Research Project: A Taxonomy of "Interactive Art"

Dr. Katja Kwastek, assisted by Ingrid Spörl, M.A. and Heike Helfert, M.A.;
database programming and support: DI Günther Kolar

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Goals of the project

The Prix Ars Electronica has been awarded annually since 1987, currently in eight categories (Digital Musics, Computer Animation, Interactive Art, Hybrid Art, Digital Communities, Media Art Research Award, U19 Freestyle Computing and the Next Idea Art and Technology Grant). Anyone can enter the competition. International juries review the submissions and choose one winner in each category, two additional distinctions and up to twelve honorary mentions, which are awarded during the Ars Electronica Festival.

Based on the 350 works entered in the category Interactive Art in 2007, a taxonomy of interactive art was developed and evaluated:

- as proposal for a keyword index for entries in the Ars Electronica Archive
- as basis for a methodological analysis of the relevance of taxonomies to media art research
- as starting point for working out a finer differentiation between the heterogeneous art forms known as "interactive art" and a more detailed description of their aesthetic, technical and structural characteristics

1. Research: existing vocabulary

a) Media art festivals

Research already carried out in 2006 by Ingrid Spörl on behalf of the LBI[1] based on information available online resulted in a list of categories used in selected media art festivals in Europe and North America.
This research, which due to the limitation to online sources makes no claim to being exhaustive, showed that most festivals have no system, or at least no consistent system, for categorizing the submitted/exhibited works/projects.
While it would certainly be a worthwhile pursuit to use the results of this research to undertake an historical investigation of categories and attempts at categorization, or its deliberate refusal, on the media art scene, such an examination would unfortunately have little relevance to the actual problem we wished to explore.

b) Initiatives for documenting and archiving media art

A large number of initiatives and cooperative projects have been undertaken for documenting media art. The motivation and emphasis of these initiatives differs depending on the focus of each institution (art collection, research institute, archive, online platform, etc.).[2]
Especially valuable, theoretically well-grounded approaches to the theme, which also reflect the work of other initiatives, can be found in the closing reports of the "Variable Media Network" and the project "Capturing Unstable Media."

In general, the various initiatives occupy themselves with

- working out documentation and description methods (for media art / for media-art-relevant documents)
- developing programs (software, applications) to implement these methods
- working out strategies for conserving and exhibiting media art

The development of a vocabulary to describe media art and in particular interactive art is thus only one aspect of the activities of the relevant institutions.
Many of these activities are described as work in progress, so that further results may be expected as time goes on. This means that ongoing exchange with these institutions is necessary.

Their activities can be divided into the following pursuits:

- **Keyword lists / controlled vocabulary (non-hierarchical vocabulary lists)**, created based on works existing/processed in the institutions.
  An online discussion in May 2006 initiated by the publishers of the online platform Rhizome dealt in detail with the various possibilities for generating keywords, pleading more or less unanimously for a so-called "folksonomy" variant, i.e. the indexing of documents by their users, primarily as part of online information offerings. Rhizome, for example, now offers a controlled vocabulary for users to select from, combined with the option of adding new keywords.[3]

- **Taxonomies (hierarchical terminology lists)**
  Apart from the approaches that illustrate complete institutional systems (e.g. the

[1] Spörl, Ingrid: Research on the development of categories of media/digital art, August 2006, holdings of the LBI (not published).
[2] For an overview of initiatives and institutes, see the links list compiled by the LBI: http://media.lbg.ac.at/de/links_thema.php?iMenuID=27.

[3] See Appendix 1 and http://rhizome.org/art/rhizome_vocabulary.php.

Langlois Foundation), of particular note as a detailed hierarchical system for documenting contemporary art is the classification developed by the 'Variable Media Network,' which focuses on describing presentation options.[4]
A simple taxonomy with keywords divided into categories such as "themes," "format" and "technique" is offered by the media art platform netzspannung.org. Like Rhizome, this approach involves a mixture of controlled vocabulary and keywords that can be freely selected by the users. After a relaunch, the number of keywords that could be selected and added by the users was restricted, however, because experience showed that users tend to assign too many keywords to their projects.[5]

- **Ontologies (semantic networks)**
  An exemplary, complex semantic model for documenting a media art archive was developed by V2 (Rotterdam) in the project "Capturing Unstable Media."[6]

- **Glossaries and synonym lists**
  Many institutions emphasize the need for glossaries and synonym lists. In its Capturing Unstable Media project, V2 has already generated many definitions for its terms.[7] However, the Langlois Foundation is the only institution known to the writer that also compiles synonym lists.

Standardization / consolidation approaches: In the email correspondence mentioned above, the consolidation of the various vocabulary lists was discussed, but has not yet been realized. The Canadian DOCAM consortium (Documentation and Conservation of the Media Arts Heritage) also plans to reconcile various standards for documenting artworks, for example that used by the Getty Art and Architecture Thesaurus. [8]

None of the institutions researched focuses on the classification of interactive art. This type of art is described in more or less detail according to the approach taken in the overall strategies.

c) Publications on media art

Few publications are dedicated to the classification of interactive art. Notable here are the works of Beryl Graham[9], Slavko Kacunko[10] and Jean Louis Boissier[11] (see below), who exemplify various perspectives on classification.
Further findings can be expected from searching through general media art literature for glossaries, as well as looking for how the pertinent terms are used in the text. This research would appear useful especially with respect to placing the usage of these terms in its historical context and (cf. Chapter 1a) should be conceived as a separate research project.

d) Publications on interactivity from the standpoints of sociology, communication studies and information technology

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[4] Appendix 1 and http://www.variablemedia.net (July 3, 2007). A detailed overview of the results obtained here can be found in Richard Rinehart's online publication: *Appendices to A System of Formal Notation for Scoring Works of Digital and Variable Media Art*, http://www.bampfa.berkeley.edu/about/formalnotation_apndx.pdf (July 3, 2007), Appendices 2, 3 and 5.
[5] http://netzspannung.org, (July 3, 2007) login required.
[6] Appendix 1 and http://capturing.projects.v2.nl/ (July 3, 2007). This also includes a detailed evaluation of the activities of other institutions.
[7] http://capturing.projects.v2.nl/glossary.html (July 3, 2007).
[8] http://www.docam.ca/en/?cat=15 (July 3, 2007).
[9] Graham, Beryl: *A Study of Audience Relationships with Interactive Computer-Based Visual Artworks in Gallery Settings, through Observation, Art Practice, and Curation*, Ph. D. University of Sutherland, July 1997 (http://www.sunderland.ac.uk/~as0bgr/cv/sub/thesis.pdf (July 3, 2007).
[10] Kacunko, Slavko: *Closed Circuit Videoinstallationen. Ein Leitfaden zur Geschichte und Theorie der Medienkunst mit Bausteinen eines Künstlerlexikons*, Berlin, 2004.
[11] Boissier, Jean-Louis: *La rélation comme forme. L'interacitivité en art*, Geneva 2004.

The number of relevant publications from these disciplines is much larger than those specifically on media art, but because of their more general orientation, they are only partially of interest for the question pursued here.

Lister et al.[12] clearly demonstrate the differing perspectives taken in the various disciplines. While information technology within the scope of research on HCI (Human-Computer Interaction) understands interactivity as a possibility for controlling and intervening in computer processes, communication studies gauges interactivity according to face-to-face situations.[13] Media studies, on the other hand, assumes a latent interaction between the receivers and the objects of their interest consisting of the processes of selection and interpretation.[14] Lister et al. cite as a further important perspective on aspects of interactivity the idea of "grassroots democratic exchange" as counter-pole to the one-to-many strategy of the mass media, which understands interactivity as the co-determination and exchange possibilities of the members of one or more societies.[15]

This extremely heterogeneous point of departure means that not only the definitions, but also the categorization or descriptive approaches to interactive processes differ strongly in the various disciplines.
A first read-through does reveal, however, a tendency in many publications to try to create a scale from a low to a high degree of interactivity. A good summary of these attempts, including a presentation of the problems involved, is provided by Lutz Goertz (see below).[16]

Now that we have presented and characterized the relevant reference sources and source types for creating a vocabulary, in the following we will summarize what appear to be particularly relevant approaches and evaluate these in terms of our initial question.

[12] Lister, Martin: *New Media. A Critical Introduction*. London 2003.
[13] The more computer-aided interactivity approaches real interaction between two or more persons, the more successful it is according to this view. Criteria for this are, for example, limited look ahead / no default / impression of infinite database (leading to AI visions). Lister et al. 2003, p. 43.
[14] "There is a perspective on interactivity, based in literary and media studies, that argues that nothing much has changed in principle. We are just offered more opportunities for more complex relationships with texts but these relationships are essentially the same." Lister et al. 2003, p. 43.
[15] "This support for 'democratic media' is a kind of popular and latter-day mobilisation of ideas derived from the Frankfurt School, with its criticism of the role of mass media in the production of a docile population seduced by the pleasures of consumption and celebrity. In this reading 'interactive' media are constructed as a potential improvement on passive media in that they appear to hold out the opportunity for social and political communications to function in a more open and democratic fashion which more closely approaches the ideal conditions of the public sphere." Lister et al. 2003, p. 44.
[16] Goertz, Lutz: "Wie interaktiv sind Medien (1995)," in: Bieber, Christoph, Claus Leggewie (eds.): *Interaktivität. Ein transdisziplinärer Schlüsselbegriff*, Frankfurt 2004, pp. 97-117.

2. Evaluation

a) Interactive art in the context of the classification of media art

The categories elaborated by the **Variable Media Network (2004)** assume, as per the project definition, a general division of artworks into different types. These are described as 'contained,' 'installed,' 'performed,' 'reproduced,' 'duplicated,' 'encoded' and 'networked.' The Variable Media Network developed sub-categories for these types. Interesting for our purposes are the following types/sub-categories:[17]

- Installed: space (museum, outdoors, etc.), boundary (defined or open boundaries), access (how many users), lighting, sound
- Performed: props, set, costumes (in each case the question of defined or freely selectable accessories), performers (who is performing, how many), audience location, boundary, synchronization (synchronous or diachronous in one or several places),
- Interactive: user input (sound, text, menu, etc.), viewers interact with (work, other viewers, performer)
- encoded: screen resolution, color palette, external data source (audio, video, fonts), fonts (web-safe, ASCII etc.), source openness
- networked: can be exhibited (live internet, stand-alone, broadcast, cached), external data source, bandwidth, network model (client/server, server-based, peer-to-peer)

These categories are not exclusively tailored to interactive art, but would nevertheless seem expedient if a vocabulary is to capture works in their overall structure, in which interactivity is a decisive but not exclusive creative factor.

The project carried out by V2, **Capturing Unstable Media (2003)**, proposes the following aspects for a general classification of media art, which are also relevant to interactive art:

- time flexibility (scheduled/not scheduled)
- number of users (single/group/audience)
- interaction location (specific/undefined)
- interaction synchronicity (indicate minimum intensity for the interaction to succeed)
- interaction level (observational/navigational/participatory/co-authoring/intercommunication)
- sensory mode (visual/auditory/olfactory/tactile/gustative)

V2's study in addition proposes a broadening of the perspective for the categories, especially with regard to the question of distinguishing input from output activities, the detailed description of interfaces and the "direction of communication" (one-to-one / one-to-many).[18]

[17] A complete listing of all types and sub-categories can be found in Rinehart, Richard: *Appendices to A System of Formal Notation for Scoring Works of Digital and Variable Media Art*, http://www.bampfa.berkeley.edu/about_bampfa/formalnotation_apndx.pdf (July 3, 2007).
[18] See V2: *Capturing Unstable Media (2004) Deliverable 1.3. Description models for unstable media art*, p. 20, http://archive.v2.nl/v2_archive/projects/capturing/1_3_metadata.pdf (June 30, 2007).

b) Classifications of interactivity

Beryl Graham (1997) provides a valuable compilation of categorization attempts. The publications she examined focus on graduating the different degrees of interactivity.
She adheres closely to the division proposed already in 1977 by Cornock and Edmonds into static and dynamic art systems,[19] with the latter divided into

- dynamic (organizational dependence on environmental variables)
- reciprocal (treats spectators as environment, with responses through time)
- participatory (the interpersonal reactions of a group of participants to a situation specified as a matrix)
- interactive (mutual exchange between man and machine, elaborately related on either side of an interface)

This classification corresponds to an attempt that can also frequently be found in sociological writings or those stemming from the HCI community to sketch a scale from minimal to strong interactivity.
Lutz Goertz (1995) determines the degree of interactivity based on the interplay of various factors:

- Degree of selection options
- Degree of modification options
- Quantitative size of selection and modification possibilities
- Degree of linearity / non-linearity

While breaking down interactivity processes into the categories of Selection, Modification and Linearity vs. Non-Linearity would appear useful, the general tendency to draw up a scale according to degrees of interactivity seems quite immaterial for the problem we are addressing here. More interesting are other approaches to describing in more detail various factors in interaction processes, especially when they involve specific issues in artistically organized interactivity.

Martin Lister et al. (2003) distinguish between

- hypertextual navigation: choices available from a pool of data to construct an individual 'text.' They equate this kind of interaction with Peter Lunefeld's definition of "extractive" interaction.[20]
- immersive navigation: investigation of spatially organized information.
  "We might say that the navigation of immersive media environments is similar to hypertextual navigation, but with additional qualities" [...] Instead of a text-based experience aimed at finding and connecting bits of information, the goals of the immersed user will include the visual and the sensory pleasures of spatial exploration."[21]
- registrational interactivity: possibility to store one's own data, which then become part of the 'text.'
- interactive communications: computer-aided human-to-human communication. "When email and chat sites are considered from the point of view of human communication, ideas about the degree of reciprocity between participants in an exchange are brought into play. So, from a Communication Studies point of view, degrees of interactivity are further broken down on the basis of the kinds of communication that occur within CMC. Communicative behaviors are classified according to their similarity to, or difference from, face-to-face dialogue, which is frequently taken as the exemplary communicative situation which all forms of 'mediated' communication have to emulate."[22]

While the studies we have looked at thus far tend to take a descriptive approach, we will now turn to two different approaches by Slavko Kacunko and Jean-Louis Boissier, which apply a

[19] Cf. the more recent publication, which however still adheres to the same categories: Candy, Linda and Ernest Edmonds: "Interaction in Art and Technology," in: *crossings. eJournal of Art and Technology*, Vol. 2.1 (2002), http://crossings.tcd.ie/issues/2.1/Candy/ (July 3, 2007).
[20] Lunenfeld, Peter: 'Digital Dialectics: a hybrid theory of computer media,' *Afterimage* April 21 (1993).
[21] Lister et al. 2003, p. 21.
[22] Lister et al. 2003, p. 22.

more interpretive methodology and orientation, examining the aesthetic strategies taken in the works.

Slavko Kacunko (2004) develops an historical overview of "closed-circuit video installations" with which he avoids the term "interactive art" while however achieving a shift compared to the usual definitions. In contrast to what is usually referred to as interactive art, he excludes those works that do not involve moving images and/or material components. This differs from conventional definitions of closed-circuit installations by including works that not only involve the viewer but also allow him more far-reaching possibilities to influence the working process by way of computer-aided reaction loops.
In the various chapters, he breaks down the works according to the following categories:

- Data capture and control/monitoring
- Reality constructions I: reality models, post-technological visions and their psychological effects
- Reality constructions II: computer-aided media reflections and interlocking levels of reality and virtuality
- Reality constructions III: reality models as VR
- Reality constructions IV: interactive narrative systems, game concepts and learning processes
- System models and behavior patterns: biological systems and cycles, (tele-)robotics and artificial intelligence
- Telecommunication
- Subject/object

Jean-Louis Boissier (2004) by contrast pursues in his publication the structural/aesthetic issues in the interaction process.

In interactive works he ascertains
- forkings
- breaks/interruptions
- changes
- transfers

and distinguishes between the following attitudes on the part of recipients
- comparison
- description
- distancing
- empowerment[23]

The two last-mentioned approaches without doubt offer very interesting ways of accessing interactive works, but require an analysis of such works that goes beyond a descriptive stance and which is thus to a much larger degree expected to deliver interpretive and context-dependent results. They thus seem ill suited for a taxonomy that aims at wide applicability and making material accessible from multiple perspectives.
For other LBI projects in the research line 'Interactive Art,' however, especially with respect to an analysis of aesthetic strategies in interactive art based on case studies, these approaches do appear to be quite promising.

[23] P. 289: "Au cours de la réalisation de nos installations, de la fabrication de prototypes expérimentaux et de la conduite de workshops, toujours axées sur la vidéo comme matériau d'une proposition interactive, un tableau synoptique des figures de l'interactivité a émergé: la bifurcation / la suspension / la mutation / la réversion; qui partent plutôt de ce qui est interne: la comparaison / la désignation / la distanciation / la procuration qui relèvent plus de la prise en compte du lecteur."

3. Application

The variety of the classification approaches researched offers important impulses for a terminological classification.
However, these had to be modified for the following reasons in order to achieve our present goal (classification of submissions to the Prix Ars Electronica Interactive Art):

- Some approaches are very interesting for a closer scholarly analysis of individual works, but are problematic when it comes to assigning keywords to entries, since they are difficult to apply without having actually experienced the work and in addition have a strongly interpretive character.
- We tried to avoid a classification according to stronger or weaker degrees of interactivity, since this suggests a rating of interactive art that gives preference to works/projects with interaction options that come closest to social interaction. This attitude often does not correspond with the artist's intention, which frequently deals precisely with the special features of the various forms of mediated interactivity.
- The problem of the multiple manifestations of works, an issue that has often been addressed elsewhere (works are presented in different ways or using different technology on different occasions/at different times), was at first neglected, since the works submitted to the Prix for preview are only taken into consideration in the technical and formal constellation described by the artist for the purpose of submission. Not the work itself is being classified here, but rather the work in its submitted form. This corresponds with the general character of the Ars Electronica Archive, which – particularly in the category of interactive art – does not own artistic works, but only the documentation of them.

As preliminary result, a vocabulary list divided into the following categories was drafted, put together and tested by applying the terms to randomly selected entries in the Prix 2006 (see Appendix for complete list)[24]:

- form (performance, sculpture, installation, etc.)
- range (stand-alone, networked, etc.)
- interaction (human-human, human-computer, etc.)
- type of interaction (observation, navigation, participation, etc.)
- topic/strategy (surveillance, game, immersion, etc.)
- channel (Internet, wireless, broadcast radio, etc.)
- input technology (video camera, cell phone, sensors, etc.)
- output technology (projection, sound, motors, etc.)

Günther Kolar integrated this list into the already existing online tool used in the submission process for the Prix Ars Electronica. The categories can still be changed at any time (see Point 5).

[24] Appendix 2.

4. Review

The proposed taxonomy was sent by email to various experts and institutions, including **Richart Rinehart (BAM/PFA)** and **Alain Depocas (Langlois Foundation)**. Feedback was consistently positive. A more detailed analysis of the taxonomy could only be achieved in the course of personal discussions, however:

Christopher Lindinger (Ars Electronica Futurelab) pointed out that in particular the technical categories are inadequate and inconsistent.
In order to register the works' technological basis correctly, one would have to differentiate between the devices, the technology and the method used. A mobile phone, for example, is a device with which one can send text messages and communicate via voice, but which can also reveal its holder's location (via Bluetooth technology or through its registration with a cell), not to mention the options of sending images and videos. All of these functions can in turn be realized using a wide variety of transmission methods. Motion tracking can be done by video camera, but also using sensors, and in the broader sense with the help of GPS technology, depending on whether one wants to capture only gestures or movements of the entire body through space.
We thought about using the indexing system as part of the submission process, as a test case that would help to expand and more closely specify the terms.

Christopher Lindinger and **Christa Sommerer (University of Art and Industrial Design Linz)** cited the lack of umbrella terms such as locative media, multi-modal interfaces, graphical user interface, etc., to which in turn various devices, technologies and methods could be assigned.
We entertained the idea of overlaying such terms after the fact as multiperspectival clusterings and search options over the terms already defined.

In addition, the issue was discussed in both meetings of how useful the currently designated separation of input and output actually is.

Both Lindinger and Sommerer suggested giving the submitters the responsibility for assigning keywords to their works. This echoes the results of the online discussion initiated by Rhizome mentioned above. Although we cannot expect the results here to be entirely objective and error-free (for example, some submitters might choose terms that are not essential to their work for tactical reasons, others for reasons of time or motivation, and still others due to ignorance or indecision), the probability of making the wrong decisions is also quite high when keywords are assigned retrospectively, both due to the fact that those entering the works are not always well qualified and because of a possible lack of information on the submissions.

Also problematic is the variability and room for interpretation offered by the terms. "Image capture," for example, both describes the general method for storing and evaluating image data and is also the name of a proprietary software from Apple/Macintosh.
The classification work will thus always move back and forth between the ideal of objectification and the necessity of interpretive leeway.

Gerhard Dirmoser (systems analyst, Linz) suggested concentrating more on the process-like character of interactive artworks, which he describes as "design gestures." In general, he considers the verb form more appropriate for describing the processes taking place in these artworks than the noun form that is usually used. He expressed skepticism about the strong focus on technology and the decision not to use buzzword-like umbrella terms. In his experience, terms that are very expressive and describe important characteristics of a work in simple terms are especially well suited to our purpose.

5. Evaluation

The categories were evaluated from March 18 to April 22, 2007 as part of the preview of submissions to the Prix Ars Electronica 2007 in the category Interactive Art.

Background:
The annual Prix Ars Electronica competition has been administered again since 2001 by Ars Electronica itself (ORF was in charge in the interim period). An online submission system was developed for this purpose. Online forms are available at the beginning of the submission period (December) and must be filled out by the artists by the deadline (March). The projects submitted appear in the so-called "Internal Tool," which also accompanies the further processing of the submissions. All submissions are previewed in advance of the actual jury session. A test of the submitted data storage medium is recorded in the tool, and the entry is checked for completeness and any necessary translations. During the jury process itself, another tool is available for ranking the projects. Günther Kolar integrated the draft vocabulary list in this tool, so that for every submission a corresponding keyword list could be clicked on. This list can be changed and adjusted during the preview. It also includes a statistical function that provides a quick overview of the distribution of the various keywords across projects that have already been processed.

The author evaluated the preview process with the assistance of Heike Helfert (cultural studies specialist, Karlsruhe) and Ingrid Spörl (cultural studies specialist, Halle). In an initial meeting, the assignment of keywords was first tested on a few sample works and then compared and discussed. Already at this point, a few changes were made.
In the course of the preview of a total of 350 works, further modifications were undertaken; on the whole, the list proved very helpful, although some categories demonstrated a greater need for closer definition than others.[25]
A few duplications were discerned, for example the category "channel" that was at first specified was changed to the expanded category of "range."
At the same time, reacting as well to the previous suggestions made by Sommerer and Lindinger, the category of "technical character" was introduced in order to add buzzwords that quickly characterize a work. This was decided above all because doubts were voiced on whether it would be possible to achieve this kind of characterization later on by clustering works together that fell under different categories, as proposed by C. Lindinger.
A category for "processing technology" was also introduced. This category in particular should be regarded as preliminary, however, and must be further refined.

Our first impressions directly following the application of the elaborated vocabulary can be summarized as follows:
As we already envisioned while drafting the vocabulary, it does in fact prove expedient to index the works by keywords the way we have done, especially for the purpose of quantitative recording and for obtaining an overview of the tendencies and variants in interactive art, as well as for searching for specific project groups (for example, machine-mediated human-to-human communication, or immersive concepts).
The system is less informative when it comes to a descriptive classification of individual works, because it is simply too abstract. In this case, the short bullet-point commentaries that are traditionally noted down during the preview seem to be more useful. If the vocabulary is also to fulfill this purpose, then the thematic focuses of the works must be taken into consideration more thoroughly (for example, by including topic categories such as genetics, evolution, ecology, memory, etc.).

Especially exciting this year was finding out to what extent the new category of "Hybrid Art" (and the elimination of the category "net vision") had influenced the distribution of the entries, since this year "only" 350 artists submitted works in the category interactive art compared to 600 last year.
During the preview phase, it was only possible to a limited extent to gain an insight into the Hybrid category (without viewing the videos) while not impeding the work in progress.

[25] See Appendix 3.

But even a quick look through the works showed overlaps with the submissions in the category of Interactive Art, particularly in the area of performance, but also regarding the use of mobile media or the submission of interactive installations in the Hybrid category. At the same time, artists submitted works in the category of "Interactive Art" that – from the point of view of the research group – could not be described as interactive. Net art works – a category that was eliminated as of 2007 – could be found in both categories, although not very often.

6. The next steps / goals

- Putting submitters themselves in charge of indexing their works
- Modifying the keywords for this more generalized application, as well as changing them into the verb form where necessary
- Expanding the index to the years 2006 and 2008, also taking into account the categories of net vision (2006) and Hybrid Art (2007/2008)
- Formulating definitions for the various terms

It would seem to be a good idea to put the submitters themselves in charge of indexing their works next year based on the list we have compiled. Naturally, we can expect some inconsistencies here, but we may assume that these will be no more misleading than the potential false classifications made by scholars, for example in the case of poorly documented projects.
We will have to adjust the vocabulary to take this into account. As a first step toward minimizing definition leeway, we recommend – as suggested by Gerhard Dirmoser – adding verbal descriptions to both of the categories that are clearly dedicated to works with interactive characteristics and which thus describe processes. While the noun form leaves open the question of the direction/perspective of the described process, the verb form more clearly defines them.
When the word "observation" is used, for example, it is unclear whether the work observed the viewer or vice-versa. If one instead formulates the categorization as "the viewer can – observe," then the direction of interaction is clear. We drafted a proposal for this type of reformulation.[26] This proposal also includes a consolidation of input and output media as well as a few further simplifications.[27]
Following further evaluation, this taxonomy is to be integrated into the submission tool so that it can be used by the artists in the upcoming submission process.

Furthermore, plans are to extend the classification to the category "Hybrid Art" in order to obtain a representative overview of the status of media art as installation or performance as presented in the Prix Ars Electronica. To this end, a retrospective indexing of the submissions in the categories "Interactive Art" and "Net Art" in 2006 as well as the category of "Hybrid Art" in 2007 would appear useful. The keyword catalogue would have to be supplemented for this purpose so that it is applicable to all three categories.
Heike Helfert is currently working on a taxonomy for the category of "Hybrid Art."
Our plans also include drafting definitions of the keywords.

Goals

- A more detailed description of the field of media art as represented in submissions to the Prix Ars Electronica
- Insight into the shifts prompted by the change in categories (a further historical investigation would naturally open up interesting perspectives here)
- Test indexing by the artists themselves vs. indexing by scholars
- Further test of the vocabulary, especially with respect to possibly using more verbs in the descriptions
- As an additional perspective, we could test clustering and visualizing this kind of expanded data set in association with Research Lines B and C.

[26] See Appendix 4 for the use of this kind of classification in verbal form, a practice that appears in the appendix of the exhibition catalogue edited by Raffael Lozano Hemmer on the exhibition "Arte Virtual," Metro Opera Madrid 2004. In an overview table (p. 21), the question "Que hace el Publico?" is asked for every installation and answered using terms such as moverse, observar, sentarse etc.
[27] The fact that we refrained from using the proposed specifications according to device, technology and method is due to the art scholarship approach taken in the 'Interactive Art' research line at the LBI, which focuses instead on the reception aesthetic. Further elaboration of the technical aspects of the artworks would also require additional personnel to be enlisted for the project with a stronger background in computer science / technological history.

Appendix 1: Examples of vocabulary, taxonomy, ontology

1. Vocabulary - rhizome org[28]

Rhizome Terms

Below is a cloud of the terms Rhizome makes available for artists when submitting their works to ArtBase. They were formulated when the ArtBase was founded in 1999. The font size indicates the relative popularity of terms.

3D Abstract access allegory Animation Anti-art archive artificial life art world audio bio body broadcast browser CD-ROM censorship cinema Collaborative collider colonialism commercialization community Conceptual conference contextual corporate CuSeeMe Database death design desire DHTML digital disappearance Documentary download education email Event exhibition film Flash Formalist fund futurism game gender Generative globalization historical homepage HTML identity immersion information map installation interact interface Internet Java Javascript labor language live machine marginality media activism meme memory MP3 Narrative nature netart network nostalgia offline Participatory performance Perl posthuman postmodern privacy public space publish queer QuickTime radio Readymade RealPlayer resistance responsibility robot rumor security Shockwave social space software space surveillance tactical tactical media technophobia Telematic television Text Third World underground utopia video Virtual virtual reality Visual VRML War

Artist Terms

Below is a cloud of the top 100 terms used by artists over the last year to describe artworks in the Artbase. The font size indicates the relative popularity of terms.

Abstract Expressionism Agricola de Cologne america Animation Anna Dumitriu art Barcelona being human Berlin blog bram.org California canada Chicago China Christian Marc Schmidt city collection color data database doron golan drawing Environment experience Flash france game Generative George W Bush Google Gustave Courbet hypertext image interactive interactive stories interactive story interface Iraq israel Italy Kinetic Abstraction kinetics local London L'origine du Monde los angeles mapping Marc Lee matrix Mexico Montreal mosaic movement movie music narrative netart News New York New York City nonlinear NYC Ohio Paris photography php pixel poetry Portugal Processing random remix Reynald Drouhin Russia ryan griffis San Francisco search engine Seattle simulation Stockholm story surveillance terror terrorism time Tokyo Toronto travel Turkey UK US USA video Walter Benjamin War webcam YouTube 2006

2. Taxonomy – Langlois and Variable Media[29]

The Langlois Foundation organizes the entire institution archive according to

- document
- individual
- organization
- artwork
- event

and offers, for example for the 'artwork' type, the following choices: architecture/choreography/cinema/collage/computer animation/computer art/computer-generated images/design/drawing/electronic art/film installation/hologram/installation/light art/multimedia performance/mural/music/network art/new media installation/painting/performance/photography/photomontage/poster/robotics/sculpture/sound art/theatre play/video/video installation/website

The Variable Media Network deals specifically with types of artworks, classifying them on three levels:

> Level 1: contained, installed, performed, reproduced, duplicated, encoded, networked
> Level 2, taking the example 'performed': props, set, costumes, performers, number of performers, format of instructions, instructions applied to, documentation of new performances, audience location, boundary, synchronization of performance, user input, viewer interacts with, maintenance
> Level 3, taking the example 'user input': other, combination, physical manipulation, sound input, text input, menu driven, video feed

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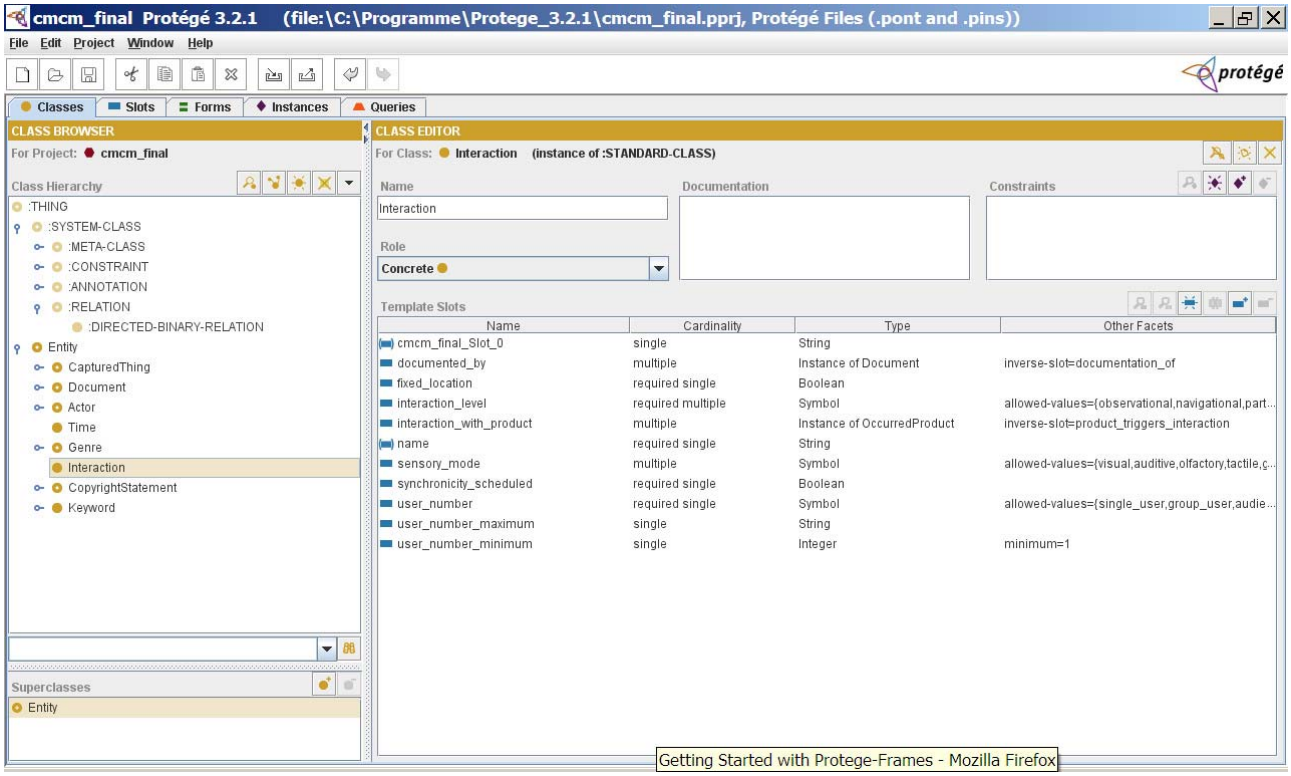
[28] http://rhizome.org/art/rhizome_vocabulary.php (July 3, 2007).
[29] http://www.fondation-langlois.org/ > CR+D Database (July 3, 2007). With regard to Variable Media see Rinehart, *Appendices* (as in Note 16).

3. Ontology – V2[30]

Sample screenshot from the V2 ontology



[30] http://capturing.projects.v2.nl/download.html > download with Protegé Browser (July 3, 2007).

Appendix 2: Status/change in taxonomy 3/2007 (preview process)

form
installation
sound installation
~~environment~~
sculpture
object
performance
software application
net art
other
range
stand-alone
public space
various sites
portable
networked (wireless)
networked (Internet)
networked (LAN)
networked (telephone network)
other
interaction
human-human (mediated by computer)
human-computer
computer-computer
computer-environment
computer-external digital data
Computer-bodily functions
informatic process
none
other
human-human (not mediated by computer)
type of interaction
observation
exploration
~~reaction~~
activation
control
selection
navigation
participation
Co-Authoring
communication
~~informatic process~~
collaboration
none
other
topic/strategy
surveillance
instrument/*tool*
trade/exchange
narration
documentation
perception
game
communication
visualization
sonification
metamorphosis
memory/storage
immersion
cybernetic/closed system
interface design
other

~~**Channel**~~
~~wired (locally)~~
~~wireless (broadcast radio)~~
~~internet~~
~~wireless (WLAN)~~
~~wireless (satellite)~~
~~wireless (mobile telephone networks)~~
~~wireless (Bluetooth/infrared)~~
~~wireless (ham radio)~~
~~other~~
input device
sensors (infrared, thermic, optical)
electromagnetic frequency sensor/receiver
video camera
infrared camera
photographic camera
light emitting device
scanner
marker tracking system
fax
microphone
cell phone *(SMS)*
cell phone (other)
telephone
handheld device (e.g. PDA)
keyboard
graphical interface (mouse)
graphical interface (trackball)
graphical interface (touchscreen)
graphical interface (touchpad)
joystick / *console*
data glove
tangible interfaces
organic devices
switches and other electronic input devices
GPS device
Smartcard
barcode
RFID
other
~~**input**~~ ***processing*** **technology**
motion capture/tracking
image capture
voice recognition
text recognition
chroma-keying
eye-tracking
bio-feedback
biometric identification
custom
other
none

output technology
video
film projector
data projector
monitor / *LCD screen*
TV
computer graphics
still image
~~immersive technology~~ VR (HMD, CAVE, other)
light
printer
sound acoustic ~~(speakers)~~
sound electronic
sound (headphones)
broadcast radio
cell phone *(other)*
cell phone (SMS)
telephone
handheld device
motors (e.g. robotics)
fax
other
technical character
locative media
augmented reality
ubiquitous /*pervasive* computing
~~pervasive computing~~
virtual reality
telepresence
artificial intelligence
low-tech
media archeology
interactive cinema

italics = new

crossed-out = deleted

Appendix 3: Prix Interactive Art submissions in 2007 (statistics)

form of artwork
installation (229)
sound installation (14)
sculpture (44)
object (25)
performance (30)
experiment (9)
software application/program (43)
net art (24)
other (5)

range of artwork
stand-alone (270)
public space (30)
separate sites (14)
mobile (10)
networked internet (53)
networked wireless (16)
networked LAN (9)
networked telephone network (11)
other (5)

interaction partners
human >< human (mediated by computer) (34)
human >< human (not mediated by computer) (7)
human >< computer (283)
bodily functions >< computer (10)
environment >< computer (17)
external digital data >< computer (9)
computer >< analogue device (6)
computer >< computer (7)
none (26)
other (3)

type of interaction
observation (23)
exploration (61)
activation (147)
control (102)
selection (27)
navigation (19)
participation (34)
co-authoring (9)
communication (14)
collaboration (13)
none (20)
other (5)

topic / strategy
surveillance (19)
instrument/ tool (64)
trade/exchange (2)
narration (34)
documentation (16)
perception (28)
game (32)
communication (37)
visualization (56)
sonification (22)
metamorphosis (23)
memory/storage (9)
immersion (11)
cybernetic/closed system (6)
interface design (41)
other (47)

input device
sensors (infrared, optical, thermic etc.) (77)
electromagnetic frequency sensor/receiver (7)
video camera (92)
infrared camera (5)
photographic camera (6)
light emitting device (3)
scanner (2)
microphone (30)
cell phone (SMS) (5)
cell phone (other) (10)
telephone (3)
handheld device (e.g. PDA) (2)
keyboard (35)
graphical interface (mouse) (39)
graphical interface (trackball) (5)
graphical interface (touchscreen) (4)
graphical interface (touchpad) (1)
joystick / console (15)
data glove (1)
tangible interfaces (31)
organic interfaces (2)
switches /electronic input devices (10)
GPS device (2)
Smartcard (2)
barcode (2)
marker tracking system (1)
RFID (8)
other (62)

processing technology
motion capture (81)
voice recognition (8)
text recognition (4)
chroma-keying (3)
eye-tracking (3)
image capture (8)
biometric identification (1)
bio-feedback (4)
custom (85)
other (96)
none (13)

output technology
video (102)
projection (161)
monitor / LCD screen (91)
TV (6)
computer graphics/animation (142)
still image (23)
VR (Cave, HMD, other) (4)
light (28)
printer (5)
sound (acoustic) (53)
sound (electronic) (110)
sound (headphones) (4)
broadcast radio (2)
cell phone (other) (4)
cell phone (SMS) (2)
telephone (3)
handheld device (3)
motors (e.g. robotics) (32)
other (20)

technical character
locative media (4)
augmented reality (11)
ubiquitous/pervasive computing (31)
virtual reality (13)
telepresence (11)
artificial intelligence (6)
low-tech (13)
media archeology (11)
interactive cinema (2)

Appendix 4: Entry form for artists (proposal)

form of artwork	
installation	
sculpture	
object	
performance	
software application/program	
other	

range of artwork	
stand-alone	
public space	
separate sites	
mobile	
networked	
other	

interaction partners	
human-human (artist interaction)	
human-human (audience interaction)	
human-computer	
computer-computer	
computer-external digital data	
computer-environment	
computer-analogue devices	
other	

type of interaction / the visitor (performer) can	
observation / observe	
exploration / explore	
activation / activate	
control / control	
selection / select	
navigation / navigate	
participation / participate	
Co-Authoring / leave traces, store	
communication / exchange information	
other	

strategy of interaction / the work (project) does	
surveillance / monitor	
instrument,tool / save as an instrument	
narration / tell, narrate	
documentation / document, inform	
perception / enhance perception	
game / offer a game	
communication / enable communication	
visualization / visualize	
sonification /sonificate	
metamorphosis / transform	
memory, storage / store	
immersion / enclose	
cybernetic, closed system / process	
interface design / mediate	
other	

media	
video	
computer graphics/animation	
still image	
projection	
monitor / LCD screen	
VR (HMD, CAVE, other)	

sound acoustic	
sound electronic	
head/earphones	
speakers	
broadcast media (radio/TV)	
cell phone/telephone	
handheld device	
light	
printer	
sensors (infrared, thermic, optical, electromagnetic)	
video camera (also infrared)	
photographic camera	
keyboard	
graphical interface (mouse/trackball/touchscreen, etc.)	
joystick / game controller	
tangible interfaces	
switches and other electronic input devices	
microphone	
GPS device	
Smartcard	
barcode	
RFID	
other	

processing technology	
motion capture	
image capture	
voice recognition	
text recognition	
chroma-keying	
eye-tracking	
bio-feedback	
custom	
other	
none	

"buzzwords"	
locative media	
augmented reality	
ubiquitous /pervasive computing	
virtual reality	
telepresence	
artificial intelligence	
low-tech	
media archeology	
interactive cinema	

topic	
genetics	
environment	
media	
social relations	
online worlds	
artificial life	
mass media	
evolution	
data processing	
politics	
biographies	
everyday issues	