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Linking art and sciences, an organizational dilemma. about *Hexagram* consortium (Montreal, Canada)

ABSTRACT

This article is based on the results of a survey of entrepreneurs, researchers and artists moving between arts organizations, institutional research labs and the business world. It puts to use the results of a survey conducted among creator-researchers of a Canadian prototype in the organization of these relationships: the inter-university consortium Hexagram (Montreal, Canada). Based on my analysis of this organizational model, I demonstrate and examine the solutions used to promote collaborative tasks. I call into question the various dimensions of the interrelatedness of development, research and creation. In conclusion, I examine the restructuring of artistic work and its resulting hybridized products.

KEYWORDS

artistic research
industrial innovation
interdisciplinary
boundary
organizations
crossing values
pragmatist sociology

There are many ways of imagining how art and business overlap and intersect, but there is one particular way in the arena of research or, more precisely, of 'research & development', as a vehicle of artistic creation, itself possibly a factor of innovation. They cannot be mutually reduced, but how can these praxes

1. For more on the concept of 'creative class' and 'creative industry', see Pratt (1999), Caves (2000) and Florida (2002).
2. See Adler (1978), Menger (1989) and Chiapello (1998).
3. See Fourmentraux (2005, 2006).

benefit from this situation of exchange, negotiation and reflective and forward-looking cooperation? What may the methods, challenges and pitfalls be?

The comparison between art and business in the area of interactive digital technologies and the multimedia audio-visual sector today represents a dynamic challenge involving international innovation. For the past ten years or so, many countries have been implementing original interfaces to encourage this comparison and make it the driving force behind a twofold technological and cultural innovation. Cases of dual successes are, needless to say, still rare, but they do exist: quality of artistic productions and their influence in the arts environment, going hand in glove with an effective and profitable introduction of technological applications and procedures, stemming directly from artistic research and the production of cultural works. These policies and new interfaces between artistic production, research & development, and industrial innovation are all part of the expansion of an 'art world' where those culturally involved, along with academics and economists, all interact. Their configuration alters a great deal of the classic clash between the cultural field and the economic market, between people belonging to these two social worlds and between the two conceptions of art circulating therein: the one based on cultural eternity, typical of classical works of art, and the other based on the 'perpetual whirlwind of innovation' that defines the economy of contemporary creation.

WHEN ART MEETS MULTIMEDIA INDUSTRY

The explosion of the multimedia industry during the 1990s, and its – perhaps temporary – downturn at the end of the same decade, demonstrates the ups and downs of the 'new economy' and the 'knowledge-based society'. Despite being bound to the promises made by these concepts, the process of innovation nevertheless promotes, within the sector of multimedia, a concrete restructuring of the organization of work. Numerous authors have brought forth, on the international scale, the stakes of recent policies of economic revitalization, both urban and social, based on the promotion of an innovation emerging from a 'creative class'¹ within which the artist now occupies, in this context, a highly prized position. This restructuring emphasizes interdisciplinarity and the hybridization of knowledge and know-how. At the confluence of the various milieux that utilize creative innovation, the artist embodies a new type of creator-researcher who is expected to intertwine academic research, artistic innovation and the development of flexible products that waver between artwork, tool and knowledge.² Nevertheless, most of these works also underscore how uncertain the alliances among art, science and industry remain. If, in fact, it is an accepted practice to rely on the new 'worker' that the artist at present represents, the links between artistic creativity and innovation remain problematic.³ Still rarer are the artists who have developed this desirable culture of entrepreneurship, which is essential in promoting the uses and transfers of certain results of the research-creation on the industrial or market stage. In this environment, ambiguous to say the least, we witness a proliferation of both political and governmental initiatives striving to incite and accelerate artistic energies in this research-creation domain. Do these political pulls have any concrete effects on the organization of work and on the economy of artistic production? Do these programmes that aid in artistic innovation and that originate from political and economic challenges and speculations in the short or long run spark a resurgence of artistic creativity? From a more pragmatic point of view, what are the conditions and modalities of this artistic entrepreneurship

that are likely to lead the way to the development and transfer of products emanating from artistic research? The overall goal is to study the potential reconfiguration of cultural markets and jobs under the influence of technological, industrial and commercial factors. I have chosen to broach this theme through an examination of Montreal's multimedia sector, notably by looking at its special relationship with the visual arts and media communities. By taking into account the results of an inquiry⁴ conducted among creator-researchers of the inter-university consortium *Hexagram* (Montreal, Canada), this article promises an initial clarification of the promises and difficulties of these articulations and new organizational interfaces between artistic production and technical innovation.⁵ *Hexagram* is characterized by the fact that it does not so much seek to create 'works of art' in the conventional sense as to develop 'applications' in the industrial and commercial sense of the term. This article combines an analysis of these concepts, which are at once social utopias and hypotheses on the transformation of industrial societies, with an empirical examination of one facet of this sector of activity in Montreal (Canada).

4. The 'material' used in this text comes from an empirical work initiated on the occasion of a post-doctoral research seminar held at the Institut National de la Recherche Scientifique du Canada (Montréal) from May to October 2003.
5. See, for example, Mitchell et al. (2003), Jackson (2003) and Jennings (2003). See also Shanken's dossier (2005).

ENCOURAGING ARTISTIC INNOVATION WITH I.C.T. (INFORMATION AND COMMUNICATION TECHNOLOGIES)

From a contextual perspective, Montreal is home to a relatively high concentration of multimedia businesses by Canadian standards. Unfortunately, no accurate figures exist on the true size of the industry. Official estimates range all the way from 200 to 600 companies, due to highly variable definitions of what constitutes a business and what qualifies as 'multimedia'. Nonetheless, over the past decade, a number of world-class commercial cultural enterprises have set up shop or have been established in Montreal. This is particularly true in the area of post-production and multimedia special effects for the film and television industries, with companies like Softimage and Discreet Logic. It is also the case for video and computer game developers such as Ubisoft and Electronic Art. Other large companies are active in areas not strictly cultural in nature, such as telemedicine, e-learning and advertising. Lastly is the constellation of start-ups that accounts for the majority of multimedia businesses (but not jobs) and whose financial health is much more precarious, especially since the collapse of the tech bubble. It is also worth noting that a good number of large domestic and multinational corporations have also actively banked on the prospects for Internet, television and telephone convergence, especially firms in the telecommunications sector. Although they have not exactly lost their shirts, all have essentially lost their investments. Juxtaposed to this first segment is a second, non- (directly) commercial segment dedicated to multimedia and the technological arts in general. It includes Softimage founder Daniel Langlois' Foundation for Art, Science and Technology, showcases like the Société des arts technologiques, and certain 'artists' centres', and institutional labs, which, like *Hexagram*, seek to position themselves as a bridge between business and academia. Universities have also generated a number of spin offs. Although these new enterprises are not as exclusively focused on multimedia and digital technology, arts and digital media play a central role in their activities. At a more theoretical level, I seek to question individuals who helped catalyze the multimedia explosion.

In Canada, and especially in Montreal, high-level government decision makers have paid special attention to multimedia. They have justified their efforts to promote the sector by the rise of the 'new economy' and the

6. With, as principal reference, the prestigious *Medialab Massachussetts Institute of Technology*, created in 1985 by Nicholas Negroponte and Jerome B. Wiesner to stimulate research dedicated to the most novel technologies and their most innovative applications (<http://web.mit.edu/>).
7. Valorisation Recherche Québec (VRQ) <http://www.vrq.qc.ca> 1999-2005.
8. La Fondation Canadienne pour l'Innovation (FCI) <http://www.innovation.ca/programs> 1997-2005.

'knowledge-based society', two closely related if rather theoretical concepts seen as foreshadowing a radical shift in the economic paradigm. Knowledge and technological innovation are at the core of this shift, and are now viewed as crucial to Canada's prosperity. Industry Canada, one of the main instigators of this mobilization, was quick to classify the multimedia sector among the 'new knowledge industries' paving the way 'to the creation of thousands of new jobs and the development of Canadian trade in a globalized economy'. The multimedia environment was presented as having the potential to profoundly transform social and cultural structures. It also served to justify a nation-wide approach to strategic planning with regard to knowledge, know-how and skills. The theme of 'knowledge management' rapidly imposed itself as an organizational strategy, replacing earlier postulates and stressing the need for labour force adaptation, training and perhaps even retraining. A new economic geography also emerged, positioning the city, or at least certain cities, as the strategic hub of change: certain cities are more creative, cultural, intelligent. With the city seen as the focal point for an unprecedented convergence of media, technology, economy and culture, major projects such as Montreal's Cité du multimédia (and E-Commerce Place) rallied all three levels of government, leading to a series of very generous job creation programmes and downtown redevelopment schemes. The discourse accompanying these projects is less than rational, and has a strong 'performative' and 'utopian' dimension. At once gamble and promise, it blends extremely rational strategic forecasting (development of markets, technology, applications, innovations) with speculative conjecture that belongs more to the realm of social utopia and literary and artistic imagination: science fiction, fictional theories, etc. This, in turn, raises another, much more theoretical, challenge: to examine, through the example of multimedia, the creation of these very contemporary technological and pragmatic utopias.

HEXAGRAM, AN INTERFACE BETWEEN ARTS AND MULTIMEDIA INDUSTRY

The Montreal consortium *Hexagram* is the result of the fusion, heartily encouraged by the government of Quebec, of two previous initiatives: the plan to found a University Institute of New Media at the francophone University of Quebec in Montreal and the plan to create a laboratory of new media (*Medialab*⁶) at the anglophone University of Concordia of Montreal. At the intersection of these two institutions, *Hexagram* brings together at the moment approximately 60 researchers. It is supported to the tune of six million dollars by the public organization of research improvement (VRQ⁷), common to both sister universities. It also receives a subsidy of 22 million dollars, earmarked for infrastructure expenses, from the Canadian Foundation for Innovation (FCI⁸). The magnitude of these subsidies constitutes a double exception. It is the first time that in Canada the organizations for the advancement of university research, usually dedicated to bio-medical sciences, have subsidized artistic disciplines. It is also the first time that such a significant amount of credit (in both meanings of the term) has been allotted to them.

In this context, *Hexagram* plans to intermingle in an original way academic research, artistic creation and industrial production. To pursue this objective and put it into practice in a concrete way, *Hexagram's* mission will be twofold. On one hand, the consortium will propose to interface the connected work of the different laboratories and various researchers spread out in a large number of departments that overlap at the two sister universities. The purpose is, then,

to implement the sharing of the equipment and resources necessary for innovation relying on the modularity and flexibility of research infrastructure. On the other hand, *Hexagram* will propose the creation of a link between these researchers from different laboratories, departments and universities and the economic sector, as well as different public organizations for the implementation of the results of university research. This consortium therefore offers to play the role of a 'boundary organization'⁹ facilitator thanks to its position in several social areas (cultural, academic, industrial), but also due to its versatility: not completely fixed, its organization must in fact be able to adapt to the conjunctural necessities of its various interlocutors, while at the same time keeping a core that assures its identity.

9. See Fujimura (1990), Star and Griesemer (1989).

The intersection of artistic and technological innovation therefore presents both a *coordinated conception*, an *incorporated development* and a *fragmentary enhancement*:

- The work of conception must be coordinated insofar as it links hybrid forms of knowledge and know-how of eclectic collectives: artists, engineers, entrepreneurs.
- The development phase must incorporate these translations of goals and interests into a programme of homogeneous creation aimed at guaranteeing the irreversibility of the results.
- But the enhancement presupposes fragmenting these results in order to redistribute them between collectives and heterogeneous worlds in which they can circulate.

However, this articulation and organizational management of research and innovation are not without difficulty. And *Hexagram's* effort gives origin to trials and adjustments in trying to symmetrically define a working outline and a strategy for the creative work on one hand, and for the orientation of hybrid products on the other. In the space of two and a half years the implementation of *Hexagram* will go through two directional models. The consortium adopts at first the hierarchical format of an 'artistic enterprise' whose principal aspiration resides without a doubt in the industrial transfer and the strictly economic development of the by-products of artistic research. This original governance structure, introduced by an artist recruited in the United States as a result of his prosperous relations with the industrial milieu, who was promoted to the rank of general director-president of *Hexagram*, is going to gradually meet very strong resistance on the part of artist-researchers. This industrial orientation of *Hexagram*, based solely on profit, has the appearance of being too closely tied to the sole goals and aspirations of its director, founded on requirements of transfer and commercialization that are unrealistic since they are *a priori* too removed from the world of art and university research. As a consequence of this first stumbling block, *Hexagram* is opting for an organizational format judged to be more democratic and consultative. The new organizational diagram of *Hexagram* that I highlight in the following chart becomes that of a body devoid of lucrative goals (non-profit organization): an autonomous institute, situated between the two universities, its departments, laboratories and organizations of research development.

The organigram associates from now on a general administrator and two scientific directors (one from each university) in accordance with the demand for independence among the many facets of creation, research and development. The administrator placed at the juncture of the university and

the industrial complex is responsible for coordinating the various consultative bodies. A three-prong administrative council (the administrator backed by the two scientific directors) composes the principal decision-making body setting the direction of *Hexagram's* research and creation. A Committee on Research Creation, composed of 'paired' members outside of *Hexagram*, was consulted on the selection of programmes and on their evaluation in the long term, and was responsible for the attribution of funds and related operations in the implementation of efforts contributing to research. Finally, a Committee of Axis Directors brings together eight people responsible for each of the specializations and fields of research covered by *Hexagram*. They are mandated to coordinate research conferences, and the distribution of work and its results, according to the different domains and thematic overviews that they are responsible for, based on their seniority in the university specialty. The search for balance of this organigram strives to implement procedures that safeguard the need for neutrality in the process of selecting artists as well as projects.

THE CREATION-RESEARCH: AN INTERDISCIPLINARITY HYBRID

Once this system has been put in place, one still must define the modalities of *Hexagram's* functioning so as to inscribe this potential alliance between artistic research and economic innovation into the realities of the daily practices of researchers and academic institutions. And here again, it will be the result of a long-term process that will necessitate overcoming various agents of inertia. A first obstacle is tied to the nebulous identity of this interdisciplinarity hybrid referred to as 'artistic research' in a university setting. A second inertia comes from the absence, in this domain, of work conventions that would clearly permit the different goals being pursued to be distinguished, be it the work, the tool or the knowledge, or their hierarchy within the activity. Finally, the uncertain alliance of these results and the incertitude concerning their space and potential manners of diffusion, outside the exclusive domain of artistic creation, contribute to hindering the ideal of a truly multicentric valorization.

The resolution of these various difficulties brings with it, consequently, a requalification of the profession as well as of the products of the creation-research adjusted to the necessity for innovation. The encounter between businesses and artists presupposes a prior definition of the end purposes of a shared research-creation programme, which can culminate in multicentric externals – works, processes, software tools and interfaces, and stage systems – closely related to the authorities certifying the different social scenes in which the projects will be incorporated: art world and industrial world, symmetrically. This synergy must not be imposed by any hierarchic *a priori*, but jointly constructed with the different people involved in the process – artists, engineers, entrepreneurs – in an encouraged and consistent dialogue. To this end, it is important to organize and increase the number of informal opportunities for encounters, where necessary initiating partnerships in watchdog and consultancy activities with businesses and companies.

The origin and the recognition of this activity of 'artistic research' is the result of a long and serious struggle articulated in the integration of the arts in the university setting, at the end of the 1960s. In Montreal, a decade after the United States and following the closing of the principal school of art studies, this disciplinary hybrid that is the 'creation-research' in the university setting was slowly legitimized and instituted. Today it finds itself placed at the centre of strategic courses of study in more and more university institutions. The

evolution of research programmes and teaching, as well as the growth and variety of subsidies granted to the artists in the university setting, confirms this commitment and recognition on the part of public agencies in favour of artistic research. The principal government agencies are in agreement today on the realization of the importance of new technologies for work options and for the elaboration of theories or novel research models that transform the various fields, and this accreditation is now encouraged by the establishment of new inter-institutional programmes.

The acceptance of these various forms of aid implies a profound transformation in artistic practice based on two largely novel and therefore essential criteria: 'interdisciplinarity teamwork' and the necessity for a 'research programme' encompassing several works or artistic projects.

On one hand, artists must acquire new competencies that are dictated by the necessity of a rigorous needs assessment ahead of production, by studying job offers, the elaboration of a work project, the search for financial backing and subsidies, and, on occasion, by the pre-sale of projected product. Moreover, the achievement of this initial prospective work, as well as the subsequent effective conduct of the project, necessitates the networking of pluridisciplinarity teams, the setting up of connections among individuals hand-picked based on their competence, the structuring of a list of charges,

Canada Council for the Arts (CCA)

Inter-Arts Program:
Non-traditional arts context
Various identifiable art products

Fonds de recherche sur la société et la culture

Establishment of new researcher-creators
Support for research and creation groups
Promotion of interdisciplinary arts

NRC/CAC

ARTRE pilot program
Artists-in-Residence for Research
Canadian Council for the Arts
National Research Council of Canada

Natural Sciences and Engineering Research Council/CCA

Joint projects—double evaluation
Partnering of artists and researchers in engineering
Canada Council for the Arts
Natural Sciences and Engineering Research Council

Social Sciences and Humanities Research Council/CCA

Research/creation grants in fine arts
Pilot program for researcher-creators
Canada Council for the Arts
Social Sciences and Humanities Research Council

Table 1: Canadian government research-creation programs.

and the assignment of tasks and responsibilities. This evolution of research and creation activities consequently adopts a more decentralized model of creative management, and it requires great effort by teams regularly assembled around hybrid research.

On the other hand, while still focused on the production of a work of art, artistic research must also seek a social utilization, a commercial application or an industrial value, and give origin to the production of by-products independent of the artwork, such as scientific breakthroughs, technical processes, methodologies and tools.

To sum up, research-creation thus introduces two henceforth essential criteria:

- Work in interdisciplinary teams
- The imperative need for a transversal research programme involving several works and artistic projects.

The challenges are important: innovation between art and business presupposes a dialogue with artists and entrepreneurs with the implementation of projects, the better to (1) define the research-creation liaison between art and business, (2) invent new forms of work organization and (3) imagine new forms of promotion and public display for artworks.

In this context, the artist will have to develop a multifaceted profile enabling him or her to be, in turn, creator, researcher and entrepreneur, based on the window of opportunity offered to him and in order to be attuned to the different promotional systems at work in art worlds now operating in accordance with project logic systems.

THE MULTICENTRIC FINALITIES OF CREATION-RESEARCH

In this context, creation-research no longer describes only that which precedes the accomplishment of the artwork: documentary research, visual or auditory finds, models, sketches, drafts and demos. It must, on the contrary, underscore a renewed methodology and produce results different from the work of art. In other words, artistic research must henceforth generate the production of new by-products, associated with ways of valorization likely to give origin to an added-value for the entity *Hexagram*.

Hexagram is not a substitute for Canada's Council for the Arts. Its mission is not to finance a work of art, but to develop a creation-research in the arts that could be utilized by industry. When we founded *Hexagram*, we adopted this word 'creation-research' to put forth the idea that it is not the artistic creation that is financed, but the research that leads to creation. Therefore, it is the search of the tools, of the interconnectors, of the apparatus, of the ways of creation. The importance of artistic research here becomes a central criterion.

(Creator-researcher, *Hexagram*, June 2003)

This need for economic profitability forces artists to orient their activities at least as much towards the search for procedures and innovative technical solutions that have a potential for commercialization and a use greater than the production of a mere work of art. Certain exemplary cases of the economic transfer of results from techno-artistic research coming from universities,

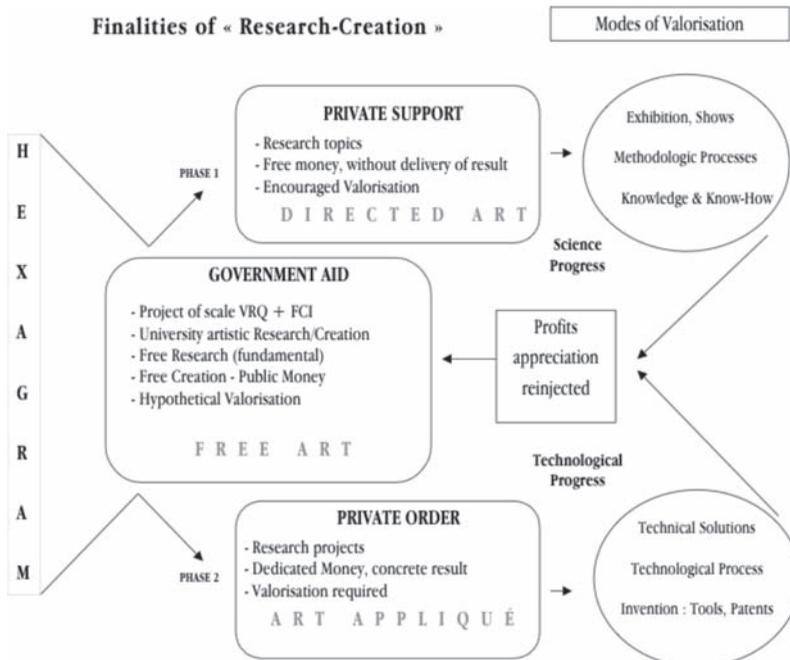
with the creation of breakthrough enterprises in the field of cinematic post-production (Softimage), of video games (Ubisoft) or of a multimedia circus (Cirque du Soleil),¹⁰ succeed in reinforcing for the Canadian economy interest in these operations of encouragement and support for artistic innovation. In the day-to-day activities of university artists, this concern with participation in innovation and national economy is by now well established, and reveals itself in work methods which allow to delineate and articulate different engagements of research and creation oriented towards the production of flexible and multicentric works of art.

The object of research is the 'prototype performance', which raises issues more reflexive than theoretical. Research/creation involves: (1) the act and experience of creating (2) reflection and follow-up, and therefore the capacity to analyze a creation (3) transmission through exhibitions, performance, publications, or other forms.

(Creator-researcher, *Hexagram*, June 2003)

The academic and technological outputs that emerge from the creation-research conducted within the purview of *Hexagram* therefore follow various steps that produce a variety of types of projects that are distinguishable: the 'artistic creations', which lead to the production of a work of art, of an apparatus or an artistic installation; the 'technological discoveries', which imply the development of innovative tools; and the 'theoretical contributions', which pursue an analytic and critical perspective of knowledge accumulation. In this context, the typical-ideal project is the one that produces the most opportune marriage among these multiple aesthetic, scientific and economic logics.¹¹

10. See <http://www.softimage.com>, <http://www.ubi.com>, <http://www.cirquedusoleil.com>.
11. For a more detailed example and description of a *Hexagram* project connecting research in design and the development of computer applications, see Fleury (2003).



The definition of multimedia varies widely depending on whether we look at multimedia as a cultural product or as an industry. Multimedia as an industry is at the intersection between three existing sectors: information technology, telecommunications and traditional cultural industries. Yet it remains very difficult to clearly distinguish this new industrial and cultural sector – which although not entirely independent is well on its way to becoming so – from the other three, to the extent that multimedia transforms each of them while remaining at the same time an integral part of each.

The definition of a multimedia product has also failed to draw a consensus and is still vague in several respects. The most precise definition so far is, once again, from Industry Canada. Based on three indissociable (but non-indispensable) criteria, it holds that a multimedia product must (1) be potentially interactive, (2) integrate content (sound, image, text, video) and (3) be distributed on digital media (fixed or mobile). This definition also anticipates the expansion of the Internet as primary distribution channel, a channel itself considered to be purely multimedia. I cannot help but observe that this definition represents an ideal that has little actual resemblance to the realities of the 'industry'. On one hand, few 'multimedia' products meet all three criteria; nor, for that matter, do many businesses if we limit ourselves to the pure, or 'purist' definition. In fact, the product that currently corresponds most closely with the official definition is the multimedia game, which raises the question as to whether the emergence of multimedia as an economic sector or industry is not essentially the rise of electronic games (or toys), if not as works of art, at least as full-fledged cultural products and a full-fledged mass market cultural industry. Compared to the more traditional cultural industries, the games sector, which up until now has been less visible, seems to have successfully capitalized on multimedia to carve out a larger cultural niche for itself, much like photography, film, television in the past, or other cutting edge art forms. In any case, this is a hypothesis worth seriously considering. The status of this new cultural object in the face of the traditional cultural industry should also be questioned. On the other hand, each element of the definition has several meanings and can be interpreted broadly or narrowly according to one's point of view. For example, multimedia product interactivity, the most original aspect, is often nothing more than 'potential'. 'Content' may refer as much to content integration, processing or publication as to the strict development of original content.

The imperative of valorization is itself declined, then, according to the multiple plausible outcomes of the creation-research effort, to which the complementary notions of impact, transferability and visibility ultimately refer. Impact is evaluated based on the potential outcomes that the research programme has for the projects of other *Hexagram* researchers and artists as well as for the concerned research domain. Transferability is understood as the possibility of improving the programme results of research outside of *Hexagram* and the artistic community. Visibility is evaluated based on the potential enhancement of *Hexagram's* image at the time of various demonstrations such as exhibits and technological fairs. This model is expected to permit the deployment of productions fashioned differently according to the market (scientific or artistic) for which they are designed.

In this context, the production of 'crossing values' does not presuppose a synergy of art and business. On the other hand, by sidestepping the pitfalls of merger and instrumentalization, what is involved is an organization of the relationship in the sense of a reciprocal apprenticeship and a multicentric

production. Put differently, each one of the partners – repositories of eclectic knowledge and eclectic skills, included within a culture or professional corpus with its own values, but also its authorities dealing with specific designations and legitimization of what work is, along with the opus and action – is here invited to link back up with the context and methods of the relationship and the artistic exchange.

To sum up, three types of pivotal projects can be singled out:

- ‘Artistic creations’, leading to the execution of a work, a system or an artistic installation
- ‘Technological discoveries’, involving the development of software and innovative tools
- ‘Theoretical contributions’, pursuing an analytical and critical perspective entailing an accumulation of knowledge.

Put differently, the parcelling of creative work must also give rise to plural modes of designation of what makes ‘the common work’³ different research and creation purposes come into play during any collaboration by being included in multiple agendas: research report, creating a tool, patenting a process, promoting a prototype, exhibition. The success of the undertaking here actually presupposes that each partner can incorporate the collective project in his or her own research or individually creative trajectory.

In this context, creation is no longer based on a hierarchic scheme that would bring in a regulated distribution of contributions in terms of conception and subcontracting, in accordance with value and remuneration scales entailing a long sequence of workers, at the service, in each instance, of a singular creator.

The work of creation, on the other hand, is distributed in different scenes and between several persons for whom it is possible to specify distinctive research challenges, following various forms of expertise and agenda. This form of distribution introduces a parcelling of creative activity and plural modes of designation of what will be a ‘work’.

The challenge also involves going beyond the ‘cultural conflict’ typical of previous models of ‘art-science-technology’ convergences, between people (computer technicians, managers, artists, entrepreneurs) whose qualifications, credentials and aims were *a priori* conceived as opposite, by inventing new systems of production logic which encourage a plurality of challenges of (artistic) creation, (technological) invention, and (economic) innovation.

In this sense it is a matter of pursuing a twofold objective:

- Developing a corporate culture aimed at promoting the transfer of certain results of research-creation to the social scene
- Partly separating ‘creation efforts’ from the production of a work of art or a technological tool, understood as end purposes that are watertight and of the past, in accordance with a system of exclusive ownership.

The perforce ‘overlapping’ promotion of a research-creation programme between art and information and communication technologies (ICT), between art and business, must consequently encourage the emergence of a work and simultaneously turn it into an ‘environment’ producing technological innovations: the work here may be multiple, intermediary and fragmentary, and the research leading to it may also be promoted (procedures, methods,

knowledge) and may sometimes give rise to productions other than the work aimed at (software tools, stage systems, etc.).

While remaining at the service of the production of a work, artistic research-creation may thus also focus on a social usefulness and give rise to the production of independent research externals of the work such as knowledge, technological procedures, methods, inventions and tools. In this context, artistic intervention often offers an additional analytical distance in the face of innovation, through operations of appropriation and/or critical prospects of imprints and determinisms of technical progress. Therefore, artistic experimentation is also part of the renewal of the uses of technique, encouraging its appropriation, practical and imaginary alike.

A (RE)DISTRIBUTED AUTHORITY

The history of the interfaces between art and science is based on a 'cultural conflict' between people whose qualifications, know-how and competence were considered *a priori* to be at odds. Within this context, research and creation efforts were steered towards the production of a work of art, or a technological tool, understood as contrasting end purposes, in accordance with a system of exclusive ownership. The division of labour usually subordinated artistic experimentation to the industrial project, encouraging the development of new services and uses of technology.

New combinations propose a renewal of partnership methods between science, art and industry, standing apart from old and more hierarchical and rigid organizations than ones that are truly interdisciplinary. When adjusted to an economy per project, these policies actually have as their objective the production of multicentric research externals: technological developments and scientific discoveries transferrable to the field of economics. Their organizational matrices must be sufficiently flexible to absorb the swift changes of the new ICT, as well as the variety of overlapping processes between social worlds.

In this context, the artist is no longer positioned *opposite* an entrepreneurial logic system: on the contrary, he himself becomes the spokesperson for a double rationality, at once artistic and entrepreneurial, whose organization therefore represents a primordial challenge.⁴ Through the definition of an artistic research adjusted to the market of information and communication technologies, the artist becomes an entrepreneur of procedures in order to cooperate with industry. Creative activity emerges from this somewhat transformed, shared between the many persons who individually and collectively inform a borderline work somewhere between logic systems that are simultaneously artistic (aesthetic quality, exhibition challenge) and technological (challenge of research and development, industrial transfer). The artist's role is duly renewed, this latter now being able to occupy a stronger place within the process of innovation: a stronghold, as it were, not diluted but which is played out collectively, and not central, but resituated at the hub of the process.

The study of *Hexagram* reveals the emphasis that is being put on the structural modalities of new creation-research consortia whose management and organization in themselves constitute major innovations, since in fact, a primary goal of innovation politics aims for a definition of new organizational models and management adjusted for a creation-research likely to promote valorizations that are at the same time aesthetic, scientific and industrial.

In this framework, if it is still difficult to satisfy the mandate of a production that could rival industrial research and development, and if likewise it is not easy to satisfactorily attain the production of a work of art such as could be defined for more traditional media, at the other end of this categorical opposition emerge the new forms of productions that, without being either purely applied, or free, manage novel spheres of hybridation between art, science and technology. These prototypes consequently considerably renew the imprints, factors and economic consequences of the arts. Their results therefore constitute a stake doubly analytical and prospective for the initiation of renewed types of management and valorization of the partnership between art, science and industry: this brings into view the transformations in progress of the profession and of the identity of committed artists, as well as the invention of original kinds of accompaniment and of regulation of the 'multicentric' career of artistic works.

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