

# Know your DestinE - or how to clone your Planet

State of the Hearts

## State of the space, state of the Earth

*Extra-terrestrial mining or space as an Observatory?*

<sup>1</sup> This is ESA | The European Space Agency, [https://www.esa.int/ESA\\_Multimedia/Videos/2019/11/This\\_is\\_ESA](https://www.esa.int/ESA_Multimedia/Videos/2019/11/This_is_ESA)

At the closing of the year 2020, we witness the spectacular evidence of planet Earth's refusal to further contain the human expansionist drive and exploitation competition.

Whilst the public consciousness drifts towards a sustainable mindset, governmental military actors have set their sights over and above the Earth's horizons. The automatic pilot of the Infinite Growth Paradigm is now eagerly targeting outer space. Be it moon landing, space mining or planet colonizing, each country has the ambition to claim their primacy.

These are highly profitable times for the space economy, which, as the world stalls, is 'rocketing upwards', it's worth expected to escalate up to 1 trillion by 2040 according to Morgan Stanley analysts.

While the bigger contenders, among which the US, India and China, are competing in the domain of imperialistic achievements, seeing space as land to conquer in line with the Infinite Growth dogma, we aim to focus on the alternative, "conservationist" model adopted by the European Union's 'inward' strategy.

*This is the European Space Agency, dedicated to the peaceful exploration and use of space for the benefit of humankind.<sup>1</sup>*

-The European Space Agency (ESA)

The scenario promoted by the ESA is driven by the ambition to deploy, in the name of preservation, the state-of-the-art digital technology to design and keep under control our given limited territory. The primary tools for this purpose are the invisible entanglement of outer space facilities and their land-based nodes: the great satellite infrastructure, a multitude of observatories that punctuate the cartesian dome, scanning the planetary surface and meticulously monitoring the environment and its transformations. In short, the ESA is reaching out to outer space in order to turn a scopic gaze back onto planet Earth, *our very own* space to take care of.

This inverted perspective is due to different factors. It first comes across as a form of consistency with the European Union's acclaimed sustainable environmental policies. 2020 was indeed the start of the EU's new decennial plan, this time decidedly oriented towards the convergence of green economy, technological advance and social equity. In March 2020, the Circular Economy Action Plan was adopted by the European Council as part of the European Green Deal with the aim to be-

come climate neutral by 2050. The confluence of ecology and economy is manifested through technology, with the ESA as the EU's futuristic tool for the implementation of its environmental protocols.

Nonetheless, as we acknowledge the recent and upcoming giant steps towards space conquest taken by the other public and private actors in the game, it isn't far-fetched to assume that this attitude is also expressing the awareness of having to exploit different assets in order to be competitive in the technological discovery race.

What can be the inmost significance of this shift from zooming out towards zooming 'back' in?

We mean to question the ESA's distinctive blueprint through a narrative and speculative analysis of its latest colossal venture, the multifaceted "Digital Twin Earth" DestinE project.

### A manifested DestinE

#### *The "Digital Twin Earth" Project*

As announced last October, a trillion pixel-Digital Twin Earth model is now being developed by ESA. Creating a virtual double of the planet using digital twin technology<sup>2</sup>, the DestinE project has the ambition to bring together meteorological data, in situ measurements and sociological data in order to "continuously monitor the health of the planet"<sup>3</sup>, strategically combining environmental politics and digitalization.

The virtual model feeds on optical data from the Copernicus Satellite System - "Europe's eyes on Earth"<sup>4</sup> - as well as local sensors scattered all over the Earth's surface. Powered by three supercomputer centres (Italy, Finland, Spain) and the nascent quantum computing at CERN, the model aims at climate management, along with the achievement of zero emissions by 2050 in the EU. While listing the DestinE project's aims and expected returns, ESA's earth observation director - and future general director - Josef Aschbacher constantly

refers to the duality between supervising climate phenomena and human behaviour. The terms "health" and "behaviour" are keywords to the DestinE manifesto, whose communicative approach shares similarities and lexicon with the medical sphere. The project itself has a strong link to biological imagery, consisting of the cloning of a complex system seen as a whole body.

The suggested aim of supervising the planet's health through constant monitoring implies the wish to engage in an environmental preventative therapy, observing and forecasting in order to cure, triggering discovery through inward examination.

### Does the Earth dream of itself?

#### *A real time self healing via the virtual double of planet Earth*

We can therefore consider the Digital Twin Earth as the projection of a holistic cure of the planetary organism, an integrated and synergetic twin model to enhance the prognosis and diagnosis for the planet Earth. This metaphor resonates with the Gaia hypothesis and the Earth System Sciences, which suggest a conception of the Earth as a complex whole, assimilating Humboldtian holistic views and traditional cosmologies.

To fully understand the scope of this project, it is worth taking a look at how Digital Twin technology works.

The Digital Twin is an inductive-deductive discovery process, where a simulation is constantly readjusted and recalibrated through a flow of in situ measurement data. This stream is called a digital thread: it can be visualised as a 'data pipe-line' that feeds the digital twin with real-time evidence, a flow of information through a timeline. An architecture of evidence, that allows the supervising and surveillance of the whole process, projecting us through past and future scenarios.

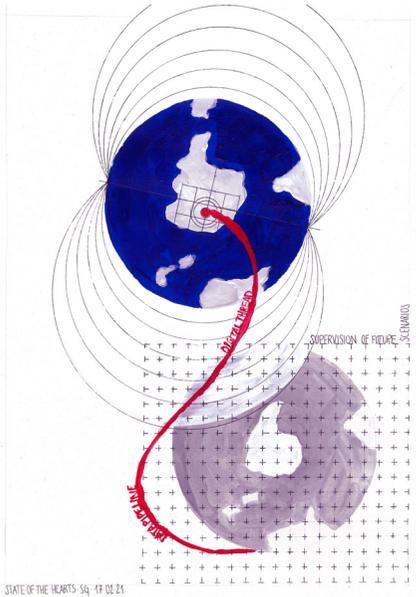
This is how DestinE aims to restructure climate forecasts, and how data science is integrated in the design

<sup>2</sup> "[...] the basic concept of the Digital Twin model has remained fairly stable from its inception in 2002. It is based on the idea that a digital informational construct about a physical system could be created as an entity on its own. This digital information would be a "twin" of the information that was embedded within the physical system itself and be linked with that physical system through the entire lifecycle of the system."

Digital Twin: Mitigating Unpredictable, Undesirable Emergent Behavior in Complex Systems (Excerpt) Dr. Michael Grieves and John Vickers

<sup>3</sup> Destination Earth (DestinE) | European Commission, <https://ec.europa.eu/digital-single-market/en/destination-earth-destine>

<sup>4</sup> Copernicus. Europe's eyes on Earth, <https://www.copernicus.eu/en>



process. The virtual simulations are to be continuously integrated and implemented with data evidence, possibly allowing spatio-temporal hacking.

The term nowcasting effectively evokes this idea: used by both economics and meteorology to describe the present and immediate future predictions to prop decision making in an unreadable now - a form of divination that exudes the extraordinary to a more immediate destiny.

### *Where do the real and the replica collide?*

We could trace the DestinE project's close link to the medical imagery right back to its technological conception: The Digital Twin comes to life as a symbiotic clone, and the Digital Thread is the umbilical cord that relentlessly binds the virtual replica to the original.

The model is constantly generated by the source, as a self-projection and imagination of the entity - *Earth dreaming of itself*.

Will it just keep occurring as an astral-projection, crystallizing and envisioning the state and processes of the planet?

And what will be the extent of its physical existence, the invisible infrastructure deployed for the powering of this hyperreal digital trace?

### **Image control**

#### *Observation as design*

If Digital Twin technology is usually deployed in product lifecycle management, the scale and complexity in this case are much higher, if not hyperbolic.

DestinE is set to replicate a highly complex environment, containing several different subsystems.

The tension to create a digital clone of our planet is driven by the urge to fully comprehend all its elements and dynamics. Reflecting on the ambiguity of the word, we could claim that along with the notion of knowledge and

understanding comes a desire for possession and control over physical and spatial, if not behavioural phenomena.

In all its features, DestinE comes across as yet another up-to-date apparatus for territorial rationalisation. A very European machine, that finds its ancestor in the Medieval Encyclopedia and aspires to an all-encompassing intelligence.

As argued by Benedict Anderson in *Imagined Communities*, studying the genesis and grammar of geography is fundamental to fully understand the political implications of territorial exploration over time. Anderson identifies the map, together with the census and the museum, as one of the most relevant inventions shaping the way European culture conceives, rules and dominates the environment. Great discoveries of tools designed to observe and 'navigate' space in various forms have historically triggered transitions in science and politics and deployed observation as a political control tool.

The renowned "Galileo Affair" may just be a perfect example. If today we recognise Galileo Galilei's Telescope as the evolutionary step in astronomy that brought the Copernican Revolution to its climax, we should not forget how the invention was sponsored and promoted: with convincing arguments on its military benefits and no mention to the astronomical and scientific implications, as testified by the fund request letter Galileo wrote to the Venetian Doge in 1609. We may wonder whether the fundamental drive of science - that is, the understanding of reality - is destined to be ever-bound to the purpose of controlling it.

The invention of the telescope was the technological prosthesis that allowed astronomers to claim Earth's spot in the cosmos, yet its potential for control and supremacy was the key element that brought it to accomplishment.

Today, ESA's independent global navigation system (GNSS, 2016) is named after Galileo, built as a civilian

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5 Galileo and the Telescope, from collection Finding our Place in the Cosmos, Library of Congress <https://www.loc.gov/collections/finding-our-place-in-the-cosmos-with-carl-sagan/articles-and-essays/modeling-the-cosmos/galileo-and-the-telescope>

and homegrown alternative to military-based US GPS or Russian GLONASS systems.

Galileo wasn't the first to invent the telescope, but he had the intuition to turn its lenses "towards the heavens"<sup>5</sup>. Several centuries after, the descendants of these lenses are journeying in space installed on satellites and probes, Earth's eyes to the outside and to itself: does our planetary 'DestinE' rely on this anti-copernican turn, from zooming out to zooming back into the highest resolution of our physical surface? A model of the Earth aimed at its observation, gathering data to forecast and watch the environmental degradation as it happens, nowcasting the apocalypse?

### Hyperresolution and over-optimization

The issue is that we may not know how to best intervene. The present ecological crisis unveils an ideological crisis, and the empirical data is not sufficient to build a system of thought.

In lack of a better strategy, the choice is to invest funds and resources in a titanic observational venture, hoping for it to become a planetary oracle.

From the infinitely large to the infinitely small, the scales collide. From a Digital Twin Earth to a 'Digital Twin Heart', the same technology that creates DestinE is also being applied to precision cardiology. The surgeon follows the steps of the operation in front of a digital monitor; a few meters away, a sprawling robot - the Da Vinci machine - operates on a human body.

Correspondingly, neoliberal major forces are calling for a planetary open-heart surgery in the form of climatic geoengineering. It is suggested that, by changing certain parameters in the not yet fully explored environmental equation, a solution to the damages dealt by the infinite growth paradigm can be found within its own structure. We are at an early stage of terraforming our own planet, owning, controlling, holding all this information in ad-

vance as a form of luxury.

Are hyperresolution and over-optimization setting us free?

Projecting its digital carbon footprint ahead, this large-scale planetary observance aimed at climate change modelling accidentally takes part in the climate change itself.

As a snake eating its own tail, the coming to life, functioning and maintenance of the digital and physical infrastructure requires significant energetic efforts, and will likely end up contributing to the phenomena it promises to prevent. This may be less due to an accident than to a (recurrent) error in method: the safeguarding machine becomes part of the destruction process.

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State Of The Hearts is a woman led discovery practice rooted in the desire of exploring post- and trans-human futures related to technological upheaval in our Anthropocentric environment. Our roots are in architectural education: AAM and ETHZ in Switzerland. Our role as architects is coordination between the tech and the sociological. We strongly believe that space is more and more dematerialized and the future role of architects is to design connections, relationships, and systems. On this ground lays the interest in the invisible infrastructure and in unveiling its collateral agents, observe and carefully adjust the reading of our augmented globe.

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