, giving nothing back to society.

If data is the new oil, then let's treat it as oil.

3/4
I think telepresence will gain even more importance and VR is a good one to escape at least mentally, and experience something different.

I think we should get a democratisation of connection, rather than restricted or monitored.

4/4
Technology is enormously helping creativity and innovation to do marvellous things, such as coping with the crisis now.

First, we should design and think dealing with society and the environment, then comes everything else.

LC: We welcome in this dialogue Varvara Guljajeva. She's an academic and professional artist working in technology and we will talk with her on how technology is embedded in our society. Welcome Varvara! How are you and how is your day in your studio in Tallinn?

VG: I am fine, still creating, thinking and pitching, life goes on!. First, maybe I can show you a bit around. Welcome to my studio! When I enter, I have my nice robotic hand. I share the studio together with Mar Canet, we work as an artist duo. [...] Here are some knitted pieces which I have done with a knitting machine, they talk about EU solidarity. The next machine speculates who will be the next to exit the European Union. Actually, this was done before Brexit itself and at the beginning it was funny, then people started realising that it's not funny anymore. We'll, technically speaking what we liked to do was starting from creating the concept until creating everything, like the machine, mechanics, the code... So, and all this work involves lots of parts, starting from fabrication but also electronics...

My table is a super chaos, but in chaos always are born crazy and nice ideas. Here what I'm doing, I'm putting my data inside the cans, so this is a Netflix I guess. In the lockdown period, the Netflix history is growing for everyone like crazy. Also, the data of Facebook, for example. We can talk about it later on, also on data, personal data and so on. This is how my daily life actually is here in the studio. We are between different experiments, some finished installations and others not so finished.

LC: Great! Thanks for sharing us your workspace and, in fact, this brings me directly to the first block of questions. The first topic, which is new models of production and consumption. We are seeing makers inventing new methods for fabrication, of masks or ventilators... We have also local companies running out of goods, since they are manufactured in faraway factories. This brings me to questions such as, Will we see the rise of distributed micro-factories?, What's

the new economy?, Are companies prone to shifting models of fabrication and go open-source, for instance?

VG: I think, as we see mini factories already exist and are actually saving us on the times when the borders and the factories are closed. It's amazing how makers manage to mobilise themselves, gather knowledge and design what they produce. They started to fabricate and design on the fly missing personal protective items, like masks and face covers and ventilators... I think it's has shown that it has an enormous value towards society to have this kind of creators, locally available and also the commonly shared knowledge is crucial because, as we see let's say only the capitalist beliefs is not sustainable for society and not even for the environment.

LC: How companies do this transition? I mean, should they be forced into new ways of thinking and manufacturing and incorporating even some maker knowledge, new ways of distributing?

VG: Yes, I mean a good example is Seat, a Barcelona based company, that has made a marvellous job by rearranging their production line of cars and started to produce respirators. Other ones, for instance, they locally produce something, but the packaging comes from China or some others' companies. So, they are in trouble because they can't deliver their products because some part is missing. And in industry the problem was sensible already when China was experiencing the lockdown. Suddenly, even me, as a maker I couldn't order any electronics, and electronics shops were empty, already in January and February. It's very sensitive. Also, the companies are reinventing now themselves, the ones that can still produce, they are trying to invent all their services and try also to produce like goods that we are missing now, what hospitals are missing... and they definitely need to reinvent. We will see lots of bankruptcy cases emerge.

LC: That was the first block. There's another controversial block, which is politics and ethics. And I know you're quite active in these areas, in terms of technology. We're seeing giants Google, Apple... joining together to

supposedly help us in tracking our health data, we're also hearing about concepts such as city-surveillance, city of privacy and also in your insight, in the report, you're mentioning that data is the new oil, dataveillance or even hacking AI systems, for instance by fashion detection. So, what is the suitable scenario? Will we be forced to hacking or should government and corporations open data in a collaborative way? Or companies should pay for data? As you're mentioning that data is the new oil. What's your view on this? What will be the preferred situation or scenario for us to be preserving our privacy and our rights?

VG: It's a bit difficult to predict, but things are not really getting better at the moment. There are several problems. First of all, all these smart city projects are mostly funded by public money and what they are doing, they are collecting lots of data, they are sourcing data, they are cleaning data... and then, it's actually available for free. What have we against open data? I would say I have nothing against open data, if it is used for the social good, it means for developing new good services for citizens, or open for research... what I am against is that big companies come and just take this free data and then they used it for their services, giving nothing back to society. I think it's unfair, if the data is the new oil, then let's treat it as oil. No one is giving oil for free on the street. So, for the business purposes they should actually pay for this material because it is data of us all, then we also have rights for taking decisions. Of course, for the research means, for example, it should be granted for free. But big tech companies definitely should pay for this. In terms of the control, nowadays you can see as a trend that personal data is becoming currency for using certain platforms and participating in the digital society. So, your ticket to be part of the society is kind of letting yourself to monitor, we have the strategies of hacking like for instance also on the web, we tried to be invisible and so on, but sometimes it's become impossible.

What it's the most dangerous is when all this public services and data are managed by private companies and also researches are managed by private companies only.

Here also comes the questions if we talk for instance, about AI, there's actually the race of who will be the leader: Google is there, Amazon, Facebook, China, Russia tries to be there... I feel like in Europe we're a bit missing out of all of this development and we only are using the infrastructure of this private overseas companies, instead we should maybe invest in our local research and having control and then through control also then get the freedom. Because we are just the kind of monitored users and influenced ones. It's quite let's say, problematic and a political problem, also ethical, which we need to fight for our right.

LC: So, it's a public and private issue too. So how politicians are going to invest in creating it?

VG: Yes, I mean it's a question like how much do you give to the private sector? At a certain level I think it's not a smart decision when it is managed by private big companies. Because what they have in mind is big revenues and also in some latest elections they have shown how people started being manipulated.

LC: Another question that we can tackle, in a more positive or less spikey approach, that is travel and experience. With home lockdown, isolation and even restricted mobility, will we see the boost of consumers adopting these new technologies? Will we explore virtual alternative realities? I think you have mentioned you have neighbours that are already experiencing it, right?

VG: Yes, I mean here in Estonia we still are allowed to go out and we have been even encouraged to do more sport. So, when I'm running or jogging in my neighbourhood, I see in lots of windows people wearing VR headsets, exploring games. I think that gaming has becoming more importance because holograms and being present, although through distance it's kind of gaining sense I would say.

And also, we all feel like how we are struggling to find the proper online tools and telepresence, so I think telepresence will gain even more importance and VR is a good one

to escape at least mentally, and experience something different. Also talking about these fancy tools, we need to have really good connection and internet. Here comes again in play the 5G and the new IP that has been so much talked about... that is also the rise of power. I think we should to get a democratisation of connection, the free web, and the free connection rather than restricted or monitored.

LC: There are big tasks as citizens to empower this change and more distributed power. We have a big task. Now it's questions time, we are open for your thoughts and insights. Here's the first: What about digital economy, decentralisation? And blockchain?

VG: Yeah, I mean decentralisation of course is a key, that's what I was talking about for avoiding the monopoly of big players and then the economy would be distributed. What I think that the crisis is more and more echoing and what we should learn from this is that we should make design work towards, I mean maybe it sounds naïve, but if the only purpose is to make more money, we won't get far. We should design and think in societal and environmental ways and then comes everything else. The blockchain is kind the same. There was a super big hype, and some people they managed to make money, some of them lost a lot of money, if we are talking about cryptocurrency. In a way, it's like with AI, there are a lot of calculations done, it means a lot of energy, a lot of technology and there is already a new term: a green-AI, trying to make all these difficult calculations more environmentally friendly. But again, it is possible or not, if the chip will be a bit like change for these players who are in a big race maybe it will be possible, but in the current moment not really.

LC: Just to close up. A couple of conclusions that you've mentioned: I would say that makers or design creative skills are need. We need to reinvent new manufacturing methods, as you mention Seat is addressing on that. That would be a good conclusion of our talk. And also, the idea for social purpose, when we share data, we have a tag that it is also for social purpose. Thank you, Varvara, we will

read your insight in the report!

VG: Maybe, as a close-up word I would like to say that I don't want that you to take away the feeling that technology is dangerous, actually is enormously helping creativity and innovation and helps us to do marvellous things like coping with the crisis now. And for instance, designers, makers, curators, creators alone can produce their little things. It democratises the production but it has also another side, which we should pay also attention to: it can be used for many different purposes, like control and power. We didn't talk about robots or labour... there's a lot of critical topics, but there's also a positive way which we can see technology.

Societal changes: refounding capitalism?

Laura Clèries (LC) in conversation with Toni Llàcer (TLL), societal researcher with background in economics.

1/4
After the COVID-19 crisis, we should not go back to normality, because normality was the problem in itself. You cannot have a sustainable growth, because growth is unsustainable by definition. We must be very aware that it is not just an economic crisis, it is a systemic crisis. Degrowth is the only solution for our problems.

2/4
We have to assume that we need to work less, earn less money, waste less money, consume less, produce less... We have to detach from markets, we have to build local communities and we have to really and deeply change our mindset.

3/4
With the Basic Income, basically, each citizen must receive one payment from the government, an unconditional payment no matter the requirements, that meets the basic needs. Our life would be much different.

4/4
How can we think that design can help to degrow, to slow the economy and to improve welfare and happiness? Design is very useful to go in this direction, but we have to start thinking of other ways of understanding design. Sustainability is okay, but we have to go one step further, beyond that.

LC: Literature is stating that more than in the Anthropocene era, we are in the Capitalocene era. As you write in the report, global capitalism, in its neoliberal shape, it's threatening human life in the planet. It has deeply eroded the way in which we interact with the environment, with each other and also with ourselves. Can you briefly describe the current context?

TLL: For me it's very important to remember that before the pandemic, we were in a systemic crisis with all this environmental climate change movements. Now we are so worried about the huge economic crises that we have, that we want to go back to normality. So, as we see, the protesters said that we should not go back to normality, because normality was the problem in itself. And, in this case, the problem is the economic growth. You cannot do a sustainable growth, because growth is unsustainable by definition. For me the current context is that we must be very aware that it's not just an economic crisis, it's a systemic crisis. The root of the problem is our obsession with growth and the assumption that if we produce more, we consume more and we work more, we will be happier and everything is going to be better. This is, for sure, not true. We have to remind this and behave accordingly, because this is the root of the problem. If you ask about the current context, for me the context is this. Degrowth is the only solution for our problems.

LC: It's a new paradigm opening up, right? Related to the title, can capitalism be refounded? Or, are there alternative to this?

TLL: Refounding capitalism sounds like huge! We are ambitious... for me it's important to differentiate between three alternatives we have. One scenario is called business as usual, where big companies and corporations will go on like before but make green-washing and use, for example, Greta Thunberg to do the same but with a different makeup. I reject this, for sure. Then, what it's trendy and the most popular

alternative is what it's called the new deal, it's more progressive. It has proponents like Jeremy Rifkin and Naomi Klein... many political parties are joining this, the new green deal. It sounds very nice, we can keep growing, but we can do it in a sustainable way. It's green growth, but the same old story. For me, alternative is degrowth, which is less popular, because we have to assume that for sure we need to work less, earn less money, waste less money, consume less, produce less... and no political party likes this speech. But we have to be brave and assume that we have to work in this direction. We have to detach from markets, we have to build local communities and we have to really change deeply our mindset. This is my point of view.

LC: Can we learn from the past? Can we extract conclusions that we can apply?

TLL: Yes, there is a lot to learn from the Middle Ages. Or, at least, we have to learn from how things were before the industrial revolution took everything or the market economy dominated the world. We have a very bad reputation on the Middle Ages, but they had very interesting initiatives. For example, how unions, artisans worked in the Middle Ages: they were self-sufficient, they had fair regulations, minimum wages, quality standards, they were together. And all this was destroyed and prosecuted with the industrial and factories work. And, for example, the main point is that people in the Middle Ages, that is much complex than in Game of Thrones or when we learn history at school, could meet their needs without having to sell full time their workforce to another one, in order to earn money and to buy things. There were many common goods, so you didn't need to pay for everything, because there were common goods that you could manage in the community, in your town and with your people: natural resources and other kinds of resources. There were other ways of manufacturing and doing things different from industrial factory business work. I think that there are many things to learn from the Middle Ages, although it doesn't sound very cool, because the Middle Ages were not cool.

LC: It was more about collective things, common things from the community. An important question for all of us is in terms of human well-being. The work-life imbalance... my question is, how all this imbalance started?

TLL: We have to be aware that things were different. Nowadays we are in a situation that is the consequence of historical processes. Regarding work and, as you said, our imbalance between life and work, we are all of us working a lot, all day available, working from home, from everywhere, we are stressed, we sleep less, we are anxious, we have lots of pressure with our personal branding... all of this is quite new. All this started, if I have to say a date, in the 70s – 80s, with what is called the neo-liberal subject, all this was built. And this comes from two streams: one is the paradigm or the belief that all of us should be as firms, personal or individual businesses. This comes from the economics universities, this belief that everything is better if works as a market. All of us are firms that compete and maximise our profits. This conquered all social life dimension, not just economy. Instead of being a worker, you perceive yourself as a little firm, you are your own business of yourself.

On the other hand, the second stream sounds strange, because it is the hippie and the counterculture of the 60s and 70s. This will of breaking with the old world of great jobs and modern times, in fact, these boring jobs and all this hierarchies... This all started in May 1968 with the French riots, with the claims “all power to imagination” and “forbidden to forbid”. All these slogans from the university students of the 60s and 70s, now apply into our job conditions, we want to be creative and not only just in creative jobs, we think we work horizontally and we are all-time producing with our brain. There are no boundaries between what is work and what is your own life: where does it end?

It's completely blurry. We are all working all day. This has very profound consequences.

So, these two things: on the one hand, the neoliberal belief that we are all like firms that compete, that we have to maximise our assets, be different from one another and add some values as workers and individuals. In addition to that, we are helping quantify everything with all these fitness apps... we are like obsessed with our challenges and goals but we work like firms, small and individual firms. On the other hand, we want to be like the hippies in the 60s, being creative, cool and free to manage our lives. And this is not true, because we are less free –maybe than ever– but we work more than in the last decades and we sleep less, we are more anxious... maybe we watch more Netflix, but the whole mental health indicators are worrying.

LC: This is one of the biggest health concerns, in terms of medical health. Is there a way-out of this? Is there any solution for a more life satisfaction situation or happiness?

TLL: I would say something because otherwise everything sounds too apocalyptic. I came here to announce the end of the world? No... There is one very popular proposal, lastly, which is the Basic Income, for sure you have heard about it. It is very interesting because it can solve some of the problems we already mentioned. There is huge amount of information on the Internet. Basically, each citizen, each of us must receive one payment from the government, unconditional payment, no matter the requirements, that meets the basic needs. Your basic needs are covered. From this, you can be free in the sense that you are not acting just because you have to meet your basic needs, because they are already covered. This would change a lot your work decisions. First of all, you are freer to say no to some things, because you are freer to decide how much amount of hours you want to devote or to dedicate to work, and not to work. The ones that you want to work, you are freer to say no to some offers, or customers, or conditions... because you are not desperate. You have a coverage and you are freer in this sense. So, for sure if all of

us would receive this Basic Income, our life would be much different. In my case, I would sleep more, I would say no to many things I say yes to now. This will of saying yes to everything because I'm afraid of missing the vote, I have to pay my rent in Barcelona, I have to pay my food and everything is becoming more and more expensive. I'm all the times saying yes to everything and I would like to say no. With Basic Income, this would change a lot.

LC: Previously, you have said that there had been some pilots using Basic Income. And actually these projects are working, it's not that people just have stopped working and they are all day watching Netflix. I mean... it's a new mindset that we need to change, and it works.

TLL: It is not a crazy idea, some years ago it was crazier. In the last years there were lots of experiments around the world. There was one small pilot in Barcelona, and yes, the results are very good. There are many different experimentations with this, but the evidence says that people keeps on working, it's not that all the people takes Basic Income and stay home playing video games and smoking joints or doing nothing. People want to work, because work is something important for our identity, for feeling us safe and useful, but not under any condition. People keeps on working and what the result of these experiments says is that, of course, poverty disappears and social links are stronger, because you start doing things with the community and other people. Even entrepreneurship increases, entrepreneurship looks like something very neo-liberal but, in fact, you can start your own experiment, enjoying more what you are doing, because you have this shelter covered. The experiments are bringing out results that invite us to be very optimistic about this.

LC: Let's be very optimistic, then! One short last question. In this context, what should design do? O what should designers do in this sense?

TLL: I think that design has been very

linked to the market economy and all these market values, and even with these neo-liberal values. And design has dedicated a lot of energy for firms and companies to differentiate, add value and all this is already unsustainable in many dimensions. So, for me, if I have to summarise, my claim would be “don't design for sustainability” – because this is wrong and not true–, but “design for degrowth”. How can we think that design can help to degrow, to slow the economy and improve welfare and happiness? How can designers create strong communities and improve real quality of life? Maybe detaching from market economy? What does this mean for the profession and how can you can make a living out of this? This is something that designers have to apply a lot of imagination and creativity to.

LC: Now time for questions. What do you think will happen with basic jobs like supermarkets or trash management, if UBI is granted?

TLL: Thank you for this question, it's very interesting. Basic Income will bring a reallocation to revalue jobs. Maybe those jobs that are more self-fulfilling or that bring more happiness itself... wages are going to go down. If you are a businessman and you have to hire somebody to clean your office, if this person is getting the Basic Income and you pay him or her a shitty wage, this person would say “no, thank you, because I have this Basic Income”. Then, the businessmen would have to go up. Maybe a cleaning person can earn much more than in the current situation. Maybe a professor, as me, I like what I teach... my wage stays the same or less... maybe, if I work less, I will enjoy more teaching, but I will work less.

LC: Do you see a correlation with Universal Basic Income and the fear of people to automatisisation and AI?

TLL: Yes, of course. I defended Basic Income from a tradition, but of course there are some people nowadays pro Basic Income with other arguments, not related to freedom. For example, in Silicon Valley, there are a lot of people saying that they

have many robots and they are going to have huge unemployment rates and many jobs will disappear, but all these robots are going to produce goods and services and we need people to buy them. And people don't have jobs and they don't have money. So, we need Basic Income to keep the wheel working and give money to people to make them consume. Of course, the Basic Income is interesting because you can arrive to it from different perspectives. One is this, automation, AI... we will need Basic Income because otherwise nobody is going to be able to pay for the goods that all these robots are going to produce.

LC: So, everything is interconnected. We have a new question. Do you think that design for sustainability doesn't go hand in hand with design growth?

TLL: I mean, design for sustainability is doing things that are greener, but in fact it doesn't go to the root of the problem. We can buy the same goods but with recycled materials or more efficient tools... the problem is about buying more and more goods. What I mean is that design is very useful of course to go in this direction but we have to start thinking of other ways of understanding design, because we are many people in the planet and many millions of people, and we cannot all consume as we were doing. So, sustainability is okay, it won't disappear but we have to go one step further, beyond that.

04. Overview

Human



H#01 Intergalactic Empathy



H#02 Post Earth



H#03 Post Fashion



H#04 Near Space



H#05 Augmented Senses



H#06 Remote Interaction



H#07 Dermal Interfaces



H#08 Healthy



H#09 Spiritual



H#10 Emotive



H#11 Self-Design



H#12 Morphing



H#13 Phygital universes



H#14 Adaptive survival

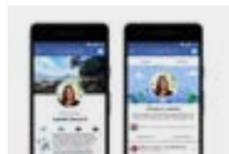


H#15 Anonymous in public

Information



I#01 Infinite Game & Long Term Thinking



I#02 Post/ Death Communication



I#03 Perception Switching



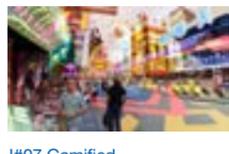
I#04 Truth vs Fake



I#05 AI Communication



I#06 New Forms of Empathy



I#07 Gamified Communication



I#08 Data Visualisation



I#09 Aesthetic Evolution & Adaptation



I#10 Language Evolution & Adaptation



I#11 Intercultural Connections



I#12 Identity Transmission



I#13 Opinion Creation & Destruction



I#14 Hypercommunication Consequences



I#15 (New) Communication Tools and Emotional Impact

Materials



M#01 Material solutions for decarbonization



M#02 Materials capture and store carbon



M#03 Hydrogen for clean energy storage



M#04 Semi-life is a key circular design dimension



M#05 Cellulose matters



M#06 Bio-Chars as engineered carbon sink materials



M#07 Material accountability



M#08 Waste archaeology and futurology



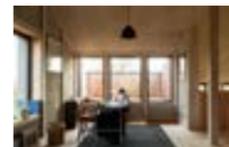
M#09 Plastic and microplastic waste



M#10 Agricultural and food waste stream materials



M#11 Art calls for material significance



M#12 Hemp multiverse



M#13 Biofabrication: algae, mushrooms and more



M#14 Cultured and crafted materials



M#15 Data as raw material

Technology



T#01 Critical Interfaces



T#02 Technology and Climate Crisis



T#03 AI and Design



T#04 Hacking AI Systems



T#05 Technology and Control



T#06 Networks Politics



T#07 Different Realities



T#08 Data Visualization and Augmenting Materiality



T#09 Robots: our Competitors or Companions?



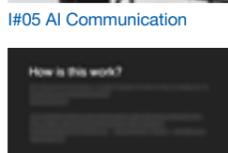
T#10 Alternative Displays



T#11 Extended Interaction



S#01 Degrowing the Economy



S#02 Fighting Economic Inequality



S#03 Fighting Gender Inequality



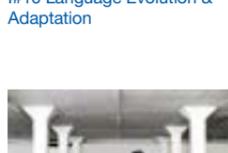
S#04 Fighting Ethnic Inequality



S#05 Democratic Values



S#06 Building Communities



S#07 Work-life Imbalance



S#08 Defining Social Design



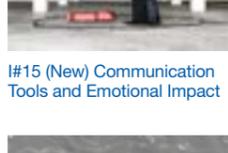
S#09 Territory



S#10 New Built Environments



S#11 Tourism Redefined



S#12 Digital Transformations



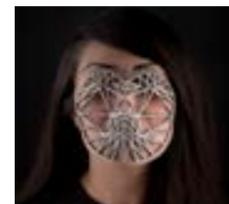
S#13 Life-long Learning



S#14 Enlighten



S#15 Hypercreativity



S#12 Digital Transformations



S#13 Life-long Learning



S#14 Enlighten



S#15 Hypercreativity

Society

#3D #3DKnitting #3DPrinting #4D #8M #Accountability #Activism
#AdaptiveTech #AdversalAttacks #AdversarialDesign #AestheticRevolution
#AgingSociety #AI #AI&Design #Airecruiting #AlgorithmicSociety
#AlternativeDisplay #Anthropocene #AR #ArtificialCommunication
#AugmentedMateriality #AugmentedSenses #Automatisation #Automats
#Availability #BasicIncome #BCI #BehaviouralInsights #BigData #BioFabrication
#BioFeedback #BiologicalData #BiometricalData #Biosensors #Body #Bots
#Burnout #Camouflage #Capitalism #Carbonomics #CelluloseMatters
#CircularDesign #CivicCities #CivicEngagement #CivilLiberties
#CleanEnergyStorage #ClimateChange #CollectiveExperiences #Colonialism
#CommunicateEmotions #Community #ComputerVision #ConsciousTourism
#ConstructiveArtivism #ContraSurveillance #Control #Cooperation #Crisis
#CriticalDesign #CriticalInterface #CulturalConnection #Data #DataAsRawMaterial
#DataPollution #DataStories #DataVeillance #DataVisualisation #DataViz
#Decarbonisation #Decentralised #DeepFake #DeepLearning #Degrowth
#Democracy #DemocratisationOfProduction #DermalInterfaces #DesignTheory
#DigitalCommunities #DigitalDeath #DigitalEducation #DigitalEmpathy
#DigitalFabrication #DigitalLife #DigitalManufacturing #DigitalMateriality
#DigitalTransformations #Display #DistributedManufacturing #Diversity
#EducationalFurniture #EEG #EmergencyDesign #EmotionalData
#EmotionalInterfaces #EmotionalMaterials #EmotionalStudies #EmotiveTech
#Employability #EnergyViz #EngineeredNaturals #EnhancedCapacities
#Enlighten #Entrepreneurship #Environmental #EphemeralArchitecture #Equality
#Ethics #Ethics #ExoSkeletons #ExtendedInteraction #FaceDetection
#FaceRecognitionAlgorithms #FacialDetection #Fairness #FakeComplexity
#FakeNews #FakeNews #FashionTech #FastDesign #FastFashion #Feminism
#FightMisinformation #FiscalPolicies #FoolingAI #Framing #FutureScreen
#GAFAM #GamifiedCommunication #GamingCommunities #Gan #GANattack
#GenderedDivisionOfLabour #GenderGap #GenderPerspective #Governance
#GreenAI #GreenNewDeal #GreenTechnology #Hacking #Happiness #Haptic
#HapticTech #HCI #HealthTech #HealthyEnvironments #HealthyMaterials

#HealthyMaterials #HumanisingMachine #HumanOrganDesigner
#HumanRights #HybridInteraction #HyperCommunication #HyperCreativity
#IdentityEvolution #ImmersiveEnvironments #InauthenticCity #Inclusivity
#Industry4.0 #Inequality #InfiniteGame #InfiniteThinking #InformationTurmoil
#Interaction #Interface #IntergalacticEmpathy #InterplanetarySpecies
#InterurbanMobility #KineticDisplay #Knitting #LanguageRevolution
#LGTBI+ #LifeLongLearning #LifeSatisfaction #LocalGems #Machine
#Machinery #MaterialsCulture #MaterialsForCarbonStorage #Medicalisation
#MicroPlastics #Migration #ML #MR #MutualSupport #NearSpace
#Neighbourhood #Neoliberalism #Networks #NeuralNetworks #NeuroTech
#Neurotechnology #NewCulturalLanguages #NewEducation #NewLanguages
#NewSkills #NewWorkCultures #Nudging #Oligopoly #OpinionMutation
#OptimistFutures #OverviewEffect #Patriarchy #Phygital #PhygitalExperiences
#PhysicalComputing #PhysiologicalData #PolicyMaking #Politics #Politics
#PostColonialism #PostConsumer #PostConsumerism #PostEarth
#PostFashion #PostGrowth #PostParticipation #PostTruth #PostTruth
#Poverty #Precarity #Prejudice #Privacy #Privacy #Profiling #Progressivity
#ProtectiveMaterials #Prototyping #Racism #RedesignTheHumanBody
#Refugees #RemoteInteraction #RemoteIntimacy #ResponsibleConsumption
#ResponsibleProduction #Robotics #RoboticsAndEthics #RR #SecondSkin
#SelfDesign #SelfHelp #SemiLife #SocialCohesion #SocialDesign
#SocialEconomy #SocialInnovation #SocialIntegration #SocialResilience
#SocialSpaces #SocietalTourism #SoftCyborgs #SoftDigitalFabrication
#SpiritualDesign #SpiritualTech #StudentEngagement #SuperCreatives
#Surveillance #Survival #Sustainability #SystemicApproach
#SystemInteraction #Tactile #TaxEvasion #TechEmpowerment #TechForCulture
#TechnoCouture #TechnoCraft #TeleDildonics #Teleworking #Tracking
#TransitionDesign #Transparency #UnderstandingTechnology #Universality
#Untaboo #UrbanTactics #UrbanWellness #VirtualVenues #VR
#WasteArcheology #WasteAsRawMaterial #Wellbeing #Whiteism
#Xenophobia #Zoomorphism

05. Experts

Expert #01

Laura Clèries, Phd

Strategic Design Researcher



Laura is a design researcher, strategic thinker and doer, editor, and curator in transformative innovation through design research-led strategic foresight and with an additional focus on materials.

She holds extensive international academic and work experience in industry (Klockner Implants, Zara Home), academia (UoL, NYU, UAlabama, UToronto, IED, Elisava) and Think Tanks (Pantone Colour Planner, WGSN).

Her recent work is addressed at generating content and strategies at international level through management of public and business research projects that bring actionable growth, and through the curation of events and exhibitions (Materiality, Zoom in Design,

Design Does, Design Attitudes, Future Woods), conferences (TEDx, Understanding Design, Madrid Design Festival) and publications (Visions By magazine, Temes de Disseny design research journal).

She is currently professor and Head of Research at ELISAVA School of Design and Engineering, as well as director of the Master in Design through New Materials. Her field of research relies on her hybrid background in PhD in physics and design, and currently focuses on design anthropology and futures research methodologies, leading the Futures Now research group. In her conferences, she is currently tagged as a Future lifestyles detective.

Expert #02

Oscar Tomico, Phd

Design researcher



Oscar Tomico, trained as an Industrial Engineer and specialised in innovation processes in design engineering, currently heads the Industrial Design Engineering Bachelor's Degree at ELISAVA, he co-directs the Design for Emergent Futures Master's Program in collaboration with the Institute of Advanced Architecture of Catalunya, and he is an Assistant Professor in the Future Everyday cluster with the Department of Industrial Design at Eindhoven University of Technology.

His research focuses on how to design, develop, produce and deploy Soft Wearables. He has been involved in multiple research projects like Fibrous Smart Material Topologies (3TU.Bouw, 2016), ArclnTexETN (H2020, 2015), From Design Fiction to Material

Science (KIEM, 2015), Crafting Wearables (CLICKNL, 2013), and Smart Textile Services (CRISP, 2011) to name a few.

His communication and dissemination activities include co-organising events like the Smart services, smart production, smart textiles debate at the Disseny Hub (Barcelona, Spain, 2016) and the Crafting Wearables breakout session at The Future of Fashion is Innovation (MoBA, Arnhem, 2013). Tomico has curated exhibitions such as the Systems Design – Eindhoven School at Design Hub Museum (Barcelona, Spain 2012) and the “Speculate, collaborate, define – textile thinking for future ways of living” exhibition at Textile Museum (Borås, Sweden, 2017).

Expert #03

Luis Fraguada

Interface programmer



Luis has practiced architecture, seeing several projects constructed in Spain and Lebanon. Luis' programming and architectural experience and passion for collaboration led him to start teaching in 2007, and to date, has taught courses and workshops in Europe, Asia, North America and Africa. He is currently senior faculty at the Institute for Advanced Architecture of Catalonia, where he has been teaching for 12 years. He is currently also a developer and 3rd party developer supporter at McNeel Europe S.L. with a mission to help people create great things with the APIs developed for Rhinoceros 3D and Grasshopper 3D. In addition to this role, Luis initiated and manages McNeel Europe's participation in EU Funded research projects.

Luis uses programming to collaborate with practitioners in diverse fields such as design, fashion and gastronomy, developing diverse interests, skills and collaborations during his academic training as an architect. Developed projects include Robots in Gastronomy, where he developed a 3D Food Printing machine and various interfaces by which chefs could digitally design edible 3D models to be printed by the machine, and Fashion tech projects, where he developed garments with wearable technology and software to aid in the bespoke design of garments. Both projects were developed with long-time collaborator and partner, Elizabeth Bigger.

Expert #04

Pau García

Info-experiences specialist



My research is based on the areas of new media technology and data languages. I have been working in projects for the REcall European Conflict Archeological Landscape Reappropriation in Berlin and Norway and doing research and design projects in Spain, France, Italy and Germany. In 2013 I received the M4M European Prize that brought me to design a project for the European Design Institute developing cartographic systems and a book that ended up with an exhibition at the Centre of Contemporary Art of Fabrica in Milan, opening a new approach to data visualisation and info-experiences.

Nowadays I lead the design firm Domestic Data Streamers working in research, communication and design projects for

cultural institutions and organisations such as the California Academy of Sciences, Google, UNICEF, Spotify or the Mobile World Congress and work as director of the Master in Data and Design at the Elisava School of Design and Engineering in Barcelona.

I believe that there is a strong need to change the way we consume and stream information today, not only in the media but also in the corporate and institutional fields. It is both an opportunity and a responsibility to build a model of change that can bring industries, culture and politics closer to an emotional and empathic approach to information and, therefore, to a more human understanding of the world.

Expert #05

Clara Guasch

Sustainability and design specialist



Working with materials and innovation as a trigger for change, I can address sustainability in a thorough way, and create movement towards circularity. I do that together with a network of people, companies, schools and institutions. Because I think collaboration and multidisciplinary approaches are needed to solve complex challenges (like the one we are facing).

I enjoy challenges and handle complexity well. I am as motivated by details as by constructive systemic transformation. The challenge of sustainability requires systemic change and I think that is beneficial for everyone.

Having extensive experience in the field of materials, circular economy and circular design, I know that the role of (material) design is key for sustainability.

Of all material areas, my core expertise begins with textiles and its multiple related industries. Textiles are in the spotlight for sustainability, and my drive is to develop projects that can bring meaningful change.

Expert #06

Varvara Guljajeva, Phd

Artist working with technology



Varvara Guljajeva, PhD, is an artist and researcher. Varvara holds a PhD in art and design from Estonian Academy of Arts, and M.Sc in digital media from University of Luebeck, and a bachelor's degree in Information Technology from IT Collage (Tallinn University of Technology).

She leads the program of Interactive Experiences in bachelor level and is a researcher at the Elisava Barcelona School of Design and Engineering, and also, at the Estonian Academy of Arts. Varvara has been invited as a visiting researcher to XRL, Hong Kong City University, IAMAS (Ogaki, Japan), LJMU (Liverpool, UK), Interface Cultures in the Linz University of Art and Design, and Blekinge Institute of Technology (Karlshamn, Sweden).

As an artist she works together with Mar Canet forming an artist duo Varvara & Mar. In their practice art meets technology, and technology an artistic concept. The duo has been exhibiting in international shows since 2009. Their works have been shown at MAD in New York, FACT in Liverpool, Santa Monica in Barcelona, Barbican in London, Onassis Cultural Centre in Athens, Ars Electronica museum in Linz, ZKM in Karlsruhe, and more.

Expert #07

Toni Llàcer, Phd

Social scientist



Toni Llàcer is a multidisciplinary researcher in Social Sciences with extensive academic and scientific experience.

He has a PhD in Sociology at the Universitat Autònoma de Barcelona, a Bachelor's Degree in Philosophy at the University of Barcelona (BA Extraordinary Award), and a Bachelor's Degree in Economics at the Pompeu Fabra University.

He has published several articles in impact journals such as *Advanced in Complex Systems* or *Revue Française de Sociologie*. He has participated in international conferences at universities such as Columbia (USA) or Münster (Germany), and has been a member of the Analytical Sociology

and Institutional Design Group (GSADI) and guest researcher at the Queensland University of Technology in Brisbane (Australia).

Currently, he is a lecturer at Elisava and a research consultant for several projects and institutions.

06. Refer- ences

Projects and literature

- 29 Rooms and The HoodWitch. 2018. You are magic. <https://www.29rooms.com/exhibits/you-are-magic>
- Aardman Animations. 2018. iReporter. <https://www.bbc.co.uk/news/resources/idt-8760dd58-84f9-4c98-ade2-590562670096>
- Afif, Zeina, William Wade Islan, Oscar Calvo-Gonzalez, and Abigail Dalton. 2018. *Behavioral Science Around the World: Profiles of 10 Countries*. Washington, D.C.: World Bank Group. Available at: <http://documents.worldbank.org/curated/en/710771543609067500/Behavioral-Science-Around-the-World-Profiles-of-10-Countries>
- Aguirre De Carcer, Giadha. 2018. "The Age Of Hemp: Global Advanced Industrial Applications." *Forbes* (blog), October 23. <https://www.forbes.com/sites/forbestechcouncil/2018/10/23/the-age-of-hemp-global-advanced-industrial-applications>
- Ahmed, Rawal. 2018. "Mirreco 3D Prints Houses With Hemp-Based Material." *3DPrinting* (blog), June 27. <https://3dprinting.com/news/mirreco-prints-houses-using-hemp-based-material>
- Ajuntament de Barcelona. 2015. Decidim Barcelona. <https://www.decidim.barcelona>
- Ajuntament de Barcelona. 2016. Cultura viva. <https://ajuntament.barcelona.cat/culturaviva/en>
- Ajuntament de Barcelona. 2017. B-MINICOME. <https://ajuntament.barcelona.cat/bmincome/en>
- Ajuntament de Barcelona. 2018. APROP. <https://ajuntament.barcelona.cat/dretssocials/ca/innovacio-social/aprop>
- Ajuntament de Barcelona. 2020. Barcelona des de casa. <https://www.decidim.barcelona/assemblies/BCNdesdecasa>
- Ajuntament de Barcelona. N.d. Superblocks. <http://www.bcnecologia.net/en/conceptual-model/superblocks>
- Akpem, Senongo. 2020. *Cross-Cultural Design: Designing for diverse audiences*. [S.l.]: A Book Apart.
- Amer, Karim, and Jehane Noujaim, dirs. 2019. *The great hack*. Documentary film, aired July 24, on Netflix.
- Anadol, Refik. 2018. Melting memories. <http://refikanadol.com/works/melting-memories>
- "Ars Electronica Archive - Prix." Ars Electronica Linz GmbH. <https://archive.aec.at/prix>
- Ashford, Rain. 2012. EEG Data Visualising Pendant. <https://rainycatz.wordpress.com/2013/05/27/eeg-data-visualising-pendant-wearable-technology-for-use-in-social-situations>
- Ashford, Rain. 2014. "Responsive and emotive wearables: devices, bodies, data and communication." In *ISWC '14 Adjunct Program: Proceedings of the 2014 ACM International Symposium on Wearable Computers*, 99-104. New York: ACM. <https://doi.org/10.1145/2641248.2642731>
- Ashford, Rain. 2019. "The EEG visualising pendant for social situations." In *UbiComp/ISWC '19 Adjunct: Adjunct Proceedings of the 2019 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2019 ACM International Symposium on Wearable Computers*, 457-458. New York: ACM. <https://doi.org/10.1145/3341162.3345613>
- Atelier Luma. 2017. Algae platform. <https://atelier-luma.org/en/projects/algae-platform>
- Atelier Luma. 2019. Carbocycene. <https://atelier-luma.org/en/projects/carbocycene>
- Atken, Memo. 2019. #EpicGanGuy2019. <http://www.memo.tv/works/epicganguy2019>
- Baart, Ruben. 2016. "Agi Haines, speculative artists that wants to redesign the human body." *Next Nature Network* (blog), December 2. <https://nextnature.net/2016/12/interview-agi-haines>
- Badri-Paul, Vasudha. 2018. "Emoji Intelligence= Emotional Intelligence." *Medium*, online article, October 15. <https://medium.com/@vasudhabadripaul/emoji-intelligence-emotional-intelligence-458a920c0232>
- Baker, Christopher, Márton András Juhász and Kitchen Budapest. 2009. Murmur study. <http://christopherbaker.net/projects/murmur-study>
- BeAnotherLab. 2012. The Machine to be Another. <http://beanotherlab.org/home/work/tmtba>
- Bendick, Dawn. 2019. Time Rock Stacks. <https://dawnbendick.squarespace.com/timerockstacks>

- Bennett, Milton J. “Intercultural communication.” In *Multicultural America: A Multimedia Encyclopedia*, edited by Carlos E. Cortés. New York: Sage. Extended entry available at: https://www.idrinstitute.org/wp-content/uploads/2018/02/Encyclopedia_entries.pdf
- Beyer, Bastian. 2015. Turm2. <https://www.bastianbeyer.com/project-udk>
- Blake Fall-Conroy. 2009. Police flag. <https://www.blakefallconroy.com/police-flag.html>
- Blas, Zack. 2013-2016. Face cages. <http://zachblas.info/works/face-cages>
- Block by Block. 2012. <https://www.blockbyblock.org/resources>
- Bodewes, Nicolette. 2016. Tools for therapy. <http://nicolettebodewes.com>
- Boleslavský, Andrej, and Mária Júdová. 2016. Dust. <https://vrdust.org.uk>
- Bouloc, Pierre. 2006. *Le chanvre industriel: production et utilisations*. Paris: France Agricole.
- Boyle, Alan. 2008. “How satellites saved the world: Scientists hail past observations from space — and worry about the future.” *NBC News*, online article. Retrieved from the *Internet Archive Wayback Machine*: https://web.archive.org/web/20130116033434/http://www.msnbc.msn.com/id/23213424/ns/technology_and_science-space/t/how-satellites-saved-world
- Braidotti, Rosi. 2019. *The Posthuman*. Cambridge: Polity.
- Brain, Tega, and Surya Mattu. 2015. Unifit Bits. <http://www.unifitbits.com>
- Bridle, James. 2017. Autonomous Trap 001. <https://jamesbridle.com/works/autonomous-trap-001>
- Brooker, Charlie, scriptwriter. 2013. “Be right back,” the first episode in the second season of the Netflix series *Black Mirror*, directed by Owen Harris. First aired on Channel 4 on February 11.
- Bueno de Mesquita, Naomi, and David Hamers. 2017. “Mapping Invisibility.” In *Proceedings of the 3rd Biennial Research Through Design Conference*, 423-437. <http://doi.org/10.6084/m9.figshare.4747015>
- Buro Belén. 2010. Wooden Textiles. <https://www.burobelen.com>
- Business for Social Responsibility. 2009. *Apparel Industry Life Cycle Carbon Mapping*. Available at: https://www.bsr.org/reports/BSR_Apparel_Supply_Chain_Carbon_Report.pdf
- Cabanas, Edgar, and Eva Illouz. 2019. *Happycracia: Cómo la ciencia y la industria de la felicidad controlan nuestras vidas*. Madrid: Planeta de Libros.
- Capella, Juli. 2020. “¿Cómo serán las casas tras el coronavirus?” *El Periódico*, online article, April 7. <https://www.elperiodico.com/es/opinion/20200407/articulo-juli-capella-casas-futuro-tras-coronavirus-7920758>
- Center for Spatial Research. 2006. Million dollar blocks. <https://c4sr.columbia.edu/projects/million-dollar-blocks>
- Center for Technological Pain. 2018. DIY and Open Source objects. <http://centerfortechpain.com/objects.html>
- Chiu, Derisa. 2018. “How emojis can be the tool to creating a more empathetic digital healthcare service.” *Mirabeau* (blog), January 19. https://blog.mirabeau.nl/nl/articles/how_emojis_can_be_the_tool_to_creating_a_more_empathetic_digital_healthcare_service/oxGcgxQSUCsM6662QGYYO
- Circle Economy. 2020. *The Circularity Gap Report 2020*. [S.l.]: Platform for Accelerating the Circular Economy (PACE). Available at: <https://pacecircular.org/node/102>
- Cirilio, Paolo, and Alessandro Ludovico. 2011. Face to Facebook. <https://www.face-to-facebook.net>
- Climate Interactive, the MIT Sloan Sustainability Initiative, and U-Mass Lowell’s Climate Change Initiative. N.d. World Climate Simulation. <https://www.climateinteractive.org/tools/world-climate-simulation>
- ClimateWorks Foundation. 2020. *Getting to Neutral: Options for Negative Carbon Emissions in California*. Available at: <https://www.climateworks.org/programs/carbon-dioxide-removal/getting-to-neutral>
- Clinatec. 2014. The BCI (Brain Computer Interface) project. <https://www.clinatec.fr/en/research/projects/bci-project>
- Collingridge, Daisy. 2017. Squishy flesh suits. <http://www.daisycollingridge.com>
- Collinson, Alwyn (@RealTimeWWII). 2011. Twitter profile. <https://twitter.com/RealTimeWWII>
- Comingle. 2014. Mod. <https://www.comingle.io>
- Comunitaria. 2019. Supervicina. <https://supervicina.com>

- Coop Himme(l)blau. 2014. CHBL Jammer Coat. <http://www.coop-himmelblau.at/architecture/projects/chbl-jammer-coat>
- Copestake, Jen. 2020. “AI ethics backed by Pope and tech giants in new plan.” *BBC News*, February 28. <https://www.bbc.com/news/technology-51673296>
- Corbalis, Michael. 2017. “The origins and evolution of language.” Filmed in Auckland. *TED* video, 17:05. https://www.ted.com/talks/michael_corballis_the_origins_and_evolution_of_language
- Cox, Murray. 2015. Inside Airbnb. <http://insideairbnb.com>
- Crippa, Maurizio, Bruno De Wilde, Rudy Koopmans, Jan Leyssens, Jane Muncke, Anne-Christine Ritschko, Karine van Doorselaer, Costas Velis, and Martin Wagner. 2019. *A circular economy for plastics: Insights from research and innovation to inform policy and funding decisions*. Brussels: European Commission. Available at: <https://op.europa.eu/s/n64y>
- Critical Engineering Working Group, The. 2018. Vending Private Network. <https://criticalengineering.org/projects/vending-private-network>
- Cross, Tristan. 2020. “I recreated my local pub in VR.” *Wired*, online article, May 8. <https://www.wired.co.uk/article/i-made-my-local-pub-in-vr>
- D’Alisa, Giacomo, Federico Demaria, and Giorgos Kallis. 2014. *Degrowth: A Vocabulary for a New Era*. New York: Routledge.
- Davies, William. 2016. *The Happiness Industry: How the Government and Big Business Sold Us Well-Being*. London: Verso.
- Dazed. 2020. #AloneTogether. <https://www.dazeddigital.com/art-photography/article/48811/1/vivienne-westwood-wolfgang-tillmans-poster-art-coronavirus-nhs>
- Depoorter, Dries. 2015. Seattle Crime Scene Cams. <https://driesdepoorter.be/seattlecrimecams>
- Depoorter, Dries. 2018. Surveillance Speaker. <https://driesdepoorter.be/surveillancespeaker>
- Despentès, Virginie. 2006. King Kong théorie. Paris: Grasset.
- Dewey-Hagborg, Heather. 2011. Stranger visions. <http://deweyhagborg.com/projects/stranger-visions>
- Di Salvo, Carl. 2012. *Adversarial Design*. London: The MIT Press.
- Disnovation.org. 2015. Predictive Art Bot. <http://disnovation.org/pab.php>
- Dumitriu, Anna, and Bobbie Farsides. 2014. *Trust me I’m an artist*. <http://trustmeianartist.eu>
- Dumitriu, Anna, and Bobbie Farsides. 2014. *Trust me I’m an artist : Towards an ethics of art and science collaboration*. S.l.: Blurb. <https://www.blurb.co.uk/b/5511117-trust-me-i-m-an-artist>
- Dunne, Daisy. 2020. “Restoring soils could remove up to ‘5.5bn tonnes’ of greenhouse gases every year.” *CarbonBrief* (blog), March 16. <https://www.carbonbrief.org/restoring-soils-could-remove-up-to-5-5bn-tonnes-of-greenhouse-gases-every-year>
- Dutch Design Week. 2019. “DDW Trend: Data as material.” Blog post, September 26. <https://ddw.nl/en/magazine-archive/332/ddw-trend-data-as-material>
- Empatica. 2018. Embrace2. <https://www.empatica.com/en-eu/embrace2>
- Ericson, Magnus, and Ramia Mazé. 2011. *Design Act: Socially and Politically Engaged Design Today — Critical Roles and Emerging Tactic*. Berlin: Sternberg Press.
- Escudero, César. 2015. Inter_fight. https://escuderoandaluz.com/2015/06/08/inter_fight
- European Commission. [2019]. “A European Green Deal: Striving to be the first climate-neutral continent.” https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
- European Parliament. 2018. “Regulation (EU) 2018/841 of the European Parliament and of the Council of 30 May 2018 on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU.” *Official Journal of the European Union*, June 19. <https://eur-lex.europa.eu/eli/reg/2018/841/oj>
- Eva (@eva.stories). 2019. Instagram profile. <https://www.instagram.com/eva.stories/>

- Evergreen, Stephanie D.H. 2019. *Effective data visualization: The right chart for the right data*. Los Angeles: Sage Publications.
- Eksobionics. N.d. Ekso-suit. <https://eksobionics.com>
- Fab Academy. 2017. The Fabulous Tufting Machine. <http://archive.fabacademy.org/archives/2017/fablabpuebla/students/212/week-9.html>
- Facebook. N.d. “Memorialized Accounts.” Accessed May 18 2020. <https://www.facebook.com/help/1506822589577997>
- FactBar EDU. 2018. *Elections approach – are you ready? Fact-checking for educators and future voters*. Available at: https://www.faktabaari.fi/assets/FactBar_EDU_Fact-checking_for_educators_and_future_voters_13112018.pdf
- Fall-Conroy, Blake. 2008. Minimum wage machine. <https://www.blakefallconroy.com/minimum-wage-machine.html>
- Fecal Matter. 2018. Skin heels. <https://www.instagram.com/matieresfecales>
- Federici, Silvia. 2018. *El patriarcado del salario: críticas feministas al marxismo*. Madrid: Traficantes de sueños.
- Felton, Nicholas, and Ryan Case. 2008. Daytum. <https://daytum.com>
- Feminist Internet and Comuzi. [2019]. F’xa. <http://about.f-xa.co>
- Feminist Internet and the Creative Computing Institute at UAL. [2019]. *Coding a Feminist Alexa: workshop guide*. Available at: <https://drive.google.com/file/d/1R4Z4BFUDlBfk4p9guYl2wgWPgCnQKBU7/view>
- Feminist Internet and the Creative Computing Institute at UAL. [2019]. *Designing a Feminist Alexa: An experiment in feminist conversation design*, project report. Available at: <https://drive.google.com/file/d/1vIrIT8dIA9muhvd-XfCCCCUQCujRhMOO/view>
- Feng, Ranran, and Balakrishnan Prabhakaran. 2013. “Facilitating Fashion Camouflage Art.” In *MM ‘13: Proceedings of the 21st ACM international conference on Multimedia*, 793-802. New York: ACM. <https://doi.org/10.1145/2502081.2502121>
- Fessler, Leah. 2017. “Siri, define patriarchy: We tested bots like Siri and Alexa to see who would stand up to sexual harassment.” *Quartz*, online article, February 22. <https://qz.com/911681/we-tested-apples-siri-amazon-echos-alexa-microsofts-cortana-and-googles-google-home-to-see-which-personal-assistant-bots-stand-up-for-themselves-in-the-face-of-sexual-harassment>
- FixEd. 2012. Fixperts. <http://fixing.education/fixperts>
- Foo, Esther, J. Walter Lee, Simon Ozbek, and Brad Holschuh. 2018. “Preliminary study of the subjective comfort and emotional effects of on-body compression.” In *ISWC ‘18: Proceedings of the 2018 ACM International Symposium on Wearable Computers*, 128-131. New York: ACM. <https://doi.org/10.1145/3267242.3267279>
- Fraser, Nancy. 1998. “Social justice in the age of identity politics: Redistribution, recognition, participation.” *Wissenschaftszentrum Berlin für Sozialforschung (WZB)*, discussion paper FS 98-108. Available at: <http://hdl.handle.net/10419/44061>
- Friday Project. 2013. Food Storage. <https://www.fridayproject.it/FOOD-STORAGE>
- Future Earth and The Earth League. 2019. *New Insights in Climate Science - a 2017-2019 Summary*. Available at: <https://futureearth.org/wp-content/uploads/2019/09/New-insights-in-climate-science-a-2017-2019-summary.pdf>
- Futures CoLab. 2019. Disrupting systems for global sustainability. <https://futurescolab.org/page/climateworks-scenarios>
- Gao, Ying. 2013. (No)Where (Now)Here. <http://yinggao.ca/interactifs/nowhere-nowhere/>
- Garcia, Ernest, Mercedes Martinez-Iglesias, and Peadar Kirby, eds. 2017. *Transitioning to a Post-Carbon Society: Degrowth, Austerity and Wellbeing*. Londres: Palgrave Macmillan.
- Gerrard, John. 2017. Western Flag (Spindletop, Texas). <http://www.johngerrard.net/western-flag-spindletop-texas-2017.html>
- Ghodsee, Kristen. 2018. *Why Women Have Better Sex Under Socialism: And Other Arguments for Economic Independence*. London: The Bodley Head.

- Giertz, Simone. 2017. “The Making of Sh*tty Robots.” *Talks at Google*, YouTube video, 44:23. <https://www.youtube.com/watch?v=TW5qLcitPro>
- GlobeScan. 2018. *IKEA Climate Action Study*, report. Available at: <https://globescan.com/ikea-climate-action-consumer-study>
- González-Reyes, Luis, Adrián Almazán Gómez, Ángel Lareo Fernández, Walter Actis Mazzola, Luis Miguel Bueno Morera, Carmen Madorrán Ayerra, Emilio Santiago Muiño, and Cristina de Benito Morán. 2019. *Escenarios de trabajo en la transición ecosocial*. Madrid: Ecologistas en acción. Available at: <https://www.ecologistasenaccion.org/wp-content/uploads/2019/12/informe-escenarios-de-trabajo-WEB.pdf>
- Goyeneche, Javier. 2018. “Upcycling the oceans.” *Tech Open Air*, YouTube video, 24:54. <https://www.youtube.com/watch?v=cYquGu4oID8>
- Grada, Raluca. 2010. Finely Grafted Jewellery. <https://ralucagrada.net/Finely-Grafted-Jewellery>
- Graikousi, Stefania, and Maria Sideri. 2020. “Death in digital spaces: social practices and narratives.” In *Proceedings of the 2nd International Conference on Cultural Informatics, Communication & Media Studies*, vol 1, num. 1. Mytilene: University of the Aegean.
- Greene, Jessica. 2019. “Free Writing Software: 15 Tools to Help You Create Better Content, Faster: find the best brainstorming, researching, writing, and editing tools.” *Zapier* (blog), January 29. <https://zapier.com/blog/writing-editing-apps>
- Greenspan, Rachel E. 2019. “On Facebook, the dead will eventually outnumber the living. What does that mean for our histories?” *Time*, online article, April 30. <https://time.com/5579737/facebook-dead-living/>
- “Grindhouse Wetware”. *Wikipedia*, s.v. last modified January 23, 2020. https://en.wikipedia.org/wiki/Grindhouse_Wetware
- Griscom, Bronson W., Justin Adams, Peter W. Ellis, Richard A. Houghton, Guy Lomax, Daniela A. Miteva, William H. Schlesinger, David Shoch, Juha V. Siikamäki, Pete Smith, Peter Woodbury, Chris Zganjar, Allen Blackman, João Campari, Richard T. Conant, Christopher Delgado, Patricia Elias, Trisha Gopalakrishna, Marisa R. Hamsik, Mario Herrero, Joseph Kiesecker, Emily Landis, Lars Laestadius, Sara M. Leavitt, Susan Minnemeyer, Stephen Polasky, Peter Potapov, Francis E. Putz, Jonathan Sanderman, Marcel Silvius, Eva Wollenberg, and Joseph Fargione. 2017. “Natural climate solutions.” In *Proceedings of the National Academy of Sciences* 114 (44): 11645-11650. <https://doi.org/10.1073/pnas.1710465114>
- Guardian, The. 2016. “The perception gap: how well do you know your country? Take our quiz.” Accessed May 18, 2020. <https://www.theguardian.com/society/ng-interactive/2016/dec/14/the-perception-gap-how-well-do-you-know-your-country-take-our-quiz>
- Guffond, Jasmine. 2017. The web never forgets. <http://jasmineguffond.com/?path=art/The+Web+Never+Forgets>
- Guzman, Andrea L., and Seth C. Lewis. 2020. “Artificial intelligence and communication: A Human–Machine Communication research agenda.” *New Media & Society* 22(1): 70-86. <https://doi.org/10.1177/1461444819858691>
- Haffmans, Siem, Marjolein van Gelder, Ed van Hinte, and Yvo Zijlstra. 2019. *Products that Flow: Circular Business Models and Design Strategies for Fast-Moving Consumer Goods*. Amsterdam: BIS Publishers.
- Han, Byung-Chul. 2015. *The Burnout Society*. Stanford: Stanford University Press.
- Harari, Yuval Noah, and Tristan Harris, speakers. “Truth Decay and the Technology Threat.” 2020. YouTube video, 48:53. <https://www.youtube.com/watch?v=Fluli30nzjE>
- Harvey, Adam. 2010. CV Dazzle. <https://cvdazzle.com>
- Harvey, Adam. 2013. Stealth Wear: Anti-Drone Fashion. <https://ahprojects.com/stealth-wear>
- Harvey, Adam, and Anastasia Kubrak. 2018. Data Pools: Wi-Fi Geolocation Spoofing. <https://ahprojects.com/datapools/>
- Harvey, Adam, and Tactical Tech. 2017. Megapixels: Faces. <https://ahprojects.com/megapixels-glassroom>
- Hasan & Partners. 2018. Sheboard. <https://hasanpartners.fi/project/sheboard>
- Hassan, Robert. 2019. “Digitality, virtual reality and the ‘Empathy Machine’.” *Digital Journalism* 8(2): 195-212. <https://doi.org/10.1080/21670811.2018.1517604>

- Hassell. 2018. NASA 3D Printed Habitat Challenge. <https://www.hassellstudio.com/project/nasa-3d-printed-habitat-challenge>
- Heibeck, Felix. 2013. Sensory fiction. <http://f3-h.de/sensoryfiction>
- Heinrich Böll Foundation. 2019. *Plastic Atlas: Facts and figures about the world of synthetic polymers*. Available at: <https://www.boell.de/en/plasticatlas>
- Hepburn, Cameron, Ella Adlen, John Beddington, Emily A. Carter, Sabine Fuss, Niall Mac Dowell, Jan C. Minx, Pete Smith, and Charlotte K. Williams. 2019. "The technological and economic prospects for CO₂ utilization and removal." *Nature* 575: 87–97. <https://doi.org/10.1038/s41586-019-1681-6>
- Heroku. N.d. BlindWrite. <https://blindwrite.herokuapp.com>
- Hickel, Jason, and Giorgos Kallis. 2019. "Is Green Growth Possible?. New Political Economy." *New Political Economy* 25(4): 469-486. <https://doi.org/10.1080/13563467.2019.1598964>
- Holschuh, Bradley, Edward Obropta, Leah Buechley and Dava Newman. 2012. "Materials and Textile Architecture Analyses for Mechanical Counter-Pressure Space Suits using Active Materials." Paper presented at the AIAA SPACE 2012 Conference & Exposition, Pasadena, California. <https://doi.org/10.2514/6.2012-5206>
- Hoogvliet, Nienke. 2014. Sea me. <https://www.nienkehoogvliet.nl/portfolio/seame>
- Hsieh, Hsiu Ching Laura, and Hsi-Hsun Yang. 2020. "Incorporating gamification into website design to facilitate effective communication." *Theoretical Issues in Ergonomics Science* 21(1): 89-111. <https://doi.org/10.1080/1463922X.2019.1645920>
- Huang, Coby. 2019. R.O.S.P - Ritual of Sexual Pleasure. <https://cobyhuang.com/ROSP-Ritual-of-Sexual-Pleasure-Konstfack>
- Huang, Zhiqi. 2015. "Revisiting the cosmological bias due to local gravitational redshifts." *Physical Review D* 91(12): 121301(R). <https://doi.org/10.1103/PhysRevD.91.121301>
- Huawei. 2018. Facing emotions. <https://consumer.huawei.com/uk/campaign/truestories/facingemotions>
- Hutson, Matthew. 2019. "Engineers and Architects Are Already Designing Lunar Habitats." *IEEE Spectrum*, online article. <https://spectrum.ieee.org/aerospace/space-flight/engineers-and-architects-are-already-designing-lunar-habitats>
- Huynh, Martina. 2018. Basic income café. http://martinahuynh.com/basic_income_cafe.html
- Illing, Sean. 2020. "'Flood the zone with shit': How misinformation overwhelmed our democracy." *Vox*, blog post. <https://www.vox.com/policy-and-politics/2020/1/16/20991816/impeachment-trump-bannon-misinformation>
- Infonavit. 2019. Housing Research and Practical Experimentation Laboratory. <https://www.dezeen.com/2019/08/23/housing-research-and-practical-experimentation-laboratory-infonavit-low-cost>
- Inocente, Daniel, Colin Koop, Georgi I. Petrov, Jeffrey A. Hoffman, Valentina Sumini, Advenit Makaya, Marlies Arnhof, Hanna Lakk, Brigitte Lamaze, Aidan Cowley, David Binns, Markus Landgraf, Piero Messina, and Claudie Haigneré. 2019. "Master Planning and Space Architecture for a Moon Village." Paper presented at the 70th International Astronautical Congress (IAC), Washington, DC. Available at: https://www.som.com/ideas/research/master_planning_and_space_architecture_for_a_moon_village
- Instagram. N.d.. "Request to Memorialize a Deceased Person's Instagram Account." Accessed May 18 2020. <https://help.instagram.com/contact/452224988254813>
- Jarmul, Katharine. 2019. "Computers are Stupid: Protecting 'AI' from Itself." *GOTO Conferences*. YouTube video, 43:19. <https://www.youtube.com/watch?v=NjBufTw30aQ>
- Jernberg, Jenny. 2020. "Sustainable material for carbon dioxide capture." *Chalmers University of Technology*, online article. <https://www.chalmers.se/en/departments/chem/news/Pages/carbon-dioxide-capture.aspx>
- Jerram, Luke. 2011. Tōhoku Japanese Earthquake. <https://www.lukejerram.com/tohoku-japanese-earthquake>
- Kao, Hsin-Liu, Christian Holz, Asta Roseway, Andres Calvo, and Chris M. Schmandt. 2016. "DuoSkin: rapidly prototyping on-skin user interfaces using skin-friendly materials." In *ISWC '16: Proceedings of the 2016 ACM International Symposium on Wearable Computers*, 16-23. New York: ACM. <https://doi.org/10.1145/2971763.2971777>
- Karhof, Merel. 2009. Wind knitting factory. <https://www.merelkarhof.nl/work/wind-knitting-factory>

- Karv One Design. 2019. Blossom School. <http://www.karvone.com>
- Keisuke, Fujita. 2017. Voltaic Realism. <http://fujita.maison/voltaic-realism--fujita-keisuke.html>
- Kimchi and Chips. 2018. Halo. <https://www.kimchiandchips.com/works/halo>
- Klein, Naomi. 2019. *On Fire: The (Burning) Case for a Green New Deal*. London: Allen Lane.
- Koblin, Aaron. 2006. The sheep market. <http://www.aaronkoblin.com/project/the-sheep-market>
- Koblin, Aaron. 2009. Flight Patterns. <http://www.aaronkoblin.com/project/flight-patterns>
- Krausmann, Fridolin, Dominik Wiedenhofer, Christian Lauk, Willi Haas, Hiroki Tanikawa, Tomer Fishman, Alessio Miatto, Heinz Schandl, and Helmut Haberl. 2017. *PNAS* 114(8): 1880-1885. <https://doi.org/10.1073/pnas.1613773114>
- Kurzweil, Ray. 2000. *The Age of Spiritual Machines: When Computers Exceed Human Intelligence*. New York: Penguin Books.
- Laguna, Hans. 2017. "¡Mamá, puedo ser artista! Renta Básica y trabajo cultural." *Nativa* (blog), April 21. <https://nativa.cat/2017/04/mama-puedo-ser-artista-renta-basica-y-trabajo-cultural>
- Laguna, Hans. 2020. "Los ojos cerrados." *Ara*, online article, April 13. https://www.ara.cat/es/opinion/Hans-Laguna-ojos-cerrados_0_2434556653.html
- Lamoncha, Fabricio. 2011. Pooprinter. <https://fabriciolamoncha.com/post/28353407741>
- Lancel, Karen, and Hermen Maat. 2014. E.E.G. Kiss. <https://www.lancelmaat.nl/work/e.e.g-kiss>
- Larson, Jeremy D. 2016. "Meet Andrew Thomas Huang, The Filmmaker Behind Björk's Stunning VR Videos." *Red Bull Music Academy*, blog post, October 19. <https://daily.redbullmusicacademy.com/2016/10/andrew-huang-bjork-vr-director-interview>
- Latonero, Mark, Keith Hiatt, Antonella Napolitano, Giulia Clericetti, and Melanie Penagos. 2019. *Digital identity in the migration & refugee context: Italy case study*. [S.l.]: Data & Society. Available at: https://www.datasociety.net/wp-content/uploads/2019/04/DataSociety_DigitalIdentity.pdf
- Lee McCarthy, Lauren. 2017. Lauren. <https://lauren-mccarthy.com/LAUREN>
- Lee McCarthy, Lauren, and Kyle McDonald. 2014. Social Soul. <https://lauren-mccarthy.com/Social-Soul>
- Lee, Maurice S. 2019. *Overwhelmed: Literature, Aesthetics, and the Nineteenth-Century Information Revolution*. Princeton: Princeton University Press.
- LEGO. 2019. Rebuild the world. <https://www.lego.com/en-gb/campaigns/rebuild-the-world>
- Lejuwaan, Jordan, and Jon Kreutzer. 2019. Zerospace. <https://zerospace.co>
- Lia. 2014. Filament sculptures. <https://www.liaworks.com/theprojects/filament-sculptures>
- Liu, Jing-Cai. 2017. Wearable face projector. <http://jingcailiu.com/?portfolio=wearable-face-projector>
- Livne, Shahar. 2017. Metamorphism. <https://www.shaharlivnedesign.com/metamorphism>
- Loach, Ken, dir. 2019. *Sorry, we missed you*. Sixteen Films.
- Lohmann, Julia. 2020. The Department of Seaweed Prototyping Workshop. <https://www.julialohmann.co.uk/news/2020/01/22/21-24-01-2020-partnering-with-nature-world-economic-forum-50th-annual-meeting-davos-klosters-ch/>
- Lok, Benjamin, and Adriana E. Foster. 2019. "Can Virtual Humans Teach Empathy?" In *Teaching Empathy in Healthcare*, edited by Adriana E. Foster and Zimri S. Yaseen, 143-163. Cham: Springer. https://doi.org/10.1007/978-3-030-29876-0_9
- Long Now Foundation. 1996. The 10,000 Year Clock. <http://longnow.org/clock>
- Lozano-Hemmer, Rafael. 2008. Pulse Spiral. http://www.lozano-hemmer.com/pulse_spiral.php
- Lozano-Hemmer, Rafael. 2010. Pulse Index. http://www.lozano-hemmer.com/pulse_index.php
- Lozano-Hemmer, Rafael. 2015. Zoom pavilion. http://www.lozano-hemmer.com/zoom_pavilion.php
- Lozano-Hemmer, Rafael. 2019. Cloud display. http://www.lozano-hemmer.com/cloud_display.php

- MacDonald, Bruce. 2019. "Fooling Facial Detection with Fashion." *Towards Data Science* (blog), June 4. <https://towardsdatascience.com/fooling-facial-detection-with-fashion-d668ed919eb>
- Mackie, David, and Jessica Murray. 2020. *Risky business: the climate and the macroeconomy*. [S.l.]: JP Morgan. Available at: https://rebellion.earth/wp/wp-content/uploads/2020/02/JPM_Risky_business__the_climate_and_the_macroeconomy_2020-01-14_3230707.pdf
- Mackintosh, Eliza. 2019. "Finland is winning the war on fake news. What it's learned may be crucial to Western democracy." *Cable News Network* (blog). <https://edition.cnn.com/interactive/2019/05/europe/finland-fake-news-intl>
- Manley, Ed, James Cheshire, and Oliver O'Brien. 2012. Twitter tongues. <https://twitter.mappinglondon.co.uk>
- Márquez Reiter, Rosina, and Raquel Hidalgo Dowling. [Forthcoming 2020]. "Intercultural Communication in a globalised world: the case of Spanish." In *The Routledge Handbook of Spanish Pragmatics: Foundations and Interfaces*, edited by Dale A. Koike, J. Cesar Felix-Brasdefer. Routledge. Available at: https://www.academia.edu/42066803/Intercultural_Communication_in_a_globalized_world_the_case_of_Spanish
- Matsuda, Keiichi. 2016. Hyper-reality. <http://hyper-reality.co>
- Mattu, Surya, and Kashmir Hill. 2018. "The House That Spied on Me." *Gizmodo* (blog), February 7. <https://gizmodo.com/the-house-that-spied-on-me-1822429852>
- McCurdy, Charlotte. 2018. After ancient sunlight. <http://www.charlottemccurdy.com/ancient-sunlight>
- McLuhan, Marshall. [1964] 2015. *Understanding Media: The Extensions of Man*. Berkeley: Gingko Press.
- Mehta, Stephanie. 2020. "Survey: 9 in 10 Americans have 'better appreciation' for tech during the pandemic." *Fast Company* (blog), April 20. <https://www.fastcompany.com/90493261/survey-9-in-10-americans-have-better-appreciation-for-tech-during-crisis>
- Mikami, Seiko. 2011. Desire of codes. https://special.ycam.jp/doc/work/index_en.html
- Milanović, Branko. 2019. *Capitalism, alone : the future of the system that rules the world*. Cambridge, Mass.: Harvard University Press.
- Miodownik, Mark. 2014. "3D knitting machines will be in every home." *Wired* (blog), November 4. <https://www.wired.co.uk/article/3d-knitting>
- MIT Media Lab, and Microsoft Research. 2015. DuoSkin. <https://duoskin.media.mit.edu>
- Moll, Joana. 2016. DEFOOOOOOOOOOOOOOOOOOOOOREST. http://www.janavirgin.com/CO2/DEFOOOOOOOOOOOOOOOOOOOOOREST_about.html
- Moll, Joana. 2019. The Hidden Life of an Amazon User. <https://www.janavirgin.com/AMZ>
- Moore, Phoebe. 2018. *The quantified self in precarity: work, technology, and what counts*. New York: Routledge.
- More, Shreyas. 2019. "The Green Charcoal at the Future of Architecture and Building Biennale." *Medium*, online article. <https://medium.com/@shreyasvmore/the-green-charcoal-at-the-future-of-architecture-and-building-biennale-e1cdf702b82c>
- Morozov, Dmitry. 2013. Reading my body. <http://vtol.cc/filter/works/reading-my-body>
- Morris, Ali. 2017. "Dutch designers convert algae into bioplastic for 3D printing." *Dezeen* (blog), December 4. <https://www.dezeen.com/2017/12/04/dutch-designers-eric-klarenbeek-maartje-dros-convert-algae-bioplastic-3d-printing-good-design-bad-world>
- Moruno, Jorge. 2018. *No tengo tiempo: Geografías de la precariedad*. Madrid: Akal.
- Motro, Daphna, Bohan Ye, Tamar Kugler, and Charles N. Noussair. 2020. "Measuring Emotions in the Digital Age." *MIT Sloan Management Review* 61(2): 1-4. Online version available at: <https://sloanreview.mit.edu/article/measuring-emotions-in-the-digital-age>
- Mulholland, Sean. 2018. "The digital selves we leave behind." *IDEO*, blog post, May 3. <https://www.ideo.com/blog/the-digital-selves-we-leave-behind>
- Muller, Michael J, Ellen Christiansen, Bonnie Nardi, and Susan Dray. 2001. "Spiritual life and information technology." *Communications of the ACM* 44(3): 82-83. <https://doi.org/10.1145/365181.365211>
- Nadal, Martin, and César Escudero. 2016. BitterCoin. <http://martinnadal.eu/artworks/bittercoin>
- Natali, Paolo, Suzanne Greene, and Perrine Toledano. 2019. "How much CO2 is embedded in a product?" *Rocky Mountain Institute*, blog post, August 5. <https://rmi.org/how-much-co2-is-embedded-in-a-product>
- Nervous System. 2013. Kinematics. <https://n-e-r-v-o-u-s.com/projects/sets/kinematics>
- Newkirk, Pamela. 2019. *Diversity, Inc.: The Failed Promise of a Billion-Dollar Business*. New York: Hachette.
- Newman, Dava. N.d. The MIT BioSuit™. <http://news.mit.edu/2014/second-skin-spacesuits-0918>
- Nieuwe Heren. 2016. Aegis parka. <http://www.nieuweheren.com/project/aegisparka>
- Niquille, Simon C. 2013. FaceValue. <https://www.ofluxo.net/facevalue-by-simone-niquille>
- Nordhaus, William. 1975. "Can We Control Carbon Dioxide?" IIASA Working Paper. Available at: <http://pure.iiasa.ac.at/365>
- O'DonnellBrown. 2020. The Community Classroom. <http://odonnellbrown.com/the-community-classroom>
- OECD [Organisation for Economic Co-operation and Development]. N.d. *Better Life Initiative: Measuring Well-Being and Progress*. <https://www.oecd.org/statistics/better-life-initiative.htm>
- Office of Energy Efficiency & Renewable Energy. 2017. *Algae Cultivation for Carbon Capture and Utilization Workshop Summary Report*. U.S. Department of Energy. Available at: https://www.energy.gov/sites/prod/files/2017/09/f37/algae_cultivation_for_carbon_capture_and_utilization_workshop.pdf
- Oliver, Julian. 2008. The Advertiser. <https://theartvertiser.com/>
- Oliver, Julian. 2017. Harvest. <https://julianoliver.com/output/harvest>
- Oliver, Julian, Tega Brain and Bengt Sjöln. <https://asunder.earth>
- Oliver, Julian, Gordan Savičić, and Danja Vasiliev. 2011. "The Critical Engineering Manifesto." *The Critical Engineering Working Group*. <https://criticalengineering.org/en>
- Oliver, Julian, and Daniil Vasiliev. 2011. Newstweek. <https://julianoliver.com/output/newstweek>
- Paech, Niko. 2016. *Liberation from excess : the road to a post-growth economy*. München: Oekom.
- Pajupuu, Kadi. 2016. RailReed. <https://www.railreed.ee/en>
- Park, Lisa. 2013. Eunoia. <https://www.thelisapark.com/work/eunoia>
- Park, Lisa. 2014. Eunoia II. <https://www.thelisapark.com/work/eunoia2>
- Pater, Ruben. 2016. *The Politics of Design. A (Not So) Global Manual for Visual Communication*. Amsterdam: BIS Publishers.
- Peirano, Marta. 2019. *El enemigo conoce el sistema: manipulación de ideas, personas e influencias después de la economía de la atención*. Barcelona: Debate.
- Peran, Martí. 2015. *General Indisposition: An essay about Fatigue*, exhibition at Fabra i Coats Centre d'Art Contemporani, Barcelona. <https://www.barcelona.cat/fabraicoats/centredart/en/content/general-indisposition-essay-about-fatigue-0>
- Peri, Valentina. 2018. Data Dating. Exhibition information at Galerie Charlot: <https://www.galeriecharlot.com/en/expo/152/Data-Dating>
- Pescetelli, Niccolo, and Nick Yeung. 2019. "The Effects of Social Communication Dynamics on Opinion Change." *PsyArXiv* preprint, submitted July 25. <https://doi.org/10.31234/osf.io/kmuqw>
- Piketty, Thomas. 2019. *Capital et idéologie*. Paris: Éditions du Seuil.
- Popp, Julius. 2010. Bit.Fall. <https://www.illuminateproductions.co.uk/bitfall>
- Posavec, Stefanie, and Miriam Quick. 2015. Air Transformed: Better with Data Society Commission. <https://miriamquick.com/air-transformed> and <http://www.stefanieposavec.com/airtransformed>
- Povloni, Steve, and Shivangee Trivedi. 2020. "Model Hacking ADAS to Pave Safer Roads for Autonomous Vehicles." *McAfee Labs*, blog post, February 19. <https://www.mcafee.com/blogs/other-blogs/mcafee-labs/model-hacking-adas-to-pave-safer-roads-for-autonomous-vehicles>
- Practice Architecture. 2019. Flat house. <https://practicearchitecture.co.uk/project/flat-house>

- Prada. 2020. Optimist Rhythm. <https://www.prada.com/ww/en/pradasphere/campaigns/2020/ss-man.html>
- Presencing Institute. 2019. "Shifts in Education and Learning," second episode of the *Dialogues on Transforming Society & Self*, hosted by Otto Scharmer with guest speakers Professors James Martin and Eva Pomeroy. <https://www.presencing.org/news/news/recap-of-dots-2--reinventing-the-21st-century-university>
- Project Drawdown. N.d. Biochar production. <https://drawdown.org/solutions/biochar-production/technical-summary>
- Psarra, Afroditi, and Audrey Briot. 2019. Listening Space. <http://afroditipsarra.com>
- Psarra, Afroditi, and Audrey Briot. 2019. "Listening Space: Satellite Ikat's." In *ISWC '19: Proceedings of the 23rd International Symposium on Wearable Computers*, 318-321. New York: ACM. <https://doi.org/10.1145/3341163.3346932>
- Ræburn and Xavier de Kestelier. 2020. New Horizons SS20 collection. <https://www.raeburndesign.co.uk/explore/collections/post/id/ss20-new-horizons>
- Raskin, Aza. 2019. "The digital attention crisis." YouTube video, 0:24:20. <https://www.youtube.com/watch?v=z8jbZPL92xs>
- Raskin, Aza, and Tristan Harris. 2020. "Mr. Harris Goes to Washington," January 30, in *Your undivided attention* E13, podcast, 42:10. <https://your-undivided-attention.simplecast.com/episodes/mr-harris-goes-to-washington>
- Read, Max. 2018. "How Much of the Internet Is Fake? Turns Out, a Lot of It, Actually." *New York Magazine*, December 26. <https://nymag.com/intelligencer/2018/12/how-much-of-the-internet-is-fake.html>
- Rebollo Pericot, Josep. 2018. "To become CO₂ negative, our civilisation's current challenge." *Camins.cat* (blog; Col·legi d'Enginyers de Camins, Canals i Ports). <http://blog.camins.cat/2018/01/12/to-become-co2-negative-our-civilisations-current-challenge>
- Resnick, Elizabeth. 2016. *Developing Citizen Designers*. London: Bloomsbury.
- Resnick, Elizabeth, ed. 2019. *The Social Design Reader*. London: Bloomsbury.
- Rifkin, Jeremy. 2019. *The Green New Deal : why the fossil fuel civilization will collapse by 2028, and the bold economic plan to save life on earth*. New York: St. Martin's Press.
- Roesch, Edward. 2019. "How gamification and social networking impact learning: communication is the key." *eLearning Industry* (blog), March 10. <https://elearningindustry.com/social-networking-impact-learning-gamification-communication-key>
- Roma, Valentín, curator. 2019. *This land will never be fertile for having given birth to colonisers*, exhibition at La Virreina Centre de la Imatge. <https://ajuntament.barcelona.cat/lavirreina/en/exposicions/land-never-fertile-colonisers-daniela-ortiz/366>
- Roy, Niklas. 2010. My little piece of privacy. <http://www.niklasroy.com/project/88/my-little-piece-of-privacy>
- Rozin, Daniel. 1999. Wooden Mirror. <http://www.smoothware.com/danny/woodenmirror.html>
- Rudin, Peter. 2018. "Artificial empathy improves communication skills of AI-machines." *Singularity 2030*, blog post. <https://singularity2030.ch/artificial-empathy-improves-communication-skills-of-ai-machines>
- Saez, Emmanuel, and Gabriel Zucman. 2019. *The Triumph of Injustice: How the Rich Dodge Taxes and How to Make Them Pay*. New York: Norton & Co.
- Safian-Demers, Emily. 2020. "Virtual gatherings. What does social distancing portend for the future of cultural experiences?" *Wunderman Thompson*, online article, March 20. <https://intelligence.wundermanthompson.com/2020/03/virtual-gatherings>
- Sakhi, Tessa, and Tara Sakhi. 2019. Wal(l)tz: Lebanon Pavilion. <https://www.tsakhi.com/walltz>
- SAND Lab. 2020. Wearable Microphone Jamming. <http://sandlab.cs.uchicago.edu/jammer>
- Savicic, Gordan. 2015. Constraint City: Pain of everyday life. <https://www.yugo.at/equilibre>
- Savin-Baden, Maggi, and Victoria Mason-Robbie, eds. 2020. *Digital afterlife: death matters in a digital age*. New York: CRC Press.
- Schmiege, Sebastian. 2016. Segmentation.Network. <http://sebastianschmiege.com/segmentation-network>
- Schmiege, Sebastian. 2019. Decisive Mirror. <http://sebastianschmiege.com/decisive-mirror>

- Schmitt, Antoine. 2008. Time slip. <http://www.antoineschmitt.com/time-slip>
- Schneier, Bruce. 2020. "Bots Are Destroying Political Discourse As We Know It." *The Atlantic* (blog), January 7. <https://www.theatlantic.com/technology/archive/2020/01/future-politics-bots-drowning-out-humans/604489>
- Schultz, Tobias, and Aditi Suresh. 2017. *Life Cycle Assessment Comparing Ten Sources of Manmade Cellulose Fiber*. SCS Global Services. Available at: https://cdn.scsglobalservices.com/files/program_documents/SCS-Stella-LCA-MainReport-101017.pdf
- Scott, Travis. 2020. Astronomical. Video available at: <https://www.youtube.com/watch?v=wYeFAIVC8qU>
- Sen, Conor. 2020. "Why Is Facebook for Remote Work? It Wants Pay Cuts." *Bloomberg*, online article, May 29. <https://www.bloomberg.com/opinion/articles/2020-05-29/facebook-s-remote-work-plan-driven-by-desire-to-cut-tech-pay>
- Share Lab. 2016. Facebook Algorithmic Factory. <https://labs.rs/en>
- Sicardi, Arabelle. 2018. "Do Androids dream of Balenciaga SS29? Robbie Barrat Imagines a Future in Which the Creative Director is a Computer." *SSENSE*, blog post, November 12. <https://www.ssense.com/en-ee/editorial/fashion/do-androids-dream-of-balenciaga-ss29>
- Sinders, Caroline. 2017. Feminist data set. <https://carolinesinders.com/feminist-data-set>
- Sinek, Simon. 2019. "The infinite game: how to lead in the 21st century." YouTube video, 1:31:19. <https://www.youtube.com/watch?v=3vX2iVIJMFQ>
- Sinek, Simon. 2020. *Infinite game*. [S.I.]: Portfolio Penguin.
- Smart Museum of Art. 2020. The Allure of Matter: Material Art from China. <https://theallureofmatter.org>
- SOM. 2019. Moon Village. https://www.som.com/projects/moon_village
- Sony CSL. 2018. Kreyon City, the ideal city made of LEGO bricks. <https://csl.sony.fr/project/kreyon-city>
- Sosanya, Oluwaseyi. 2014. 3D weaver. <https://www.sosafresh.com/3d-weaver>
- Space10 and EFECT. 2017. The Urban Village Project. <https://www.urbanvillageproject.com>
- Stahel, Walter. 2016. "End of Waste." The Product-Life Institute. <http://www.product-life.org/en/3ecos/part4-End-of-Waste>
- Stanley, Jason. 2018. *How Fascism Works: The Politics of Us and Them*. New York: Random House.
- Studio Roosegaarde. 2015. Smoke Free Project. <https://www.studioroosegaarde.net/project/smog-free-tower>
- Studio Roosegaarde and the European Space Agency. 2018. Space Waste Lab. <https://www.studioroosegaarde.net/project/space-waste-lab>
- Submarine Channel. 2014. Refugee Republic. <https://refugeerepublic.submarinechannel.com>
- Sudjic, Olivia. 2018. *Exposure*. London: Peninsula Press.
- Sunyuan and Pengyu. 2016. Can't help myself. <http://www.sunyuanpengyu.com/works/2016/cant%20help%20myself/cant%20help%20myself.html>
- Sustainable Development Solutions Network. [Annual]. *World Happiness Report*. <https://worldhappiness.report>
- Tada, Ryo. 2019. FULU. <https://www.ryotada.com/fulu>
- Takadiwa, Moffat. 2019. Son of the Soil. <http://www.nicodimgallery.com/exhibitions/moffat-takadiwa-son-of-the-soil>
- Talbot, David. 2014. "Artificial Skin That Senses, and Stretches, Like the Real Thing." *MIT Technology Review* (blog), December 9. <https://www.technologyreview.com/2014/12/09/170133/artificial-skin-that-senses-and-stretches-like-the-real-thing>
- Tamppuu, Pia, and Anu Masso. 2019. "Transnational digital identity as an instrument for global digital citizenship: the case of Estonia's e-residency." *Information Systems Frontiers* 21(3): 621-634. <https://doi.org/10.1007/s10796-019-09908-y>
- Tejero, Héctor, and Emilio Santiago. 2019. *Qué hacer en caso de incendio: Manifiesto por el Green New Deal*. Madrid: Capitán Swing.

- Thaler, Ricahrd, and Cass R. Sunstein. 2008. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. New Haven: Yale University Press.
- Thomas, Greg. 2019. “Simon Sinek: Applying The Infinite Game Mindset To Business.” *Forbes*, online article, April 30. <https://www.forbes.com/sites/workday/2019/04/30/simon-sinek-applying-the-infinite-game-mindset-to-business>
- Thwaites, Thomas. 2016. A holiday from being human (GoatMan). <https://www.thomasthwaites.com/a-holiday-from-being-human-goatman>
- Thys, Simen, Wiebe Van Ranst, and Toon Goedeme. 2019. “Fooling automated surveillance cameras: adversarial patches to attack person detection.” Cornell University preprint, submitted April 18. <https://arxiv.org/abs/1904.08653v1>
- Time. 2020. “Heroes of the Front lines.” *Time*, articles collection. <https://time.com/collection/coronavirus-heroes/>
- Top Manta. 2019. Artists Series - Lotería Mantera. <https://manteros.org/loteriamantera/>
- Torre, Román, and Ángeles Angulo. 2016. 048 Thero. https://www.romantorre.net/v3/fwp_portfolio/thero
- Towards Zero [Transport Accident Commission Victoria]. 2016. Project Graham. <http://www.meetgraham.com.au>
- Trout, Christopher. 2018. “Teledildonics gave me the gift of long-distance sex with a stranger.” *Christopher Trout* (blog), April 12. <http://www.christophertrout.com/teledildonics-gave-me-the-gift-of-long-distance-sex-with-a-stranger/2018/12/04>
- Turner, Brad. 2019. “Wellbeing and design: materials for healthy interiors.” *Materials Council* (blog), January 4. <https://www.materialscouncil.com/wellbeing-and-design-materials-for-healthy-interiors>
- Uebermorgen. 2000. Vote-Auction. <http://vote-auction.net/>
- UNESCO. 2019. *I'd blush if I could: closing gender divides in digital skills through education*, by Mark West, Rebecca Kraut and Han Ei Chew. UNESCO and EQUALS Skills Coalition. Available at: <https://unesdoc.unesco.org/ark:/48223/pf0000367416>
- United Nations Environment Programme. 2019. *Emissions Gap Report 2019*. Nairobi: UNEP. Available at: <https://www.unenvironment.org/resources/emissions-gap-report-2019>
- Universal Everything. [2017]. Screens of the Future. <https://universaleverything.com/projects/screens-of-the-future>
- Universitat Oberta de Catalunya, and Fundación BBVA. 2013. Proyecto MOVICOMA. <http://movicoma.blogs.uoc.edu>
- University of Maryland. 2018. “UMD Researchers Create Super Wood Stronger Than Most Metals”. *UMD Right Now* (blog), February 8. <https://umdrighnow.umd.edu/news/umd-researchers-create-super-wood-stronger-most-metals>
- University of Michigan and McGill University. 2018. “Harvesting clean hydrogen fuel through artificial photosynthesis.” *University of Michigan*, blog post, May 3. <https://news.umich.edu/harvesting-clean-hydrogen-fuel-through-artificial-photosynthesis/>
- [University of Washington] Suwajanakorn, Supasorn, Steven M. Seitz, and Ira Kemelmacher-Shlizerman. 2017. “Synthesizing Obama: Learning Lip Sync from Audio.” *GRAIL: UW Graphics and Imaging Laboratory*. <http://grail.cs.washington.edu/projects/AudioToObama/>
- V&A. 2020. Alice: Curiouser and Curiouser. Exhibition at the Victoria & Albert Museum. <https://www.vam.ac.uk/exhibitions/alice-curiouser-and-curiouser>
- Valero, Alicia. 2014. “Límites a la disponibilidad de minerales.” *Ecologista* 83: 24-27. Available at: https://www.researchgate.net/publication/271828672_Limites_a_la_disponibilidad_de_minerales
- Valero, Alicia. 2019. “Límites minerales de la transición energética.” Available at: https://www.researchgate.net/publication/334480232_Limites_minerales_de_la_transicion_energetica
- Van Doorne, Hubert, Elisabeth van Doorne, and Dutch Design Foundation. 2015. Bottle-Up. <https://www.bottle-up.org/>
- Van Helvert, Marjanne, ed. 2016. *The Responsible Object: A History of Design Ideology for the Future*. Amsterdam: Valiz.
- Varvara & Mar. 2013. Neuroknitting. <http://var-mar.info/neuroknitting/>

- Varvara & Mar. 2014. Circular knitic. <http://var-mar.info/circular-knitic/>
- Varvara & Mar. 2014. Speed of markets. <http://var-mar.info/speed-of-markets/>
- Varvara & Mar. 2014. Wishing wall. <http://var-mar.info/wishing-wall/>
- Varvara & Mar. 2016. Chameleon. <http://var-mar.info/chameleon/>
- Vedal. 2020. Oslo Airport City. <https://osloairportcity.no/en>
- Visnjic, Filip. 2018. “The Center for Counter-Productive Robotics – Human-centric approach to automation.” *Creative Applications Network*, blog post, December 17. <https://www.creativeapplications.net/processing/the-center-for-counter-productive-robotics-developing-a-human-centric-approach-to-robotics>
- Vora, Sejal. 2019. *The Power of Data Storytelling*. Los Angeles: Sage Publications.
- Vosoughi, Soroush, Deb Roy, and Sinan Aral. 2018. “The spread of true and false news online.” *Science* 259(6380): 1146-1151. <https://doi.org/10.1126/science.aap9559>
- Vosper, James. N.d. “The Role of Industrial Hemp in Carbon Farming.” *GoodEarth Resources*. Available at: <https://hemp-copenhagen.com/images/Hemp-cph-Carbon-sink.pdf>
- Warwick, Kevin. 2014. “Human Enhancement—The way ahead: The technological singularity (Ubiquity symposium).” *Ubiquity* 2014(October): article 3. <https://doi.org/10.1145/2667642>
- Weckert, Simon. 2020. Google Maps Hacks. <http://www.simonweckert.com/googlemaphacks.html>
- Wertheim, Christine. 2019. Crochet Coral Reef. <https://crochetcoralreef.org>
- Wightman-Stone, Danielle. 2019. “What will humans wear on mars?” *Fashion United* (blog), October 18. <https://fashionunited.com/news/culture/what-will-humans-wear-on-mars/2019101830482>
- Wikipedia, s.v. “Overview effect”, last modified April 30, 2020. https://en.wikipedia.org/wiki/Overview_effect
- Wilkinson, Richard G., and Kate Pickett. 2011. *The Spirit Level: Why Equality is Better for Everyone*. London: Penguin Books.
- WU Vienna. 2019. “Raw Material Profile for Biomass.” *Vienna University of Economics and Business*. Available at: <http://www.materialflows.net/visualisation-centre/raw-material-profiles>
- Wu, Jun. 2019. “Empathy in artificial intelligence.” *Forbes*, blog post, December 17. <https://www.forbes.com/sites/cognitiveworld/2019/12/17/empathy-in-artificial-intelligence>
- Yakubovskaya, Irina. 2018. “Ellen Pearlman: brain opera, telematic performance and decoding dreams.” *The Theatre Times* (blog), December 15. <https://thetheatretimes.com/ellen-pearlman-brain-opera-telematic-performance-and-decoding-dreams>
- Yes Men, The. 2019. Trump is over: If you want it. <https://theyesmen.org/trumpisover>
- Yildirim, Doruk, Luis Edgardo Fraguada, and Elizabeth Esther Bigger. 2019. “DualSkin: Ambient Electric Field Sensing Wearable.” In *ISWC '19: Proceedings of the 23rd International Symposium on Wearable Computers*, 339-345. New York: ACM. <https://doi.org/10.1145/3341163.3346931>
- Yildirim, Doruk. 2019. DualSkin. <http://www.iaacblog.com/programs/dualskin>
- Young, Catherine Sarah. 2013. Climate Change Couture. <https://apocalypse.cc/tagged/climate-change-couture>
- Yu, Lingling, Chenling Shi, and Xiongfei Cao. 2019. “Understanding the Effect of Social Media Overload on Academic Performance: A Stressor-Strain-Outcome Perspective.” *Proceedings of the 52nd Hawaii International Conference on System Sciences*, 2657-2666. <http://doi.org/10.24251/HICSS.2019.320>
- Yudkin, Daniel, Stephen Hawkins, and Tim Dixon. 2019. *The Perception Gap: How False Impressions are Pulling Americans Apart*. New York: More in Common. <https://doi.org/10.31234/osf.io/r3h5q>
- Zafra, Remedios. 2018. *El entusiasmo: Precariedad y trabajo creativo en la era digital*. Barcelona: Anagrama
- Zandan, Noah. 2016. “The future of human communication: how AI will transform the way we communicate.” *Quantified Communications*, blog post, June 14. <https://www.quantifiedcommunications.com/blog/artificial-intelligence-in-communication>
- Zero 2 Infinity. N.d. Bloon. <http://www.zero2infinity.space/bloon>
- Zhou, Shanshan, and Adam Ben-Dror. 2012. Pinokio. <https://www.behance.net/gallery/5914541/Pinokio>

- H#00. The Cyborg Hand, by Judit Parés. 2018. Elisava Final Degree project; Simultaneous Studies Program in Design and Industrial Design Engineering.
- H#01. RadioCosmo Suit, by Agustina Palazzo. www.agustinapalazzo.com. 2018. Developed in Augmented Sense Studio of Masters in Advanced Interaction at IAAC “Institute for Advanced Architecture of Catalonia”. Faculty: Luis Fraguada and Jonathan Minchin. Studio assistant: Irene Ródenas. Picture by Lucho Vidales.
- H#02. Moon Village, by Skidmore, Owings & Merrill (SOM | Slashcube GmbH). Architect, structural engineer, and designer of the master plan for Moon Village.
- H#03. New Horizons SS20 collection, by RÆBURN in collaboration with with the leading design practice HASSELL (Xavier de Kestelier).
- H#04. Bloon, by Zero 2 Infinity SL.
- H#05. DualSkin, ambient electric field sensing wearable, by Doruk Yildirim. 2019. Faculty: Luis Fraguada and Elizabeth Bigger.
- H#06. R.O.S.P - Ritual of Sexual Pleasure, by Coby Huang. Photo by Domka Spyttek.
- H#07. Finely Grafted Jewellery, by Raluca Grada. 2010.
- H#08. Embrace2, by Empatica Inc.
- H#09. Curious Time Rock Stack, by Dawn Bendick. Photo by Max Jacquard.
- H#10. Eunoia, by Lisa Park. Image courtesy of the artist.
- H#11. Implants by Amal Graafstra (Dangerous Things). www.dangerousthings.com
- H#12. Squishy flesh suits, by Daisy Collingridge.
- H#13. FULU, by Ryo Tada. Photo by Deo Suveera.
- H#14. EksoNR™ suit by Ekso Bionics™.
- H#15. Stealth Wear: Anti-drone Burg, by Adam Harvey. Photo © Adam Harvey.
- I#00. Phonoma, by Sandra Lara Baranera. 2017. Elisava Final Degree project; Undergraduate Degree in Design.
- I#01. © Block by Block.
- I#02. “Memorialized Accounts,” at Facebook (screenshot).
- I#03A. Online Culture Wars, by Disnovation.org. 2019.
- I#03B. Profiling the Profilers, by Disnovation.org. 2020.
- I#04A. The Great Wall of Memes, by Valentina Tanni. 2012-2014. Installation at The Darknet – from Memes to Onionland. An Exploration exhibition. Courtesy: Valentina Tanni: the artist, Anonymous. Photo: Kunst Halle Sankt Gallen, Gunnar Meier.
- I#04B. Hell Yeah We Fuck Die, by Hito Steyerl. Photo by Marc Asekhome. Courtesy of Andrew Kreps Gallery, New York.
- I#05. Apparatum, by panGenerator. Photo by Maciej Jedrzejewski.
- I#06. Eva (@eva.stories). Instagram account.
- I#07. Hyper-Reality, by Keiichi Matsuda.
- I#08. Air Transformed: Better with Data Society Commission, by Stefanie Posavec and Miriam Quick. Photo by Steve McInerney.
- I#09. Smog Free Tower Korea, by Daan Roosegaarde. www.studio Roosegaarde.net
- I#10. BlindWrite, by Heroku. Online at: <https://blindwrite.herokuapp.com>
- I#11. Algorithmic Justice League (AJL). Ars Electronica Award of Distinction 2020.

- I#12. A Truly Magical Moment, kinetic sculpture by Adam Basanta. 2016. From the exhibition Data Dating, curated by Valentina Peri. Courtesy of the artist and Galerie Charlot.
- I#13. Predictive Art Bot, by Disnovation.org. 2017.
- I#14. Self-defense moves against technology leaflets, by Dasha Ilina (Center for Technological Pain). 2017 - ongoing. Courtesy Dasha Ilina. Photo: MU Hybrid Art House.
- I#15. Voltaic Realism, by Fujita Keisuke.
- M#00. Luca, by Laura Gusart. 2019. Elisava Final Degree project; Undergraduate Degree in Design.
- M#01. After Ancient Sunlight, by Charlotte McCurdy.
- M#02. The Green Charcoal. 2018. Principal Researcher: Shreyas More. Research Mentor: Meenal Sutaria. Institution: ISDI School of Design and Innovation.
- M#03. “Harvesting clean hydrogen fuel through artificial Photosynthesis” research project. Colorized electron microscope image courtesy of Faqul A. Chowdhury (McGill University).
- M#04. Magnified images of wood treated by a new process invented by engineers at the University of Maryland that compresses the natural structures of wood into a new material five times thinner. Image Credit: University of Maryland.
- M#05. Honext Material SL. www.honextmaterial.com.
- M#06. Charcoal Foam Composite, by Natural Material Studio.
- M#07A. Image used with permission from Microsoft, retrieved from: Smith, Brad. 2020. “Microsoft will be carbon negative by 2030.” *Official Microsoft Blog* (blog). blogs.microsoft.com/blog/2020/01/16/microsoft-will-be-carbon-negative-by-2030
- M#07B. Illustration retrieved with permission from: United Nations Environment Programme. 2019. Emissions Gap Report 2019. Nairobi: UNEP.
- M#08. Metamorphism, by Shahar Livne. Image courtesy of Shahar Livne Design Studio. Photo by Alan Boom.
- M#09. #Rethink campaign, by Evo & Co. www.campaign.com/rethink
- M#10A. Feltwood Ecomateriales S.L.
- M#10B. Piñatex, by Ananas Anam.
- M#11. Dumitriu, Anna, and Bobbie Farsides. 2014. *Trust Me, I'm an Artist: Towards an Ethics of Art Science Collaboration*. N.I.: Blurb. Book cover: IKB Pee, by Neal White.
- M#12A. Flat House, by Practice Architecture. Photo by Oskar Proctor.
- M#12B. 3D printed house with hemp-based material, by MIRRECO™. Design: Arcforms.
- M#13A. Algae Platform, by Atelier Luma (www.atelier-luma.org) and Studio Klarenbeek & Dros (www.dotunusual.com). Photo by Antoine Raab, Luma Arles.
- M#13B. Algae Platform, by Atelier Luma (www.atelier-luma.org) and Studio Klarenbeek & Dros (www.dotunusual.com). Photo by Florent Gardin, Luma Arles.
- M#14. Maile Teliauli beating the tapa, from the Wooden textiles project, by Buro Belén in collaboration with tapa community of Tongatapu islands. Photo by Belén. www.burobelen.com
- M#15A. Biotechnology from the Blue Flower, by Anna Dumitriu and Alex May in collaboration with the EU CHIC Project.
- M#15B. CRISPR transfected Chicory protoplasts with GAS gene knockout 02 experiments at Keygene, by Anna Dumitriu, Robert Sevenier and Alex May in collaboration with EU CHIC.
- T#00. Ammartaggio, by María Carrión. 2019. Elisava Final Degree project; Simultaneous Studies Programme in Design and Industrial Design Engineering.
- T#01. Unfit Bits, by Tega Brain and Surya Mattu. 2016. Photo: CC-BY Tega Brain 2019.
- T#02. Asunder, 2019, Tega Brain, Julian Oliver, and Bengt Sjöln. Photograph CC-BY Tega Brain 2019.

- T#03. “Fooling automated surveillance cameras: adversarial patches to attack person detection”. Simen Thys, Wiebe Van Ranst and Toon Goedemé.
- T#04. Google Maps Hacks, performance and installation by Simon Weckert. 2020.
- T#05. Decisive Mirror, by Sebastian Schmiegl. Installation view at “Entangled Realities – Living with Artificial Intelligence” exhibition at HeK Basel, 2019. Photo by Franz Wamhof.
- T#06. 048 Thero. Design, hardware, software and production by Román Torre and Ángeles Angulo.
- T#07. Dust, created by Mária Júdová and Andrej Boleslavský. Dancers: Soňa Ferienčíková and Roman Zotov.
- T#08. Social Soul, by Lauren Lee McCarthy and Kyle McDonald. 2014. Photo by Kyle McDonald.
- T#09. The Center for Counter-Productive Robotics. ECAL and AATB / Thibault Brevet.
- T#10. Screens of the Future, by Universal Everything.
- T#11. Lauren, by Lauren McCarthy.
- T#12. Face Cage 2, by Zach Blas. Endurance performance with Elle Mehrmand. 2014. Photo courtesy of the Artist.
- T#13. EEGKISSStillhires: E.E.G. Kiss, by Karen Lancel and Hermen Maat. @ Eye Film Institute Amsterdam 2014; © lancelmaat.
- T#14. Kniterate.
- T#15. Kinematics Concept, by N-e-r-v-o-u-s.
- S#00. Entre redes, by Amalia Puga. 2019. Elisava Final Degree project; Undergraduate Degree in Design.
- S#01. Fairphone.
- S#02A. Basic Income Café, by Martina Huynh. Photo: Karin Fischnaller.
- S#02B. Basic Income Café, by Martina Huynh. Photo: Martina Huynh.
- S#03A. I :-) feel :-) home :-) every :-) where :-) I’m :-) inside :-) you :-) , by Plasticity Studio (Grazia Mappa + Gabriele Leo) for the Institute of Queer Ecology. 2018. Installation view at Towards a Common Survival exhibition at Prairie Gallery, Chicago.
- S#03B. Thinx Inc.
- S#04. Gugu Peteni. Images by Lihle Menziwa.
- S#05A. Modified photo viralised after Vox tweet. Original photo by Ignacio Pereira.
- S#05B. Jitsi video conference screenshots.
- S#06. Artists Series / Lotería Mantera, by Top Manta. Jacket illustrated by Olga Capdevila.
- S#07A. *The Happiness Industry: How the Government and Big Business Sold Us Well-Being*, book by William Davies.
- S#07B. *The Burnout Society*, book by Byung-Chul Han.
- S#08A. Virtual environment as visual identity. School of Speculation (SOS) and The Rodina continue to collaborate connecting participants with radical contemporary thinkers and doers. Image credit: The Rodina, Sonic Acts Academy, 2018.
- S#08B. SOS_20, a free month-long design residency hosted by museums and galleries across London. Image credit: School of Speculation, 2020.
- S#08C. Image Credit: School of Speculation, 2019.
- S#09. The Urban Village Project, by Space10 and EFFEKT Architects.
- S#10. Tonal Home Gym.
- S#11. Oslo Airport City, by Vedal. Nordic – Office of Architecture and Haptic Architects, produced by Forbes Massie.
- S#12. Club Quarantine curated lineup. In clockwise order from the top left: @b_e_a_r_c_a_t (dj), @thequeenpriyanka (drag performer), @torvs (DJ), @segabodega_ (DJ), @cordill3ra (DJ), @caseymq (cofounder and resident DJ), @namasenda (DJ).

- S#13. WAL(L)TZ, by Tshaki. Photo by Tessa Sakhi.
- S#14. #AloneTogether contribution by Jonas Lindstroem for Dazed - NHS trust Barts Charity.
- S#15. Image by Six N. Five for Rimowa.

All images have been granted permission from authors and/or organisations.

Elisava Insights
75 challenges faced
by humans and the planet.

Editors:

Laura Clèries, PhD
Javier Peña, PhD

Authors:

Laura Clèries, PhD (Foreword)
Luis Fraguada (Human)
Pau García (Information)
Clara Guasch (Materials)
Varvara Guljajeva, PhD (Technology)
Toni Llàcer, PhD (Society)
Nicola Montaretto (Information)
Oscar Tomico, PhD (Human Dialogues)

Editorial Team:

Project Leader and Curator:
Laura Clèries, PhD

Project Manager:
Gemma Caihuelas

Research Editor:
Guim Espelt, PhD Researcher

Art Direction & Graphic Design:
Lorena G. Ortiz
Lluc M. Bevia
Attassa Cabrera

Communication Manager:
Maria Gracia

An innovation report by Elisava Research.
Barcelona, June 2020

ISBN: 978-84-09-20608-7
https://doi.org/10.46467/ElisavaResearch_Insights

This work is licensed under a Creative Commons
Attribution - Non Commercial - No Derivatives (CC BY-NC-ND)
4.0 International License

Elisava Research

research.elisava.net
Contact: research@elisava.net

ELISAVA

Barcelona School of Design and Engineering.
La Rambla, 30-32, 08002 Barcelona.
www.elisava.net