

In the future, more sensitive and more open humans

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Résumé

L'article examine les conditions de production des technologies du futur, en se demandant si elles suivront une logique d'innovation linéaire ou si elles donneront lieu à des bifurcations techniques et sociales. Il s'appuie sur l'analyse de l'ouvrage *Au nom de l'innovation*, de Vincent Bontems, qui examine de manière critique la conception dominante de l'innovation comme résultat direct et linéaire d'une recherche fondamentale orientée par le marché. Le texte met en évidence l'influence décisive de Gilbert Simondon dans la réflexion de Bontems, en particulier l'idée selon laquelle le progrès technique s'opère par des transductions qui articulent des horizons de faisabilité et de créativité, jusqu'à atteindre des seuils de saturation. L'innovation ne peut être forcée, car elle dépend du stade atteint par les lignées techniques. L'article souligne également des exemples analysés par Bontems, tels que des projets de la NASA et du CERN, dans lesquels la création technique résulte de processus collectifs, longs et incertains, mais aux retombées scientifiques et techniques significatives, notamment dans les domaines de l'imagerie médicale, de la supraconductivité et des interfaces tactiles. Le CERN est présenté comme un modèle institutionnel singulier, fondé sur l'accès ouvert aux données, un financement public proportionnel et l'absence de retour financier direct, constituant ainsi une « utopie techno-socialiste ». Enfin, l'article oppose ce modèle à la recherche industrielle contemporaine, marquée par des impératifs de rentabilité et par des formes d'aliénation liées à la soumission de la technique à la logique de la performance.

Mots-clés : Innovation technique; Philosophie de Gilbert Simondon; Transduction technique; Recherche Collective; Critique du modèle linéaire de l'innovation.

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Abstract

The article discusses the conditions under which future technologies are produced, questioning whether they will follow a linear logic of innovation or give rise to technical and social bifurcations. It is based on an analysis of Vincent Bontems's book *Au nom de l'innovation*, which critically examines the dominant conception of innovation as the direct and linear result of market-oriented fundamental research. The text highlights the decisive influence of Gilbert Simondon on Bontems's thinking, in particular the idea that technical progress occurs through processes of transduction that articulate horizons of feasibility and creativity, until limits of saturation are reached. Innovation cannot be forced, since it depends on the stage reached by technical lineages. The article also emphasizes examples analyzed by Bontems, such as projects at NASA and CERN, in which technical creation results from collective, lengthy, and uncertain processes, yet produces significant scientific and technical outcomes, including advances in medical imaging, superconductivity, and tactile interfaces. CERN is presented as a singular institutional model, based on open access to data, proportional public funding, and the absence of direct financial return, thus constituting a "technosocialist utopia." Finally, the article contrasts this model with contemporary industrial research, marked by imperatives of profitability and by forms of alienation associated with the subordination of technology to the logic of performance.

Keywords: Technical innovation; Gilbert Simondon's philosophy; Technical transduction; Collective research; Critique of linear innovation model.

How will the technologies of the future be produced? What imperatives will they obey? The technical lineages that continually improve automobiles are undoubtedly well established. The technologies that will enhance all household appliances are already known. The miniaturization that transformed the early large computers into today's microcomputers combined the search for a mass audience with that for greater autonomy in intellectual work. When I asked a computerscientist friend in the early 1970s whether one could create a keyboard that would store in its memory what one wanted to have printed once back home, the friend believed it would revolutionize production relations too much to be accepted by the market. The market, however, was more sensitive to users' desires than to inventors' caution and proved him wrong.

Will the technologies of the future be innovations or bifurcations? Will they continue to use ever more energy and rare materials, or will they have to adopt a less

prosthetic approach thanks to human attitudes that are more open to the diversity of our possible ways of performing?

The book that Vincent Bontems has just devoted to innovation¹ is more interested in scientific and technical productions than in the development of more sensitive human beings.

It is nevertheless interesting to follow him along these paths before moving further toward the technologies of the future. The beginning of the book is devoted to the belief in the linear model that presents technical, economic, and social innovation as the logical consequence of fundamental research, something that raises both ethical and practical problems. On page 36, we reach the conception of innovation that I myself have known, which also involves consumers as well as the recommendations of actors throughout the entire diffusion chain.

It was in the 1980s that the idea of targeted research appeared in research funding, subordinated to the needs of the market, which research was supposed to supply with products in a linear manner. «Innovation becomes the name that gives a veneer of scientificity to discourse on research management»².

Gilbert Simondon, frequently cited by Vincent Bontems, who is one of the specialists on his work, would not have thought about it in this way. Gilbert Simondon identifies two types of improvement in technical objects: those that modify the distribution of functions and increase the synergy of operation, and those that merely reduce the residual obstacles to functioning. The continuous progress of a technical object consists in modifying certain elements for better performance, until any further improvement of one element leads to degradation in another dimension. At that point, saturation is reached.

Vincent Bontems also frequently cites Jean-Louis Maunoury, for whom the process of innovation is a transduction (a term from Simondon) that realizes a “technical intention” by closing the gap between a ‘horizon of feasibility’ (the available operations) and an ‘horizon of creativity’ (the desirable functions). This transduction crosses a threshold of concretization and advances the technical lineage. There are periods of effective creation, when technical lineages progress significantly, and periods of stagnation, when the pace is much slower and the design of objects reaches the saturation threshold. In Maunoury’s model, innovation cannot be forced; it depends on where one stands in the technical lineage, whether close to saturation or ready for the emergence of a new arrangement of functions.

Vincent Bontems illustrates his thinking with NASA’s experience, which at first managed to achieve faster, better, and cheaper results, but failed when applying this approach to the Mars exploration program. I find that his analysis of the obstacles

¹ Bontems, V., 2023, *Au nom de l’innovation. Finalités et modalités de la recherche au XXI siècle*, Paris, Les Belles Lettres, coll. L’Âne d’or.

² Bontems, V., 2023, *Au nom de l’innovation. Finalités et modalités de la recherche au XXI siècle*, Paris, Les Belles Lettres, coll. L’Âne d’or, p. 57.

encountered by NASA would also apply to the French EPR program, which I regret not seeing examined.

Vincent Bontems emphasizes that the management of research personnel, which requires reporting what one is doing halfday by halfday to prevent researchers from wandering unproductively, is counterproductive, because it is based on the idea that we already know what we are supposed to find, which makes breakthrough innovation impossible. The evaluation of research activity according to this type of indicator has no metric whatsoever for invention or innovation. He then describes more creative design regimes in order to find other indicators: creative stimulation induced by play, abductive prompting through formal analogies, inventive problemsolving aimed at the ideal object, and expansive design as in the CK theory developed at the École des Mines, which makes the two horizons of creativity and feasibility covary. The analysis is applied to the cases of the ChemCam laser integrated into the Curiosity rover sent to Mars, the superconducting electromagnets of the Large Hadron Collider (LHC) designed to capture the Higgs boson, and the mirror of the Herschel space observatory. In these three creation processes, « the feedback of the virtual upon the actual, which defines invention for Simondon, operates recurrently »³. It is obviously very difficult to keep all the stages of this feedback in memory; it would require an additional, competent writerly function, never included in any research program—although this is precisely what the philosopher devoted to scientific processes, Vincent Bontems, sketches. He emphasizes that the awareness of what is happening is fundamentally transindividual, as Simondon had already argued, which would complicate the work of our scientific writer. It is the transmissions and transactions between individuals that produce the present; any given individual's view of it will be partial and distorting. These transactions and transmissions do not belong to the normal functioning of laboratories or companies; they arise in the search for the conjunction of the two horizons. They put heterogeneous series into relation, the condition for the emergence of new machines, as Félix Guattari intuited. For these series to be brought into relation, research and innovation ecosystems must be created, as Maunoury said: open institutional spacetimes for establishing such connections⁴.

The proposal that Vincent Bontems draws from this is that of a right to research and innovation, which would consist in a right to research shared with others within “technological terroirs” in which each person would bring their capital of available functions to connect them with a common social, economic, and cultural horizon of creativity. Something sketched by the Cerisy conferences, during which I met Vincent Bontems, but which most often lack the longterm investment and the horizon of creativity that such “technological terroirs” to be created would allow.

³ Reference details missing.

⁴ Bontems, V., 2023, *Au nom de l'innovation. Finalités et modalités de la recherche au XXI siècle*, Paris, Les Belles Lettres, coll. L'Âne d'or, p. 129.

The examples of innovation given by Vincent Bontems are objects whose production requires an exceptional kind of faith, something Isabelle Stengers mocked in *The Virgin and the Neutrino*, where she compares the scientists' quest to the pilgrimage of believers. Yet the scientific and technical outcomes of these efforts are considerable.

The research conducted at CERN to develop the LHC produced inventions within the technical lineage of magnets, in the field of superconductivity, in the fabrication of ultrahigh vacuum, in the devices ensuring cooling, insulation, etc. ... The progress of the particle accelerator lineage had direct repercussions on medical imaging with the positron camera now commonly used in hospitals. It was also at CERN that the first capacitive touch screen was invented in March 1972, 'an invention that today makes the smartphone possible'⁵.

According to Vincent Bontems, it was at CERN that the Web was invented, but mathematicians tell a different story. All agree that they envisioned something free of charge. But is free access possible without public funding and state oversight?

The CERN appears to Vincent Bontems as a model of a democratic institution, which I also assume to be as elitist—if not more so—than Athenian democracy. Regardless of where a scientific laboratory integrated into the CERN network is located, one has access to all the data in the network under the same economic conditions, and one has the right to the same computing power. The publications of CERN researchers are freely accessible so that researchers around the world are not strangled by access costs. In every respect, CERN favors the “best offer”. For the management of these “global public goods” that are the observational instruments developed by CERN, there is a Strategy Council in which sit representatives of the member and associated countries. Some sessions concern the functioning of the CERN laboratory, and other sessions concern strategy—that is, the coordination of research at the European and global levels, since non-European countries are also associated with CERN. Each country's contribution is proportional to its GDP, and there is no return on investment, which makes it possible to detach research from national profit-seeking. «CERN is a technosocialist utopia: each contributes according to their means, and all participants benefit from the common production»⁶.

Alongside these major technoscientific facilities, which operate under exceptional rules, today's society is inhabited by numerous researchers who, within various institutional settings, feel obliged to innovate. Whereas the few scientists of the past adhered to values of universalism, disinterestedness, and originality, the many new researchers, most often employed by industrial companies that organize proprietary, commissioned research under authoritarian and local conditions, are develop-

⁵ Bontems, V., 2023, *Au nom de l'innovation. Finalités et modalités de la recherche au XXI siècle*, Paris, Les Belles Lettres, coll. L'Âne d'or, p. 131.

⁶ Bontems, V., 2023, *Au nom de l'innovation. Finalités et modalités de la recherche au XXI siècle*, Paris, Les Belles Lettres, coll. L'Âne d'or, p. 159.

ing a new ethic grounded in concern for the world, perfectibility, the transversality of disciplines, and an expanded scientific responsibility. This allows them both to innovate and to escape the narrow and constraining framework of the company.

The ethics of industrial research seems increasingly shaken by the discovery that human alienation stems from the performance requirements imposed on the machine, requirements that technical research, particularly in the energy sector, seeks to improve.

Paradoxically, it is the subjugation of the machine to the human will to power that transfers into alienation by the machine, an especially strong subjugation and alienation in the military sphere. The criterion of ‘best value,’ which has been highlighted to counter the damage caused by ‘lowest cost,’ would require evaluation methods that have yet to be developed. Yet the planet’s ecological situation is pressing. «For the ecosystem formed by living beings and machines to endure, it must both decrease and progress. »⁷

Among the myths of innovation analyzed by Vincent Bontems, that of the robot and artificial intelligence draws our attention.

The robot cannot go beyond the data at hand in order to innovate by anticipating a pure virtuality—that is, a future not merely improbable but unimaginable on the basis of present data’—whereas, as Simondon says, the living being can make the virtual act upon the actual, can invent a future without knowing it, but one it desires. ‘The desire for an unknown state forges the link between the future as undecidable (beyond the reach of artificial intentionality) and the affective orientation toward the future (beyond the reach of artificial interiority), for the undecidable future is the condition of an unpredictable and discontinuous transformation.’⁸

The myth of the robot attributes to it the capacity to revolt like a human slave, but it does not have the interiority required to negotiate its relation to power; it obeys or it breaks. Science, by contrast, is an open system of norms because it contains within itself the possibility of a transduction toward another system of norms.

For my part, I experienced such an attempt at a transduction of desire within a system of social, rather than technical, innovation, developed from the psychiatric clinic of La Borde, within the CERFI, the Center for Institutional Studies, Research, and Training. In the years following 1968, in most administrations, young senior civil servants were questioning the authoritarian and disdainful management norms for collective facilities established in earlier decades, as well as the new philosophy proposed by political authorities, which consisted in reserving these facilities for poor and assisted populations in order to discipline them, while granting greater organizational freedom, though necessarily in a private framework—to those better off

⁷ Bontems, V., 2023, *Au nom de l’innovation. Finalités et modalités de la recherche au XXI siècle*, Paris, Les Belles Lettres, coll. L’Âne d’or, p. 161.

⁸ Bontems, V., 2023, *Au nom de l’innovation. Finalités et modalités de la pesquisa au XXI siècle*, Paris, Les Belles Lettres, coll. L’Âne d’or, p. 210.

populations who could afford it. Social workers, teachers, and physicians, gathered in the journal *Recherches*, sought to experiment with new ways of doing things. In the new towns or in neighborhoods undergoing social development, some officials were receptive to such innovation. Many ingredients were missing to succeed at the time, beginning with scientific research grounded in congruent hypotheses, but also locally elected officials open to experimentation, as well as residents' associations concerned with the fate of the common good. The change of president of the Republic in 1974 put an end to the attempt. The term social innovation was recycled. Paradoxically, reading Vincent Bontems's book, and above all the messages posted online by innovators in the educational field, often enthusiastic about neuroscience and cognitive science, leads me to think that the possibility of realizing this social innovation is now more distant than it was fifty years ago! The relationships among all participants in a given action would need to be jointly worked toward congruence, while the individual lines opposing it would be analyzed and gradually transformed. The resources of literature and science fiction would be mobilized to generate the necessary imaginary transformations.

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