Planetary Platform Automation

STEPHANIE SHERMAN

In his planetary design treatise *Operating Manual for Spaceship Earth* (1969), Buckminster Fuller described "comprehensively commanded automation" as a fundamental principle for a viable "Earth operating system."[1] "[A]utomation displaces the automatons," Fuller claimed, positioning automation as a foundational process of biological and technological evolution, a dynamic bio-technical process of encoding and embedding persistent decisions.

Fuller parsed automation in three distinct and contingent ways: first, automation as a function of *universal physical principles*, such as gravity, rotation, and movement, part of the regulatory structure that governs the trajectories of planetary bodies;

second, automation as *socio-technical processes* that delegate memorization, specialization, and maintenance to computers and machines to open space for human creative generalization and transferability; and third, automation as a *planetary protocol* that coordinates Earth's ecosystemic complexity through artificial management, interoperation, and calibration.[2]

Over half a century later, Fuller's manual remains an unrequited mandate for Earth operations, with his framing of Earth as an automated spaceship and his pragmatic operational design philosophy still beyond the scope of increasingly desperate planetary policies. Automation is a series of resolutions that build on one another, an ever-evolving operating infrastructure that inscribes decision-making power in agents and environments. Earth is, and has always been, an automated platform. In the age of planetary computation and artificial intelligence, automation can and must be harnessed to intentionally enable the development, survival, and governance of planet Earth.

As described elsewhere in this volume, the Planetary provides a practical philosophical framework for situating Earth and its extraplanetary astronomical systems. The Planetary accounts for the evolutionary functions and flows of material recomposition, scientific observation, metabolic recalibration, and synthetic construction. Distinguished from the sociocultural and political emphasis of the global, which centers the forces of human development and divisions in territories and ideologies, the Planetary investigates the complex processes that merge the biological, geological, chemical, metaphysical, and technological. The Planetary grapples with the forms of intelligence implicated in this comprehension, as well as the functional modalities that

can reorient the current phase of energetic malfunction toward systems viability. The planet, in other words, evolved humans — and now humans are evolving ways to sense, perceive, model, and modify the planet.

Planetary intelligence, as described by Sara Walker, David Grinspoon, and Adam Frank, is the evolutionary transformation of an immature biosphere to a mature technosphere in which energetic systems eventually compose a self-maintaining apparatus capable of ensuring a modulated and sustainable homeostasis.[3] The achievement of a mature technosphere would necessarily entail the evolution of the process of evolution itself — from the slow localisms of natural selection to an accelerated and intentional integration of "autocorrect" functions informed by planetary sensing and modeling.

Planetary computation is one way that planetary intelligence evolves to construct self-maintaining apparati. The instruments and infrastructures through which the planet is observed, modeled, and patterned increasingly coordinate automatic action without human intervention. Planetary computation provides the tools to support, augment, and recompose complex Earth operations while posing new paradigms for learning, behavior, and intelligence.[4]

Planetary platform automation frames this evolutionary process as a form of *operational* intelligence through which platforms build upon other platforms, embedding intelligence into environments and infrastructures. Planetary platform automation positions intelligence not as awareness, metacognition, reason, consciousness, or prediction, but as a functional operational behavior by which systems continuously learn and revise

themselves according to feedback from the world.

The Earth, as Fuller saw, is *already* functioning as an automated platform. Planetary platform automation builds upon the existing condition of automated platform Earth, shaping the maneuvers by which planetary computation might augment, coordinate, recalibrate, update, and optimize Earth's operations, which inevitably reshapes the philosophies that underpin it.

Planetary Platforms

Earth is a platform of platforms. The geologic definition of platform is a flat plane or plate of rock covered by sedimentary strata. Geological platforms, such as Earth's continents, form by filling in a jagged or inconsistent formation to create a smooth base. These platforms, bounded by oceans or crusts, compose new layers of tectonic stability and homogeneity. Over time, these geologic platforms grow and degrade and migrate and splinter, precipitated by both slow tectonic shifts and accelerated by grand disruptions like volcanoes and earthquakes.

Earth's platforms include not only geological composites, but also the biogeochemical assemblages, energetic reactions, atmospheric compositions, and material pressures that provide the basis for the ongoing dynamic interaction and development of life. In this sense, platforms are foundations and frameworks that scaffold operations for further interaction. This process is found both in the material physics of planetary operations and also in technologies across scales. In synthetic biology, for example, researchers refer to a cellular scaffold as a "chassis," a platform upon which biological systems are designed, built, and

tested.[5] This platform provides standardized protocols, resources, and infrastructures that can be used to manipulate biological components such as DNA, RNA, and proteins to engineer biological functions or systems.

Earth's platforms also include the human-constructed architectures and infrastructures that, at planetary scale, encase the Earth in an "artificial megastructure"[6] that builds from, upon, with, and between biological and geochemical foundations. These platform architectures — oil rigs, train platforms, ramps, docks — collect and distribute energy, facilitate material processing, and channel and coordinate information through standardization and allocation, evolving upon one another through layering, sometimes amplifying and sometimes undermining their earlier formations. Road, rail, marine, and other infrastructures are by now almost entirely standardized to coordinate global flows of physical goods across the Earth's surface.

These platforms fold the planetary into itself, recomposing Earthly materials in their construction and operations. Digital platforms extend this infrastructural network logic to information channels, financial exchanges, and communication, which similarly depend on an energetic substrate. Extraplanetary machines in orbit, such as satellites, servers, and sensors, produce planetary observations of the Earth's condition, a condition that computational systems like GIS, visualization, and simulation tools can monitor and model. Planetary organizations such as the Square Kilometre Array Observatory, space agencies, and the International Telecommunications Union provide platforms for regulating, certifying, and coordinating Planetary science and research. This stratum of platforms provides the basis for

the rapid evolution of planetary computation and the ongoing disclosure of planetary conditions, what Benjamin Bratton in this volume calls "planetary sapience."

More broadly, platforms are a particular type of system with particular evolutionary dynamics. They designate an environment or ecosystem, a physical or cognitive architecture, an infrastructure or interface that establishes the parameters in or through which other things can be programmed, built, or designed. Platforms provide a foundation that both sets things apart and raises them up, making closer and interoperable connections, a reverse entropy that evolves by microscopic iteration as well as macrophenomenal reconstruction. These platforms prescribe protocols that, like DNA, operate within fixed and rigid vertical rules, enabling a horizontal distribution based on repeatability, transferability, interoperability, and flexibility. A multitude of permutations develop, advancing diversity and differentiation through homogenization and coordination. Through standardization, consolidation, distribution, and resolution, platforms accelerate automation, which further accelerates and encodes decisions into processes that no longer need to be explicitly considered but are directly embedded into environments themselves. Platforms not only provide stages for enhanced observation (looking out or over) but also often make other processes invisible. These stages refer to the spatial domains and protocols that platforms set up and also to the stages of development through which platforms evolve and progress according to feedback.

It is through the ongoing development of platform processes that humans are able to comprehend and act upon planetary conditions. If the Earth is a platform of platforms currently unable

to manage its energetic output, then a planetary society situates humans within an evolutionary process that eventually automates platform evolution itself.

Automation As A Planetary Process

In the most common definition, automation describes the delegation of human labor, decision-making, or production process to *machines*, which typically overtake roles humans previously occupied. This happened first with manual work like weaving or switchboard operation, and later with more cognitive tasks through automated intelligence in calculation and computation, pattern detection and modeling, writing and image generation.

This definition of automation limits its planetary potential. From a Planetary perspective, automation is a *relative* phenomenon, less about the direct transfer of human work to machines than about the continued process of resolving questions embedded in decisions or context. Automation is the evolving environment of consolidation, coordination, and choreography of the operations required to achieve any outcome.

Humans have always struggled against the biological forces of planetary automation by developing technological systems that work against primitive or natural automation. Through technologies, industrial automation outsourced what was beyond or beneath human capabilities, and it enabled the infrastructures of global civilization: water supply, industrial agriculture, refrigeration, health care, air traffic control. In this way, platform automation became a means to establish a quality of human life

that overrode or undermined naturally inefficient or suboptimal biological processes. Inter- and extra-planetary machines and sensing apparati extend the human capacity to probe and explore the Earth, like robots for venturing into the deep sea.

Planetary automation also involves extraplanetary automation, as Claire Isabel Webb explores in her contribution to this volume. When the spacecraft *Cassini*, a satellite set up to sacrifice itself, took its final dive through the rings of Saturn, it sent back the most stunning images, providing humans with extraordinary visual information. With the rapid development of artificial intelligence, planetary automation gained and then surpassed human-level cognition for operations, including data compilation, pattern searching, and language production and translation.

If machine automation was invented to augment machines in factories operated by humans, the evolutionary trajectory of automation implies that the planet Earth combined with its extraplanetary condition becomes another sort of factory producing intelligence about itself — automation producing and predicating further automation.

Platform automation, then, refers both to the *automation of platforms* — the encoding and prescription of biogeochemical, metaphysical, or technical processes — and the *platformation of automation*, which describes how automation further embeds standardization and amplification of founding conditions into ecosystems and environments. No platforms without automation, no automation without ongoing platform formation.

Following Fuller, we can define automation as a deeper evolutionary logic that embeds responses to the physical

properties of the universe — a process of bio-technical decision-making that resolves prescriptive actions without conscious cognitive oversight. Evolution automates decisions by discovering structures through encounters and tests in environments rather than by programming operations from first principles. Any decision taken automatically, without thinking, is a form of automation. In this sense, learning is a process of updating a model based on feedback, establishing a new framework upon which to build. Planetary platform automation describes externalized construction and embedded cognition as the evolutionary trajectory of cognition itself.

Artificial intelligence presents an opportunity for humans and biotechnical machines to detect patterns and develop abstract models and predictions based on performance, and also to embed decisions and decision-making capacities into environments themselves, giving platforms the ability to auto-decide, auto-maintain, auto-manage, autocorrect. Intelligence, then, can be understood as self-conscious cognition and prediction based on modeling and a process of *performative* externalization whereby successful behaviors and protocols demonstrate fitness and utility based on circumstances and maintain adaptive flexibility even as learnings are consolidated into evolving agents and environments. This goes beyond the cybernetic focus on feedback and control — it positions automation both as an internal function of automatic self-regulation *and* as a continuous process of externalized experimenting, testing and infrastructuralization.

From a philosophical perspective, the highest forms of intelligence seem not to stop at cognition or consciousness or reflection; optimized intelligence *inscribes* the ability to process

information with such alacrity and fidelity that an agent can behave automatically, without conscious cognition or external regulations. It also offloads agential functions into environmental ones as part of intelligent distribution and infrastructuralization.

Automation does not eliminate the role of human beings but rather shifts their role in planetary processes to the critical functions of cultivating interoperable optimizations of evolutionary processes while eliminating other operations altogether.

Artificial intelligence transforms platform automation and computation from programmable rules and prescriptive processes to environments that precipitate *development* through continuous feedback and learning. Computation offers a useful heuristic in this respect. A programmer writes or composes code, whereas a developer determines the operations by which a code might be leveraged or optimized to realize a desired outcome. Humans become designers and developers of platform automation processes, which then automate platform automation.

The urgency of recalibrating Earth as a viable ecosystem programmed toward survival requires the humans currently at the helm of such decisions to frame intelligent planetary operations as operations without operators. *Intelligence* means energetic sustainability in which a system sacrifices a part for the survival of the whole, or the ability to update a model rapidly in response to new information, and also something more akin to involuntary virtuosity — the efficient performance of effective operations that no longer require cognitive effort.

Planetary Platform Automation And Intelligent Evolution

Gaia theory, developed by James Lovelock and Lynn Margulis, posits that Earth's ecological systems serve as a self-regulatory mechanism, a naturally occurring, *automatic* planetary feedback loop.[7] The theory espouses an Earthly autopoiesis, in which the entire Earth functions as an autonomic platform regulating and adapting symbiotic life. The theory has been challenged due to its limited geologic historicity, primarily in reference to the Holocene era, during which integrated mechanisms of auto-regulation produced only temporary stability.[8] A volatile climatic age preceded the Holocene, and similarly the Anthropocene has disrupted the autopoietic homeostasis presumed to be inevitable and persistent.

The most salient takeaway from Gaia theory's inconclusivity is that evolutionary planetary platform automation proceeds both by iterative optimization and by grand disruption. The so-called Great Oxidation Event transformed the Earth's atmosphere and enabled the evolution of aerobic life-forms. Distinct from the localisms and niches of natural selection, this event proceeded through a rupture in the iterative automated platform of evolution, precipitating a new evolutionary trajectory in which atmospheric oxygen gave way to the thinking organisms we call human beings. Gaia theory relies on natural time and evolution. Platform automation can accelerate spacetime at the planetary scale.

Darwinian natural selection as an evolutionary system is energetically intelligent at a local level, but not necessarily intelligent from a whole-systems view. It works through

slow species adaptation in response to local environments, neighborhoods, or niches that determine fitness according to the most immediate contexts. Because this form of evolution is developed through a series of locally determined outcomes, which are themselves based on established protocols, it does not have the capacity to account more holistically for the myriad factors that shape the environments in which it plays out.

Localized competitive decisions are unable to incorporate broader patterns or the predictive modeling of secondary effects that might result from cascades of automated and optimized processes. This is the case in natural systems and in infrastructural ones as well. Autopoietic automation, for example, led to the dramatically inefficient megastructure of the automobile and the highway system, producing a wicked problem in which platform automation built on platform automation encoded a dependence on fossil fuels and pervasive concretization that destroys ecological habitats. In this sense, local or site-specific autopoietic selection as a process is (as the computer scientist Eliezer Yudkowsky put it) "stupid" because its optimizations occur too slowly over generations to accommodate the rapidity of the transformations they precipitate and because each decision cannot account for its effects on the whole system in which it develops, or the potential cascades of that intervention, at any given instant.[9]

As the anthropogenic climatic transformation of Earth's ecosystem continues to evolve beyond homoeostasis, it demonstrates maladaptive human behavior: the inability to calibrate cognitive intelligence (the awareness that the climate is in fact changing in existential ways) into coordinated action

(intelligence as the ability to act upon this knowledge at the scales required). Fuller's prescription was to harness the forces of automation, whether they be physical, cognitive, or mechanistic operations, toward the reconfiguration of Earth operating systems that would both harness existing power and intervene as generalists in the design of evolution.

Planetary platform automation plays a growing role in intentional systems governance. The cybernetic "governor" is a regulatory device that maintains a process of bio-technical autocorrection rather than a political figure who relies on rhetoric and representation. Governance is, after all, just the mechanisms, processes, and practical implementation of regulating, orienting, and calibrating, intelligent systems that maintain and act upon insights derived from automated platforms operating in the world.[10] Automation optimizes and builds on existing systems, and humans working within them reroute, redirect, and make them interoperable through testing and feedback.[11]

Platform automation provides a model for bridging the energetic intelligence of local natural selection with the kinds of artificial interventions that might be designed to derive insights from emergent exceptions, deep pattern detection, and path-dependent updates. This model would operate by activating converging forces rather than prescribing rote rules. This line of thinking runs counter to the litany of critiques of algorithmic governance, what John Danaher calls "the threat of algocracy."[12] Planetary platform automation shifts the computational model from threat to opportunity, from critique to constructive optimization. The technological and predetermined becomes a potential social asset if leveraged with nuance, precision, and

iteration.

One obvious arena for planetary platform automation in Earth systems management would be the coordination of economic and ecological relations, two systems that currently operate independently. Imagine, for example, a planetary mechanism in which carbon output *automatically* sets price. Rather than proceed via convincing individual agents or national actors to modify their behavior at will toward collective flourishing, this would reset the fundamental terms upon which economic assets derive value. It would combine the demonstrable intelligence of localized market decisions with an intentionally directed definition of value modulated by planetary conditions.

Platform automation reframes the philosophy of Planetary governance not as a means of convening actors to think through mitigation, but as a commitment to effective and efficient planetary calibration. The realization of a collective philosophical orientation proceeds at once by devising mechanisms that can infiltrate the processes of iteration and readily prepare to harness disruption through a paradigm of action where those mechanisms might *automatically* take hold. In this sense, planetary platform automation requires environmental interdependence rather than autonomy. Platform automation optimizes operational verticals that integrate insights from horizontal distribution.

Operational Intelligence: Planetary Prediction And Performance

In the grand strategy planetary simulation game Stellaris, players build an empire through intergalactic expansion with

the goal of developing a functional planetary system. Players cannot choose to reroute fundamental parameters of physics or cellular development, but they can select technological, ecological, or economic principles that set planetary priorities and the variables that determine viable governance operations. An array of expansion packs allows players to introduce various paradigmatic resources and pressures — Synthetic Dawn, MegaCorp, Federations, Aquatics, First Contact, The Machine Age. In the game, one available function is to "automate" the management operations of the empire, allowing the player to prioritize their attention on some operations while prescribing or programming others. As one player put it on a Reddit thread replete with musings on the poor performance of this planetary management program: "[Is] it really that hard to code competent AI for planetary administration?"[13]

To become a properly intelligent process, planetary platform automation must model and test potential outcomes. In the age of planetary computation, this happens regularly through simulations that present, with various levels of fidelity, scenarios in which factors and variables can be isolated and tweaked to experiment with possible trajectories. Simulations support the understanding of such outcomes, modeling through performance and feedback based on wholesale effects. Like any model, including any model of planetary intelligence, planetary platform automation would never be able to observe and model a system in its entirety. Platform automation must be highly adaptable, intentionally designed with flexible protocols rather than fixed programmed operations, and capable of navigating and changing with new insights from accelerating effects and cascades. In this

sense, platform automation operates as a form of *operational intelligence*, which establishes protocols and procedures that reduce the variables of the unknown. Operational intelligence attempts to address all that can possibly be predicted or predetermined or prescribed to make space for the incorporation of insights from what cannot.

Operational intelligence, as a domain of activity, historically refers to the capability to collect, analyze, and act upon data in real-time to make informed decisions and optimize operational processes for continuous improvement and modification. Currently, most modeling and decision-making tools (traffic control, water resource management, health care) use mathematical/computation frameworks like entropy theory or adaptive modeling to accommodate complexity. These systems, relying on Von Neumann computational architectures that underpin simulation technologies, use sequences that prescribe a series of operational rules. They do not, in their foundational architecture, mirror derivative complexity or automatically update their models based on observed schisms between predictions and outcomes.

Operational intelligence is a process of designing systems to accommodate all "known knowns" (as Donald Rumsfeld would put it) to accommodate "unknown unknowns" — in other words, procedures that respond to effects impossible for any system to model. In this sense, operational intelligence involves a perpetual accounting not just for what previously existed, but also for what-ifs, while knowing full well that those what-ifs are incomprehensive and that convergence supersedes causality. Nevertheless, intelligence also involves synthesis — the reduction

of variables as a recursive and reflexive process. An operationally intelligent tool for governance would leverage operational intelligence not as a series of rules or protocols, but as a process of optimization that incorporates unexpected outcomes back into the system's model.

As a form of operational intelligence, then, planetary platform automation evolves via the configurations and cascades of effects of automated processes embedding, encoding, inscribing, and artificially transforming environments in their image through feedback on performance. Stellaris's AI model might be terrible at planetary administration because it does not yet integrate *conditioning* and *memory*: An abstract model has not yet become channeled into its functionality. This model, like the ones we currently have, runs predictive programs based on past parameters, but the system is not actually intelligent — it does not update its model based on new outcomes.

This lack of learning or updating based on models and memory prevents another form of virtuosity from emerging. The operationally intelligent evolution of planetary platform automation would require a continuous interlinking of various planetary systems, such that feedback loops could be cross checked, and also require a computational architecture with the power to process predictions simultaneously rather than sequentially and to build recursively on previous conclusions.[14] Rather than a string of cause and effect or if-thens, it would need to architect a calibrating mechanism whereby adaptive processes can distinguish unexpected and unanticipated formations as factors, delineating trends from outliers.

Planetary platform automation is not only an operating

protocol, a proposed interoperable infrastructure for an evolving Spaceship Earth. It is also a philosophical framework, one that approaches planetary intelligence not as cognition or self-awareness, but as *the reflexive incorporation and continuous modification of behavioral processes that meet the challenges of continuously and rapidly evolving environments through performance.* Planetary platform automation relies on an operational intelligence that encounters not totality but vastness in every direction, from quark to universe. This incompleteness does not thwart its intentionality or its encoding of rules. Rather, it is a commitment to deep incorporation, a comprehension of continuous movement by way of expansion, determination, acceleration, and modulation, based on standard deviations and the incorporation of presumed exceptions. It derives its momentum not from the abstraction of prediction, but from the active realization of continuous behavior modification.

Like platform processes, policy shifts for planetary platform automation might be realized by way of slow iteration or unpredictable disruption, by incorporating insights from copious accidents and failures as well as successful examples in intentional Earth management and systems conversion. One such example, a rare exception of planetary policy gone right, is the Montreal Protocol, a unilateral universal agreement arranged by a series of UN agencies that came together to establish atmospheric pollution regulations with the very specific goal of eliminating the use of ozone layer-depleting chlorofluorocarbons. The lesson from the Montreal Protocol was not only the explicit removal of certain chemicals from energetic processes, but the development of and mandate to deploy their synthetic substitution,

hydrofluorocarbons, which are still greenhouse gasses but do not deplete the ozone layer with the same rapidity. An alternative model would be an Independence Day-scale emergency, in which an external force or enemy disrupts the foundations upon which the apparatus depends, leveraging a widely recognized existential threat as a justification for instituting automated procedures. Regardless of its procedures, planetary platform automation presents a philosophy of the planetary that positions intelligence as the ability to act *automatically*, an operation without operators that updates auto-regulation through artificial interventions, learning through both slow iteration and the precipitous shifts of emergency.

Planetary platform automation is an evolutionary process that occurs through augmented and automated intelligence. The modification of an operating manual for Spaceship Earth is no longer a mandate for designing the protocols for human intelligence, but a systems manual for designing and developing synthetic intelligences realized through feedback based on actualized performance, many which humans themselves can neither conceive of nor comprehend.

One of the great ironies of current AI hype is the inflated obsession with governing AI rather than a rigorous exploration of ways to deploy AI as a tool for governance. An operational intelligence that mobilizes planetary platforms proceeds through the inexorable automation of evolution. This is an artificial evolution that surpasses natural evolution, learning by testing and exceeding, step by step and leap by leap, the parameters and procedures that determine, constrain, and enable it.

Notes

1   M. A. Ellis, P. K. Haff, and E. Lazarus, "Earth Operating Systems 5.0: Law as a Geological Process in the Anthropocene," American Geophysical Union, Fall Meeting 2018, abstract #GC31G-1327.

2   R. Buckminster Fuller, *Operating Manual for Spaceship Earth* (Carbondale, IL: Southern Illinois University Press, 1969).

3   "Intelligence as a Planetary Scale Process," *International Journal of Astrobiology* 21, no. 2 (February 2, 2022): 47-61. https://doi:10.1017/S147355042100029X.

4   Benjamin H. Bratton, *The Terraforming* (Moscow: Strelka Press, 2019).

5   J. Kim, M. Salvador, E. Saunders, J, González, C. Avignone-Rossa, and J. I. Juménez, "Properties of alternative microbial hosts used in synthetic biology: towards the design of a modular chassis," *Essays in Biochemistry* (2016): https://doi.org/10.1042/EBC20160015

6   Bratton, *The Stack: On Software and Sovereignty* (Boston: MIT Press, 2016), 8-17.

7   James Lovelock, *Gaia: A New Look at Life on Earth* (Oxford, UK: Oxford University Press, 2016); Lynn Margulis and Dorion Sagan, *Gaia and Philosophy* (London: Ignota Books, 2023).

8   Michael Ruse, "Earth's Holy Fool?" *Aeon: A World of Ideas*, January 14, 2013. https://aeon.co/essays/gaia-why-some-scientists-think-its-a-nonsensical-fantasy.

9   "Evolutions Are Stupid but Work Anyway." *LessWrong* Blog. November 3, 2007. https://www.lesswrong.com/posts/jAToJHtg39AMTAuJo/evolutions-are-stupid-but-work-anyway.

10   Gregory Bateson, *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution, and Epistemology* (Chicago: University of Chicago Press, 1972).

11   Bateson, ibid.

12   "The Threat of Algocracy: Reality, Resistance and Accommodation," *Philosophy and Technology* 29, no. 3 (January 6, 2016): 245–68. https://doi.org/10.1007/s13347-015-0211-1.

13   WesternReactionary. "Why is AI planetary management … so terrible?" *Reddit*, October 2023. https://www.reddit.com/r/Stellaris/comments/17e63iy/why_is_ai_planetary_management_so_terrible/

14   *The Computer and the Brain* (New Haven, CT: Yale University Press, 1958).