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The Experiments in Art and Technology Datascape

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Christophe Leclercq et Paul Girard

The Experiments in Art and Technology Datascape

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Christophe Leclercq et Paul Girard

The Experiments in Art and Technology Datascape

1 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. Its purpose was to facilitate collaboration between artists, engineers, and scientists by producing art systems and projects outside the art sphere in a strictly defined sense. Between 1966 and 1970, E.A.T. was thus at the root of more than 600 joint projects[1] in the United States and abroad, most of which, rightly or wrongly, are largely unknown.

2 Billy Klüver and Julie Martin, the organization's last two directors, undertook the task of archiving their activities in a particularly conscientious way, classifying and preserving a collection of documents related to the production of projects that were the organization's brainchildren. They also worked toward developing these records, in particular through the making from the 1990s onward, of documentary films using hitherto unpublished archival documents. This work was undoubtedly affected by the emergence of a certain critical recognition by the art world, as gauged by the increase, in the 2000s, of works made and exhibitions held by exhibition curators, researchers, and art critics.[2]

3 Yet the partial use made of these archives makes it impossible to take the full measure of the organization. In fact, it inadequately reflects both the diversity and the proliferation of the structure's activities, including its systems and methods, its exhibitions and shows, its lectures and, not least, its publications—in other words, its complexity. The collaborative dimension of E.A.T.'s activities (often reduced to technical assistance schemes), of which the creation of systems is just the tip of the iceberg, adds to the problem. Elaborating a response to the seemingly simple question "What is E.A.T.?" therefore calls for the availability and collective use of a great deal of information related to the organization's many activities. Examined in this way, E.A.T. emerges as an exemplary case study for the burgeoning fields of digital humanities and design alike. Based on this case, it is actually possible to identify, within areas of aesthetics, of art history and social art history, new, practical ways of making use of archives not only by providing access to digitized resources, but also—especially—by focusing on the organization of these resources so as to provide answers to issues raised by the scholars engaged in these different disciplines and in the areas where they overlap.

E.A.T. Archive

The presently existing archives

4 Researchers interested in E.A.T. have to deal with a whole host of resources located in different geographical places. The identification of a corpus that can be utilized is therefore the first difficulty facing scholars. The organization's main archives are held essentially in two places: the Daniel Langlois Foundation in Montreal, Canada, and the Getty Research Institute in Los Angeles, California. E.A.T.'s director, Julie Martin, also holds two boxes of E.A.T. archives at her home in Berkeley Heights (New Jersey), for the most part containing documents listed in the publication produced by the organization, the so-called E.A.T. bibliography.

E.A.T. bibliography: documents and references

5 The social art historian Julie Martin and the engineer and scientist Billy Klüver, two leading E.A.T. figures who served successively as director, have painstakingly archived various documents associated with collaborative projects undertaken (or not, for want of funding) by the organization. Not only has this documentation been preserved, but it has also been organized with the intention of further developing it, as is shown by the publication of a bibliography by E.A.T. on E.A.T.[3] Comprising a collection of resources on E.A.T.'s activities, the bibliography provides an initial corpus defined by people actually involved

with the organization. This bibliography singles out two types of resources, divided into two sections: Documents and References. While the first segment 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 program), publications produced by E.A.T. (newsletters, magazines)—the References are for the most part made up of press articles and other critical and academic literature.[4] The latter section actually seems more homogeneous than the first, which may be likened to a "Prévert-type inventory." It is nevertheless helpful to be able to group the resources on the basis of their author's identity and to separate those produced strictly by people involved in the organization (present, willy-nilly, in both sections) from those generated by individuals outside the organization (only present in the References). This is an advantage that the print edition, favoring one classification method—albeit a relevant one—at the expense of others, cannot easily provide.[5]

6 The available E.A.T. archives are not, however, limited to the corpus included in this bibliography. The archives housed by the various structures previously mentioned contain a range of other documents, 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 their function, while specifying both the format and the nature of the information conveyed.[6] The "archival documents" include the following 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 are "published text documents": Book, Text in book, Periodical issue, Text in periodical, Proceedings, Thesis, Solo Exhibition catalogue, Group exhibition catalogue. Lastly, there are video documents (interview, documentary/report), audio documents (interview), visual documents (photographs, and the like), and digital documents (CD-ROMs, etc.).

7 At this stage, scholars already have two equally interesting sources at their disposal: the E.A.T. bibliography, which, though not exhaustive (it stops in 1980), forms a relatively coherent whole whose significance derives in large part from the fact that it was composed on a historical basis by actors from within the organization; and a more thorough, rigorous collection of archives that is descriptive and exhaustive—the Langlois Foundation's archives.

An "activity"-oriented approach: works and projects

8 The respective approaches of the Daniel Langlois Foundation and of the main E.A.T. member, Billy Klüver, to this common material reveal two different ways of organizing these primary sources.

Thematic and activity-oriented approaches

9 The Daniel Langlois Foundation offers a thematic approach to bibliographical references according to 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 related to any production having a clear beginning and end carried out in collaboration with E.A.T. or with its support.

10 Norma Loewen's dissertation, published in 1975, is invaluable precisely in that it demonstrates the diversity of the organization's activities and compiles a first list of works and projects produced by E.A.T.[8] She singles out several groups of activities that 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 newsletters aimed at the community, or press dossiers and exhibition catalogues aimed at as broad an audience as possible (*E.A.T. News*, *Information*, *Techne*, *E.A.T. Clippings*, etc.).

11 To these various undertakings—information and training, networking, fundraising and project management, development and promotion (publishing, exhibitions, etc.)—we should add those activities related to the reception of projects by the artistic and engineering communities,[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 a program, from its conception and production to its distribution and reception.

The story of E.A.T. by its members

12 The main members of E.A.T. themselves made a selection among the organization's activities in view of constructing a more eloquent narrative than the one offered by the aforementioned bibliography. *The Story of Experiments in Art and Technology* is the title given to both a series of lectures presented by Klüver and to a film made by Anne-Olivia Le Cornec[10], as well as to various exhibitions. These included a show "in two suitcases," composed of a set of easy-to-transport panels displaying the E.A.T. program, and another, more important, event held at the InterCommunication Center (ICC) that associated this first set of panels with an exhibition of systems and documents and the screening of archival films. The catalogue *The Story of Experiments in Art and Technology 1960-2001* is a printed version of a sequence of oral presentations that Klüver gave in several universities and other venues, consolidating a story that had hitherto existed in different, variable versions.[11] Klüver succinctly describes a series of project-related works, each in a short essay generally accompanied by an illustration. Presenting them in a descriptive and technical manner, he reserves any judgment on their aesthetic value.

13 The narrative of E.A.T. nonetheless remains a (hi)story, at once experienced and observed by its main coordinator, Klüver, who above all highlights the theme of collaboration dear to the engineer and to the artist Robert Rauschenberg alike. This approach makes it possible to record certain chronological and thematic decisions. The story begins with the decisive collaboration between Klüver and the artist Jean Tinguely for the performance *Homage to New York*, staged in the garden of the Museum of Modern Art (MoMA) in 1960, i.e. well ahead of the founding of E.A.T. in 1966. It ends with the archival activity of *Nine Evenings*, in 1996. This narrative arc requires that a selection be made from among the much larger set of productions presented in the E.A.T. bibliography and in Norma Loewen's dissertation. The comparison between this story and the other sources mentioned effectively highlights the choices made and authorizes a critical reading thereof. Klüver selected some thirty activities[12] out of the six hundred collaborative projects made possible by E.A.T. In this story, understandably enough, Rauschenberg has pride of place.[13] The inclusion of prestigious names such as Jasper Johns, John Cage, Merce Cunningham, and Andy Warhol bolsters their "symbolic capital." It is more surprising, however, that 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 *Heart Beats Dust*, produced by the artist Jean Dupuy in collaboration with Ralph Martel—while a large role is given 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.

14 The E.A.T. story plotted by Klüver does indeed represent an unusual trajectory within a much broader series of activities, whose thread remains the collaboration between artist and engineer. Its main merit lies in the possible re-reading of a history of art based on thematic groupings by movement, making leaps between works of art and projects lying outside the sphere of the visual arts, from one medium to another (from the visual arts to dance, etc.), and dealing with figures traditionally associated with Pop Art, Minimalism, Land Art, and the like. What is indeed involved here is a heterogeneous range of practices 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 scholars outside the organization.[14] Thanks to the digital project, it is not a question of having to choose one or the other but rather 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.

What is E.A.T.? What is collaboration?

15 The scholar studying E.A.T. thus has at his or 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. carried out or simply initiated by the organization—is both significant and partial. It focuses essentially on those activities instigated and realized by the E.A.T. team and, more modestly, on the collaborative projects made possible through their system of networking.[15] Moreover, 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 an uneven use of the 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 *9 Evenings* and, to a lesser degree, to the Pepsi-Cola Pavilion at the Osaka World Fair of 1970, in Japan.[17]

16 For these varied reasons, the E.A.T. program is hard to define and difficult to appraise, a point echoed in different areas of research.[18] Scholars encounter problems adjusting their equipment in order to focus on the organization's overall activity and on more local initiatives undertaken on a cooperative basis, as well as on the specific trajectories of individuals and works. Overall views, trajectories, and special points form the E.A.T. network, just as they define its complexity.

17 E.A.T. rightly raises a certain number of issues having 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 execution of a project, as well as on artistic practices and the forms in which these projects are presented. What were the most widely used technologies, and why? How does the incorporation of technology alter a given artistic practice (sculpture, dance, etc.)? What is the situation with interdisciplinarity? And, above all, how does one qualify a collaborative project involving an artist and an engineer? What possible impact can such collaboration have on an artist's career? And what was the life of a specific work such as Rauschenberg's *Oracle*?

18 Regarding the social history of art, what matters stems from the development of an "art world" peculiar to E.A.T., raising questions of agency and of the collaborative context of production[19]. Attention is focused on the delegation process: who is mobilized in each one of the projects? Who are the artists, engineers, and organizations most involved in E.A.T.? What does an artist engage an engineer to do, and vice versa? Have these collaborative efforts born fruit from a scientific angle? In other words, to what extent have they been the object of a transfer or of patent applications (a strategy often used by Klüver and Rauschenberg to attract the attention of industry)?

19 Finally, aesthetics has to do with the genesis of the work of art and 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, stands to benefit from the diversity of methods of exploration offered by a digital platform for managing the organization's digitized archives.

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

20 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 the E.A.T archive by equipping her with the tools necessary to explore it. Our approach didn't use any advanced data mining techniques to automatically extract information from the archive. We focused on data modeling 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 modeling, data visualization, and data exploration. We call this a tool a datascape.

What is a datascape?

21 A datascape[20] is a set of digital methods and tools that provides social scientists with a means of exploratory data analysis.[21] It is an Information System (back office, database, data engine, data visualization) designed collaboratively by social science researchers, IT engineers, and information designers. It provides a method for modeling information from archival documents and a navigable set of interactive information visualizations.

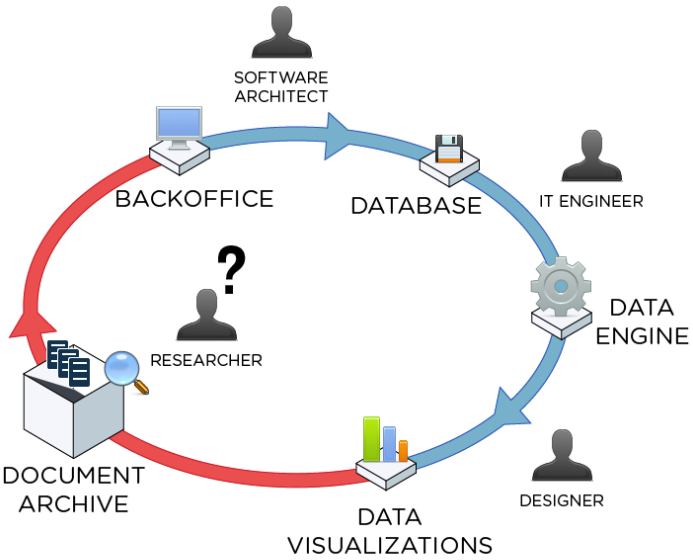

Figure: datascape iterative method.

22 Researchers, the targeted users of datascapes, are required to fulfill two tasks: data modeling (feeding the database) and data exploration (through data visualization). 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; gaining insights from the exploration process and detecting patterns in the data structure; returning to the archive to check the patterns' origin; possibly correcting the database when the pattern actually comes from a modeling bias; going back to exploration...

23 The whole process is managed by the researcher himself. Understanding and participating in the construction of the database is crucial to the researcher's understanding of the visualizations. By being both data provider and data explorer, the researcher is situated at the center of a virtuous cycle: provide data to explore, explore to check the data. Alternatively cartographer and explorer, the researcher surveys the corpus 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

24 Designing a database requires a data model, a structure in which to store the data.

25 We started by designing a very structured model (the easiest way). We then tried to reduce the specificity by finding a way to describe identical cases with a more generic schema. Our data model—*in extenso* our system—has to provide the essential simplicity that allows it to express complexity, complexity in this case being the plethora of actors and projects and the relationships between them.

26 Designing a data model is a tradeoff between accuracy (specificity) and quantification (generality). 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 is a process of both reduction and amplification.[22] The raw data provided by archives can be used to generate observations, which are then normalized and stored in a database. Once the raw data has been streamlined in this way, it can then be amplified through visualization.

27 Ensuring the amplification by reduction requires documentation: we included items to indicate the archival documents from which researchers had harvested data. Even as the archive is transformed into a database, a link remains between the two in the form of documentation, and the archive will always remain the reference to consult.

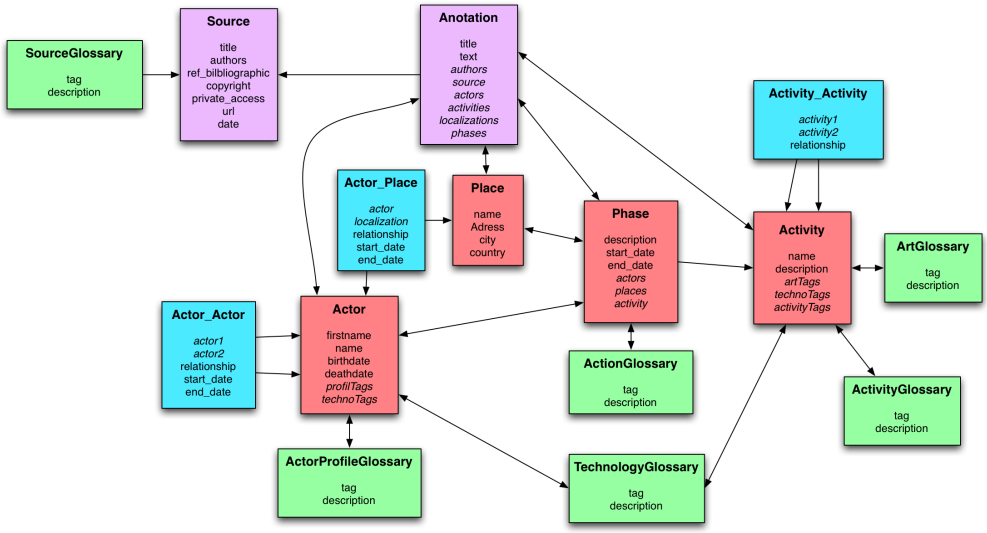

Figure: E.A.T. datascape's data model.

28 Finally, after many iterations between the Art Historian and the Information Technology Engineer, the final data model we created focused on four main items: Actors ("Who?"), Activities ("What?"), Phases ("When?" and "How?"), Places ("Where?"). The relationships between those objects are coded in three linked items: the Actor_Actor link (social network), the Actor_place link (home, workshop…), the Activity_Activity link (a performance linked to a festival...).

29 References to the archive are described in 2 references objects: the source item describes the archive document with precise bibliographic reference; the annotation gives researcher the possibility to point a quote part of a source where information were extracted to fill in the database. It's an important mechanism to let the researcher trace his codification work back to the raw database material.

30 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 to avoid having to foresee all tags that might be needed in the future or to bend reality to a closed tagging system.[23] Although more complex to maintain, this system allows alternative descriptions for new cases and lets new researchers apply their own coding system.

Still a manual task: entering data in the back office

31 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.

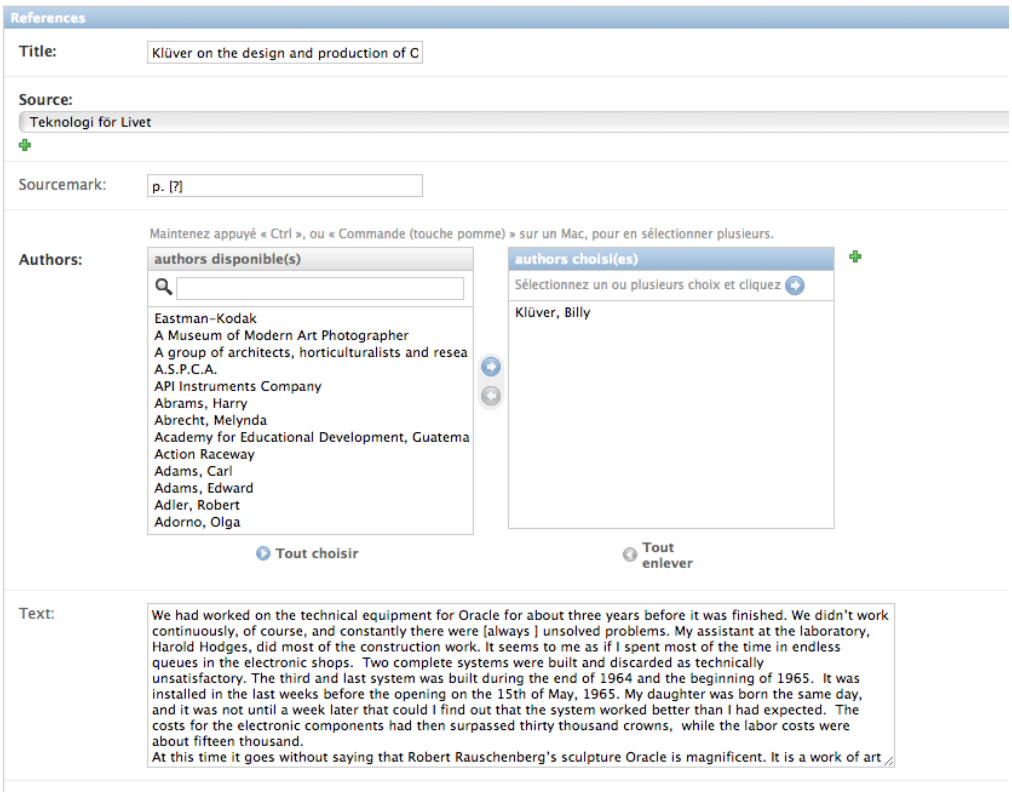

Figure: database interface for Reference.

32 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 into the database (list of actors, projects...). Digital means are used only as a repository for human work.

Visualization and exploration

33 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 datascape, to be explored through:

34 - projection facets: on time with timelines, on geographical space with maps, on relationships through social networks;

35 - aggregation levels: to allow the researcher to switch from macro (aggregated view) to micro (specific actor view) levels with the same instrument;

36 - the reversibility of actor-network: to consider any actor as sets of attributes (tags, activities...) and reciprocally to consider any attributes as sets of relationships of actors[24].

37 This exploratory data analysis enhances the reading-coding experience of the archive through an interactive environment, with the objective of confirming known patterns or discovering new ones through quantification.

38 The E.A.T. Datascape contains three pages (Overview, Actor and Project) composed of several visualizations:

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

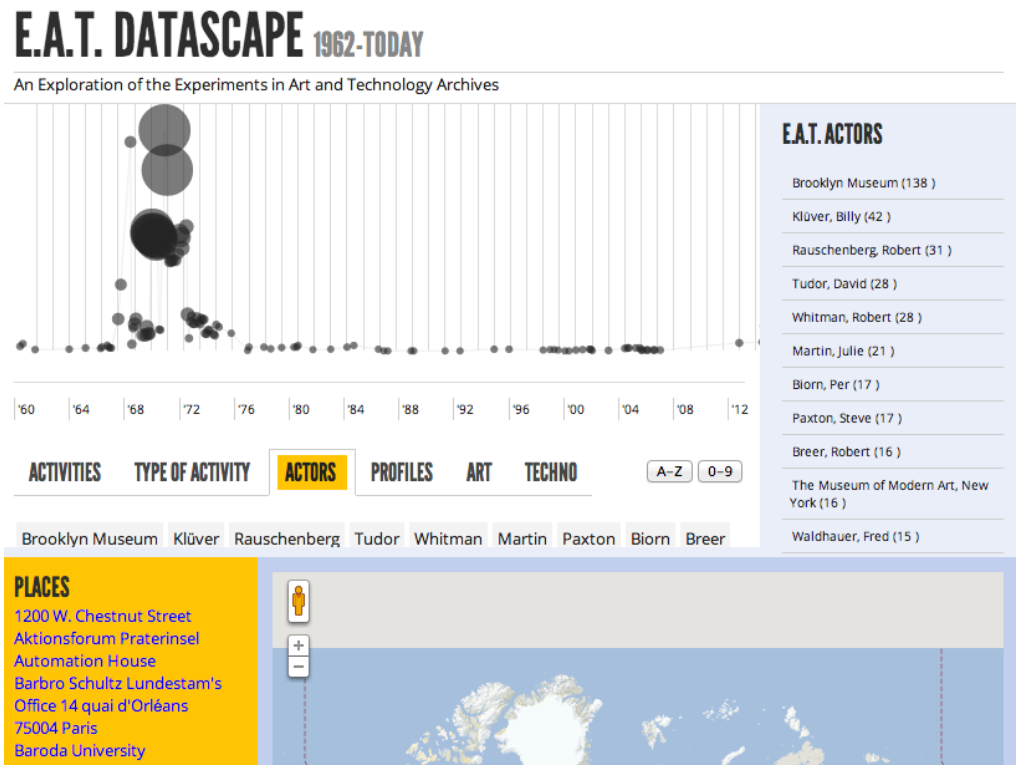

Figure: the overview page.

40 - Actor page: a page per actor modeling phases of activity, collaborators, and where the actor participated in E.A.T.;

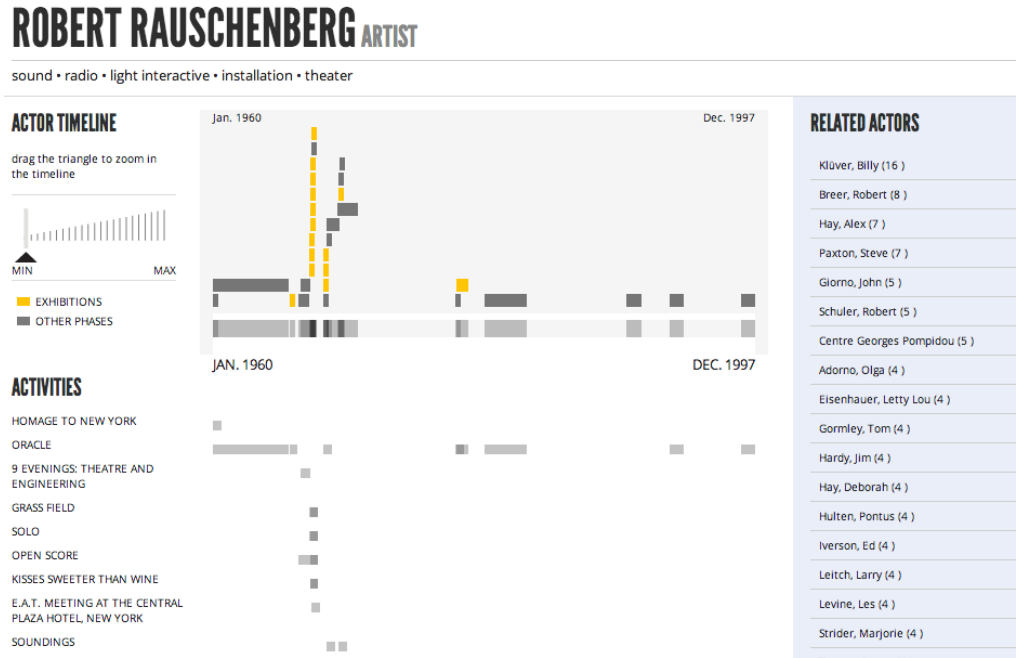

Figure: an actor page - Robert Rauschenberg.

41 - Activity page: a page per project showing the history of the activity by phase, actor participation, and place.

42 On both Actor and Activity pages, a sidebar shows all annotations referencing information contained in documents in the archive.

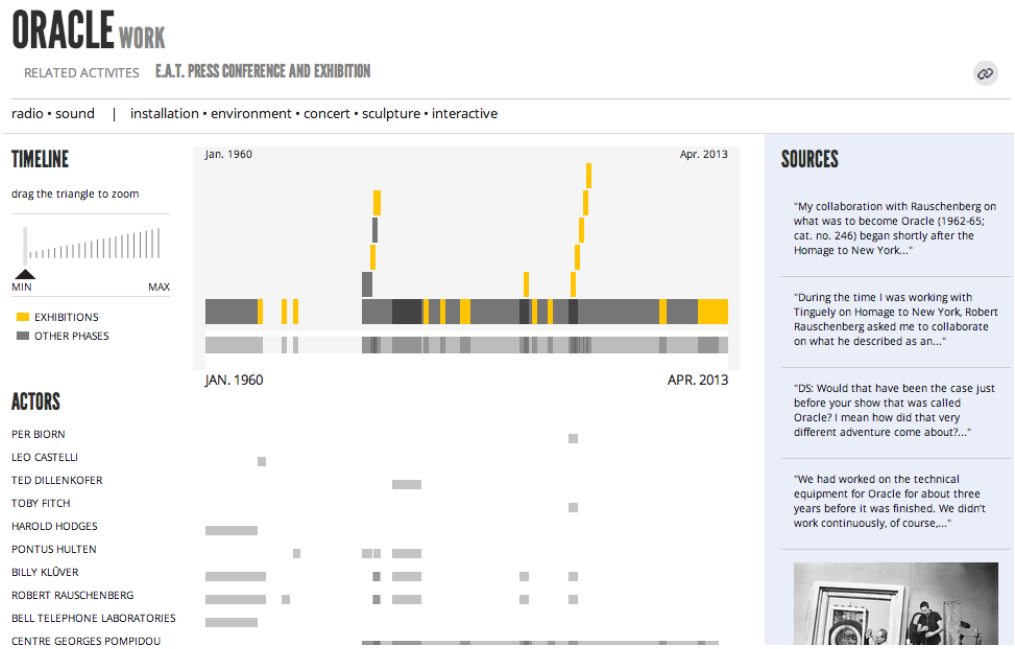

Figure: an activity page - Oracle.

Explore an actor network

43 The identification of the different players, their relations, and their involvement in especially heterogeneous activities poses a particular challenge for art history, whose interest in the figure of the artist makes it difficult to include engineers and mediators, more often favored by the social history of art and the sociology of art. But we do have all the information necessary for defining a particularly precise "art world.[25]" This can 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 is construed as an interaction of different individual protagonists (artist, engineer, exhibition curator) and organizations (gallery, museum, foundation, etc.). 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]

44 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 in which he or she has been involved and the people with whom he or she has worked, and visualize their importance in the organization. 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.; yet it should also be possible to follow the different involvements of a Bell Labs engineer such as Per Biorn, and thus gauge the significance and multi-faceted nature 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, or vice versa. This flexibility can also lead to a useful reappraisal of certain art categories that are firmly established and often pigeonholed, in favor of considering the hybridizations, transfers, and exchanges on which their praxes are nurtured.

Explore a project: Oracle

45 In addition to the overall panorama, it is also helpful to more detailed views, oriented towards the various activities as such. Factual information regarding the activities, and the members' involvement therein, actually makes it possible to reconstruct a history of a given activity—i.e. a work, a project—from conception and production to communication (publication, lecture, exhibition) and reception, independently of whether the project actually took place. The work

Oracle, initially conceived and developed by Rauschenberg and Klüver between 1960 and 1965, is an especially enlightening example, from their encounter and initial discussion in 1960, through 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.

46 The visualization of the information—actors, timeline, places, sources—not only demonstrates that the development of the work was long and that many people were involved in its production, but its life story (the timeline associated with different sources, mainly texts and photos displayed in the source column) also reveals 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 the original aesthetic 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 and elsewhere was regularly—if not systematically—preceded by a restoration phase; one can see here how difficult it is to preserve and exhibit (formerly new) media art integrating technologies that are now obsolete.

Feedback on experience

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

From datascape back to the archive

48 Our tool was built to help the researcher explore an archive. It was first conceptualized as a movement from the archive to the datascape, from the document to the data, representing extracted information through visualizations. Yet, to explore the datascape, the researcher needs to reverse directions, going from the visualization back to the archive. Through sources and annotations, the researcher can return to the archive to check data, continue carrying out data extraction work...

49 More generally, if one imagines the use of the datascape by a larger audience, it can be envisioned as a gateway to the archive. Reversing the movement from the datascape to the archive reveals an alternative way to open up archive to a broader set of users by presenting a collection of documents as an interactive map of information. Exploration would be a first step into the archive, which could then be enhanced by accessing and reading the preserved documents. Although this would mean adding an editorial layer to guide exploration by users, the datascape could be used by preservation institution (museum, archive organism...) to propose his public interfaces to explore their collection.

Dive into data: an information laboratory

50 The research process described in this work places the researcher at the center of the data processing flow. In a single process, the researcher handles data in the form of manual extraction, modeling in a database, and visual exploration. He goes from documents to data by reading and noting important facts; from data to information by exploring the datascape that gives form to the database, it creates information (“derived from the verb "informare" (to inform) in the sense of "to give form to the mind"”[28]); and from information to knowledge, by analyzing and interpreting the forms of data obtained. By allowing researchers to be the main actors of those steps, we let them dive into data.

51 Diving into data signifies exposing oneself to data coding issues. Since the data model has been opened (the least *ex ante* structure possible) and the extraction is manual, the researcher has to decide how to transform his reading experience into modeled data. We engaged in many discussions on how to map a given fact into data. For example, the first phase of an activity has been modeled in this work as design and production, though these were initially two different phases. The decision to code design and production as one phase of activity reflects the difficulty of knowing, based on archival material, when and how design was separated from production. The decision depends on the particular event and on the research question

targeted. The researcher should therefore be the main actor of this process of coding facts into data.

52 With the concept of datascape, we try to reconcile qualitative and quantitative approaches to data analysis. While the data model forces a quantification of events within the confines of a database, designing a simple and open data model and letting the researcher decide how to code the data grounds this quantification into a qualitative environment. This hybridization continues with the exploration. The quantification of the database is used to create interactive visualizations. In this Exploratory Data Analysis approach, the researcher plays the crucial role of the explorer. The datascape lets him see the geography of the field through the lens of his own coding work. Using the database to create navigable 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 confront and critique his own coding work.

53 In this way, the datascape 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 then be exported in a specific file format in order to process it using specific software. For example, in this work, we exported from the database a network of actors collaboration (i.e. actors linked by number of common activities). We then analyzed those quantitative data in a dedicated network statistics software.[29]

Toward collaborative work

54 With the documentation of the quantitative elements being incorporated into the database (both data and references to the archival documents) and directly accessible to any other researcher than the main one, we could imagine using the datascape as a collaborative research tool. We have not yet tested this, and the tool developed in this work is not ready to allow collaborations. Many missing features have yet to be developed, including providing private coding glossaries for each researcher, a bottom-up categorization system which would let the research community decide how to build a common ontology from the multi-tagging system, the possibility of adding to the visualization to identify who coded a data, etc.

55 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 feedback proved that, as a digital tool and method, this work could help other humanities researchers who are working on an archive and who are confronted with a certain level of complexity—i.e. many players, activities, etc.—to test their own hypotheses and to examine future avenues of research.

Notes

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

2 In France, the exhibition *Les Années pop : 1956-1968* (March 15 2001-June 18 2001) at the Centre Pompidou is a notable example.

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 Klüver and his wife, Julie Martin, who have a common passion for social art history and for those artistic communities that experienced a feeling of participating in a historical moment likely to be recorded in art history. (see Billy KLÜVER and Julie MARTIN, *Kiki et Montparnasse : 1900-1930*, Paris: Flammarion, 1998).

4 It should be said that the distinction can be muddled. Though, at times, one finds the same items in Documents and References, this method of classification is nonetheless very useful for an “activity”-oriented approach 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.

7 The Daniel Langlois Foundation gives bibliographical access to the following eighteen thematic groupings: 9 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, and 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.).

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

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

14 Sylvie LACERTE, "E.A.T. Experiments in Art Technology", *Leonardo/Olats*, 2002; URL: http://www.olats.org/pionniers/pp/eat/eat.php. Accessed January 27, 2014; Norma LOEWEN, *Experiments in Art and Technology: A Descriptive History of the Organization*, *op. cit.* (note 8).

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*, Ph.D. dissertation, University of Michigan, Ann Arbor, 2005.

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

17 Jennifer GABRYS, "Jennifer Gabrys: Residue in the E.A.T. archives", published by Fondation Daniel Langlois, 2004; URL: http://www.fondation-langlois.org/html/e/page.php?NumPage=522. Accessed January 27, 2014. Sylvie LACERTE, "9 Evenings and Experiments in Art and Technology", published by Fondation Daniel Langlois, 2005; URL: www.fondation-langlois.org/html/e/page.php?NumPage=1716. Accessed January 27, 2014. Clarisse BARDIOT, "9 evenings: theatre and engineering", published by Fondation Daniel Langlois, 2006; URL: http://www.fondation-langlois.org/html/e/page.php?NumPage=572. Accessed January 27, 2014. 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", published by Fondation Daniel Langlois, 2006, URL: www.fondation-langlois.org/html/e/page.php?NumPage=2144. Accessed January 27, 2014. Let us also mention the publication of performance films at Artpix and the cycle of lectures and screenings at the MoMA and the Centre Pompidou on the 9 Evenings.

18 Christopher DE FAY, *Art, Enterprise and Collaboration*, *op. cit.* (note 15).

19 Howard BECKER, *Art Worlds*, Berkeley, CA.: University of California Press, 1982.

20 Bruno LATOUR, Pablo JENSEN, Tommaso VENTURINI, Sebastian GRAUWIN and Dominique BOULLIER, "The whole is always smaller than its parts: a digital test of Gabriel Tardes' monads", *The British Journal of Sociology*, vol. 63, n° 4, 2012, p. 591-615.

21 John W. TUKEY, *Exploratory Data Analysis*, Reading, Mass.: Addison-Wesley, 1977 (Addison-Wesley series in behavioral sciences).

22 Bruno LATOUR, "Le topofil de Boa Vista ou la référence scientifique # montage photo-philosophique", *Raison Pratique*, n° 4, 1993, p. 187-216.

23 Clay SHIRKY, *Ontology is overrated; categories, links and tags*, 2005; URL: http://www.shirky.com/writings/ontology_overrated.html. Accessed January 27, 2014.

24 Bruno LATOUR, *Reassembling the Social. An Introduction to Actor-Network Theory*, Oxford: Oxford University Press, 2005 (Clarendon lectures in management studies).

25 Howard BECKER, *Art Worlds*, *op. cit.* (note 19).

26 This is reminiscent of what the art historian Steven Watson proposes for Andy Warhol's factory in *Factory Made: Warhol and the Sixties*, New York: Pantheon Books, 2003, xvi-xvii.

27 The Gephi visualization and exploration platform (http://gephi.org) meets these needs.

28 Citation extracted from Wikipedia. Accessed January 27, 2014, http://en.wikipedia.org/wiki/Information.

29 Mathieu BASTIAN, Sébastien HEYMANN and Mathieu JACOMY, "Gephi: An Open Source Software for exploring and manipulating networks," *in International AAAI Conference on Weblogs and Social Media*, published by Gephi, 2009. URL: www.aaai.org/ocs/index.php/ICWSM/09/paper/view/154. Accessed January 27, 2014.

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