

M.A.D.: Media Art Database(s) and the Challenges of Taste, Evaluation and Appraisal

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APPRAISALS AND DISCIPLINES: PRELIMINARY REMARKS

Considerations of digital appraisal provide a good opportunity for comparing the various actual challenges of the academic disciplines that are traditionally devoted to appraisal in general. Questions about estimation, judgment and selection fall within the purview of the archival sciences and are unmistakably related to the continued preservation of archival material [1]. Other disciplines, such as art history, are competent at evaluating important cultural artifacts such as artworks and other aesthetic objects, whereas philosophical aesthetics judges the philosophical and historical concepts of appraisal, understood as “taste” or “discriminative faculty” [2]. (Recent attempts to include the cognitive sciences within this circle should also be mentioned, although they cannot be discussed here.)

This essay seeks to define the possible mutual benefits that the mentioned disciplines might gain from their specific efforts in formulating requirements and strategies for the appraisal of records and data as well as scientific and other concepts. One of the task force members of the InterPARES Project for the Long-Term Preservation of Authentic Electronic Records, Terry Eastwood, correctly concluded, “Efforts to provide universal guidelines or criteria for appraisal have failed” [3]. In this context, the “anomalies of the digital world” [4] should presumably not be blamed, just as the “analog” concepts of appraisal should not be regarded separately. Because questions of appraisal in the digital world cannot be posed adequately as either/or, the answers should probably not seek to reduce this complexity to situation diagnoses that, as the saying goes, simply put old wine in new bottles.

In fact, certain shared academic attitudes, such as faith in authenticity, suggest that the archival sciences and art-historical disciplines are comparable in ways that suggest room for a fruitful transdisciplinary discussion on appraisal. In this context, I first confine my attention to the two “appraisal” disciplines par excellence, art history and aesthetics. I then focus on the especially challenging part of contemporary appraisal: media art and its history.

Art history first appeared as an academic discipline during the Victorian Age, one marked by the ascendancy of historical disciplines sometimes romantically rooted in archaeology and its cousin, archival science. This development was accompanied by the growth of positivist theories and improved within the praxis of industrial societies.

Alexander Gottlieb Baumgarten’s Master Thesis (1735) [5]

introduced “Aesthetics” as a scientific discipline. At the time, it concerned the perceptual (as opposed to the cognitive) appraising of the world. This rather clumsy attempt to propose scientific rules of sensual appraisal was motivated by the rather sprawling French discussion on *goût* in the late 17th and 18th centuries. It accompanied and was followed by similar attempts in Scotland and England. These efforts finally culminated in the work of David Hume, a Scotsman, and his East Prussian follower, Immanuel Kant, whose work took a critical turn in the *Critique of Judgment* (1790) [6]. For these historical reasons, the archivist’s problem of value-considerations based on the requirements of authenticity appears, at least from this perspective, to be inseparable from art-historical and aesthetic considerations. Within the context of “analog” and “digital” appraisal, media art history might have sufficient potential to bridge existing semantic and technical, as well as sociopolitical, gaps in the appraisal discussion by posing the question of “functional analysis” (that is, the question of the different theoretical approaches to describing media art [history] within different scientific and curricula-perspectives) in more pragmatic terms, without disregarding related traditions and genealogies. On the other hand, the different schools of media art history, as practiced today, should strive after increasing and cumulative exchange of experiences in digital preservation and dissemination strategies with distinguished experts in archival sciences and other disciplines.

However, media art history should not obstruct its efforts by focusing only on image appraisal, since media art no longer deals exclusively with images of a temporary, finite nature. Media art actually covers all kinds of materials, including sound, installation, performance, architecture and telecommunication tools, up or down to the digital code itself. Media art is consequently and essentially a time-based art. It thus demands a specific sensibility for appraisal, description and presentation of both analog and digital records and data. This essay therefore covers a brief overview of the actual diversity of media art, based on the diversity of its historical origins, which must include consideration of the existing as well as not-yet-existing standards for appraisal, preservation and dissemination in this specific field.

As a time-based art by definition, media art is fundamentally concerned with the problem of “liveness.” Elizabeth Diller and Ricardo Scofidio have pointed out that:

ABSTRACT

This essay seeks to delineate the possible mutual benefits that different disciplines such as art history, media studies, computer science, etc. might derive from their specific efforts at formulating requirements and strategies for the appraisal of records and data as well as scientific and other concepts related to media art in its widest sense. In this context, the author presents the M.A.D. Media Art Database project as an information system at the disposal of media art and its history and theory, and as a network interface between archived material and knowledge. With its bottom-up structure, the M.A.D. database is proposed as a decisive motive force in assembling potent aggregates of knowledge and expertise.

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Table 1. Diversity of Media Art (as set out in Kacunko, 2004) [9]

1. Subject—Object Relationship
Medium: Mirror; Metaphor: Narcissus; Material: Machine Vision
2. Constructions of Reality
Reality and Virtuality: Fragment and Superposition
Reality and Virtuality: Model and Construction
Reality and Virtuality: Narration and Interaction
3. System Models and Behavioral Patterns
Silicon Meets Carbon: Animal, Human, Robot and Beyond
4. Game Concepts and Learning Processes
Games—Rules—Learning: Ludic Aspects of Media Art
5. Data Collection and Monitoring On Watching of Watching: Media Art between the private and common space
6. Telecommunication
From Slow Scan-TV, Closed Circuit-TV, and Satellite to Telerobotics via Internet, WiFi, Mobile Phone, etc.

For technophobes who blame technology for the collapse of the public sphere, liveness may be a last vestige of authenticity—seeing and/or hearing the event at the precise moment of its occurrence. The unmediated is the immediate. For technophiles, liveness defines technology’s aspiration to simulate the real in real time. This skepticism [about truth] aids, to a degree, these artists’ desire to tease the distinctions: to undermine the authority of “live” overmediated experience and to collapse the two into an indeterminate unity [7].

Here we have to go on without physical and epistemological, as well as philosophical, considerations on this essential issue. In other words, the answer to the question *Can liveness cover the concept of authenticity?* depends on the definition of medium. If the medium is described as a storage device, it appears suitable to the conception of authenticity from the traditional archivist’s point of view; but if the notion of “medium” is taken literally and etymologically as “the middle” between “send” and “receive,” or a kind of highly unstable entity, then liveness should be regarded as an authenticity guarantee, one not (yet) compatible with the traditional archivists’ storage-based definition of authenticity.

MEDIA ARTS: ONTOLOGIES AND EPISTEMOLOGIES

With regard to media art, we therefore have to deal primarily with unsustainable media projects within the unsustainable media environment (analog as well as digital). As in other disciplines, there are no common existing rules within media art studies upon which the diversity of media art may be mapped universally.

The content-related categorizations [8] represent general “fields of inquiry,” founded on a geohistorical view and an attempt to record individual works as precisely as possible, in order to better analyze the achievement and significance of artists and groups of artists within their respective contexts (Table 1).

The favorable characteristics of this kind of approach to the general variance of media arts today lies not least in the precision of the explicit and implicit description and appraisal of the individual “works” or “projects,” accompanied by the multiplicity of geographical and chronological inter-relationships. It does not permit any definite, qualitative individual statements; however, it does provide a temporary classification from the viewpoint of the interconnecting complex of art and media theory–related problems.

On the other hand, some categorizations of media art subordinate the media art fields of inquiry almost entirely to research institutions and academic curricula (Table 2).

If we compare the generally accepted

historical origins of media art with traditional academic curricula and longstanding academic preferences, we can easily understand how media studies, cultural studies, critical studies, art history and other disciplines have referred mostly to the origins of media art for their placement within academic curricula (Table 3).

This kind of contemporary praxis of appraisal, archiving and dissemination for media art is not necessarily representative, simply because the categories do not arise from the discursive *history* of (analog as well as digital) media art. Therefore, the categories are not actually comparable to the complexity of *historical* media contexts or our media context today.

The wish to “overcome” the patterns and curricula outlined above, as well as institutionally driven problems related to media art, may admittedly appear quite naïve, because this wish seems to disregard the fact that joint information gathering and sharing systems do not seem to be very welcome within the exclusivity-driven concepts and contexts of the tradition. Some disciplinarily driven media theorists, art theorists and cultural theorists see comprehensive and generally accessible information platforms as a kind of stumbling block on their way to scientific or economic canonization.

Nevertheless, as we increasingly relocate the knowledge of the off-line world on-line, the concept of “intellectual property” quite naturally loses more and more of its value within the electronic environment, as was discussed at Ars Electronica 2008, where the theme was “The Limits of Intellectual Property.” The concepts of exclusivity seem to yield progressively to the concepts of inclusiveness. The issues of copyright, Creative Commons, Science Commons and other contemporary concepts of utilization of records and knowledge within an electronic environment are already considered within the different disciplines, including archival science and art history.

Table 2. Diversity of Media Art (as set out in Wilson, 2002) [10]

1. Biology: Microbiology, Animals and Plants, Ecology, Medicine and the Body
2. Physics, Nonlinear Systems, Nanotechnology, Materials Science, Geology, Astronomy, Space Science, Global Positioning Systems, Cosmology
3. Algorithms, Mathematics, Fractals, Genetic Art and Artificial Life
4. Kinetics, Sound Installations, Robots
5. Telecommunications
6. Digital Information Systems/Computers

DECISIONS: EMPHATIC OPPOSITIONS AND “FRAGILE CONTINUITIES”

The various Wiki, rating and tagging websites are examples of the inclusion of immense human, time and attention resources into a work despite limited administration resources on the institutional level. At the same time, notions such as tagging, appraisal and curating have become core issues within media art itself. Today, in the creative handling of media technologies, we are not dealing primarily with colorful pictures and fancy Flash animations: It is the *conceptual* approach of digital media artists, especially so-called net-artists and designers, as well as curators, that puts taste, evaluation and appraisal at the center of their work. Thus the *decision processes* used in archiving go to the core of creative media praxis and theory—in addition to the considerations of the scientific, political and business communities. We actually witness a blurring of the boundaries between these communities and perspectives within recent media art theory and praxis.

For example, the software project “kurator version beta 1.0,” developed in 2007, includes a team of programmers, artists and curators working on an open source software application designed as an on-line system for curating source code itself. The curatorial function of appraisal, understood as abstract subjective potential, is therefore complemented with the potential of binary code, which is itself—as opposed to in commercial search engines’ practices—displayed as a transparent entity [11].

Before I reach my point, let me add another, similar example. As with kurator (supported by the University of Plymouth, U.K.), the media-art curating project at the TAGallery (Austria) [12] has tried to include Web 2.0 features such as open source and tagging to improve their curatorial procedures and long-term archiving.

The question I would like to pose here is: How could we use personal associations like tagging within the hierarchical structures of museums, archives or distribution organizations? This is one of the issues that the Digital Curation Center (DCC) is confronting, in a joint effort with UKOLN (formerly the United Kingdom Office for Library and Information Networking), a center of expertise in digital information management based at the University of Bath (U.K.). The UKOLN strategy for 2007–2010 cites the Steve Museum as “a collaborative research

project exploring the potential for user-generated descriptions of the subjects of works of art to improve access to museum collections and encourage engagement with cultural content” [13].

Ela Kagel, a digital media producer and curator from Berlin, stated in 2006 that “the initiative of the Steve Museum clearly has its roots in the realm of Net Art [and that] this could be an important contribution to close the semantic gap between audience and curators” [14]. Such initiatives—despite their continuing lack of transparency—are very important for those of us interested in increasing access to art and especially to media art resources. That means—and here I finally reach my objective—that we need to learn how to employ Web 2.0 tools such as (social) tagging in our appraisal and archiving work and, at the same time, consider how to harness and motivate the immense human and time resources of the Internet within such. According to my experience, such motivation requires maximization of transparency—by extending Web 2.0 tools into curatorial processes within the hierarchical business models of the museums, archives and so on.

The business world has of course discovered the considerable commercial potentials of folksonomy, especially of tagging, but I believe that art and cultural, as well as educational, institutions, including archives and private collections, could reach even higher levels of transparency. I also think that experiments and considerations in this direction could finally help them (and all of us) to include enormous human and fi-

nancial resources that otherwise would not be available.

CONSCIOUSNESS: “EVIL NECESSITIES” AND GOOD WILL

Let me now return to the problem of (in)compatibility between the comprehensive and ambitious media art databases and institutionally driven academic curricula. We should and probably could do something about it. The “top-level networking” of media art history and theory (e.g. as used by the Leonardo organizations, ISEA, etc.) demands a transparent and universally accessible information system that does equal justice to production, distribution and data archiving and to individuals’ provision and scholarly processing of information on media art. Previous experience worldwide has shown that the laborious, but (for the survival of the information system) crucial task of compiling such a database is at odds with hitherto customary top-down structures. The signs suggest that in the longer term, media theory and practice must meet at eye level.

With the M.A.D. project [15], I therefore propose a networking bottom-up structure as the decisive motive force in assembling potent aggregates of knowledge and expertise. M.A.D. is envisioned as a database of media artists, which is to be open to modification by users through social networking tools. It could be a forum where both knowledge and expertise are delegated and constituted, with “distributed editors” and an “advisory

Table 3.

Historical Origins of Media Art	Academic Curricula and Their Preferences
New Music/New Dada/Fluxus/nouveau realisme (since the 1950s)	Musicology, Art History
Experiments in Art & Technology (E.A.T.) (since 1966)	Media Studies, Art History
Video Collectives (since ca. 1968)	Cultural Studies, Critical Studies, Art History
Media Theater/Jeux de communication (since ca. 1963)	Theater Studies, Media Studies
Post-minimalist tendencies (since ca. 1967)	Art History, Theater Studies
Videofeedback-/Synthesizer Art (since ca. 1968)	Image Science, Computer Science
Luminal-kinetic Art (since the 1950s)	Informatics, Mathematics

board” responsible for development and coordination.

Inevitably, this brings us back to the question of appraisal. Traditionally, at least in the archival sciences, appraisal implies or is described as an inescapable “evil necessity” in striving for objective criteria in the preservation of records. The institutional and conceptual perceptions and differences between single-organization archives and “delegated archives” [16] are the reality that archivists and (media) art historians traditionally face in their work. I think that the involvement of digital materials produced by individuals, as we proposed in the M.A.D. project, need not cause as much turbulence among traditionally institution-based archives and art historians as they seemingly do at present. Projects such as M.A.D. even have a good chance to free up existing archives and their limited personnel by integrating other resources.

While the appraisal of electronic records and, moreover, the “appraisal of

into account the quite rapid growth of “stuff” on all levels, which involves reorganizing some institutional premises as they exist in our “offline” world. Our “analog,” “manual” and paper-based methodologies and thinking within the archiving, archaeologically and historically oriented disciplines cover scientific theories, institutional and academic practices as well. However, they sometimes prevent growth within contemporary societies, where *growth* is usually used as a synonym for maintenance and preservation!

INSTITUTIONS: CLOSED CIRCUITS AND OPEN SYSTEMS

The good news within the institutional milieu is that we need not reinvent either our main goals or the existing technical tools, nor must we alter already functioning services; the bad news—for some of us at least—is the need to reinvent our self-conception(s) and to give up monopolies as well as to rethink outdated

which makes verbal *description*, “tagging” and conscious multimedial (re-)presentation techniques so important.

At the same time, some parallels between our considerations and more general standards and recommendations should be mentioned here. They would show first that media art is not that specific at all and could even serve as a model for the description of all possible kinds of real and virtual objects. Secondly, the M.A.D. project requires some specific considerations on appraisal strategies that may also draw our attention to incompatibilities between institutional business models, archivist approaches and the needs of the media art and science communities. These remarks may, again, deliver further motivation for a discussion of the meaningful involvement of the both top-down and bottom-up methods in appraisal and preservation of digital material in general.

The Consultative Committee for Space Data Systems, with its Reference Model for an Open Archival Information System (OAIS) (January 2002) [17], includes a very well-known, general and brief set of recommendations for the long-term preservation and archiving of digital objects. Accordingly, the OAIS model appears rather simple: Within an OAIS Environment, an archive is defined as an object placed between production (producer), reception (consumer) and distribution (management), as we know them from traditional business concepts. If we regard the scope of the largest part—administration—it appears even more familiar, because it is huge and its costs are immense. This very general scheme may not provide a model for small businesses, startups and other similar entities or private persons to contribute effectively to the worldwide project of preservation, archiving and dissemination of digital information—especially now that we have added to our experiences with tools and services from the so-called Web 2.0 and even Web 3.0 domains.

CATEGORIZATIONS: METADATA, QUOTABILITY AND SCIENTIFIC RECORDS

The above point is the first reason why I believe that the M.A.D. business model should differ slightly in emphasis from the OAIS Environment. At the same time, I believe that the DCC Digital Curation Manual [18], where the taxonomy of information object classes used by OAIS is explicitly mentioned, is not incompatible with the M.A.D. project in respect to at least some mutual goals.

As a time-based art by definition, media art is fundamentally concerned with the problem of liveness

appraisal,” must be continually discussed and refined by archivists, the question of the appraisal of data, or metadata requirements, should also be discussed with regard to related media and specific characters of related disciplines (MPEG 7, for example). It is both a blessing and an anathema for archivists and (media) art historians that they deal with (and must deal with) a wide range of important data and information, whose specifics cannot be properly involved in the workflows, as we know them from different recommendations and reference models. The conventional off-line institutional structures and the booming new curricula remain the major cornerstones in these processes.

Again, if we make a strong distinction between “folksonomy” and “resources for appraisal” in this context, this implies that folksonomies are not taken as seriously as they should be. Similar misconceptions can be observed if we oppose (the strong business model of) folksonomy to “business issues” or to “maintaining what is digested/digitized” or to questions of “who is going to sustain the stuff,” etc. I think that it is precisely questions of sustainability that must take

institutional structures and workflows. With the point of departure in our comfortable off-line world, we need to start with strong exercises in testing the—apparently or factually—more transparent and flat structures of the on-line world. The flat organizational structures may become a reality, but not before the gradual generational changes underway have come to pass.

In order to arrive at an impartial view of media art that derives its pertinence from media theory, art history, archaeology, the archival sciences and other disciplines, it is essential to overcome the emphatic opposition between what is “specific to media” and what “has become historical.”

Within art history, the directness of aesthetic experience—although tried and tested “archaeologically” (by describing the “artifact,” the circumstances etc., not only by theory, etc.)—is liable to pass over the historicity of art. The revelation of the “innocent eye,” a myth of the modern age, involves the risk of a radical shift in research toward the historicity of art institutions—which is an important component of, but ultimately not a replacement for, the analysis of works/projects,

The second point requiring discussion of the OAIIS recommendations, their basic structure and the problems of their implementation lies in the nature of the production, reception and distribution of media art, with its progressive conver-

“sources,” scholarly texts, critiques and so on. Without transparently displayed appraisal practices and without making descriptive, content-related metadata quotable, we cannot really talk of a sound research approach to media art.

the aforementioned media dialectic of storage and transmission. I focus here on transmission and liveness, because it shows quite easily how the aforementioned “emphatic oppositions” may be replaced by “fragile continuities” on the historical, theoretical and technical levels, not to mention the political and economical ones.

As we relocate the knowledge of the off-line world on-line, the concept of “intellectual property” loses more and more of its value

gences between those three elements, where the artist, researcher, curator and mediator, as well as the distribution institution, are often the same person. This is why the tools and services surrounding our preservation efforts should be understood as a constituent object of our attention, still to be concentrated on contents and their contexts.

Luis Silva, a Portugal- and Spain-based curator and author dedicated specifically to the problems of appraisal in digital media art, stated recently, “The most important feature of social bookmarking lies in the *categorization* of these resources by the users themselves” [19]. Within the M.A.D. project, however, we do not try to replace the top-down approach exclusively with bottom-up tagging and appraisal. We try to analyze and understand the necessities of a transparent and therefore credible approach to these issues.

The analyses of the Archival Information Package (AIP), as part of the archiving process envisioned in the OAIIS recommendations and the Electronic Resource Preservation and Access Network (ERPANET)’s ERPA Guidance: Ingest Strategies of September 2004, show strong emphasis on the need for descriptive information at almost every level before, during and after ingestion of the digital material. Descriptive information actually converts the “data” into “information” by making the related record readable.

This is because the M.A.D. project places particular “emphasis on gathering substantial, precise descriptions—a resource hitherto given little attention—despite the fact that the production and gathering of so-called metadata are the critical nodes in almost every model—not only within the general OAIIS Reference Model. From our point of view, the extant descriptions of individual objects should be open to supplementation with a series of data that in turn will form a reliable and quotable resource of as-yet impartial “meta-data” for the compilation of new

What, however, does it actually mean to make a media art work/project quotable? Take as an example one of the main categories from the M.A.D.’s preliminary Categorization, Media Installation: Unlike in traditional art history, where most objects/artifacts (paintings or sculptures) are defined as “output only” devices, media art installations always have at least three elements to be “tagged” to the piece as an objectively quotable piece of information: Input/Output/In Between (Control Unit) [20]. The cybernetic terms “input” and “output” seem best suited to the description of any kind of electronic audiovisual feedback because they unequivocally characterize the recording device (microphone or video camera: input) and the transmitting device (loudspeaker, television monitor or video projector: output). An audio or visual recording device can be allied to a suitable transmitting device, so that not only can a *live* image or sound be broadcast, but the current footage of a video camera can also be employed merely as noise or music. Conversely, the recording of a microphone can be used to produce or influence a live television image, etc.

This cybernetic model enables a more systematic approach and ultimately a peaceful correlation between analog and digital, continual and discrete, signal and data than appears in different models of media materialism [21]. We cannot dwell here on questions of decomposition and resolution principles of the analog and the digital; neither can we discuss the general signal-data dialectic in its historical dimension [22] nor can we reflect for instance on Timothy Binkley’s dialectic of converting and transcribing. However, I would at least like to indicate that the pragmatic ethos of *ars digitalis* [23] is sometimes accompanied by ahistorical constructions not necessarily founded in what really happened within art, science and technology over the years.

To me, this general problem reflects

For instance, if we study the photographic documentation of the media installation *Zerseher* [24] from the Berlin-based collective Art+COM, we can understand that, within the actual piece, the image disintegrates when looked at with the help of an eye-tracking technology.

By simple denotation of input/output, as well as the in-between (controlling, analog or digital) device, we *begin* by adding basic categories to the record or data. These generate objective parameters of description that may be accompanied by the subjective appraisal of the “trusted instance” (or as some still say, the “connoisseur”). Such or similar developing description standards that go beyond the Dublin Core, MPEG 7, MPEG 21 [25] and similar known standards (still not subordinate under the “macro” or “micro” appraisal categories) are to enable the gradual growth of a more transparent system of information that does justice in equal measure to the work of production, distribution and data archiving sites and of individuals occupied with the creation, archiving and scholarly processing of information on, and the theory of, media arts.

The standards for the description of individual projects apply to related sources too. In spite of the concurrent usage of both popular tagging and scientific texts, M.A.D. shall be able to put them together and keep them apart at the same time, so that the user can benefit from both origins of the particular sources [26]. Praxis and theory come together without the possible disadvantages of their dogmatic amalgamation. The important initial steps so far taken by media creators, curators and thinkers could continue in a more constructive, collective and nondogmatic way for any interest groups mentioned (or not mentioned) above.

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20. Feedback systems, which have the specific quality of using a part of the output signal as an input signal, are still represented in such important concepts as biofeedback. Earlier important concepts include those of radical constructivism, as represented by H. Maturana (biopistemology) and von Glasersfeld (psychology), systems theory (see von Foerster), neuropsychology (D.H. Dubel and T.N. Wiesel), Gestalt psychology (Metzger) and psychochemistry (H. Schwegler), as well as physics (James P. Crutchfield).
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Guest Editors: Tom Rockwell and Tami I. Spector

Over the last decade, “nano” has become *the* buzzword signifying everything from imagined atomic-scale robotic utopias to small electronics. For scientists the shift toward nano has also become ubiquitous; what used to be referred to as “molecular” has been reframed as “nano,” 27 journals devoted to nanotech/nanoscience are now published, and the National Science Foundation and other granting agencies have devoted a significant amount of funding toward nanotech/nanoscience. Among engineers, scientists and science-studies scholars, discussions of the potential of nanotech/nanoscience abound, including conferences that debate the pros and cons of a nano-hegemony and attempt to debunk some of the hype. Artists, however, have only begun to explore this emergent scientific field, leaving it wide open for creative interpretation. With this special section of *Leonardo* we hope to ignite artists’ interest in the exploration of nanotech/nanoscience and encourage scientists, scholars and educators to contemplate the implications of an art-nanotech/nanoscience connection.

Leonardo, in collaboration with the Exploratorium under the auspices of the Nanotech Informal Science Education Network, will publish a series of special sections periodically over the next 5 years exploring the intersections of nanotech/nanoscience and art. We are especially seeking submissions of artworks (visual, performance, sound, etc.) with artists’ statements explaining the relationship of the work to nanotech/nanoscience; essays from scientists, engineers and scholars exploring the connection between nanotech/nanoscience and art; and essays and visuals aiming at nanotech/nanoscience education that uses the arts as a pedagogical tool.

Articles published to date as part of this special project include:

Tami I. Spector, “Introduction: Nanotechnology, Nanoscale Science and Art,” *Leonardo* **41**, No. 4.

Filipe Rocha da Silva, “Nanoscale and Painting,” *Leonardo* **41**, No. 4.

Boo Chapple with William Wong, “Can You Hear the Femur Play? Bone Audio Speakers at the Nanoscale,” *Leonardo* **41**, No. 4.

Jane Bearinger, “Chaos Control on the Nanoscale,” *Leonardo* **41**, No. 4.

David S. Goodsell, “Fact and Fantasy in Nanotech Imagery,” *Leonardo* **42**, No. 1.

Chris Toumey, “Truth and Beauty at the Nanoscale,” *Leonardo* **42**, No. 2.

Paul Thomas, “*Midas*: A Nanotechnological Exploration of Touch,” *Leonardo* **42**, No. 3.

Interested artists and authors are invited to send proposals, queries and/or manuscripts to the Leonardo editorial office: Leonardo, 211 Sutter St., Ste. 501, San Francisco, CA 94108, U.S.A. E-mail: <isast@leonardo.info>. Editorial Guidelines for Authors can be found at <www.leonardo.info>.

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