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Revisiting the Network of "Les Immatériaux"

The Exhibition as Manifestation and Interdisciplinary Research Platform

The exhibition "Les Immatériaux" took place at the Centre Pompidou in Paris in 1985. It has since become one of the prime reference examples for the conjunction of artistic, philosophical and scientific discourses in the 20th century. The main curator was philosopher Jean-François Lyotard, and much of the scholarship on the exhibition has focused on the ways in which the show articulated Lyotard's concept of "immateriality" and, more broadly, his conception of postmodernity.[1]

In addition to being an exhibition of recent developments in art and science, and a manifestation of philosophical thoughts and concepts, "Les Immatériaux" was also a research platform that extended over several years. The project for the exhibition had already been in the making at the Centre Pompidou's "CCI" (Centre de Création Industrielle) since 1981, two years before Lyotard joined as a chief commissioner in 1983. In the course of its preparation, an extended consortium of science, research and development agencies had been constructed to create a survey of the latest trends and innovations in techniques and materials of industrial creation.[2] This consortium was shaped, fostered and organised by design theoretician Thierry Chaput and a whole team of people and included university departments, research agencies, and technology companies. For many people involved, "Les

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1   See Hui and Broeckmann 2015 for a selection of essays that establishes the current state of research on "Les Immatériaux", and a comprehensive bibliography of the secondary literature (on page 269). The most substantial archival research on the exhibition was conducted by Gallo 2008 (in Italian), Hudek 2001 and 2009/2015 (in English), and by Wunderlich 2008 (in German). The latter publication contains an exceptionally detailed, 150-page, site-by-site description of the exhibition, "Phénoménologie de la visite," pp. 103–250.

2   For references to the participating artists, researchers, institutions and companies, see *Inventaire* 1985, sheet "Remerciements", no pagination, and the verso sides of the exhibition sheets. For an account of the institutional and political setting of "Les Immatériaux", see Mackay 2015: 222–233.

31   *Les Immatériaux*, opening on 28 March 1985, Centre Pompidou, Paris, Thierry Chaput behind Jean-François Lyotard, with Jack Lang and Mme Pompidou (from right to left), at site "Toutes les copies". Photo © Jean-Louis Boissier, 1985.

Immatériaux" was less a philosophical exercise, nor a reflection on the *zeitgeist*, but rather a collaborative and interdisciplinary effort at practical research and innovation. While the over-arching narrative that Lyotard developed for the project had a lasting effect on thinking about the transformation of ontological and technological paradigms, "Les Immatériaux" as an interdisciplinary research platform was an important, seminal moment in the development of art, science, and technology in France, and beyond (fig. 31). A comprehensive archive and documentation of "Les Immatériaux" will therefore encompass its conceptual and material aspects, as well as evidence of the research practices which coalesced in the project.

Conceptualising "Les Immatériaux"

An exhibition project on new materials, their production and reception, their meaning and the related technologies of information and communication had been planned at the CCI, the Centre Pompidou's department for design and industrial creation since 1981. The general theme of the exhibition project was sketched in a document dated April 14, 1983. Given that the first conversations with Lyotard took place around this time, we can consider it a source for understanding the state of discussions among the organizing team before Lyotard was invited to join as chief curator in the summer of 1983. The eight-page docu-
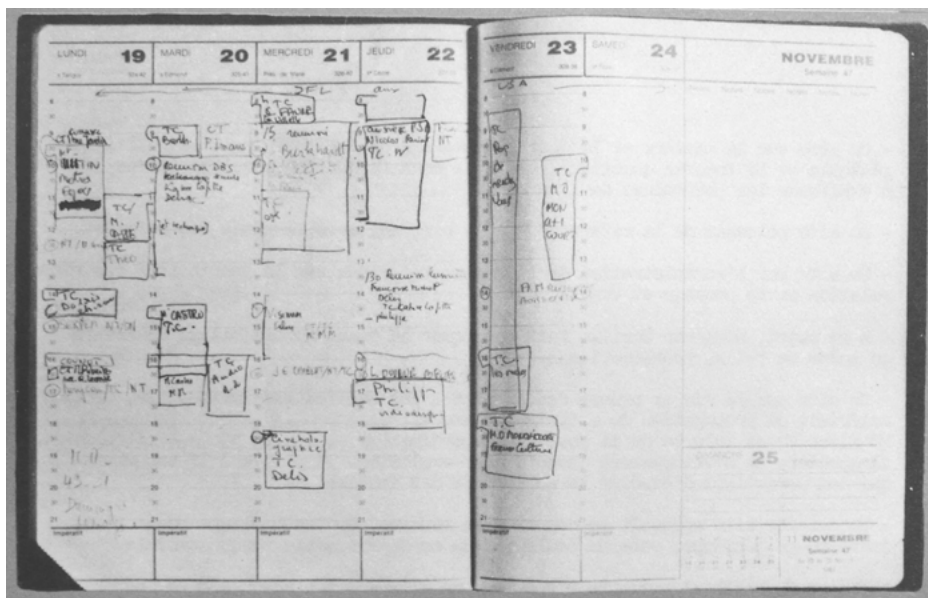
32 *Les Immatériaux*, catalogue Album, double page from Thierry Chaput's calendar, November 1984. Courtesy of Centre Pompidou, MNAM, Bibliothèque Kandinsky.

ment is entitled "'*La matière dans tous ses états' (titre provisoire)*" (Matter in all its states [provisional title]), and the subtitle reads: "*Manifestation du Centre de Création Industrielle sur le thème des matériaux nouveaux et de la création*" – a manifestation on the theme of new materials and creation.[3] No author is mentioned, so we can assume that it was written collectively by Chaput and the équipe at the CCI.

The document is reprinted in the *Album,* a 64-page bound brochure which was published as part of the exhibition catalogue, together with the *Inventaire*, a site-by-site account of the exhibition in the form of a collection of 71 unbound A4 carton sheets (fig. 32). The *Album* is a surprising publication to appear simultaneously with the exhibition proper, since it includes facsimiles of documents, sketches, scrap notes and even the reproduction of a double page from a production calendar that documents working meetings in the week of November 19, 1984. The *Album* thus opens up to public scrutiny the preparation and production period of the exhibition, and highlights the processual quality of a project which was not limited to the exhibition period in the spring of 1985, but started earlier and pointed the visitors and readers into the future, through the list of participants and collaborators, and a comprehensive reading list.

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3   *Album* 1985: 8–11; the exhibition was then still planned for the second half of 1984. The following remarks are based on insights offered by Thierry Dufrêne in a lecture at the Centre Pompidou, November 27, 2015.

Lyotard's own first comprehensive conceptual sketch ("*Esquisse*"), which also introduced the term "Les Immatériaux" as a working title for the project, was dated 10 August 1983, four months after Chaput's document.[4] In this *Esquisse* – which was not included in the *Album*, perhaps because a later, 1984 exposé which was printed there was seen as more complete and more crucial for understanding the conceptual development[5] –, Lyotard would maintain the general thematic focus of the exhibition, but importantly criticized the terms in Chaput's subtitle, "material," "new," and "creation," for their modernist thrust.

The central topics which would eventually be featured in the exhibition, like clothes, fabrics, food, printing and electronic means of reproduction, interactive narration, and digital and 3D imaging, were all already mentioned prominently in Chaput's April 1983 document. It also mentioned the "escape from the notion of modernity" which the technical world was engendering,[6] and pointed to the crucial role that the scenography of the exhibition was going to play as a "mediator" and a "producer of meaning."[7] Chaput even introduced the terminology of immateriality, speaking of the "*matériaux 'immatériels'*" which are characterised by the flux and transformation of one form into another, and from the abstract state of information into "hard" materials (*des matériaux "durs"*). By means of the computer, the text contends, all synthetic materials can be produced and one knows about their properties, no matter whether they exist or not, or not any more. "Prisoners of the materialism of the industrial revolution, the immaterial materials suffer from their invisibility. Now however, a new culture is taking shape, through images, sounds, and words."[8]

An important source for Lyotard's initial response to this concept was his own 1979 report on "The Postmodern Condition." One way in which Lyotard extended this critique of modernism to "Les Immatériaux" was through the rejection of the notion of an "exhibition." Instead, he favoured the designation of the project as a "manifestation" – a term that had also been used by Chaput in the April 1983 document. As Chaput and Lyotard wrote in the press material in 1985, they would rather speak of a "non-exhibition," in order to "question the traditional presentation of exhibitions, which are indebted to the salons of the eighteenth century and to galleries."[9] The aim was not to show things or represent ideas, but to posit them and make them manifest. In the spring of 1984, Lyotard delivered a discourse on the development of his ideas for the "Immatériaux" project. In a lengthy section, the philosopher explains how the notion of the exhibition is linked to the concept of modernity: "There is a relation implied in this concept of exhibition, the relation of a subject who visualises objects, works, who confronts them, who looks at them face-to-face, with this visualisation – that of those who have conceived the exhibition – controlling it through the spatial layout itself. Thus on the part of the recipient who is the visitor, there is the principle

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4   Unpublished document, Centre Pompidou Archives.
5   *Album* 1985: 16–22.
6   Ibid., 8.
7   Ibid., 9.
8   Ibid., 10.
9   Quoted in Hudek 2009/2015: 85.

that he is foremost a man who looks, an eye."[10] The aim of the "Immatériaux" was not to teach "but ..., for the team in any case, ... to question, and I would even say to disquiet, the idea of the will and intelligence of an allpowerful subject, in order to produce instead a sort of effect of modesty in the anthropological atmosphere in which we live – the problem is that it effectively risks ending up in failure."[11]

In this talk, Lyotard goes to great length to further illustrate how such a notion of the manifestation is translated into the scenographic concept of "Les Immatériaux." He compares the experience intended for the show to the perambulations in the city, and to the literary form of the *Bildungsroman*, and then ventures into two lengthy digressions, only the second of which I want to retrace here. The first digression examines one of Denis Diderot's reviews of the 18th century Salon exhibitions and its blurring of the boundary between experience and representation.

Lyotard's second digression draws on the architect Giairo Daghini and the philosopher Paul Virilio, both of whom offered model thoughts for radically addressing the key question regarding the spatial arrangement of "Les Immatériaux," namely, as Lyotard puts it, "What is the new space that is constituted today through these invisible networks?"[12] Daghini insisted on the necessity of a conceptual break with achieved concepts of urban and architectural space:

> ... one thing is certain: once the system has changed, there is no point in making directional and coherent analyses with the logic of this system or with the logic of the project defined as that of modernity. On the other hand, we will have to work patiently and at length so as to grasp and to practice the characteristic logics of the systems in which we are immersed.[13]

Paul Virilio's text, *"Une ville surexposée"* ("An Overexposed City"), from which Lyotard quotes and which, like that of Daghini, had only recently been published in the December 1983 issue of the journal *Change International*, plays with the double meaning of the French *"exposition"* as both "exhibition" and "exposure." "I would be pleased," writes Lyotard, "if the exhibition Les Immatériaux could be called a surexhibition/over-exposure [*surexposition*]."[14] Lyotard quotes at length Virilio's description of the urban concatenation of streets, screens, lights, electronic topologies, electronic microscopes, and data bases, and refers these to his own ideas for the spatial lay-out of "Les Immatériaux" which he will continue to discuss later. Lyotard was clearly fascinated to find in Virilio's text descriptions

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10   Lyotard 1984/2015: 45. On this text, "Après six mois de travail ...", see the detailed reading by Wunderlich 2008: 93–101, which however touches on this discussion of the exhibition format only briefly (100–101); see also Gallo 2009: 57–58, and Rajchman 2009 who emphasizes the aspect of the 'presentation of ideas.' Hudek 2009/2015: 85–87, affirms that Lyotard's wish to transcend the singularity of the modernist eye "undermines the efforts of those seeking to discuss 'Les Immatériaux' as a novel treatment of the 'exhibition medium.'" (86)
11   Lyotard 1984/2015: 60.
12   Ibid., 55.
13   Ibid.
14   Ibid.

of the type of manifestations of immateriality that he was looking for, for example, Virilio's definition of what Lyotard calls, with Marcel Duchamp's term, *"infra-mince,"* the ultra-thin: "Every surface is an interface between two milieus in which a constant activity prevails, taking the form of an exchange between two substances placed in contact with one another."[15]

Lyotard's conclusions drawn from this analysis of modern and postmodern urban spaces is remarkable in our present context not only because he thus fortifies the scenographic concept of "Les Immatériaux" – for instance its labyrinthine structure, the suspension of "walls" and vitrines, the absence of separate rooms, and the conflation of entrance and exit area –, but also because he repeatedly insists on this being an understanding developed not by him alone, but by the whole organisation team:

> If now I take this barely sketched-out model and transport it to the case of the exhibition, asking myself, therefore, what a postmodern exhibition corresponding to the metropolis or to the nebula of conurbation could be, then I am indeed obliged – and this is what we have all concluded – we are obliged to refuse the traditional *dispositif* of the gallery and the salon – that is to say, the *dispositif* which opposes, for example, rooms and the corresponding corridors, habitats and lines of circulation.[16]

The collaborative realisation of "Les Immatériaux"

These thoughts were formulated by Lyotard a year before "Les Immatériaux" opened, but of course these considerations don't necessarily mean that the exhibition actually became such an over-exposed site. The gloom of the first major space the visitors entered into, the site "Théâtre du non-corps," already made it clear to them that they were not in such a brutal, expansive, Virilio'esque postmodern space. As Hudek remarks:

> What distinguishes this [i.e. Virilio's] sublime cyber-landscape from Lyotard's and Chaput's stagecraft is precisely the exhibition's opacity and depth – its 'difficult' greyness and theatrical obscurity – which impeded the seamless mobility and translucency of Virilio's futuristic vision.[17]

Equally, the other sixty sites of the exhibition presented not only, and not even primarily, items from the fledgling "digital culture," as we would call it today, engendered by the immaterial materials. There were contemporary and historical paintings, photographs and sculptures, historical costumes and specialist suits, industrial robots and samples of synthetic

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15 Ibid., 56. The notion of the "infra-thin" (*infra-mince*) which Lyotard used as key metaphor for the immaterials, had been adopted and developed by Marcel Duchamp in notes made in 1935, in the context of his research into the fourth dimension. In Duchamp's understanding, the concept combined optical as well as material aspects, and it related to the transparencies and textures of materials – which wedded it to the Russian Constructivists' concept of *faktura* –, as well as to the multiple dimensions proposed by modern physics; see Henderson 2005: 213–214. For the exhibition site "Infra-mince," see Wunderlich 2008: 136–139.

16 Ibid., 58.

17 Hudek 2015: 86.

skin. But there were also multiple computer screens and video projections, interactive and networked installations, treating the new media technologies of the time both as a means of display, and as a topic of the exhibition.[18]

For the site "Corps chanté," for instance, Christophe Bargues and Jean-Claude Fargier had sampled over 100 music video clips to elucidate the aesthetic of bodies, speed and rhythm that prevailed in this new media format. The clips were presented in loops on three large video monitors.[19] Bargues and Fargier were assisted by Catherine Testanière, the video editing was done by Cédric Bossard, the audio mixing by Nicolas Joly, and the production was coordinated by Thierry Chaput and Annyck Graton – names which are mentioned here in order to underscore that in most parts of the exhibition there were numerous people involved. Many of them were young people who not only had an important influence on the aesthetics of works produced for the exhibition, but who also continued as – or went on to become – artists in their own right, and for whom "Les Immatériaux" turned out to be a momentous artistic experience.[20]

It is therefore untenable to assume that "Les Immatériaux" was "Lyotard's exhibition." Jean-François Lyotard himself spoke about the consensual way of working, and repeatedly used phrases like, "this is what we have all concluded," or "the aim of the exhibition ... for the team, in any case," as in the passages quoted above. Even in the opening sentence of the 1984 report, he refers to "the question of installation as we have collectively thought it through." With regard to the future catalogue and what would become the *Album*, documenting the preparations of "Les Immatériaux," Lyotard acknowledged in 1984 that this volume would also "include the team's working texts spanning almost two years," i.e. from the period before he himself had joined the project. Lyotard recounts the special *esprit de corps* which underpinned the collaboration: "I remember that, having had to be away from the team for a few months last autumn, I was overcome by a sort of anxiety, thinking that we ought at least to make some indication as to the spatial layout, so as to satisfy the demands of the project." But when he suggested such changes, "this proposition was rejected unanimously by the team almost without discussion, without any argument – fundamentally rejected, as if the team understood that we could not get to the root of this problem of postmodern space through a rapid, controlled spatial layout of a plan for the exhibition."[21]

While some sites displayed already existing artworks or technical items, and others included things that were specially produced for the occasion, there were also works which were under development for other purposes and adopted for "Les Immatériaux." An example is German sound artist Rolf Gehlhaar's interactive installation *Son = espace*, which had been commissioned by the Cité des Sciences et de l'Industrie at La Villette in Paris,

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18 For a number of contemporary reference examples of exhibitions dealing with related themes, see Gallo 2008: 157–174.
19 See Wunderlich 2008: 132–134, and *Inventaire*, site "Corps chanté."
20 See Boissier 2015: 103–104.
21 Lyotard 1984/2015: 29, 63, and 55, respectively. On the production process, see also Délis 2001, and Boissier 2015: 93–107.

where it was later presented, from 1986 till around 1992. On request by the French Ministry for Culture, an early version, under development in cooperation with IRCAM, the Centre Pompidou's centre for sound research, was installed as the only item in the site "Musicien malgré lui."[22]

Many of the curatorial decisions that led to the final make-up of the exhibition included an entanglement of philosophical and artistic, didactic and pragmatic, financial and institutional, political and strategic aspects. In a letter to the Minister for Culture, dated March 30, 1984, and framed as a follow-up to a meeting there some time earlier, "Les Immatériaux" project manager, Martine Moinot – who worked as "Chaput's right hand"[23] – describes how the dematerialisation of the means of creation and display also put pressure on achieved assumptions of copyright and authorship, indicating that gradually the law would have to change and adapt to the new technical conditions of production.[24] This letter indicates that the research for the project, and probably also, as in this case, the fund-raising efforts of the team members, got them into discussions about the very foundations of cultural production.

Such discussions were as much part of the project of "Les Immatériaux," as were subsequent occasions like the conference on "Le musée aujourd'hui" (The Museum Today) about the role of new technologies in museums, which was organized by Thierry Chaput in October 1986 at the Centre Pompidou and which included reflections by Michel Servière on the particularity of an exhibition made by a philosopher, on the informatic (Bernard Deloche) and the roboticized museum (Serge Renimel), and on the reproducibility of artworks (Bernard Stiegler).[25]

Revisiting the research process of "Les Immatériaux"

Until his untimely death in 1993, Chaput went on to cooperate with the computer graphics association SIGGRAPH, setting up a French equivalent called Pixie. The annual SIGGRAPH conferences and exhibitions were important sites of preparational research for Chaput at least since 1981, and they were the source for materials displayed at the site "Images calculées."[26]

For a show that is listed among the "exhibitions that made Art History[27]," there still is surprisingly little research about "Les Immatériaux." The greatest shortcoming seems to be, besides a detailed textual and visual documentation, a survey of the multiple cooperations with science and research institutions that cooperated in the preparations of the project and that the brief overview provided here can only point towards. What they show is that such

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22   See Gehlhaar 2001, and Wunderlich 2008: 187–190.
23   See Délis 2001.
24   See Moinot in *Album* 1985: 34.
25   See the audio recording in the Archive of the Centre Pompidou.
26   See Wunderlich 2008: 212–213, and Délis 2001.
27   See Altshuler 2013.

research and documentation efforts will have to develop synchronic as well as diachronic research trajectories, looking at the breadth of activities during the preparation and exhibition period, as well as at the pre-history and the aftermath of "Les Immatériaux."

Philosopher John Rajchman, in his own account of "Les Immatériaux," looks chiefly at the constellation of contemporary art and philosophy, but his proposition for broadening the methodological scope of research can of course be extended to other fields of knowledge and cultural practice that were articulated in this exemplary show:

> But how, then, should we construct the history of exhibitions? Perhaps such a history is not one thing, governed by a single logic or narrative but, on the contrary, vital precisely because it intersects with many others. This at least is what is suggested in my little contemporary fable of 'Les Immatériaux': how this exhibition can now be seen as a point of intersection for different histories going off in numerous directions. We might therefore consider 1985 not simply as a date in the field of exhibitions, but also in theory and research, and hence for that presentation of 'ideas' of, and in, art which for two centuries after Kant came to be known as 'aesthetics.'[28]

One dimension of this "point of intersection for different histories going off in numerous directions," was that "Les Immatériaux" also constituted a platform for the conduct and the presentation of ongoing interdisciplinary research activities. Importantly, the exhibition did not so much *illustrate* Lyotard's conceptions of postmodernism, and it did not present things that had already been thought, but it formed part of a complex field of research that made it possible to think and manifest things that were perhaps imaginable, but not yet formulated as concrete thought. In order to be able to fully describe this, it will be necessary to reconstruct the conception and production of the individual exhibition sites and their respective historical setting, through oral history interviews and contextual research.

Jean-Louis Boissier's account, published in 2015, of the interactive video installation *Le Bus* which Boissier and his students at the Université de Paris 8 produced for the site "Visites simulées," is an exemplary case study for such a reconstruction.[29] The text is not only a detailed account of the project and of the conditions under which it came about, but it also exemplifies how the items and artworks on display in the exhibition each had a history before and after "Les Immatériaux," including *Le Bus*'s inspiration by the interactive video system of the *Aspen Moviemap* (1978, shown in Paris in 1980), its institutional context in the Paris of the early 1980s, and its follow-ups in projects conducted by Boissier in the 1990s. The text indicates how a detailed historical account of the exhibition project as a whole will have to place a focus on the individual sites and objects, their producers and the research that went into them, in order to provide a full picture of what "Les Immatériaux" meant in the broader context of art, science and theory, and the correspondences between them.

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28   Rajchman 2009, n.p.
29   Jean-Louis Boissier 2015: 109–117.

33 *Les Immatériaux*, exhibition visitor, site "Arôme simulé". Courtesy of Centre Pompidou, MNAM, Bibliothèque Kandinsky.

Given the size of the task, the following three examples can do no more than indicate how rich and complex these, as yet dormant corresondences might be.[30]

1. The site "Arôme simulé" included an installation from which different synthetic and natural smells were diffused, challenging the visitors to identify which of them was artificially created, accompanied by the projection of a computer-generated 3D animation of a virtual fruit basket (fig. 33, plate XXIX).[31] In the adjoining text in the *Inventaire*, Lyotard made explicit reference to Baudrillard's concept of the "simulacrum" exemplified here. The animation film, entitled *Gastronomica* and also screened at the 1985 exhibitions of SIGGRAPH, Parigraph, and Imagina, had been produced by the artist group Illegal Command and co-produced by the Centre mondial de l'informatique et ressources humaines, as well as by Boissier's department for Technologies de l'Image at Université de Paris 8, with contributions from the computer artists Michel Bret, Monique Nahas, Hervé Huitric, and the musician Yves Siederichs. The *Inventaire* provides no information about the production of the fragrance installation, beyond mentioning the name Dragoco, a German fragrance

30 The following is in part based on research by students of Leuphana University, Lüneburg, and Hamburg Media School, especially Anna-Maria Dickmann, Ann-Kathrin Christina Möller, and Kai Man Wong, in a seminar on the media of "Les Immatériaux," held in the winter of 2016.
31 See Wunderlich 2008: 216–217.

and flavoring company whose French subsidiary had been founded in 1961.[32] To evaluate the complexity of the site, more research is required into its entanglement with the modern history of perfumes and artificial fragrances and their industrialization, one of whose birthplaces was the Paris International Exhibition in 1867,[33] and into the more recent history of fully synthetic fragrances – which were first produced by French chemists in 1983, during the preparation period of "Les Immatériaux."[34]

2. The site "Langue vivante" dealt with DNA research which had experienced fast advances since the 1950s. (In the same month of March 1985, when "Les Immatériaux" opened, the English geneticist Alec Jeffrey published his discovery of the technique which is now known as DNA fingerprinting.) The conception of the genetic code of the DNA was central to Lyotard's understanding of language as a hinge of the new ontological regimes: "Decoding the molecular language, knowing how to read it, learning to write it."[35] The main item on display at this site was a video of experiments done by Jean-Pierre Ozil and Jacek Modlinski at the French national research institute, CNRS, showing the insertion by means of a microscopic syringe of DNA into an emptied cell. Significantly, Ozil and Modlinski only published the paper about their research a year later, so that the presentation at "Les Immatériaux" was a premiere, and a sensation also from a scientific point of view.[36] The *Inventaire* sheet for "Langue vivante" also includes a still image showing a mesh of DNA ribbons, taken from the film by Charles and Ray Eames, *Powers of Ten: A Film Dealing with the Relative Size of Things in the Universe and the Effect of Adding Another Zero*, which had been completed in 1977 and hugely impressed large audiences with its environmental and scientific facts and images.

3. The site "Deuxième peau" (second skin) prominently featured skin samples produced by a variety of methods, including human skin cells, cultivated pork skin, and artificially created skin grafts (fig. 34, plate XXX).[37] The site that drew a lot of attention from the audience had an impressive list of scientific contributors, including Bioplastique, the Centre de recherche appliquée de dermobiochimie in Lyon, Dynarelax, the genetics department of ISOTEC, Laboratoire AHS France, Laboratoire Delalande, Laboratoire Fisch, the Laboratoire de recherche en dermatologie of the Hôpital Henri Mondor, Creteil, the Service de santé des Armées (Hôpital militaire Percy, Clamart), the Smithsonian Institution in Washington D.C., and Vionnet. Among these, the health service of the French army was an obvious partner, given that, besides the repair of skin damage caused by Syphilis, the reconstruction of maimed soldier bodies was a prime motivation for research in this field at least since the

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32   Since 2003, Dragaco runs under the company name Symrise.
33   See Panda 2003: 21.
34   See Sherrow 2001: 126.
35   *Inventaire*, site "Langue vivante." See Wunderlich 2008: 165–166, who reminds us that this neutral description was sometimes taken to be more affirmative of the topic of genetic engineering than Lyotard wanted to be.
36   Ozil and Modlinski 1986.
37   See Wunderlich 2008: 127–129.

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34   *Les Immatériaux*, catalogue Inventaire, site "Deuxième peau," recto. Courtesy of Centre Pompidou, MNAM, Bibliothèque Kandinsky.
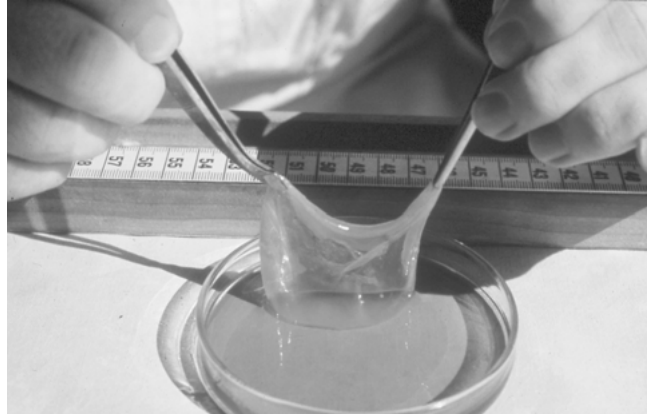
15th century. Significant advances were made in the decade before "Les Immatériaux:" the first cultivation of epithelial skin in 1975 was followed by its first successful transplantation onto a human in 1981.[38] The same year 1981, saw the first successful transplantation of artificial skin onto a human.[39]

As a "counterpoint" to the skin samples, the site "Deuxième peau" included two other "artificial envelopes which point to the limits of the skin," as Lyotard wrote in the *Inventaire*. One was an astronaut's space suit – presumably borrowed from the Smithsonian Institution –, the other a privation chamber ("*caisson de privation sensorielle*", or *camera silens*).[40] Chambers like these have been used for sensory deprivation in psychological research since the 1950s, in conjunction with the declared aim of testing the duress they could exert. The results of this research were applied in the penal system, for instance in Germany against members of the terrorist group, Rote Armee Fraktion, in the 1970s.[41] It seems unlikely that Lyotard, Chaput and their team would not have been aware of this political context of their exhibit, which connected the advances associated with space flight and synthetic skins, with innovations in torture techniques and the prison system.

Many observations like the ones sketched here – with regard to three more or less randomly chosen exhibition sites –, have yet to be brought into the debate about the concept, the meaning and the efficacy of "Les Immatériaux." Similar trajectories could be laid out with regard to holography, which prominently featured in four sites of the exhibition ("Peinture luminescente," "Espace réciproque," "Profondeur simulée" and "Homme invisible") with works by internationally renowned holographers like Alexander, Sam Moree, Doug Tyler, Claudine Eizyckman and Guy Fihman, and Stephen Benton whose invention

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38   See O'Connor et al. 1981.
39   See Burke et al. 1981.
40   Wunderlich 2008: 128.
41   See Moonen and Arndt 1995.

of white light transmission holography in 1968 had been the major breakthrough in the development of a medium which had only been invented 20 years earlier, by Dennis Gabor in 1947.[42] Equally important, we know almost nothing about the preparation, the technical production and programming of the much-discussed collaborative writing experiment, "Épreuves d'écriture" which had been in the making for several years and involved various computer companies, including Olivetti, SERPEA, ZH Computers, and Serial Informatique.[43]

Understanding "Les Immatériaux" will therefore require a much more comprehensive investigation of the research network that was constructed, maintained and tapped by Thierry Chaput, Jean-François Lyotard and the organizing team at the CCI, than is available to us at the moment. If such a reconstruction can be realized, however, it will also be exemplary methodologically, for the way in which the social and technical meshworks can be understood from which a manifestation of knowledge and thought like "Les Immatériaux" is made to emerge.

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42 See Johnston 2006.
43 See Épreuves d'écriture 1985, and Wunderlich 2008: 58–63.

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