The Experiments in Art and Technology Datascape

This paper is based on the talk given by Christophe Leclercq and Paul Girard at the REWIRE conference, September the 29th 2011, the FACT Liverpool.

Acknowledgment
First we would like to thank the Rewire committee since we would have never initiated the development of this work if we would have not been selected.

The Experiments in Art and Technology (E.A.T.) organization was set up in 1966 by the artists Robert Rauschenberg and Robert Whitman, in association with the engineers Billy Klüver and Fred Waldhauer. Their purpose was to make it easier for artists, engineers and scientists to work together, by producing art systems and projects outside the art sphere, properly so-called. Between 1966 and 1970, E.A.T. was thus at the root of more than 600 joint projects[1] in the US and abroad, most of which are, rightly or wrongly, little known about.

Billy Klüver and Julie Martin, the organization's last two directors, undertook the task of archiving their activities in a particularly conscientious way, by classifying and preserving a collection of documents concerning the production of the projects which were the organization's brainchildren. They also contributed to their development, in particular through the making of documentary films, from the 1990s onward, using hitherto unpublished archival documents. This work was not unaffected by the emergence of a certain critical recognition by the art world, which could be gauged by way of the increase, in the 2000s, of works made and exhibitions held by exhibition curators, researchers and art critics[2].

Yet the partial use made of these archives does not make it possible to take the full measure of this organization. In fact it records not without some difficulty both the diversity and the proliferation of the organization's activities—its systems and methods, its exhibitions and shows, its lectures and, not least, its publications. Otherwise put, its complexity. The collaborative dimension of E.A.T.'s activities (often reduced to technical assistance schemes), where the creation of systems represents just the tip of the iceberg, adds further to the problem. So the development of a response to this seemingly simple question: "What is E.A.T.?" calls for the availability and collective use of a great deal of information to do with the organization's many different activities. E.A.T. henceforth comes across like an exemplary case study for the burgeoning field of digital humanities and design, alike. Based on this case, it is actually possible to reflect upon the input, within areas of aesthetics, of the history of art and the social history of art, new practical ways of making use of archives whose goal is not only to provide access to digitized resources, but which, above all, focus their effort on the organization of resources, so as to be able to come up with answers to issues raised by the researcher evolving in these different disciplines, and in the areas where they overlap.

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[1] *E.A.T. Information*, Experiments in Art and Technology, New York, March 18, 1970, p.1.

[2] In France, the exhibition: *Les Années pop: 1956-1968* at the Centre Pompidou.

I. E.A.T. ARCHIVES

A- The Presently Existing Archives :

Researchers interested in E.A.T. have to deal with a whole host of different resources, in different geographical places. The first difficulty thus has to do with the identification of a corpus that can be made use of. The organization's main archives are held essentially in two places: the Daniel Langlois Foundation, Montreal, Canada; and the Getty Research Institute in Los Angeles, in the US. E.A.T.'s director, Julie Martin, also holds in her home at Berkeley Heights (California) two boxes of E.A.T. archives, essentially containing documents listed in the publication put out by the organization, the *E.A.T. Bibliography*.

E.A.T. Bibliography : Documents and References

The social art historian Julie Martin and the engineer and scientist Billy Klüver, two leading E.A.T. figures, have painstakingly archived various documents to do with collaborative projects undertaken (or not, for want of funding) by the organization, which they directed, one after the other. This documentation has not only been preserved but has also been organized with a view to being further developed, as is shown by the publication of a bibliography by E.A.T. on E.A.T.[3]. This bibliography lists a collection of resources about E.A.T.'s activities and thus provides an initial corpus defined by people actually involved with the organization. This bibliography singles out two types of resources within the two sections: Documents and References. While the first section encompasses documents written and published solely by E.A.T. members—correspondence, notes, project descriptions (pre-project, text, budget, diagram, list, final report), printed matter (flyers, post cards, advertising, posters, edge-notched cards, lecture programmes), publications put out by E.A.T. (information letters, magazines)--, the References are for the most part made up of press articles and other critical and research writings to do with E.A.T.[4]. It actually seems more homogeneous than the first section, which

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[3] Billy Klüver, *E.A.T. bibliography: August 12, 1965-January 18, 1980*, New York, Experiments in art and technology, 1980. The classification and conservation of the archives owe a great deal to the archivist's spirit shared by B. Klüver and his wife, J. Martin, two people who are passionate about the social history of art and those artistic communities which had a feeling of being part of a historical moment likely to be recorded in a history of art. (See Billy Klüver and Julie Martin, *Kiki et Montparnasse : 1900-1930*, Paris, Flammarion, 1998)

[4] It should be said that the distinction may be muddled. So at times one finds the same items in Documents and References, but this classification method, overall, is still very useful for an

may be likened to a “Prévert-type inventory”. It nevertheless seems helpful to be able to group the resources on the basis of their author’s identity, and to single out those produced strictly by people involved in the organization (present, willy-nilly, in both sections) and those produced by people outside the organization (only present in the References). This is something which the printed publication, favouring a classification method—no matter how relevant it may be—at the expense of others, cannot easily provide[5].

The E.A.T. archives which can be used are not, for all that, limited to this first corpus included in this bibliography. The archives given to the resource centres mentioned contain other documents about a diverse range of things, including sound recordings and films. In cooperation with Julie Martin, the archivists at the Daniel Langlois Foundation have taken on the task of dividing these resources into three major categories, based on what they are designed for, while at the same time borrowing and specifying both the format and the nature of the information being conveyed[6]. The “archival documents” include the following information formats and types: Correspondence - Letter, Manuscript, List - Inventory, File, Budget - Finance document, Grant application, Program, Advertisement document, Invitation card, Press kit, Press release, Communiqué - Memo, Speech, Report – Memorandum, Bibliography, Essay. Also featured among them are “published text documents”: Book, Text in book, Periodical issue, Text in periodical, Proceedings, Thesis, Solo Exhibition catalogue, Group exhibition catalogue. Last of all, there are video documents (interview, documentary/report), audio documents (interview), visual documents (photographs, and the like) and digital documents (CD-ROMs, etc).

At this stage, researchers already have at their disposal two equally interesting groups: the E.A.T. bibliography, though not exhaustive (because it stops at 1980), forms a relatively coherent whole, and one that is above all meaningful because of the fact that it was put together on a historical basis by people in the organization; and a further more rigorous archiving, which is descriptive and exhaustive—the Langlois Foundation’s archives.

B- An “activity”-oriented approach: works and projects

We can now see two different organisations of this primary resources by Fondation Daniel Langlois and by the main E.A.T. member, Billy Klüver.

“activity”-oriented approach which is concerned with their production and reception.

[5] The index at the end of the publication usually represents the only alternative search mode.

[6] These distinctions of information format and type feature in the bibliography produced by E.A.T., with each bibliographical item being usually accompanied by a description specifying the nature of the information listed.

b.1. Thematic and Activity-Oriented Approaches

A thematic approach is offered by the Daniel Langlois Foundation, which encompasses bibliographical references by groups of projects, for example the "Nine Evenings"[7]. It should be possible to develop this work in-depth in order to obtain a still finer texture, by proposing an "activities"-oriented approach in the broad sense of the word, meaning any programme production carried out in collaboration by E.A.T. or with its support, and including a clearly attributable beginning and end.

This is what is interesting about Norma Loewen's thesis, published in 1975, which, it just so happens, makes it possible to observe the diversity of the organization's activities, and complement the first list of works and projects produced by E.A.T[8]. She singles out several groups of activities, which are often connected: lectures and demonstrations; technical services and edge-notched cards; joint projects with a view to producing an artistic system or a project going beyond the artistic framework; fund-raising to back a project; exhibitions; editions and publications of technical, scientific and artistic information letters aimed at the community, or press dossiers and exhibition catalogues, aimed at as many people as possible (*E.A.T. News*, *Information*, *Techne*, *E.A.T. Clippings*, etc).

We should add to these very varied activities undertaken by the organization—information and training, networking, seeking funding, and project management, development and promotion (publishing, exhibitions, etc)—the activity to do with the reception of projects by the artistic community and the engineering community[9], established on the basis of critical writings, and press reviews (essentially brought together in the "References" section of the E.A.T. bibliography). It is thus possible, for certain works and given projects, to recreate the whole sequence of programmes from its conception to its distribution and reception, by way of its production.

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[7] The Daniel Langlois Foundation gives bibliographical access to the following eighteen thematic groupings: Nine Evenings: Theatre and Engineering, Technical Service Program, Technical Information, E.A.T Competition for Engineers and Artists, Lectures-Demonstration Series, Pepsi-Cola Pavilion Project, Anand Project, Telex: Q&A, American Artists in India, New York Collection for Stockholm, Multi-Dimensional Scaling, Projects Outside Art, Children and Communication, Artists and Television Projects, Projects in Central America, Paris-New York-Paris, Island Eye, Island Ear, et United Nations Satellite Demonstration.

[8] Norma Loewen, *Experiments in Art and Technology: A Descriptive History of the Organization*, New York: New York University, 1975.

[9] It would be a mistake to be interested only in art magazines, because there are also interesting scientific publications (Bell Laboratories magazine, article for the IEEE, etc.).

b.2. The Story of E.A.T. by its members

For their part, the main members of E.A.T. themselves made a selection among the organization's activities, in order to put together a more eloquent story than the mere bibliography afore-mentioned. *The Story of Experiments in Art and Technology* is thus the name given both to a series of lectures given by Klüver, a film made by Anne-Olivia Le Cornec[10], as well as to various exhibitions: one called "in two suitcases" made up of a set of panels displaying the E.A.T. programme, and easy to transport, another more important show, held at the InterCommunication Center (ICC), encompassing this first set of panels by associating with it the exhibition of systems and documents and the screening of archival films. The text of the catalogue *The Story of Experiments in Art and Technology 1960-2001* is the written version of a sequence of oral presentations which Klüver gave in several universities and other venues, consolidating a story which had always hitherto been prey to different versions[11]. In it, in a succinct way, Klüver described a series of project-related works, a short essay generally accompanying an illustration. He broached them from an especially descriptive and technical point, while refusing to pronounced any aesthetic value judgement in their regard.

Nevertheless, the E.A.T. story is still a (hi)story, that of E.A.T., at once experienced and observed by its main coordinator, Billy Klüver, who above all highlights the theme of collaboration, dear to the engineer and to the artist Rauschenberg alike. This approach makes it possible to record certain chronological and thematic decisions. The story thus starts in 1960 with the decisive collaboration between Klüver and the artist Jean Tinguely for the performance *Homage to New York* put on in the garden of the Museum of Modern Art [MoMA], i.e. well ahead of the founding of E.A.T. in 1966. And it ended with the archival activity of *Nine Evenings*, in 1996. This story thus makes choices in a set of productions much greater in number, if we refer to the information provided by the E.A.T. bibliography and Norma Loewen's thesis. The comparison between this story and the other resources mentioned effectively highlights the selections and authorizes a critical reading thereof. Klüver thus selected about thirty activities[12] which can be related to the 600 collaborative projects made possible by E.A.T. In this story, logically enough, Rauschenberg has pride of place[13]. The listing of prestigious names, like Jasper Johns, John Cage and Merce Cunningham, not forgetting Andy Warhol, bolsters their

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[10] At a moment when Klüver was no longer able to give these lectures, and thus with the aim of having himself replaced.

[11] Billy Klüver repeatedly wrote and rewrote this story, and we know of at least three versions, all different, the two earlier ones being: Billy Klüver, "Rainforest", manuscript of a presentation, written on 30 January 1970, E.A.T. Archives / Julie Martin; Billy Klüver, *What Are You Working on Now?: A Pictorial Memoir of the 60's*, New York, Experiments in Art and Technology, 1983.

[12] Works and projects, like *Oracle* and the Pepsi-Cola Pavilion at Osaka, being described over several pages.

[13] *Oracle* and *Soundings* are, in particular, each developed on two panels.

"symbolic capital". On the other hand, it is surprising that, for example, there is no mention whatsoever of the winner of the artists' and engineers' competition organized by E.A.T. to mobilize the community of engineers, then less present in its ranks—namely the *Heart Beats Dust* production made by the artist Jean Dupuy in collaboration with Ralph Martel—but a preference given, in the narrative of the E.A.T. story, to the kinetic work of Lucy and Nancy Young, *Fakir in ¾Time.* Lastly, this story totally sidesteps the problems encountered within joint projects and with companies, thus laying the way wide open to criticism.

So this E.A.T. story does indeed represent an unusual trajectory within a corpus of much broader activities, where the thread is still the collaboration between artist and engineer. Its main merit lies in the possible re-reading of a history of art which is based on thematic groupings by movement, making leaps between works of art and projects lying outside the art sphere, from one art praxis to another (from the visual arts to dance, etc) and dealing with persons traditionally associated with Pop Art, Minimalism, Land Art, and the like. What is indeed involved here is a heterogeneous range of praxes and approaches. Several stories may thus end up side by side, or even rival one another, some of them written by the players themselves and others by researchers outside the organization[14]. Thanks to the digital project, it is not a question of having to choose one or the other, but of managing to identify them, comparing them with the sources and appraising their relevance. It may be possible to increase the number of stories, and open up other prospects capable of responding to issues stemming not only from art history, but also from the sociology of art, innovation, and aesthetics.

b.3. What is E.A.T. ? What is a collaboration ?

To broach the E.A.T. subject, the researcher thus has at his/her disposal a set of resources scattered in various places, an uncertain number of interlocutors and activities, and unusual or special trajectories. The space-time outlines of the organization are, to say the least, blurred and the documentation relating to E.A.T.'s activities—i.e. followed or simply initiated by the organization—is both significant and partial. It focuses essentially on those activities where the E.A.T. team is the instigator, and which it has undertaken, and more modestly on the collaborative projects which it made possible through their system of networking[15]. Likewise, the activities and history of the "E.A.T. Local Groups[16]" spawned in different cities in North America, as well as in other countries (Europe, India, Japan) remain to be specified. Lastly, we can note

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[14] Sylvie Lacerte, "E.A.T. Experiments in Art Technology », olats.org, 2002. [on-line: http://www.olats.org/pionnier+s/pp/eat/eat.php.]; and Norma Loewen, *Experiments in Art and Technology: A Descriptive History of the Organization*, , op. cit.

[15] A point raised by Christopher de Fay in his thesis : *Art, Enterprise and Collaboration : Richard Serra, Robert Irwin, James Turrell and Claes Oldenburg at the Art and Technology Program of the Los Angeles County Museum of Art, 1967-1971*. Phd, University of Michigan, 2005.

[16] Subsidiary E.A.T. groups, which have sprung up all over the world.

an uneven use of these archives by researchers: the resources referred to are often promoted and developed by E.A.T. members themselves as well as by the institutions holding collections. Priority has thus been given to the distribution, in differing formats, of the *Nine Evenings*[17] and, to a lesser degree, to the Pepsi-Cola Pavilion at the Osaka World Fair of 1970, in Japan[18].

For these varied reasons, the E.A.T. programme is hard to define, and thus not easy to appraise, a point echoed by different areas of research[19]. Researchers encounter one or two problems in adjusting their equipment, and focusing on the organization's overall activity as well as on more local activities undertaken on a cooperative basis, as well as these specific trajectories of individuals and works. Overall views, trajectories and special points form the E.A.T. network, just as they define its complexity.

E.A.T. thus rightly raises a certain number of issues which have to do with the historical, social and aesthetic fields. Where art history is concerned, attention is focused on the means, technologies and materials used in the production of a project, as well as on art praxes and the forms in which these projects are presented. What were the most widely used technologies, and why? What changes does the incorporation of technology bring to a given art praxis (sculpture, dance, etc.)? What is the situation with inter-disciplinarity? And, above all, what is a collaborative project involving an artist and an engineer? What were the possible impacts of collaborations on artists' careers? And what was the life of a specific work such as Rauschenberg's *Oracle*?

Regarding, this time around, the social history of art, what matters stems from the development of an "art world" peculiar to E.A.T., in which there is interest in the agents and in the collaborative context of their production[20]. Attention is focused on the delegation process: who are the people mobilized in each one of the projects? Who the artists, engineers and

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[17] Let us mention the publication of performance films at Artpix, the travelling show organized by Catherine Morris, the exhibition at the Institut d'Art Contemporain de Villeurbanne, the website produced by Clarisse Bardiot with the backing of the Fondation Langlois, and the cycle of lectures and screenings at the MoMA and the Centre Pompidou.

[18] Jennifer Gabrys, "Jennifer Gabrys: Residue in the E.A.T. archives", Fondation Daniel Langlois [On line: http://www.fondation-langlois.org/html/e/page.php?NumPage=522]; Sylvie Lacerte, "9 Evenings and Experiments in Art and Technology », Fondation Daniel Langlois, 2005 http://www.fondation-langlois.org/html/e/page.php?NumPage=1716. Clarisse Bardiot, "9 evenings: theatre and engineering". Fondation Daniel Langlois, 2006. http://www.fondation-langlois.org/flash/f/index.php?NumPage=571; Catherine Morris (ed.), *9 evenings reconsidered: art, theatre, and engineering*, 1966. Cambridge (Mass.), MIT List Visual Arts Center, 2006; Frances Dyson, "And then it was now", Fondation Daniel Langlois, 2006. http://www.fondation-langlois.org/html/e/page.php?NumPage=2143.

[19] Christopher de Fay, *Art, Enterprise and Collaboration : Richard Serra, Robert Irwin, James Turrell and Claes Oldenburg at the Art and Technology Program of the Los Angeles County Museum of Art, 1967-1971*, op. cit.

[20] Howard Becker, *Les mondes de l'art*, Paris, Flammarion, 1988.

organizations most involved in E.A.T.? What does an artist get an engineer to do, and vice versa? Have these collaborative efforts born fruit from a scientific angle: otherwise put, to what extent have they been the object of a transfer or of patent applications (an argument often called upon by Klüver and Rauschenberg to attract the attention of industry)?

Last of all, aesthetics has to do with the genesis of the work of art, the autonomy and the heteronomy of art, like the distinction between art and non-art. It is concerned with the relations between the E.A.T. theory about the collaborative principle between artist, engineer and industry, and its social scope, and the reality of heterogeneous practices. The E.A.T. “object”, which is especially complex and reticular, thus seems able to benefit from the diversity of the methods of exploration offered by a digital platform managing the organization’s digitized archives.

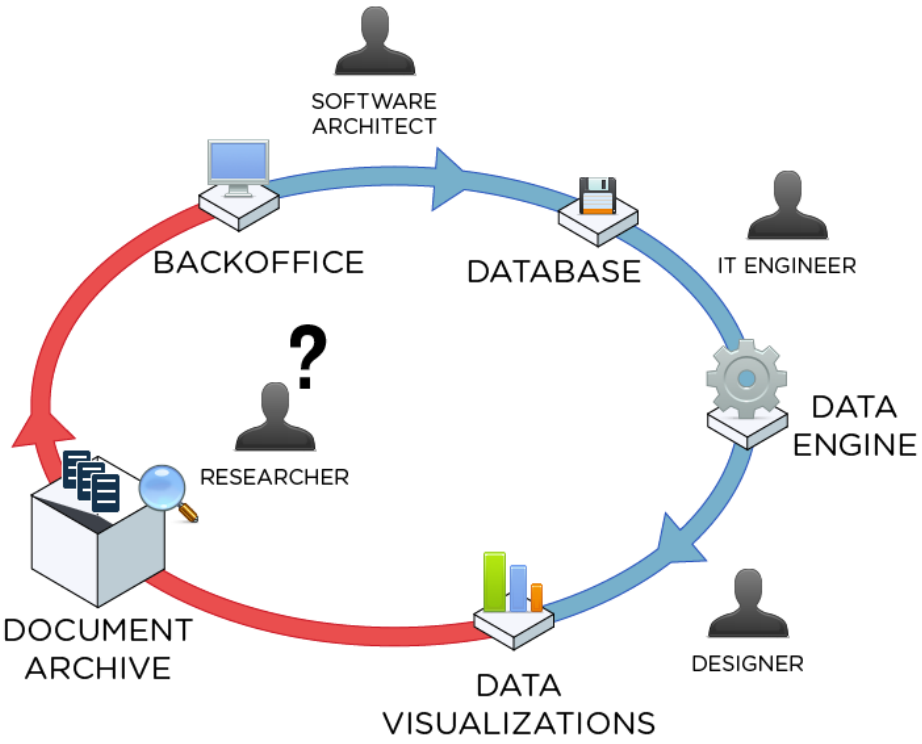
A digital method to work on E.A.T. archive?

This work was born from the meeting between an art historian and an Information Technology engineer. We tried to imagine how digital means could help a historian working on E.A.T archive. We propose to equip the researcher with exploration tools of the archive. Our approach didn’t use any advanced data mining techniques to automatically extract information from the archive. We focused on data modelisation and exploration. Our tool is a notebook of a new kind to help archive analysis. In this work, the only algorithms we rely on to interpret the vast heterogeneity of the documents are the reading and interpretation skills of the researcher. Our tool addresses the research steps following data extraction : data modelization, data visualizations and data exploration. We call such a tool a datascape.

What is a datascape ?

A datascape[21] is a set of digital methods and tools which provides exploratory data analysis[22] means for social scientists. It is an Information System (back office, database, data engine, data visualization) designed by a collaboration of social science researchers, IT engineers and information designers. It provides a method to modelize information from archives documents and an explorable set of interactive information visualizations.

[21] Bruno Latour and al., *‘The whole is always smaller than its parts’ – a digital test of Gabriel Tardes' monads*, The British Journal of Sociology, 2012.
[22] John Tukey, John Wilder, *Exploratory Data Analysis*, Addison-Wesley, 1977.



datascape iterative method

Researchers are the targeted users of datascapes. They are required to achieve two tasks: data modelling (feeding the database) and data exploration (through data visualizations). Those two sequential actions are to be repeated in many successive iterations : harvesting data (manually) from the archive to feed data models; exploring the visualization automatically updated by harvesting; get insights from the exploration process, detect patterns in the data structure; go back to the archive to check the patterns' origin; eventually correct the database when the pattern actually comes from a modeling bias; go back to exploration...

The whole process is achieved by the researcher himself. Understanding and participating to the construction of the database is a crucial issue for the researcher to understand the visualizations. By being both data provider and data explorer the researcher can be the center of a virtuous cycle: provide data to explore, explore to check the data. Alternatively cartographer and explorer, the researcher paces the corpus back and forth using the datascape as a map (reference tool through the corpus), as a notebook of his exploration (writing new data discovered in the archive) and as a field (finding data patterns in the data visualizations).

First step: data modeling

Designing a database requires a data model, a structure in which to store the data. We started by designing a very structured model (the easiest way). But little by little we tried to reduce the specificity by finding a way to describe identical cases but with a more generic schema. Our data model, *in extenso* our system, has to propose the essential simplicity to maintain complexity. Complexity being thought as the diversity of actors, projects and relationships between them.

Designing a data model is a tradeoff between accuracy (specificity) and quantification (genericity). The archive represents the highest level of accuracy. By trying to amplify the information hidden in the many documents, we have to reduce the specific documents to structured data. It's both a reduction and amplification process[23]. Archive is a field of study from which we create observations we normalize and store through the use of a database. We reduce the field of study to a database which is then amplified through visualization.

Ensuring the amplification by reduction, requires a documentation: we included items to indicate the archive documents from which the researchers had harvested data. Although we transform the archive in a database, a documentation link remains between the two and the archive will always remain the reference to consult.

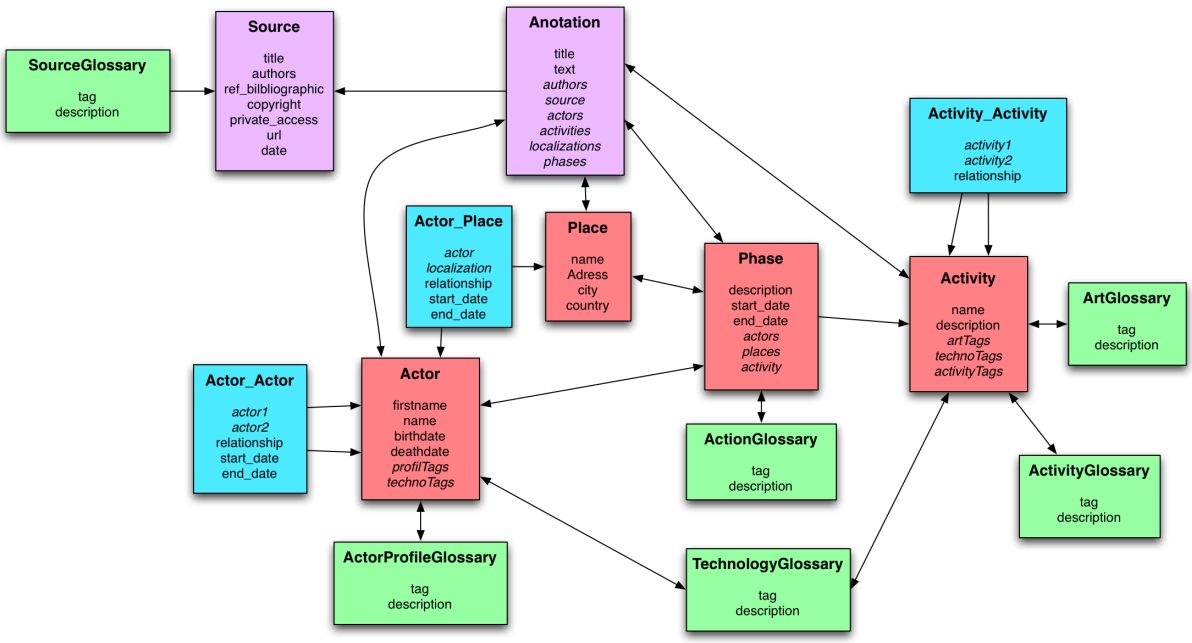


Figure : E.A.T. Datascape's data model

Finally after many iterations between the Art Historian and the Information Technology Engineer, the final data model we created focused on 4 main items: Actors (the 'Who'), Activities

[23] Bruno Latour, *topofil de Boa Vista ou la référence scientifique -montage photo-philosophique*, Raison Pratiques, 1993.

(the ‘What’), Phases (the ‘When’ and ‘How’), Places (the ‘Where’). The relationships between those objects are coded in 3 links items : the Actors_Actors link (social network), the Actor_place link (home, workshop..), the Activity_activity link (a performance linked to a festival...).

References to the archive are hold by 2 references items : the source item gathers the list of the archive document with precise metadata, the annotation gives researcher the possibility to quote part of a source and link it as description/justification of a phase object.

Six glossaries handle the descriptions of the database objects. Each glossary is a free multi-tagging system : non-controlled sets of tags, multiple description values. This choice is inspired by the Folksonomy techniques using an open tagging system in order not to have to foresee the tag we will need, and not to have to bend the reality to a fix closed tagging system[24]. Although It’s a more complex system to maintain, it allows alternative descriptions for new cases or let new researchers apply their own coding system.

Yet a manual task : entering data in the back office

A database is set up according to the data model. We use the web application framework DJANGO to manage a MySQL database. This application provides an automatic way to build data entry interfaces in order to edit the database.

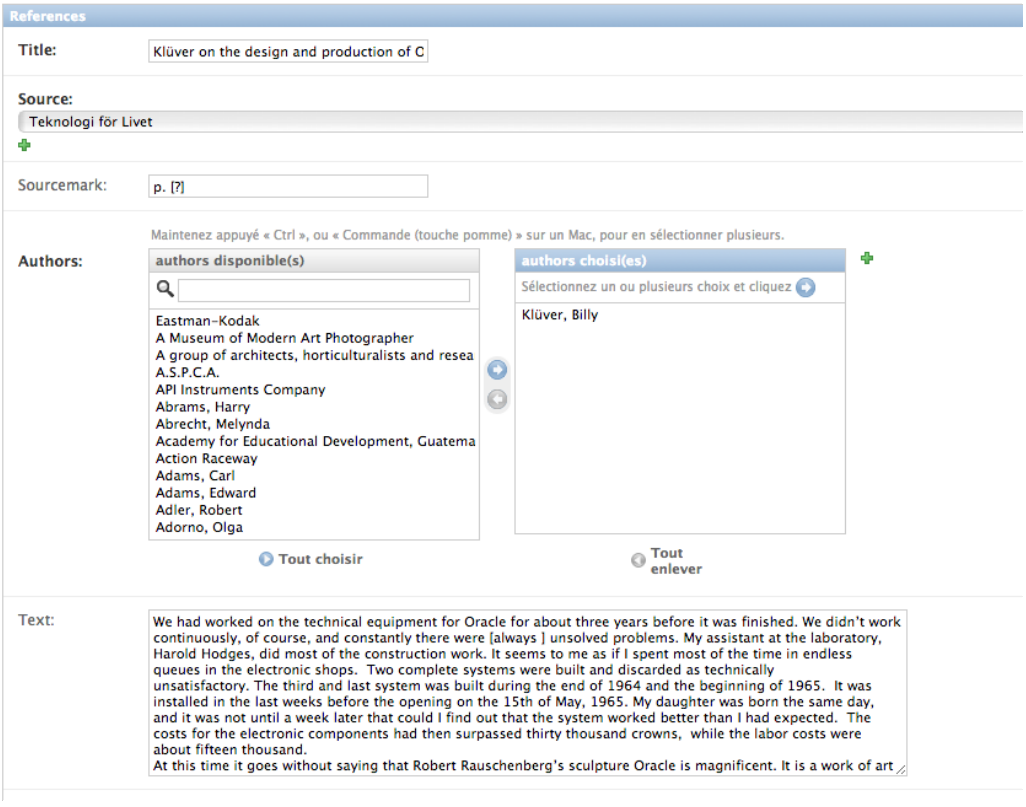


Figure : database interface for Reference

[24] Clay Shirky,*Ontology is overrated; categories, links and tags*, Clay Shirky's Writings About the Internet, 2005

The researcher can then describe E.A.T. activity from the archive documents by feeding new data into the database. All the previous notes the researcher had written were translated as data to be imported in the database (list of actors, projects...). Digital means are used only as a repository to human work.

visualization and exploration

The manual work of data extraction is motivated by the opportunity to build a set of data visualizations. Once structured in a database, data can be represented as graphs and schemas : timelines, maps, collaboration charts, tag clouds, etc. Dynamically updating, this set of visualization creates a scape of data. A scape to be explored through :

- projection facets : on time with timelines, on geography space with maps, on relationships through social networks ;
- aggregation levels : to allow the researcher to switch from macro (aggregated view) to micro (specific actor view) level with the same instrument;
- the reversibility of actor-network: open up substances by seeing actors as a set of collaborations to activities and reciprocally.

This exploratory data analysis enhanced the reading-coding experience of the archive with an interactive environment, aiming to confirm known patterns or discover new ones through quantification.

The E.A.T. Datascape contains 3 pages (Overview, Actor and Project) composed by several visualizations :

- Overview page : an aggregation of all data on time (curve representing the number of activities and people involved), space (places) and categorisation (clouds of tags used sorted by occurrences) facets;

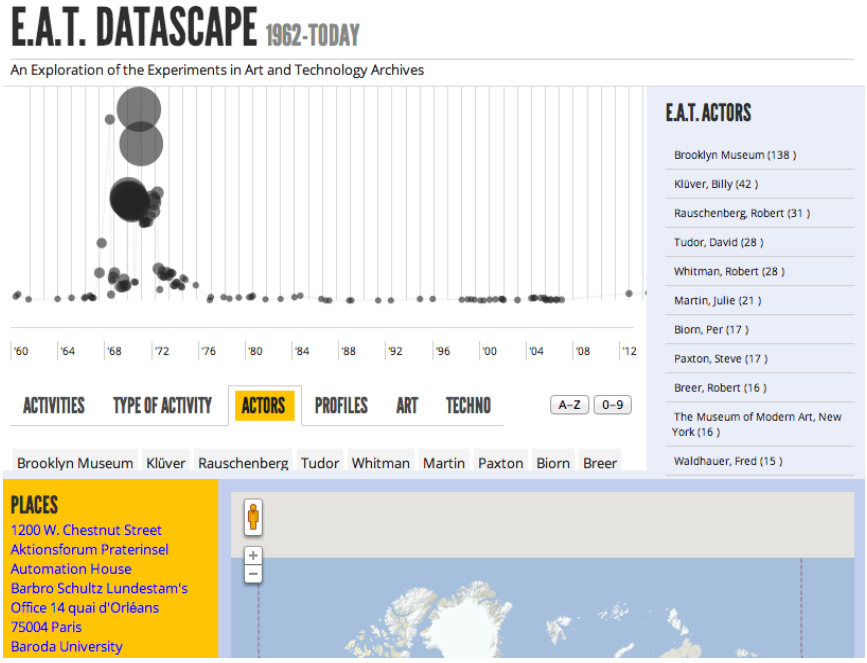


Figure : the overview page

- Actor page : a page by actor visualizing on which phases of activity, with who and where the actor participated to E.A.T.;

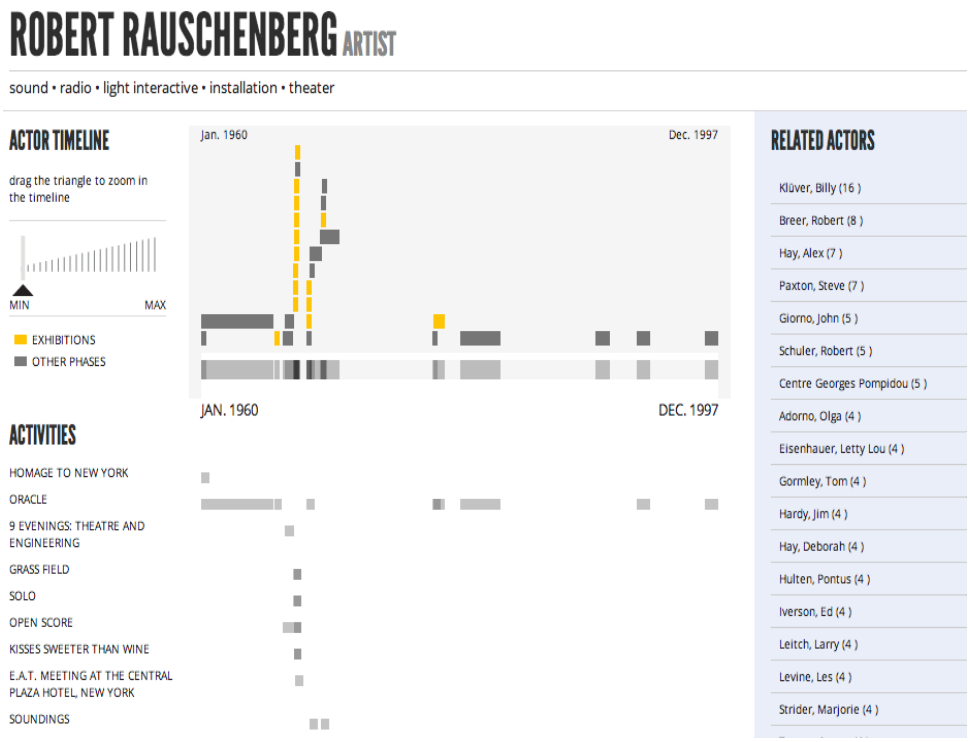


figure : an actor page - Robert Rauschenberg

- Activity page: a page by project showing the history of the activity by phases, actors participation and places.

On both Actor and Activity pages a sidebar shows all the annotations which reference the information coding work to documents of the archive.

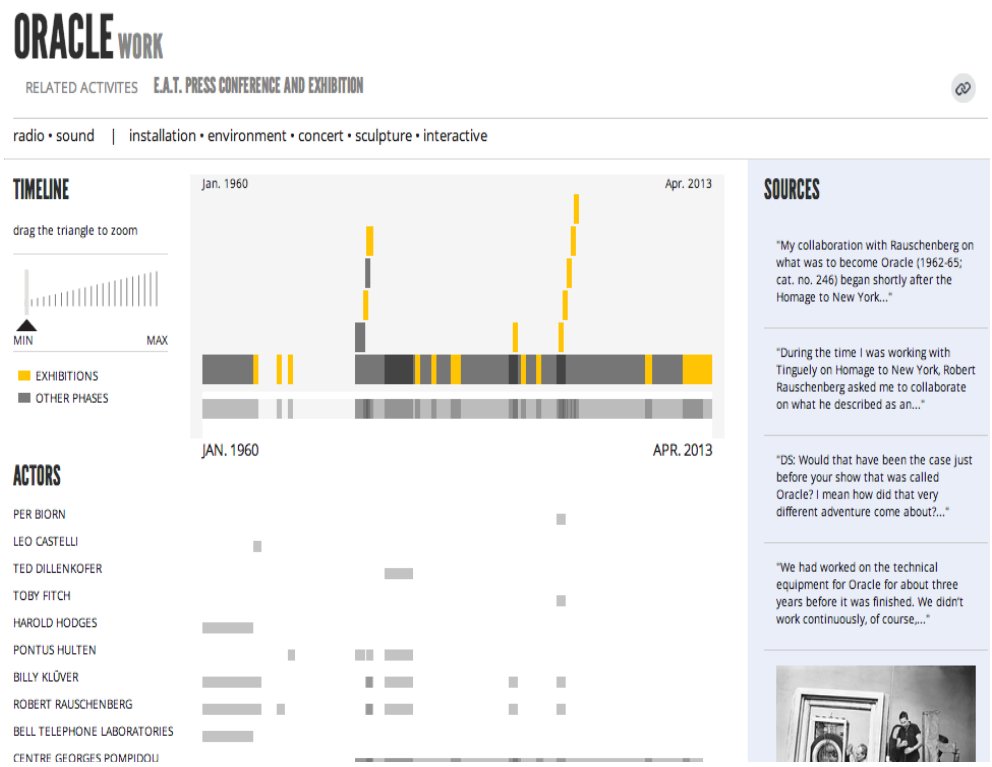


figure : An activity page - Oracle

explore an actor network

One of the difficulties has to do with the identification of the different players, their relations and their involvement in especially heterogeneous activities, for the interest in art history in the figure of the artist has trouble espousing the inclusion of engineers and mediators, which is favoured more by the social history of art and the sociology of art. But we do have all the information necessary for thus defining a particularly precise "art world.[25]" This art world can thus take the form of a social cartography, or sociography, to wit, a representation of the players and their relations, where it is possible to be interested in artists[26] and/or engineers solely or in all the players involved. The network can then be made up of the different players and persons involved (artist, engineer, exhibition curator) and organizations (gallery, museum, fundation, etc) concerned. The use of several additional data like the frequency of collaboration between players or the various hierarchic links is likely to alter the appearance of the relational graphs[27].

The exploration interface must above all permit a search by player, whatever the definition (artist, engineer, mediator or organization) in order to identify all the activities he or she has been involved in, and the people with whom he or she has worked, and visualize their

[25] Howard Becker, *op. cit.*

[26] Like what the art historian Steven Watson proposes for Andy Warhol's factory. See: *Factory Made: Warhol and the Sixties*, New York: Pantheon Books, 2003, p.xvi-xvii.

[27] The Gephi visualization and exploration platform <http://gephi.org/> meet these needs. See below.

importance in the organization. So the story of E.A.T. by Klüver makes it possible to partly establish the network peculiar to the engineer who was joint founder of E.A.T. But it is also be possible to follow the different involvements of a Bell Labs engineer such as Per Biorn, and thus gauge the significance and multi-facettedness of his involvement within E.A.T. If the activity of the two artists who co-founded E.A.T., Robert Rauschenberg and Robert Whitman, merits our close attention, the more marginal involvement of artists like Robert Morris and Allan Kaprow, other major figures in the New York art scene of the day, is likely to interest the researcher. At any given moment, it is possible to decide to follow a player, or else abandon a defined player to follow another, and pass from a player to an activity, and vice versa. This flexibility can also lead to a useful reappraisal of the hold of certain art categories that are firmly established and often pigeonholed to consider the hybridizations, passages and exchanges on which their praxes are nurtured.

Explore a project : Oracle

It is helpful to have an overall view, but also more detailed views, oriented towards the various activities properly so-called. The factual information regarding the activities, and the members' involvement therein, actually makes it possible to reconstruct a story of a given activity -i.e a work, a project- from conception to communication (publication, lecture, exhibition) and reception, by way of production. Whether such projects actually take place or not. The case of the work *Oracle* initially conceived and developed by Rauschenberg and Klüver between 1960 and 1965 is an especially enlightening example, from the encounter and initial discussion in 1960 to the initial intentions, the re-formulation of the project, and its execution between 1962 and 1965, to its many shows and its conservation and restoration (phases) at the Centre Pompidou.

The visualization of the informations -actors, timeline, places, sources- not only shows that the development of the work took a while and that many people were involved in the production of the work, but the life story of this work (the timeline associated with different sources, mainly texts and photos displayed in the source column) also shows that radically different versions of the same work of art -which was at first interactive and immersive but not necessary afterwards- were exhibited through time, respecting more or less to the original esthetic statements of the artist. From another perspective, and considering the successive phases in the timeline of the work, one can also see that the exhibition of the work at the Centre Pompidou or elsewhere, was regularly - if not systematically- preceded by a restoration phase so that one can here see how difficult it is to preserve and show (former new) media art work integrating technologies that become quickly obsolete.

Feedback on experience

This work is an attempt to implement the concept of a datascape and test its validity in a humanity case study.

From datascape back to the archive

Our tool was built to help the researcher explore an archive. The movement was first conceptualized from the archive to the datascape, from the document to the data, representing extracted information through visualizations. But yet to explore the datascape the researcher needs to turn around, going from the visualization back to the archive. Through the source and annotations, the researcher can go back to read the archive to check data, complement data extraction work...

And more generally if one envisions the use of the datascape to a larger public, the datascape could also be seen as a door to the archive. Reversing the movement from the datascape to the archive reveals an alternative way to open up archive to a wider public, by presenting a collection of documents as an interactive map of information. Exploration would then be a first step into the archive which could then be enhanced by accessing and reading the documents preserved. Although this would mean to add to the method we presented an editorial layer to guide users exploration, the datascape could still be used to propose the preservation institution to create a public view of a collection.

Dive into data : an information laboratory

The research process described in this work places the researcher at the center of the data processing flow. In a same process the researcher handles data by manual extraction, modelization in a database and through visual exploration. He goes from documents to data by reading and noting important facts; from data to information by exploring the datascape which creates a form (“informare”) out of the database; and from information to knowledge, by analysing, interpreting the forms of data obtained. By letting the researcher being the main actor of those steps, we let the researcher dive into data.

By diving into data, we mean to expose oneself to data coding issues. The data model being opened (the less *ex ante* structures as possible), the extraction being manual, the researcher has to make a decision on how to transform his reading experience in modelized data. We experienced many discussions on how to map a given fact into some data. For example, the first phase of an activity has been modelized in this work as design & production. First design and production were 2 different phases. The decision to code design and production in one phase of activity came from the difficulty to know from the archive material when and how design would be separated from production. The decision depends on the particular event and on the research question targeted. The researcher should then be the main actor of this process of coding facts into data.

With the concept of datascape we try to reconcile qualitative and quantitative approaches to data analysis. The data model forces to quantify the description of events inside a database. Nevertheless, designing a simple and open data model and letting the researcher decide how to code the data grounds this quantification into a qualitative environnement. This hybridation goes on with the exploration. The quantification of the database is used to render interactive visualizations. In this Exploratory Data Analysis approach, the researcher plays the crucial role of the explorator. The datascape let him see the geography of the field he studied through the lens

of his own coding work. Rendering the database created as explorable interfaces, gives him a tangible view of the necessary simplification of the quantification. The quantification of data is then reviewed by the qualitative work of exploration and interpretation by the researcher. The researcher can then face and criticize his own coding work.

The datascape then becomes a tool to build a corpus of quantitative data from a qualitative perspective using the visual and interactive exploration as a bridge between the two. The corpus built can be after exported in a specific file format to follow up the analysis with a specific software. In this work we exported the database as a network of actors collaboration to be analysed in a dedicated network statistics software[28].

Toward collaborative work

The documentation of the quantification choices being incorporated in the database (both data and references to the archive documents) and directly accessible to any other researcher than the main one, we could imagine to use the datascape as a collaborative research tool. We didn't test this and the tool developed in this work isn't ready yet to allow collaborations. Among the many missing features to reach this goal we can mention the necessity to provide private coding glossaries for each researcher, a bottom-up categorization system which would let the researcher community decide how to build a common ontology from the multi-tagging system, add to the visualization the possibility to know who coded a data, etc.

Though we worked on a highly specific corpus to answer specific question -'What is E.A.T.?'- in the field of art and social art history, the first positive feedbacks proved that, as a digital tool and method, this work could help humanities researchers working on an archive and dealing at first with a certain complexity -i.e many players, activities, etc.-, to test their own hypotheses and to examine future avenues of research.

[28] Mathieu Bastian, Sébastien Heymann, Mathieu Jacomy, *Gephi: an open source software for exploring and manipulating networks*, International AAAI Conference on Weblogs and Social Media, 2009