InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

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A. Overview of Case Study

This case study examines the documentation of the performance art of Stelarc, an Australian performance artist who combines robotics and technology with the human form. Stelarc collaborates with specialists from a variety of scientific and technological fields, such as engineering, computer programming and technology, biology, etc.[1] However, the performance assimilates the technology with the human body, using the body and its functions, such as pulse and muscle tension, as mechanisms for movement and sound.

The form and content of Stelarc's work is motivated by a clear philosophy that he has been consistently developing for almost thirty years, the essence of which is that humans are 'zombies' and 'cyborgs' who "have never had a mind of [their] and [who]…often perform involuntarily – conditioned and externally prompted."[2] According to Stelarc, our long-standing reliance on tools and technology, extending back to the first use of hand tools by early hominids, has transformed the human body into an "increasingly automated and extended" prosthetic. In fact, Stelarc argues that the body is an 'obsolete' and 'absent' entity that 'performs in the world with its physicality receding' (artist's Web site) and with no individual identity of its own. The movement vocabularies that are generated through it are inseparable from the environmental and technological systems with which it interacts. This body derives its intelligence from complex interrelations between human biological systems and environmental conditions rather than any willful set of actions on its part, and requires the assistance of technology because it is ill equipped to handle the activities our current society expects of it. Stelarc believes that we are merely hosts for 'multiple agencies' and 'intelligent avatars.'

Stelarc's early work involved body suspensions and skin piercing, from which he graduated to using industrial machines/robots in the *Third Hand* events, electronic stimulation in the *Involuntary Muscle Stimulation Events* series and internal body scans in the *Stomach Sculptures* series. His exploration of the body from both the outside and inside, as flesh, data and cybernetic device, is the work of a performance artist using the expertise of scientists. This allows him to bypass highly scientific and technological details and to concentrate on artistic, philosophical, moral and ethical issues.

Considering Stelarc's unique philosophy and aesthetic, this report assumes that the choreographic record in Stelarc's case exists in a distributed state amongst the biological and technological systems that generate it. However, from Stelarc's perspective, the more important issue with respect to the long-term preservation of his work is "not to preserve the artwork, but to preserve the body itself."[3] In other words, according to Stelarc, the primary record exists in his own body as much as it does in the computing systems and/or electronic networks through which he performs or disseminates those performances. The records created in the process of Stelarc's performance art projects are clearly experiential, interactive and dynamic, but where they begin

[1] His recently completed Bio-Robotic project at the Performance Arts Research Unit at the Nottingham Trent University and the School of Cognitive and Computer Science at the University of Sussex was supported by the Wellcome Trust. See the *Sci-Art: Bio-Robotic Chorography Project* Web site at (http://art.ntu.ac.uk/dru/sci-art.htm) (accessed 22 Nov 2003).
[2] From the artist's Web site at http://www.stelarc.va.com.au/index2.html (accessed 30 Aug 2006).
[3] Stelarc. 2002. Interview by Luciana Duranti and Henry Daniel (transposed by Glenn Dingwall). Crowne Plaza Hotel, Vancouver, BC, 22 June, p. 20.

and end is clearly a dilemma that this case study cannot determine without a more detailed modeling of the artist's performance processes. In an extensive interview with InterPARES researchers Duranti and Daniel, the artist claimed:

> …whereas before I kept sketchbooks and notes, what I keep now is a Web site, and my Web site is in a sense a collection of what I think are interesting documentations: records, notes.[4]

This report has thus chosen to look at the records the artist has 'archived' on his own public Web site, which he claims are the more 'interesting documentations' for his purposes. The Web site was created in 1994, in collaboration with Gary Zebington, who is the site's Webmaster and the only person with access to upgrade, update and alter the site.

B. Statement of Methodology

Qualitative methods were used to answer the twenty-three research questions laid out for case study researchers. An extensive interview was conducted with the artist in Vancouver, which proved to be very effective. Observations of the artist in performance at several locations in Vancouver were extremely useful, as were post-performance feedback, e-mail exchanges, information gleaned from unrecorded casual conversations, reviews of his writings, and conversations with others who had seen or actively participated in his performance experiments.

The specific activities that were analyzed include:

- The *Third Hand*, as displayed in 'The Uncanny: Experiments in Cyborg Culture' exhibit at the Vancouver Art Gallery from 9 February 2002 until 26May 2002.
- Pacific Art and Technology Alliance Series 'Zombies and Cyborgs' demonstration at the Western Front in Vancouver on 11 February 2002. The demonstration featured hands-on audience participation with the *Third Hand* technology.
- Performance demonstration at the Fletcher Memorial Theatre located at the Simon Fraser University Harbour Centre Campus, 12 February 2002, as organized by the Emily Carr Institute of Art and Design's Centre for Art and Technology.
- CBC television interview and broadcast of the artist's Vancouver performance, aired 22 March 2002, on ZeD TV, a CBC program.
- Interview with the artist by InterPARES Project Director, Luciana Duranti, and InterPARES researcher, Henry Daniel, in Vancouver on 22 June 2002.
- Examination of the documentation represented on the artist's official Web site: http://www.stelarc.va.com.au/index2.html.
- E-mail communications with the artist regarding the InterPARES Case Study and his

[4] Ibid., p. 15.

most recent project, *Hexapod*.[5]

- E-mail communications with the artist's Web host and Webmaster.

The digital entities examined include the Artist's Web site and its individual Web pages, each of which includes one or more digital components, including, but not limited to, diagrams, sound files, still images, video, Virtual Reality Modeling Language (VRML), Quick Time VR and Shockwave files. While each of these components are, as by-products of the Artist's various performance development and execution activities that are set aside, records in their own right, it is the Web site and Web pages that, taken as a whole, are the digital entities of primary interest in this report. To help better understand the nature of these entities and their individual components, a number of performance artifacts were examined, including the *Third Hand*, exhibited at the Vancouver Art Gallery and performed at the Western Front, and the six-legged robot, *Hexapod*, in its newly developed incarnation of *Muscle-Machine* at Nottingham Trent University in the UK. The latter was most recently performed 26 June 2003.

The *Third Hand* is an electronic device, an appendage to the right arm, capable of independent motion and activated by the electromyographic (EMG) signals of the abdominal and leg muscles. It has a pinch-release, grasp-release, 290-degree wrist rotation (clockwise and counterclockwise) and a tactile feedback system for a rudimentary sense of touch.[6]

Hexapod has a previous incarnation in *Exoskeleton*, and both are related to the *Sci-Art Bio Robotic Choreography Project* that led to the *Muscle Machine* performance. This latter was the finale of the joint interdisciplinary performance project combining elements of performance art, dance and sound. It was also the focus of a building project researching the possibilities of creative interaction between humans and machines that involved the Performance Arts Digital Research Unit within the Nottingham Trent School of Art and Design (NTSAD) and the School of Engineering within the Faculty of Construction, Computing, and Technology (FaCCT) at The Nottingham Trent University, and The School of Cognitive and Computer Sciences at The University of Sussex (COGS).

In the original proposal for this case study, it was anticipated that a model or prototype of an experiential, interactive and dynamic performance installation system could be created to help examine one or more levels of Stelarc's composite system of record generation. While this proved to be infeasible, it is believed that such an approach is likely the most effective means of accurately determining the reliability, accuracy and authenticity of the artistic record within new digital environments that are experiential, interactive and dynamic. This approach may indeed be possible in another context, such as the Electronic Café International InterPARES 2 case study (case study 22) by lead investigator Howard Besser and co-investigators Shelby Sanett and Henry Daniel. Notwithstanding the current lack of a prototype performance installation system, the interview process and the examination of the artist's Web-based records provide valuable material for an assessment of the nature of these types of records for this stage of the InterPARES 2 research.

[5] A joint collaboration between Stelarc and the Performance Digital Arts Research at The Nottingham Trent University, which hosts the Digital Performance Archive (http://dpa.ntu.ac.uk/dpa_site/) and the Sci-Art Bio Robotic Choreography Project (http://art.ntu.ac.uk/dru/sci-art.htm) and (http://art.ntu.ac.uk/dru/ae.htm), and the Evolutionary and Adaptive Systems Group at the School of Cognitive and Computing Sciences (COGS) at the University of Sussex, supported by The Wellcome Trust.
[6] Description is from the artist's Web site at http://www.stelarc.va.com.au/third/third.html.

C. Description of Context

The Stelarc case study is framed within the context of an interdisciplinary art form that utilizes the body as the primary performance tool. It draws on cognitive science, robotics, medical visualization tools, minimally invasive surgical techniques, and above all, the World Wide Web. This meeting of disciplines, and focus of interest on the body and technology as primary sites for investigating the human condition under the aegis of art, has precedents in the work of twentieth century artists from the Futurists (1909-) to the American Avant Garde artists of the 1960s.[7] Maintaining records of this type of work over time has not been the primary concern of the artist's creating them. Historians of Art and Culture often lament the lack of adequate documentation as the significance of the work is later realized. What this study seeks to do is identify what actions can be taken to avoid the above-mentioned deficiencies. Of the following five contexts identified by InterPARES 1 for the creation and management of digital records, this report identifies the two most relevant as documentary and technological.

Provenancial Context

The individual responsible for the creation of the digital entities examined in this report is the performance artist, Stelarc, whose artistic activity is described above. It is noted, however, that while Stelarc is the author of the digital entities in question (i.e., the Web site and its pages); that is to say, the person with the authority and capacity to create and issue the entities), the Webmaster is the writer; that is to say, the person with the authority and capacity to articulate the content of those entities.

Juridical-Administrative Context

Issues related to copyright, intellectual property and patenting of technology are of particular relevance to the digital entities examined. The jurisdiction encompasses Australia, England and Germany, depending on the project. However, the Web site is Australian. The copyright of the programs, codes and likely design of the technology belongs to the institution that designed and built the technology. Clearly, however, the copyright on the interaction of body and technology, as shown in the pictures and videos of the performance, belong to Stelarc. Increasingly, artists are re-orienting their artistic process to protect more of the expression of their ideas, especially given the fact that technology experts are delegated with much of the implementation of the artistic idea when it takes the form of technology.

While Stelarc's scientific team ensures the quality and reliability of the technological product, Stelarc retains the exclusive right to perform the works with the said equipment. For example, details of the *Exoskeleton* performance cite Stelarc for the concept and performance, Tom Diekmann, Stefan Doepner, and Gwendolin Taube for Design/Construction, Lars Vaupel for Electronics and Programming, Joy Wagner for Technical Assistance, Jan Cummerow for Construction, Ulf Freyhoff for Programming, and Steve Middleton for Computer Simulation. The entire performance was produced at Kampnagel Hamburg in an association between Stelarc and F18/Diekmann Enterprises, and sponsored by SMC Pneumatik GmbH and SMC Pneumatics (Australia). This, of course, is a completely different team than the one that produced and

[7] See Goldberg, R. L. *Performance Art from Futurism to the Present* (New York: Harry N. Abrams, 2001).

designed the *Hexapod* and *Muscle Machine* projects. This latter team cites Stelarc for concept and performance, Dr. Inman Harvey for robot design, Dr. Sophia Lycouris for choreography (although, during the Vancouver interview, the artist insisted that Dr. Lycouris did not choreograph his work) and Professor Barry Smith as the overall director of the project.

Procedural Context

The business procedures during which the individual components of the digital entities examined here are typically created are summarized as follows. First, Stelarc either proposes a project to engineers, computer scientists, visual artists, cognitive scientists, etc., or responds to a call from an institution (e.g., Nottingham Trent University) or a granting agency (e.g., the Wellcome Trust). The proposal is accepted after appropriate deliberations, which generate correspondence and a contract. Then, if the call is not from a granting agency, an application is prepared for funds from any number of different agencies. Once accepted, Stelarc is invited as a research fellow to teach, do performances, and work with the project team. The primary contribution of Stelarc to the project involves development of the overall artistic concept in relation to the kind of performance that will result from the use of the technology. Stelarc focuses on the artistic performance aspect of the project, while the technology experts focus on the performance of the technology. Thus, Stelarc's input relates the function that the technology has to fulfil in interacting with his own body. At this stage, Stelarc gives an overall artistic design, such as sketches and instructions, from a performance perspective. The technology team then creates the necessary hardware and software programs, codes, etc., and the technical design specifications. In doing so, the team creates documents related to generating artificial intelligence systems. In all, different designs typically are generated from five or six disciplinary perspectives. One or more of the project participants builds a Web site to document the progress of the project from their perspective and the artist links these documents to his own Web site, where he shares some of the new material with his Internet audience.

Then, a prototype is built and tested in the lab and in performance within the University. The latter usually involves a sort of lecture/performance/demonstration, during which notes are taken and a film is produced. Research students attending the lectures take notes leading to the writing of dissertations. During this time, the prototype is refined for as long as the grant lasts. When the grant expires, Stelarc takes the equipment and uses it for his performances, while the makers of the technology patent it and keep the related records. Stelarc relies heavily on the Internet and DVD ROM technology to support his appearances at performance demonstrations, lecture demonstrations, museums and galleries, international conferences, industrial fairs, media gatherings and conventional theatre locations. He records his performances and keeps the records to eventually post them on his Web site, which is database-driven and is hosted by a commercial company, *eyespace*.[8] Stelarc claims that his Web site provides links to the complementary records related to the technology.
The digital components of the entities in question are created throughout the series of processes mentioned above, all of which focus on the performance event as their ultimate goal. The *Hexapod/Muscle Machine* collaborative project with the Wellcome Trust[9] resulted from a combination of all the above processes.

[8] See http://murlin.va.com.au/eyespace/.
[9] For further details about this Trust, see http://www.wellcome.ac.uk/.

Finally, Stelarc transfers some or all of the digital components produced related to each of his performances, along with any analogue components, such as photographs, technical drawings, analogue video, etc., to the Webmaster for the purpose of creating and updating the Artist's Web site. It is at this stage, that the digital entities in question in this report are created.

Documentary Context

All the project records generated in the course of the collaboration are part of the archives of the institution building the technology. These documents include all the data produced by a technology that is used by Stelarc, and documents such as images, sound, and sensory data of the way his body functions during its interactions with the technology. The documentation for each project also include Stelarc's initial correspondence, his contract, and videos and pictures of the technology, the testing of the prototype and any subsequent performance(s). Stelarc keeps most of these records on his Web site. In addition, his Web site has links to the Web site of the institution that has developed the technology, which contains copies of all the records related to the design of the technology.

It is assumed that all 'original' documents are kept in the artist's own care or in the archives of partners and collaborating institutions.

Technological Context

The technological environment within which the digital entities in question reside consists of the electronic hardware and software related to the server environment (i.e., computer devices, hard discs, programming code, software applications, Internet protocols, etc.) of the site's Web host.

D. Narrative Answers to the 23 Core Research Questions

1. What activities of the creator have you investigated?

This study investigated the activities of creating and developing an artistic performance, creating digital entities for public consumption of the performance on the artist's Web site, and of updating said Web site.

2. Which of these activities generate the digital entities that are the objects of your case study?

The digital entities examined in this study are generated as by-products of: (1) the various performance creation and development processes associated with each project and performance, (2) the processes associated with documenting performances, and (3) the documentation conversion and management processes involved in providing access to the performance documentation on the artist's Web site.

3. For what purpose(s) are the digital entities you have examined created?

The digital entities examined in this study are created primarily for the purposes of advertising, implementing, and documenting the various stages of a complex performance process, mainly for use in a digital environment (the Internet).

4. What form do these digital entities take? (e.g., e-mail, CAD, database, sketches, sound files, images, etc.)

The digital entities examined include e-mail, technical drawings, audio files, video files, photographs, text documents, digital animation and video stills.

4a. What are the key formal elements, attributes, and behavior (if any) of the digital entities?

The key elements of the digital entities on the artist's Web site are text, still and moving images and sound. Text and images function as level 1 interaction, i.e., they are hyperlinked to open as animations or to reveal other levels of data on the site or linked to other Internet locations. The Web site furnishes some of the material and the Internet functions, in effect, as part of Stelarc's presentation, performance and recordkeeping system.

4b. What are the digital components of which they consist and their specifications?

The Web site consists of a series of HTML 4.0 Transitional[10] documents that each contain some or all of the following digital characteristics, components and/or call-outs: JavaScript,[11] cascading style sheets (CSS),[12] graphics interface format (.gif)[13] images and animation, Joint Photographic Experts Group (.jpg)[14] images, waveform audio format (.wav)[15] sound files, QuickTime VR (virual reality)[16] image files, and Macromedia Shockwave (.dcr)[17] and Live Picture's RealSpace Viewer Xtra[18] plug-ins for video and audio files. There are also e-mail

[10] See W3C. *HTML 4.01 Specification W3C Recommendation 24 December 1999*. http://w3.org/TR/html401/ (accessed 30 Aug 2006).
[11] Version not specified.
[12] For style sheet specifications, see W3C. *Cascading Style Sheets, level 1*, revised 11 Jan 1999. http://www.w3.org/TR/REC-CSS1 (accessed 30 Aug 2006).
[13] See CompuServe Incorporated. 1990. *Graphics Interchange Format, Version 89a*. http://www.w3.org/Graphics/GIF/spec-gif89a.txt (accessed 30 Aug 2006).
[14] See Hamilton, Eric. *JPEG File Interchange Format, Version 1.02*. Malpitas, CA: C-Cube Microsystems, 1992. http://www.jpeg.org/public/jfif.pdf (accessed 30 Aug 2006). See also the official site of the Joint Photographic Experts Group at http://www.jpeg.org/jpeg/index.html (accessed 30 Aug 2006).
[15] Also known as Wave file format. See The Sonic Spot. *Wave File Format*. http://www.sonicspot.com/guide/wavefiles.html (accessed 30 Aug 2006).
[16] QuickTime VR is an image file format supported by Apple's QuickTime multimedia framework, which enables creation and viewing of panorama images, as well as the exploration of objects through images taken from multiple viewing angles. See http://www.apple.com/quicktime/technologies/qtvr/ (accessed 30 Aug 2006).
[17] Macromedia was acquired by Adobe Systems in 2005. The Macromedia Shockwave Player uses .dcr files created using the Macromedia Director authoring tool. For further information about the Macromedia Shockwave player, see Adobe Systems. 2006. *Shockwave Player TechNote: Macromedia Shockwave Player Support FAQ*. http://www.adobe.com/cfusion/knowledgebase/index.cfm?id=tn_15508 (accessed 30 Aug 2006).
[18] Live Picture, Inc.'s RealSpace Viewer is a 3-D plug-in for Web browsers that enables a photospatial interactive imaging and navigation environment by combining virtual reality and multimedia panoramic viewing with VRML 2.0 specifications for rendering, graphics, video and audio playback. It is available as a browser plug-in for Netscape Navigator and Microsoft Internet

messages posted on the 'comments' page that have been converted into HTML 4.01 Transitional format. Some of these components were created by project collaborators in various digital forms, such as CAD files and other professional applications, not all of which are known or documented. Also, there are security software components, the specifics of which are unknown, that are implemented and managed by the Web host, Virtual Artists.[19]

Finally, it is noted that the site's home page provides information about minimum browser and plug-in specifications for optimum viewing. In particular, the site alerts users that it is "[b]est viewed and heard with NS/IE 4+ and the appropriate plug-ins" and that the site "contains sound, video, VRML, QuicktimeVR and Shockwave files."

4c. What is the relationship between the intellectual aspects and the technical components?

The technical components of the Web site reflect the concepts and intellectual values that the artist, and his Webmaster, have of his work in an attempt to reflect the artistic ideology of Stelarc the Artist. The digital entities are chosen to reflect the best and most comprehensive elements of Stelarc's work. As is noted on the home page, Stelarc's Web site has won several awards.[20]

4d. How are the digital entities identified (e.g., is there a [persistent] unique identifier)?

The primary strategy used for uniquely identifying the digital entities on the Web site involves the use of a unique URL (Universal Resource Locator) associated with each entity coupled with, in some cases, unique embedded hyperlink titles.[21] Individual Web pages are also identified using a unique HTML title tag in the header section of the underlying HTML code, which is displayed in the title bar section of the user's browser. In some cases, title tags are also used to identify individual components on a page; however, use of this practice is sporadic. It is assumed that the URLs associated with individual digital entities and components will remain constant as long as Stelarc maintains his own defined Web domain name, but they are not associated with a Persistent URL (PURL).[22]

Explorer, and as a stand-alone application. Note: This application was originally available for download, in both Mac and Windows versions, at http://www.livepicture.com/download/misc/xtra_win.html, but no longer appears to be available, as the livepicture.com site is no longer accessible.

[19] See http://www.va.com.au.

[20] Unfortunately, however, none of the award links provided on the Web site lead directly to information about the cited awards. One link, in fact (http://www.sintercom.org/makan/award/ap.html), leads to a gift basket Web site (accessed 30 Aug 2006).

[21] For example, the digital entities are identified using embedded hyperlink project titles, event series, and biographical content on the Web site, i.e., *Third Hand* events**,** *Involuntary Muscle Stimulation Events* series, *Stomach Sculptures* series, *Exoskeleton*, *Hexapod* or *Sci-Art Bio Robotic Choreography Project***,** *Articles* and *Stelarc Biographical Notes*, each of which is associated with a unique HTML file in their respective href tag in the underlying HTML code.

[22] A PURL is a Uniform Resource Name, i.e., a reference to the resource content rather than its technological address, which is maintained in a server. The technological address is monitored for currency and any changes are recorded in the PURL server. Clients requesting a resource use the PURL and are then redirected to the current URL for the resource. PURL is an Online Computer Library Center initiative. http://purl.oclc.org/docs/new_purl_summary.html (accessed 30 Aug 2006).

4e. In the organization of the digital entities, what kinds of aggregation levels exist, if any?

Within the Web site as a whole, the individual Web pages reflect organized aggregations of text, static and moving images, and other components that are both conceptually and physically linked to one another. As is common practice for Web sites, most, if not all, of the site's main Web pages are grouped together on the home page, using the classification strategy noted in footnote 21, presumably for the navigational convenience of the user.

4f. What determines the way in which the digital entities are organized?

Stelarc has no recognized system of organization from an archival point of view with regard to his artifacts. His material is arranged according to his performance and publicity needs. The following quotations explain his position with regard to his records:

> Well, for example, whereas before I kept sketchbooks and notes, what I keep now is a Web site, and my Web site is in a sense a collection of what I think are interesting documentations: records, notes. So, for example, the set of those postcards are on my Web site. You can see the front and the back view of the postcards. You can see the image and then you can see the information on the back.[23]

> In a sense, the archives, the Web site becomes a kind of public archive. But also, more importantly for the artist, a means by which he can organize his kind of artistic life really. I mean there's my biographical notes….and of course the advantage of the Web site from the artist's point of view: I don't have to carry anything. I can come to Vancouver and say, "ok download all of this stuff," and then I walk out of the office and I can walk into the gallery and give you a set of my documentation. But the Web site is more than just simply a kind of visual gallery documenting my work. It's really a record of my thoughts…much like I used to keep sketchbooks, now I keep a Web site.[24]

5. How are those digital entities created?

The photos, audio, technical drawings, and some of the textual documents are digitized, edited and formatted for Web publication. The digital videos are edited, while the rest of the Web site text is digitally produced. Most of these activities are carried out by the Webmaster, who is also responsible for arranging, composing and compiling the individual entities into Web pages that he then uploads to the artist's Web site.

5a. What is the nature of the system(s) with which they are created? (e.g., functionality, software, hardware, peripherals, etc.)

- **Virtual Web Hosting**, using Apache on FreeBSD, with numerous features including PHP, Perl, mod_perl, Tomcat (for JAVA Servlets), Cocoon (XML/XSL/XSP publishing framework)

[23] Stelarc. 2002 Interview, p. 15.
[24] Ibid., pp. 15-16.

- **Streaming Media Hosting**, specializing in QuickTime and Windows Media streaming formats
- **DNS Hosting** (to host Stelarc's domain name)
- **Virtual e-mail Hosting**
- **VCe Hosting** (Virtual Community Engine) The VCe is Virtual Artist's flagship product and provides a complete content management system and Web application development platform.

[Editor's Note: The above answer seems to suggest that it is the Web pages themselves that are the (only) digital entities in question, which is not the case. The focus here should instead be on the systems that *create* the various digital entities (photos, audio, video, technical drawings, etc.). For most of the entities involved, it does not appear that the Web site is that system. The Web site is simply the 'final repository' into which these entities are eventually uploaded. Instead, they are created before, during and/or after performances using, presumably various types of digital and analogue audio-video and image capture equipment (perhaps linked to a computer in some cases?). After which, the digital audio-video/images are transferred to a computer (if they were not captured directly to computer in the first place), and the analogue audio-video/images are digitized and transferred to a computer. They are then manipulated, transformed, and/or aggregated in various ways into Web pages for uploading to the Artist's Web site. Thus, in this case, the system includes far more than just the Web server, its hardware and software; it also includes the audio-video equipment (cameras, microphones, etc.), computer(s), capture and post-capture processing software, etc.

The nature of the systems used for the creation of the individual digital entities residing on the Artist's Web site is largely determined by the Webmaster, who, as noted above, is responsible for most of the processing required to transform the entities into the formats and configurations required for publishing them on the artist's Web site. To some degree, the activities of the Webmaster are guided, constrained or determined by the technical services and functions provided by the Web site host, Virtual Artists, that are provided in the bulleted list above.]

5b. Does the system manage the complete range of digital entities created in the identified activity or activities for the organization (or part of it) in which they operate?

Yes.

6. From what precise process (es) or procedure(s), or part thereof, do the digital entities result?

See case study activity and data flow models in Appendix 2.

7. To what other digital or non-digital entities are they connected in either a conceptual or a technical way? Is such connection documented or captured?

See documentary context. In the *Hexapod* project, the entire process is documented by teams of researchers primarily because of the nature of the research. In the *Third Hand* project, the artist

claims that the original sketches and plans are stored in cupboards or boxes somewhere in his dwelling in Australia. Both sets of records now have a common location on Web sites because these are the entities that are useful for Stelarc in his round of international performance appearances.

8. What are the documentary and technological processes or procedures that the creator follows to identify, retrieve, and access the digital entities?

The artist accesses his personal records from his Web site from a computer terminal and downloads the required files at any location. This process does not require any passwords or other verification, as the documents can be printed directly off of the Web site.

9. Are those processes and procedures documented? How? In what form?

No.

10. What measures does the creator take to ensure the quality, reliability and authenticity of the digital entities and their documentation?

All performance materials are copyrighted by the artist unless specifically stated by the research organization or the project funder. The Web site is secured by the Virtual Artists hosting service, ensuring virus protection and hacking protection. The Web site is accessible only to the Webmaster who is the sole password holder.

11. Does the creator think that the authenticity of his digital entities is assured, and if so, why?

The artist/creator believes that the authenticity of the digital entities is assured primarily because of his own unique position at the centre of the entire process and the unique nature of his performance events. The documentation on his Web site and the linking of this documentation to the other sites that have permission to display the information assures some degree of control and hence authenticity. The security measures provided by the Web host and Webmaster also ensure authenticity by making tampering virtually impossible. Collaborators do not have permission to adapt the original form, say for example, to change or manipulate an image. To a great extent, Stelarc believes that it is the record of his performance that assures the authenticity of all the digital entities involved.

12. How does the creator use the digital entities under examination?

Stelarc uses the digital entities in question as material in his performances, his lecture demonstrations, and as publicity on his Web site or on his tours. Stelarc also uses the Web site as a means of retrieving documents while traveling to various locations, if those documents are needed.

13. How are changes to the digital entities made and recorded?

For each new performance, Stelarc makes photos, videos, audio recordings, etc., depending on the documentation desired.

Collaborators make changes to their designs, the hardware, and the software until such time as the machine or software design is complete. These records may or may not be used by Stelarc on his Web site as they are the property of the collaborating institution. The artist authorizes his Webmaster to make or alter records on the Web site as needed; this is done approximately every 6 months. Viewer comments that are posted on the Web site are processed and added by the Webmaster on a monthly basis.

14. Do external users have access to the digital entities in question? If so, how, and what kind of uses do they make of the entities?

Visitors have access to the artist's Web site. Collaborators have access to their own records of the process. Visitors leave text documents via e-mail as comments on Stelarc's Web site, comments the artist's Webmaster edits as he sees fit (the artist has no say in which comments are to be posted). Text and images can be cut and pasted off of the Web site without permission, audio and video can be saved to viewers personal computers as well. Images used by researchers in the production of books, journals and publicity material, require the permission of the artist for use.

15. Are there specific job competencies (or responsibilities) with respect to the creation, maintenance, and/or use of the digital entities? If yes, what are they?

Yes, as outlined above, these competencies are highly specialized. The Webmaster controls the content (in collaboration with Stelarc) and maintenance of the Web site, he is the only persons with access to do so.

16. Are the access rights (to objects and/or systems) connected to the job competence of the responsible person? If yes, what are they?

Yes. The job competence of the Webmaster is to present Stelarc in a positive way and to ensure impartiality with respect to the comments of the Web site's viewers. Collaborators have access to their own records in relation to Stelarc's projects, as well. Otherwise Stelarc is the responsible person for his work.

17. Among its digital entities, which ones does the creator consider to be records and why?

The artist considers all of the materials produced by his performance processes to be records. He is also quite convinced that his body is the primary record-creating entity in the entire process since it is data from his body that create various aspects of particular projects, such as the use of heartbeat, muscle tension, brainwave activity, intestinal images, etc.

18. Does the creator keep the digital entities that are currently being examined? That is, are these digital entities part of a recordkeeping system? If so, what are its features?

Yes, they are part of a recordkeeping system. At this point the creator's Web site is the central unit in that system. Hard copies of the records accessible on the Web site are also transferred onto portable digital media, such as CD-ROMs, which are retained in the custody of the Webmaster.

18a. Do the recordkeeping system(s) (or processes) routinely capture all digital entities within the scope of the activity it covers?

Yes it does, but only in the form of digital copies, i.e., processed images, sound and video files, plus links to more processed images, sound and video files on the collaborators Web sites.

18b. From what applications do the recordkeeping system(s) inherit or capture the digital entities and the related metadata (e.g. e- mail, tracking systems, workflow systems, office systems, databases, etc.)?

Mail system, web-driven database operated by Web host, Internet networks, public databases functioning as sources for data mining and conversion into performance images.

18c. Are the digital entities organized in a way that reflects the creation processes? What is the schema, if any, for organizing the digital entities?

Yes, they are. Technical drawings appear in conjunction with images, video, and sound from final apparatus and performances, each project is represented individually, except in cases where the individual projects make up a larger project. The digital entities are also arranged in a chronological way on the Web site and grouped with related entities.

The schema for organizing is the mapping of the developmental process as a whole. As results are obtained, the artist uses it in his appearance and performance schedule. He does this as a work-in-progress, often giving a title to a particular stage of the process to maximize its appeal.

18d. Does the recordkeeping system provide ready access to all relevant digital entities and related metadata?

Yes. Links are also present to make collaborators' Web sites and other relevant internet locations accessible. If general links become obsolete the Webmaster will keep them on the Web site as dead links. If important links become obsolete new links will be set up to make that information accessible.

18e. Does the recordkeeping system document all actions/ transactions that take place in the system re: the digital entities? If so, what are the metadata captured?

No, the Webmaster does not keep a record of specific updates to the Web site. The metadata are unknown.

19. How does the creator maintain its digital entities through technological change?

Early works are not re-performed because the technology is obsolete and the material cannot be reconstructed on newer technologies without substantially changing the work, but pictures of the earlier performances are digitized and posted on the Web site. See above with regards to links.

19a. What preservation strategies and/or methods are implemented and how?

The digital entities created for use in performances are used until the performance is no longer performed or the performing apparatus is no longer working. Each performance generates its own documentation, each of the drawings, photos and videos made are converted to appropriate digital formats when needed, and are then posted to the Web site. The Webmaster converts digital entities from their original form (photographs, audio recordings, etc.) into useable files for the Web site, such as .jpg, .gif or .wav files; he also places these files on CD-ROM for further preservation. Other digital changes in Web site software, such as updates, are done by either the Web host or Webmaster as needed. Works are never 're-staged' and to date no one besides Stelarc has made an effort to mount a discontinued work.

19b. Are these strategies or methods determined by the type of digital entities (in a technical sense) or by other criteria? If the latter, what criteria?

No.

20. To what extent do policies, procedures, and standards currently control records creation, maintenance, preservation and use in the context of the creator's activity? Do these policies, procedures, and standards need to be modified or augmented?

There is a range of policies, procedures and standards in Stelarc's work: some are determined by scientific concerns and others by artistic. Scientific procedures control the production of the technologies and machines, which in turn generate much of the artistic content. The artist, on the other hand, creates his own policies, procedures and standards to maintain the integrity of the work.

21. What legal, moral (e.g., control over artistic expression) or ethical obligations, concerns or issues exist regarding the creation, maintenance, preservation and use of the records in the context of the creator's activity?

There are many ethical and moral considerations involved in the content of Stelarc's work. How the body is presented seriously challenges current conventions and accepted practices in many disciplines. The project for creating *Extra Ear* for example has been on hold for a number of years.[25] The artist claims that his offer was refused by several organizations because of practical medical, moral and ethical considerations. A team of researchers in Australia is now developing it.

22. What descriptive or other metadata schema or standards are currently being used in the creation, maintenance, use and preservation of the recordkeeping system or environment being studied?

Unknown.

[25] See http://m3.uv.es/HypLit/1Autores/1www.stelarc.va.com.au/EXTRA%20EAR and http://www.tca.uwa.edu.au/extra/extra_ear.html.

23. What is the source of these descriptive or other metadata schema or standards (institutional convention, professional body, international standard, individual practice, etc.?)

More than likely individual practice by Stelarc and his Webmaster.

E. Narrative Answers to Applicable Domain and Cross-domain Research Questions

Domain 1. Question 1.7: *How do record creators traditionally determine the retention of their records and implement this determination in the context of each activity? How do record retention decisions and practices differ for individual and institutional creators? How has the use of digital technology affected their decisions and practices?*

Stelarc makes such determinations according to convenience and publicity (e.g., whatever can be posted to the artist's Web site, and whichever results are effective and relevant to ongoing projects, largely determines what is kept). The institutions collaborating with Stelarc are more bound by legal, procedural and accountability requirements. Stelarc is only bound by his business needs. The selection of the posted records is largely technology driven.

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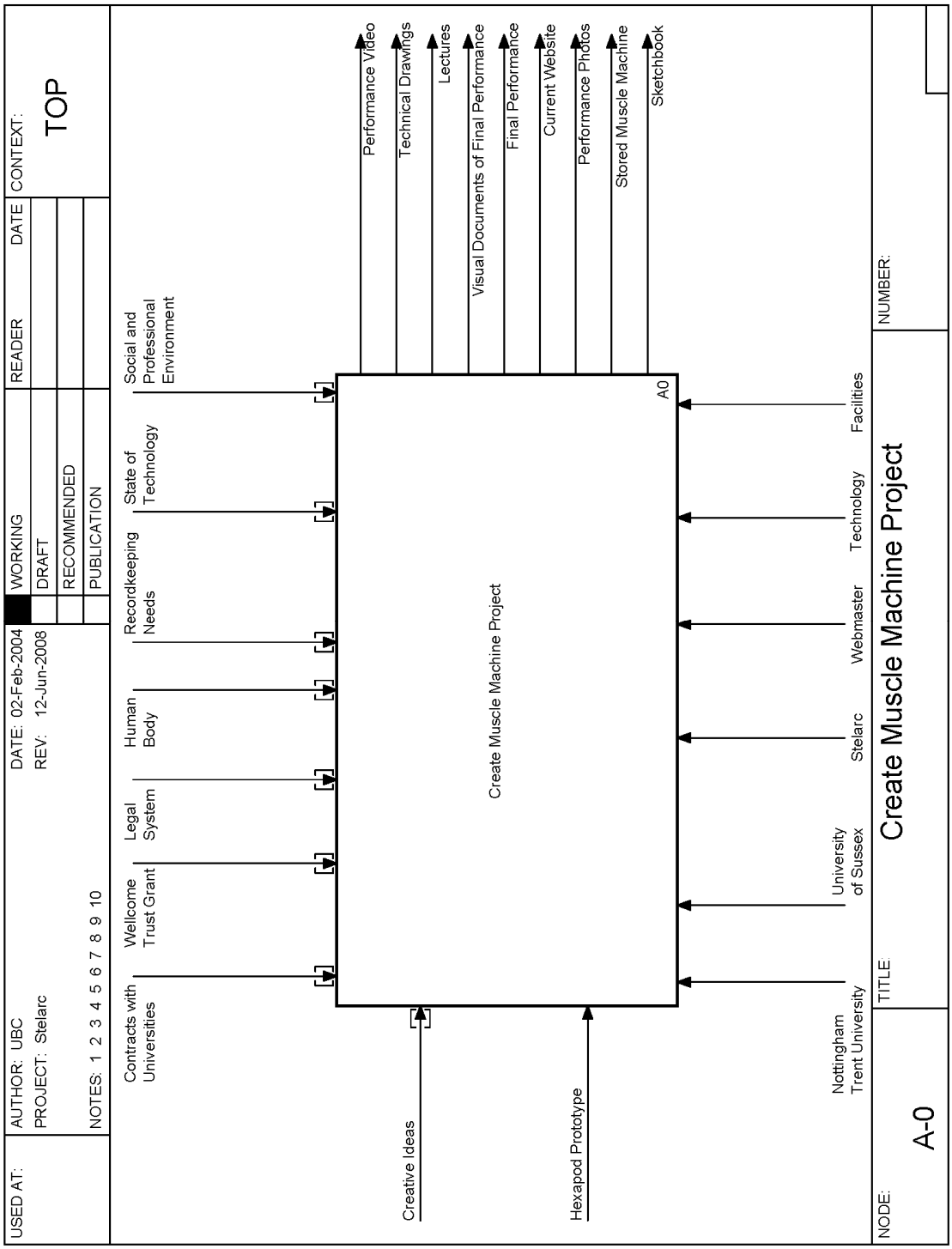
G. Glossary of Terms

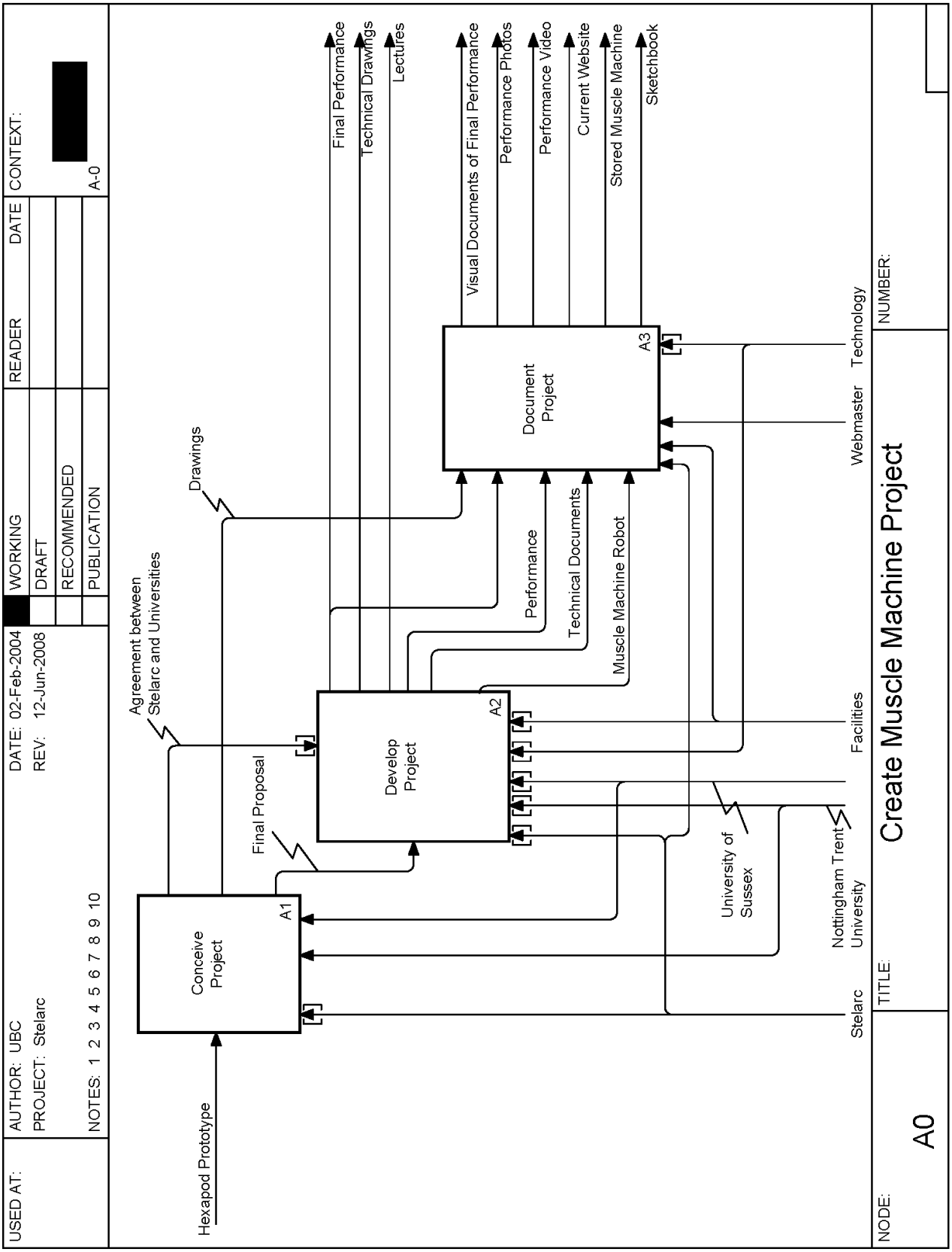
Performance Art: A visual art work that involves the human body, typically interacting with technology, in a performance context. Developed out of the Dadaist movement of 1916 and carried over into the Avant-Garde.

Digital Art: Art that manifests itself in digital form.

H: Case Study Modeling

IDEF0 Activity Model

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REV: 12-Jun-2008
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PUBLICATION
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DATE
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NUMBER:
Hexapod Prototype
Conceive Project
A1
Final Proposal
Develop Project
A2
Agreement between Stelarc and Universities
Drawings
Document Project
A3
Final Performance
Technical Drawings
Lectures
Visual Documents of Final Performance
Performance Photos
Performance Video
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Sketchbook
Performance
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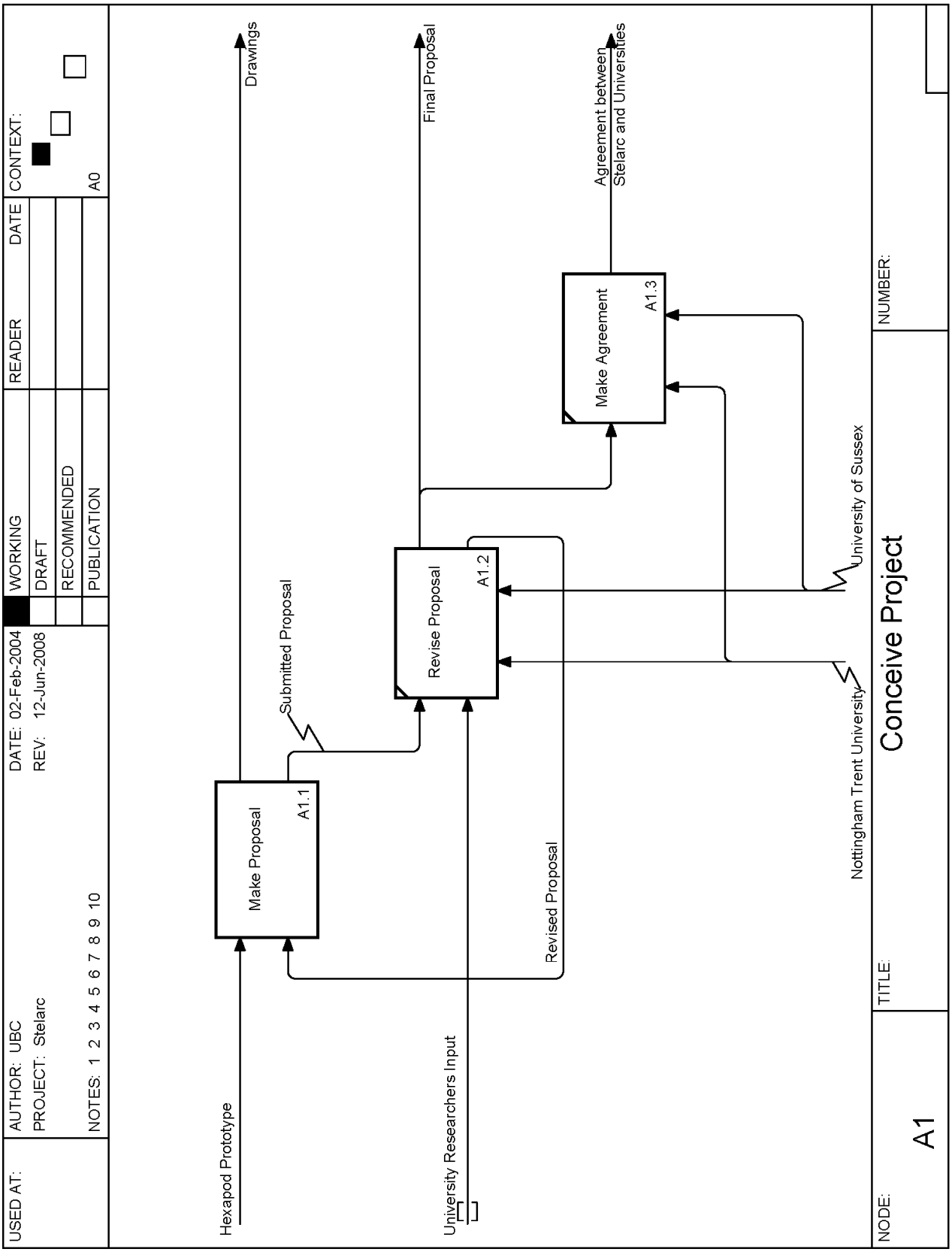
Muscle Machine Robot
Stelarc
Nottingham Trent University
University of Sussex
Facilities
Webmaster
Technology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PROJECT: Stelarc
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REV: 12-Jun-2008
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CONTEXT:
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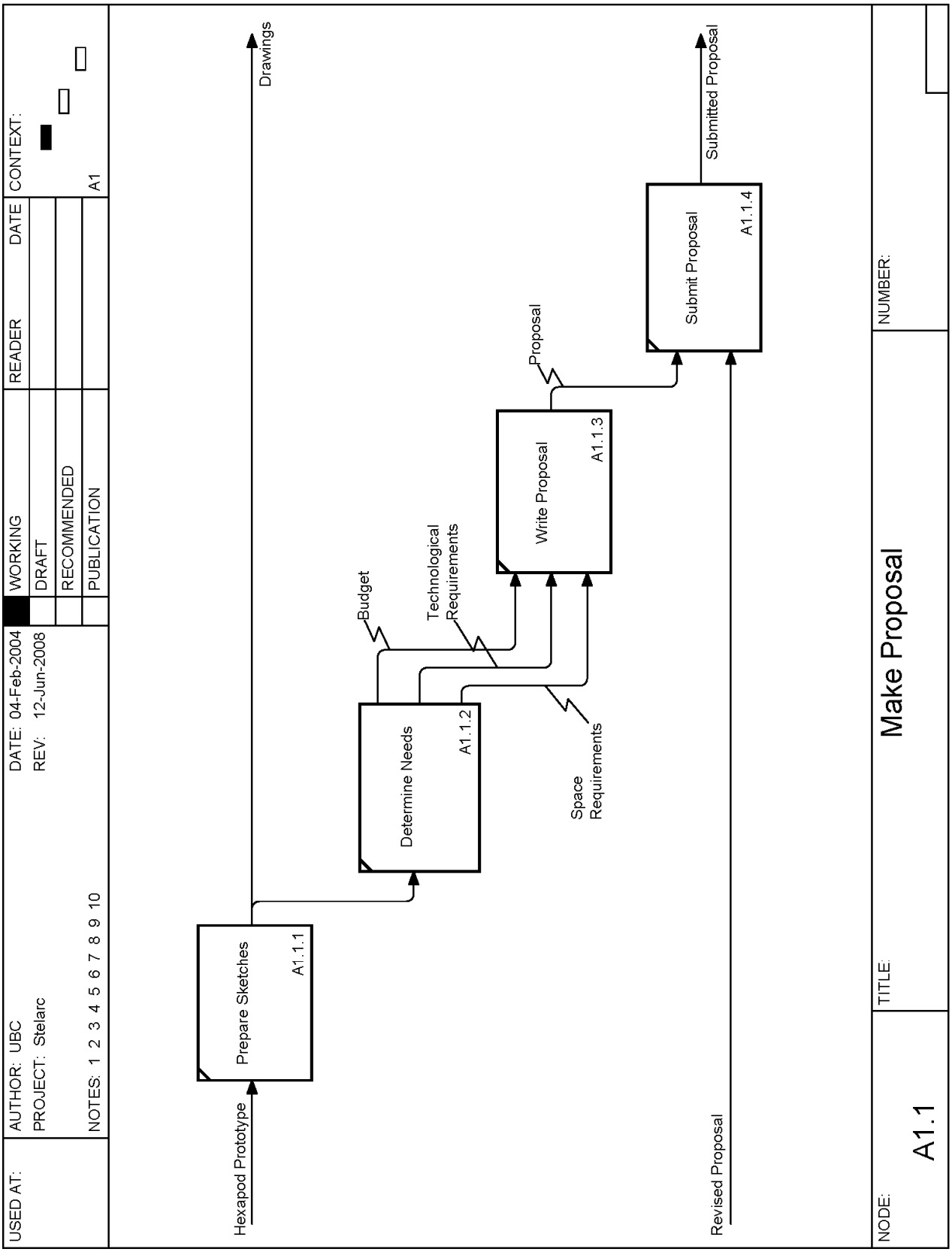
Drawings
Final Proposal
Agreement between Stelarc and Universities
Submitted Proposal
Revised Proposal
Hexapod Prototype
University Researchers Input
Make Proposal
A1.1
Revise Proposal
A1.2
Make Agreement
A1.3
University of Sussex
Nottingham Trent University
NODE:
A1
TITLE:
Conceive Project
NUMBER: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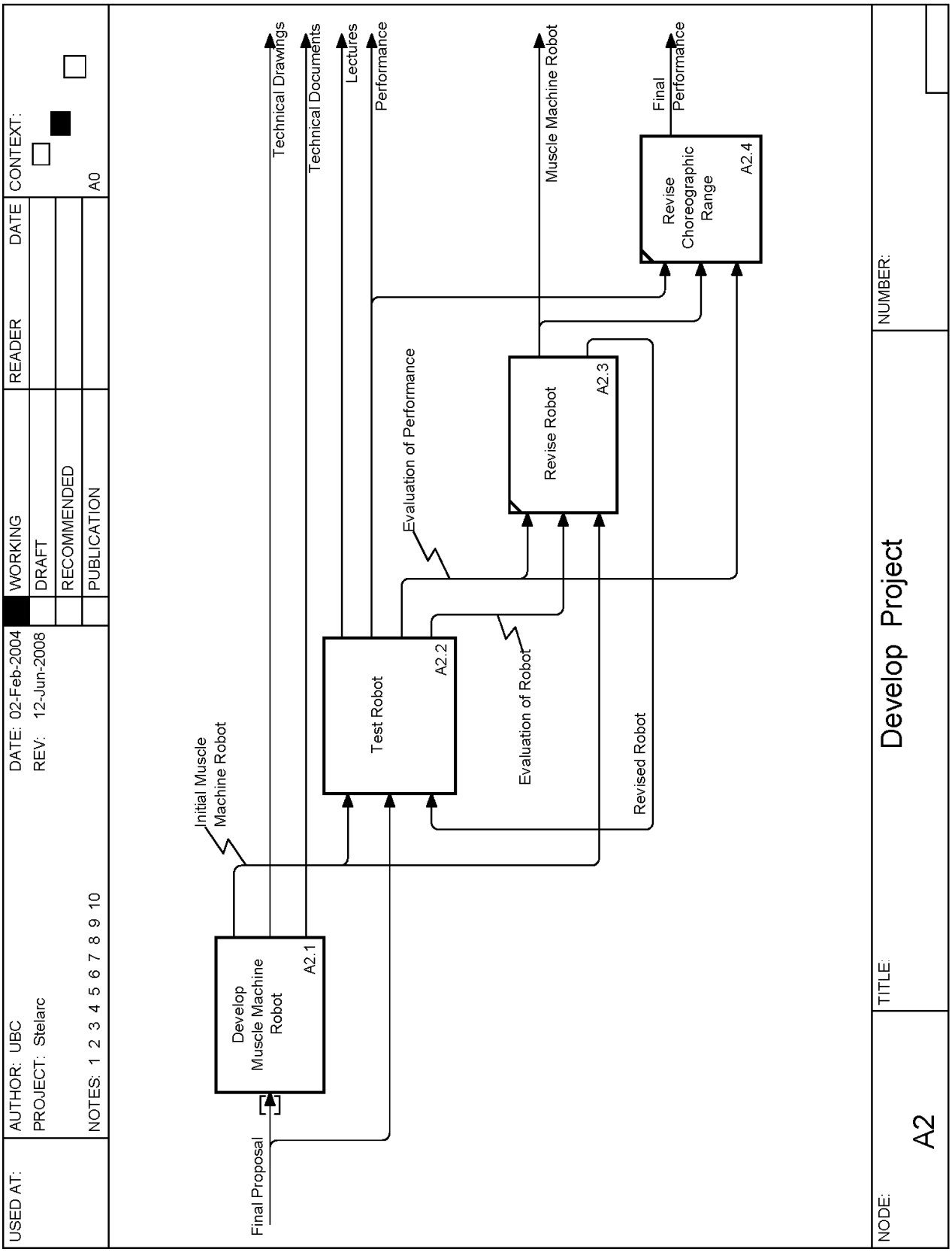
AUTHOR: UBC
PROJECT: Stelarc
DATE: 04-Feb-2004
REV: 12-Jun-2008
NOTES: 1 2 3 4 5 6 7 8 9 10
WORKING
DRAFT
RECOMMENDED
PUBLICATION
READER
DATE
CONTEXT:
A1
Hexapod Prototype
Prepare Sketches
A1.1.1
Drawings
Determine Needs
A1.1.2
Budget
Technological Requirements
Space Requirements
Write Proposal
A1.1.3
Proposal
Submit Proposal
A1.1.4
Submitted Proposal
Revised Proposal
NODE:
A1.1
TITLE:
Make Proposal
NUMBER: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PROJECT: Stelarc
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REV: 12-Jun-2008
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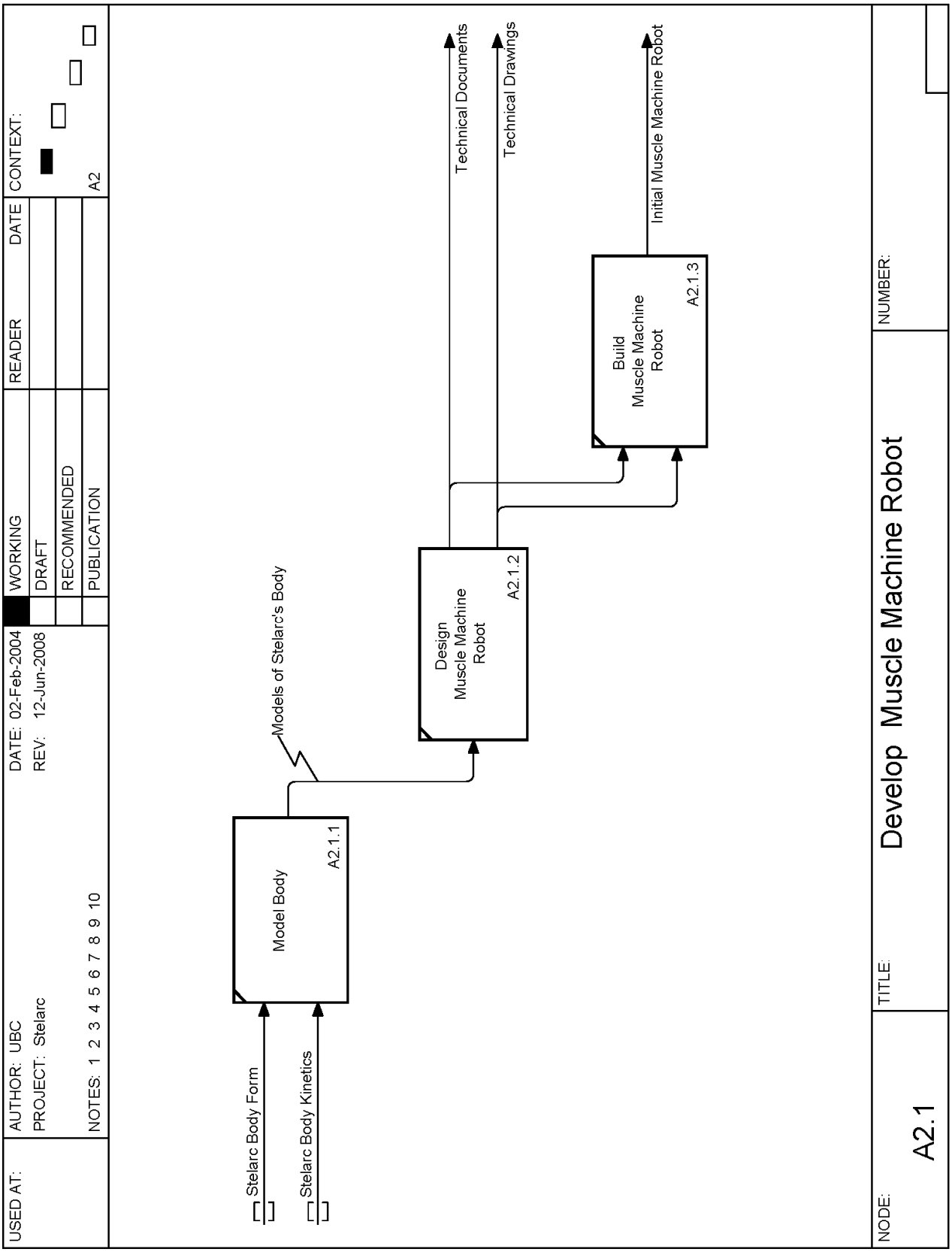
DRAFT
RECOMMENDED
PUBLICATION
READER
DATE
CONTEXT:
A0
Technical Drawings
Technical Documents
Lectures
Performance
Muscle Machine Robot
Final Performance
Evaluation of Performance
Initial Muscle Machine Robot
Develop Muscle Machine Robot
A2.1
Test Robot
A2.2
Revise Robot
A2.3
Revise Choreographic Range
A2.4
Evaluation of Robot
Revised Robot
Final Proposal
NODE:
A2
TITLE:
Develop Project
NUMBER: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PROJECT: Stelarc
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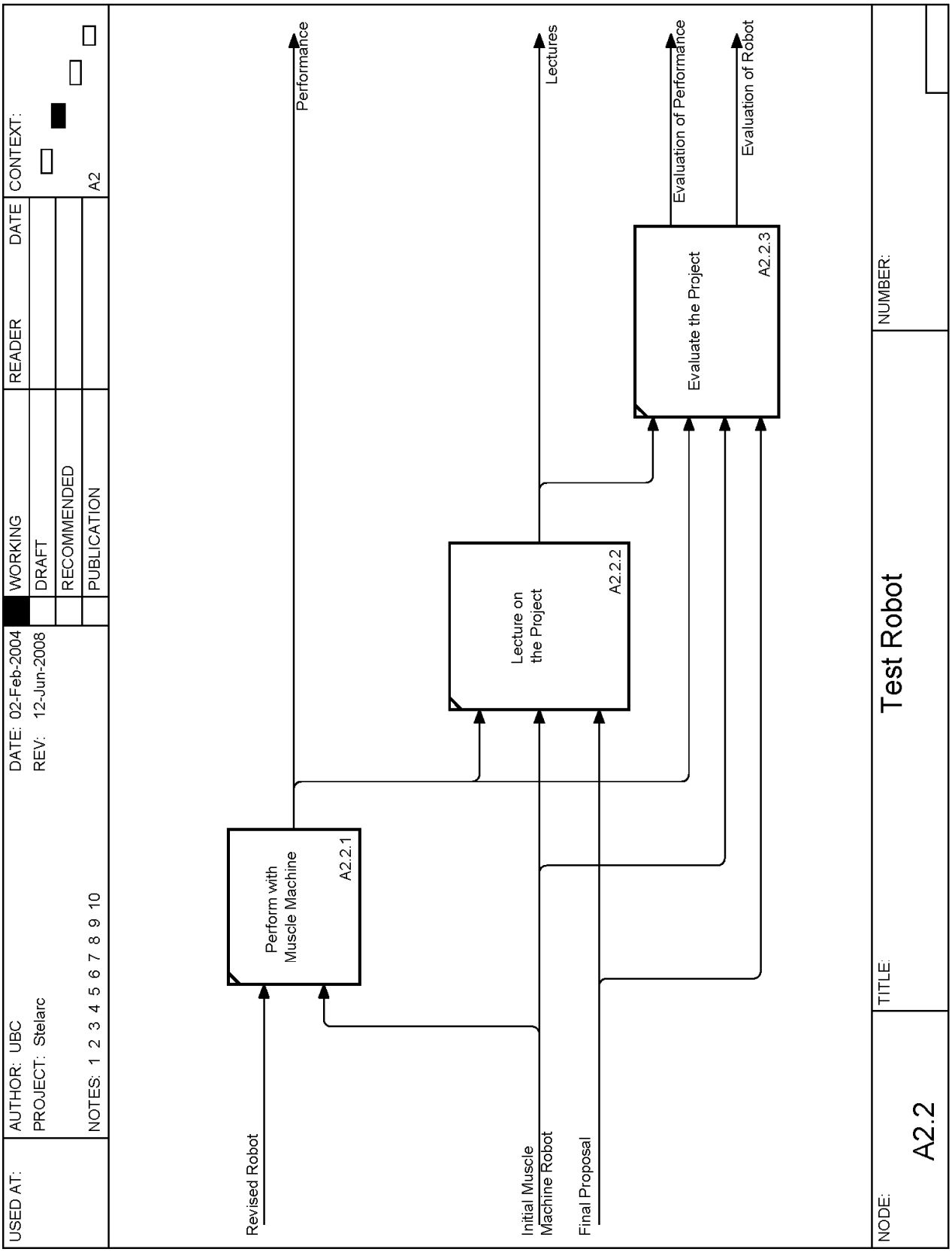
REV: 12-Jun-2008
NOTES: 1 2 3 4 5 6 7 8 9 10
WORKING
DRAFT
RECOMMENDED
PUBLICATION
READER
DATE
CONTEXT:
A2
NODE:
A2.1
TITLE:
Develop Muscle Machine Robot
NUMBER:
Stelarc Body Form
Stelarc Body Kinetics
Model Body
A2.1.1
Models of Stelarc's Body
Design Muscle Machine Robot
A2.1.2
Technical Documents
Technical Drawings
Build Muscle Machine Robot
A2.1.3
Initial Muscle Machine Robot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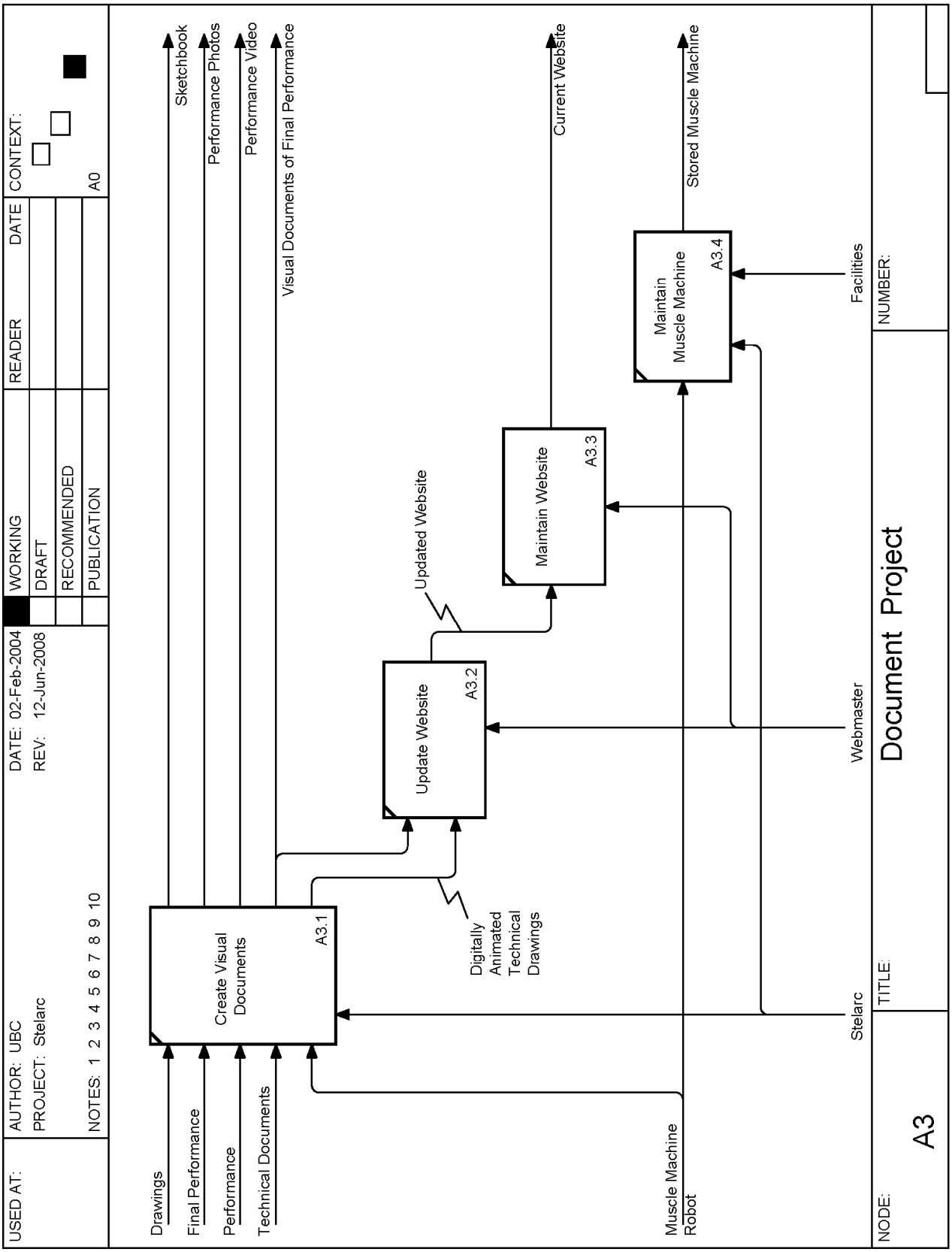
PROJECT: Stelarc
DATE: 02-Feb-2004
REV: 12-Jun-2008
NOTES: 1 2 3 4 5 6 7 8 9 10
WORKING
DRAFT
RECOMMENDED
PUBLICATION
READER
DATE
CONTEXT:
A2
Revised Robot
Perform with Muscle Machine
A2.2.1
Performance
Initial Muscle Machine Robot
Lecture on the Project
A2.2.2
Lectures
Final Proposal
Evaluate the Project
A2.2.3
Evaluation of Performance
Evaluation of Robot
NODE:
A2.2
TITLE:
Test Robot
NUMBER: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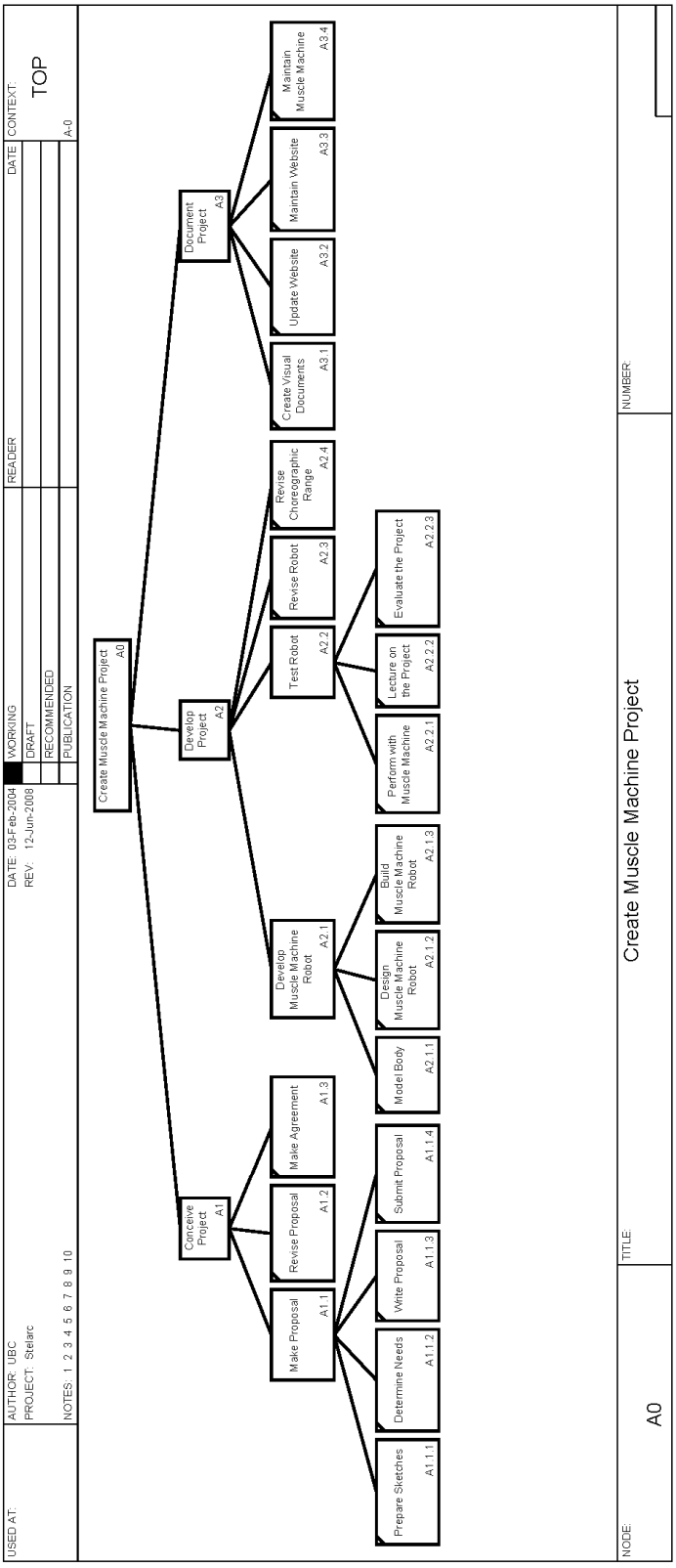
NOTES: 1 2 3 4 5 6 7 8 9 10
WORKING
DRAFT
RECOMMENDED
PUBLICATION
READER
DATE
CONTEXT:
A0
Drawings
Final Performance
Performance
Technical Documents
Muscle Machine
Robot
Create Visual Documents
A3.1
Update Website
A3.2
Maintain Website
A3.3
Maintain Muscle Machine
A3.4
Digitally Animated Technical Drawings
Updated Website
Sketchbook
Performance Photos
Performance Video
Visual Documents of Final Performance
Current Website
Stored Muscle Machine
Facilities
Webmaster
Stelarc
NODE:
A3
TITLE:
Document Project
NUMBER: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PROJECT: Stelarc
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DATE: 03-Feb-2004
REV: 12-Jun-2008
WORKING
DRAFT
RECOMMENDED
PUBLICATION
READER
DATE
CONTEXT:
TOP
A-0
Create Muscle Machine Project A0
Conceive Project A1
Develop Project A2
Document Project A3
Make Proposal A1.1
Revise Proposal A1.2
Make Agreement A1.3
Determine Needs A1.1.2
Write Proposal A1.1.3
Submit Proposal A1.1.4
Prepare Sketches A1.1.1
Develop Muscle Machine Robot A2.1
Test Robot A2.2
Revise Robot A2.3
Revise Choreographic Range A2.4
Model Body A2.1.1
Design Muscle Machine Robot A2.1.2
Build Muscle Machine Robot A2.1.3
Perform with Muscle Machine A2.2.1
Lecture on the Project A2.2.2
Evaluate the Project A2.2.3
Create Visual Documents A3.1
Update Website A3.2
Maintain Website A3.3
Maintain Muscle Machine A3.4
NODE:
A0
TITLE:
Create Muscle Machine Project
NUMBER:

Case Study 02 – Performance Artist Stelarc IDEF0 Model: Activity Definitions			
Activity Name	**Activity No.**	**Activity Definition**	**Activity Note**
Create Muscle Machine Project	A0	All the acts involved in fulfilling the commission.	Conceiving, testing, organising, notating, programming, consulting,
Conceive Project	A1	Consists of preparing a sketch, submission of proposal to universities, revising the proposal, and making an agreement with the university.	private individuals cannot receive grants. However, universities apply for the grant and receive it. With part of the grant, universities pay a salary to Stelarc as a research fellow.
Make Proposal	A1.1	To represent preliminary ideas.	imagine sounds, musical processes, interactions, mood, form,
Prepare Sketches	A1.1.1		
Determine Needs	A1.1.2		
Write Proposal	A1.1.3		
Submit Proposal	A1.1.4	To develop a proposal for the universities detailing the kind of technology that they should build for his performances.	
Revise Proposal	A1.2		
Make Agreement	A1.3		
Develop Project	A2		
Develop Muscle Machine Robot	A2.1		
Model Body	A2.1.1		
Design Muscle Machine Robot	A2.1.2		
Build Muscle Machine Robot	A2.1.3		
Test Robot	A2.2		Is also the final stage of performance.
Perform with Muscle Machine	A2.2.1		
Lecture on the Project	A2.2.2		
Evaluate the Project	A2.2.3		
Revise Robot	A2.3		
Revise Choreographic Range	A2.4		
Document Project	A3		
Create Visual Documents	A3.1		
Update Website	A3.2		

Case Study 02 – Performance Artist Stelarc IDEF0 Model: Activity Definitions			
Activity Name	**Activity No.**	**Activity Definition**	**Activity Note**
Maintain Website	A3.3		
Maintain Muscle Machine	A3.4	To write musical ideas in common musical notation.	

Case Study 02 – Performance Artist Stelarc IDEF0 Model: Arrow Definitions		
Arrow Name	**Arrow Definition**	**Arrow Note**
Agreement between Stelarc and Universities		
Budget		
Contracts with Universities		
Creative Ideas		
Current Website		
Digitally Animated Technical Drawings		
Drawings	Representation of the technology that he would like to use as part of a performance and of the envisioned performance itself.	These drawings would include a narrative description of the functionality of the technology and of its interaction with his own body.
Evaluation of Performance		
Evaluation of Robot		
Facilities		
Final Performance		
Final Proposal		
Hexapod Prototype		
Human Body		
Initial Muscle Machine Robot		
Lectures		
Legal System	Relevant rules and laws.	author copyright, performance rights for both composer and performer, software licensing agreements
Models of Stelarc's Body		
Muscle Machine Robot		
Nottingham Trent University		Includes students and academics
Performance		
Performance Photos		
Performance Video		
Proposal		

Case Study 02 – Performance Artist Stelarc IDEF0 Model: Arrow Definitions		
Arrow Name	**Arrow Definition**	**Arrow Note**
Recordkeeping Needs	The needs of the composer for storing and making accessible the work and entities generated in the course of its creation.	They are related to practical constraints in size and format for maintaining the material and distributing it to interested parties.
Revised Proposal		
Revised Robot		
Sketchbook		
Social and Professional Environment	Environment in which the composer is active.	Constraints on aesthetics choices, form, materials as presented by the specific time and place
Space Requirements		
State of Technology		
Stelarc		
Stelarc Body Form		
Stelarc Body Kinetics		
Stored Muscle Machine		
Submitted Proposal		
Technical Documents		
Technical Drawings		
Technological Requirements		
Technology		
University of Sussex		Includes students and academics
University Researchers Input	The feedback to Stelarc's proposal provided by engineers, cognitive scientists, and other university researchers on what is possible to realise, by which means, and within which restraints.	
Updated Website		
Visual Documents of Final Performance		
Webmaster		
Wellcome Trust Grant		

Data Flow Model

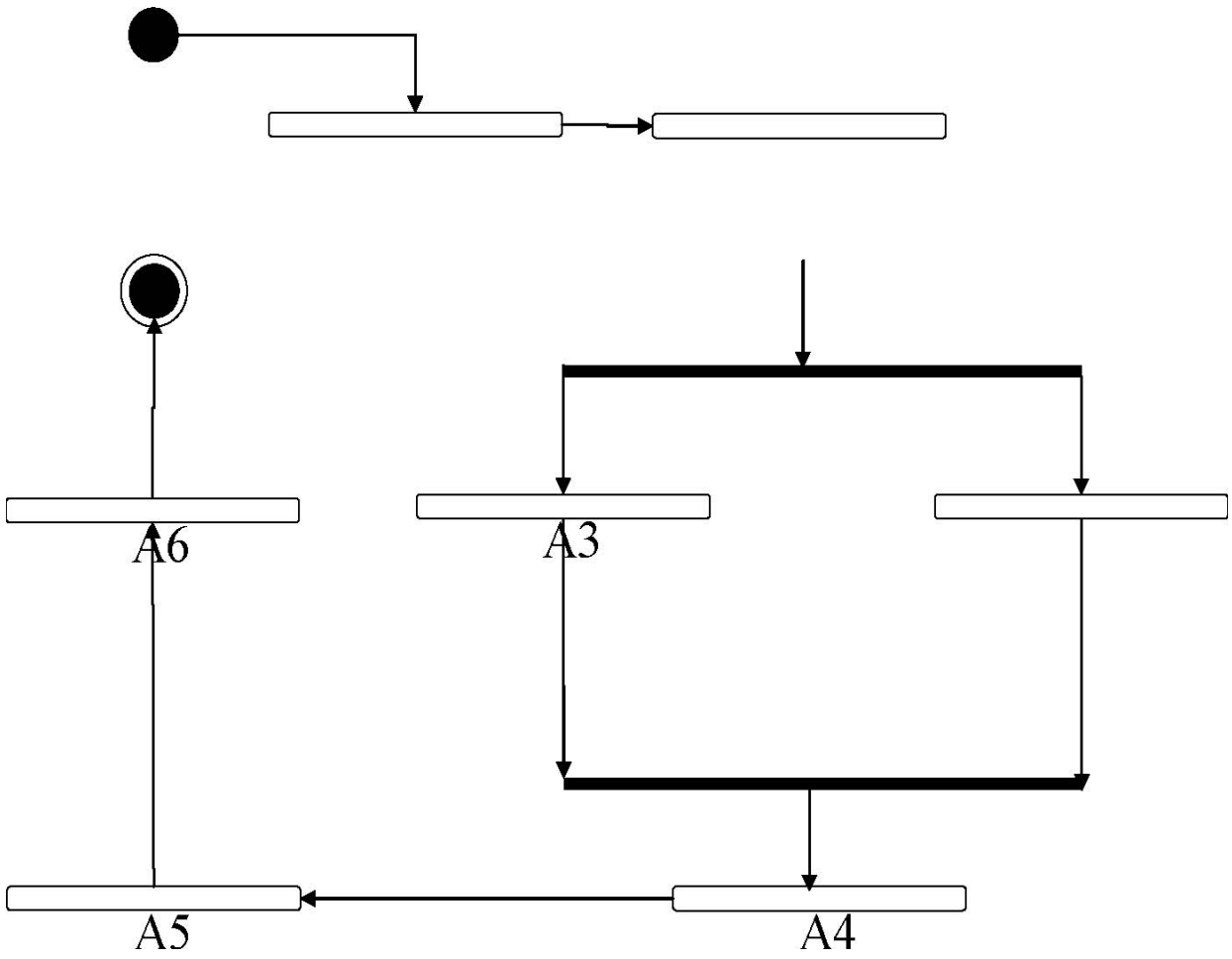
Activities

- A0: Decide to develop Web site
- A1: Decide what material to put on Web site (performance recordings, operation specs, drawings, links to other sites, …)
- A2: Digitize or migrate to digital formats
- A3: Organize & configure Web site (design)
- A4: Compose/Populate Web site
- A5: Host Web site
- A6: Maintain Web site (update, access, …) What part of this is Stelarc's responsibility and what is the Webmaster's responsibility?

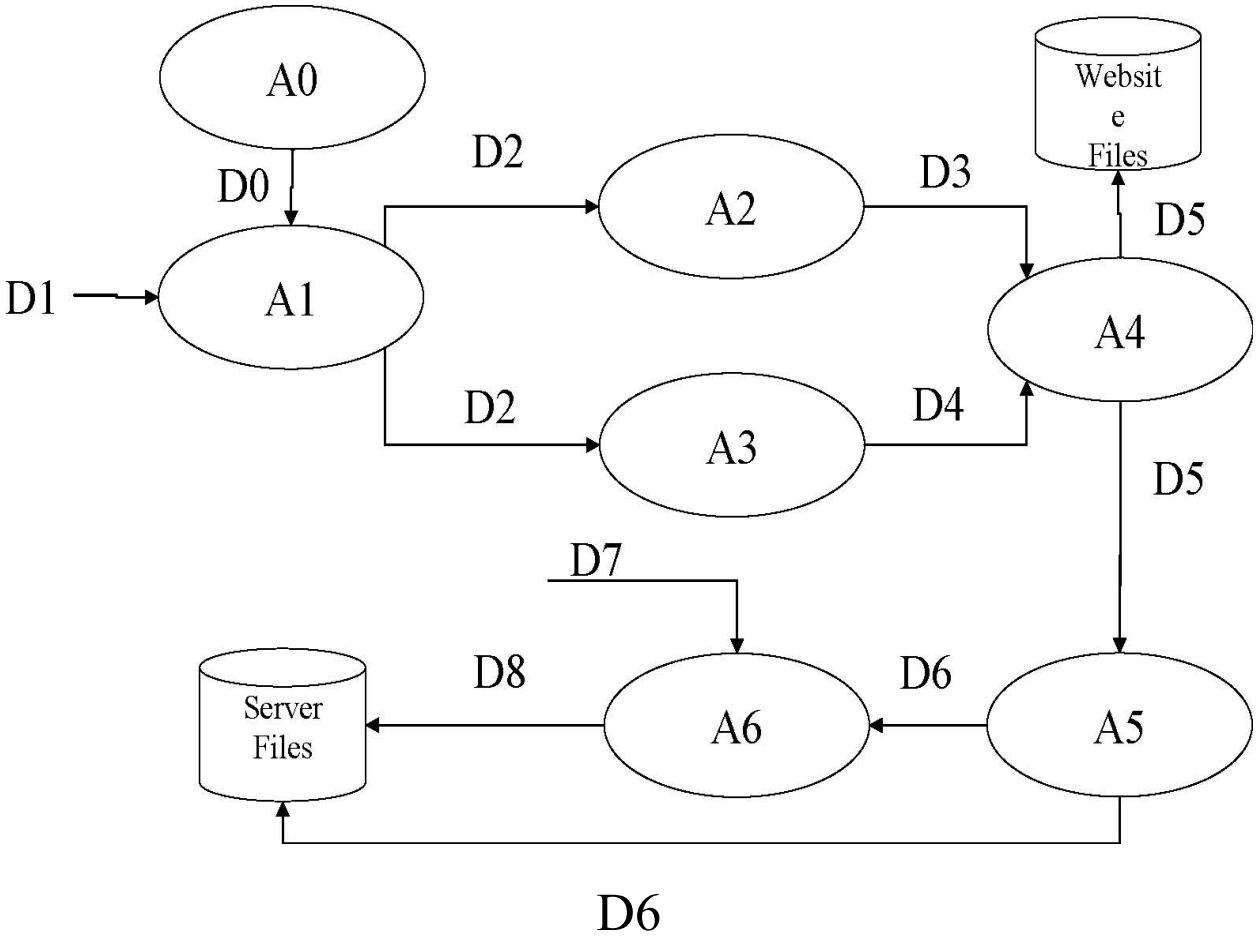
Data Elements

- D0: Decision to develop Web site
- D1: Available content
- D2: Content to "publish" and "preserve"
- D3: Digital content
- D4: Organized content
- D5: Web site files and structures
- D6: Net-accessible content
- D7: New content
- D8: Gives new content to the Webmaster, who makes it net-accessible

Activity Diagram

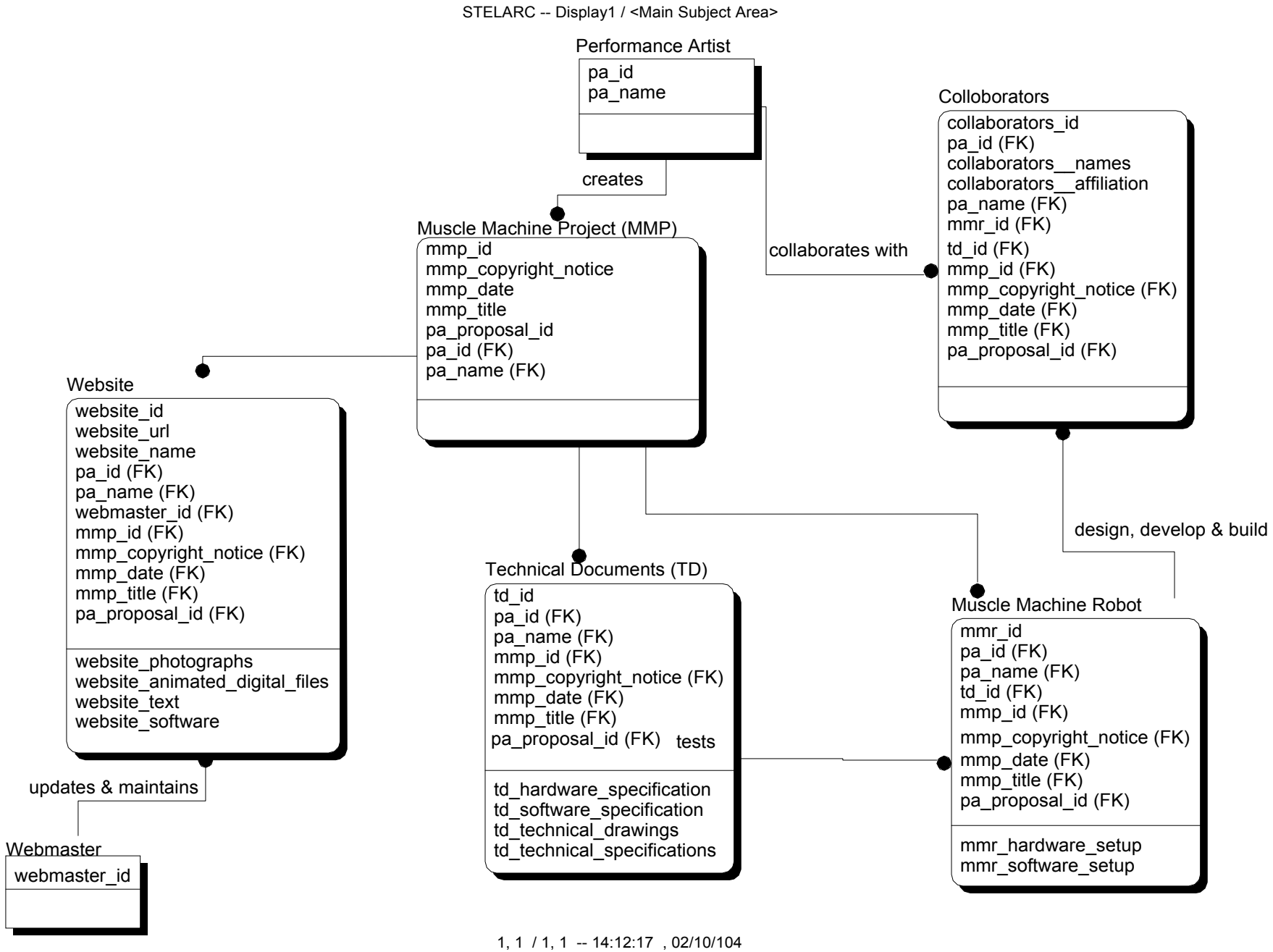


Data Flow Diagram



Entity Relationship Model

See next page.


STELARC -- Display1 / <Main Subject Area>
Performance Artist
pa_id
pa_name
creates
Colloborators
collaborators_id
pa_id (FK)
collaborators__names
collaborators__affiliation
pa_name (FK)
mmr_id (FK)
td_id (FK)
mmp_id (FK)
mmp_copyright_notice (FK)
mmp_date (FK)
mmp_title (FK)
pa_proposal_id (FK)
collaborates with
Muscle Machine Project (MMP)
mmp_id
mmp_copyright_notice
mmp_date
mmp_title
pa_proposal_id
pa_id (FK)
pa_name (FK)
Website
website_id
website_url
website_name
pa_id (FK)
pa_name (FK)
webmaster_id (FK)
mmp_id (FK)
mmp_copyright_notice (FK)
mmp_date (FK)
mmp_title (FK)
pa_proposal_id (FK)
website_photographs
website_animated_digital_files
website_text
website_software
design, develop & build
Technical Documents (TD)
td_id
pa_id (FK)
pa_name (FK)
mmp_id (FK)
mmp_copyright_notice (FK)
mmp_date (FK)
mmp_title (FK)
pa_proposal_id (FK)
tests
td_hardware_specification
td_software_specification
td_technical_drawings
td_technical_specifications
Muscle Machine Robot
mmr_id
pa_id (FK)
pa_name (FK)
td_id (FK)
mmp_id (FK)
mmp_copyright_notice (FK)
mmp_date (FK)
mmp_title (FK)
pa_proposal_id (FK)
mmr_hardware_setup
mmr_software_setup
updates & maintains
Webmaster
webmaster_id
1, 1 / 1, 1 -- 14:12:17 , 02/10/104

Case Study 02 – Performance Artist Stelarc Entity Relationship Model Definitions			
Entity Name	**Attribute Names**	**Attribute Definition**	**Attribute Note**
Collaborators	collaborators_id (PK)	Collaborators identification	Sussex University, Nottingham Trent University, COGS, the Wellcome Trust, etc…
	pa_id (PK) (FK)	Performance artist identification	Stelarc
	collaborators__names (PK)	Names of Collaborators	• PROJECT CO-ORDINATOR: Professor Barry Smith (DRU, TNTU) • ROBOT CONSULTANT: Dr Inman Harvey (COGS, Sussex University) • DEVELOPMENT/PROJECT MANAGER: Dr Philip Breedon (FaCCT, TNTU) • CHOREOGRAPHY: Dr Sophia Lycouris (DRU, TNTU) • SENSOR TECHNOLOGY & SOUND PRODUCER: Stan Wijnans (DRU, TNTU) • PROJECT SUPPORT - PNEUMATIC CIRCUITS AND SYSTEMS: Kerry Truman (FaCCT, TNTU) • COMPUTER AIDED DESIGN: John Grimes (FaCCT, TNTU) • LEG DESIGN: Lee Houston - Final year BSc Product Design Student • MANUFACTURING SUPPORT: Alan Chambers (FaCCT, TNTU) Sussex University, Nottingham Trent University,
	collaborators__affiliation (PK)	Affiliations of collaborators	The Nottingham Trent University and The Evolutionary and Adaptive Systems Group, COGS, The University of Sussex.
	pa_name (PK) (FK)	Performance artist's name	Stelarc
	mmr_id (PK) (FK)	Muscle Machine Robot identification	Muscle Machine Robot
	td_id (PK) (FK)	Technical Documents identification	Technical drawings, engineering documents, etc…
	mmp_id (PK) (FK)	Muscle Machine Project identification	Muscle Machine Project
	mmp_copyright_notice (PK) (FK)	Muscle Machine Project copyright notice	
	mmp_date (PK) (FK)	Muscle Machine Project date	June 26 2003 and July 1, 2003
	mmp_title (PK) (FK)	Muscle Machine Project title	Muscle Machine Project
	pa_proposal_id (PK) (FK)	Performance artist proposal identification	Stelarc proposal for Muscle Machine Project
Muscle Machine	mmp_id (PK)	Muscle Machine Project identification	Muscle Machine Project
	mmp_copyright_notice (PK)	Muscle Machine Project copyright notice	

Case Study 02 – Performance Artist Stelarc Entity Relationship Model Definitions			
Entity Name	**Attribute Names**	**Attribute Definition**	**Attribute Note**
	mmp_date (PK)	Muscle Machine Project date	June 26, 2003, and July 1, 2003
	mmp_title (PK)	Muscle Machine Project title	Muscle Machine Project
	pa_proposal_id (PK)	Performance artist proposal identification	Stelarc proposal for Muscle Machine Project
	pa_id (PK) (FK)	Performance artist's identification	Stelarc
	pa_name (PK) (FK)	Performance artist's name	Stelarc
Muscle	mmr_id (PK)	Muscle Machine Robot identification	Muscle Machine Robot
	pa_id (PK) (FK)	Performance artist's identification	Stelarc
	pa_name (PK) (FK)	Performance artist's name	Stelarc
	td_id (PK) (FK)	Technical Documents identification	Technical drawings, engineering documents, etc…
	mmp_id (PK) (FK)	Muscle Machine Project identification	Muscle Machine Project
	mmp_copyright_notice (PK) (FK)	Muscle Machine Project copyright notice	
	mmp_date (PK) (FK)	Muscle Machine Project date	June 26 2003 and July 1, 2003
	mmp_title (PK) (FK)	Muscle Machine Project title	Muscle Machine Project
	pa_proposal_id (PK) (FK)	Performance artist proposal identification	Stelarc proposal for Muscle Machine Project
	mmr_hardware_setup	Muscle Machine Robot hardware setup	
	mmr_software_setup	Muscle Machine Robot software setup	
Performance	pa_id (PK)	Performance artist's identification	Stelarc
	pa_name (PK)	Performance artist's name	Stelarc
Technical Documents	td_id (PK)	Technical Documents identification	
	pa_id (PK) (FK)	Performance artist's identification	Stelarc
	pa_name (PK) (FK)	Performance artist's name	Stelarc
	mmp_id (PK) (FK)	Muscle Machine Project identification	Muscle Machine Project
	mmp_copyright_notice (PK) (FK)	Muscle Machine Project copyright notice	
	mmp_date (PK) (FK)	Muscle Machine Project date	June 26 2003 and July 1, 2003
	mmp_title (PK) (FK)	Muscle Machine Project title	Muscle Machine Project
	pa_proposal_id (PK) (FK)	Performance artist's proposal identification	Stelarc proposal for Muscle Machine Project
	td_hardware_specification	Technical Documents hardware specification	
	td_software_specification	Technical Documents software specification	

Case Study 02 – Performance Artist Stelarc Entity Relationship Model Definitions			
Entity Name	**Attribute Names**	**Attribute Definition**	**Attribute Note**
	td_technical_drawings	Technical Documents technical drawings	
	td_technical_specifications	Technical Documents technical specifications	
Webmaster	webmaster_id (PK)	Webmaster identification	Gary Zebington
Website	website_id (PK)	Website identification	Stelarc.va.com.au
	website_url (PK)	Website Uniform Resource Locator	http://www.stelarc.va.com.au/musclemachine/index.html
	website_name (PK)	Website name	Stelarc.va.com.au
	pa_id (PK) (FK)	Performance artist identification	Stelarc
	pa_name (PK) (FK)	Performance artist name	Stelarc
	webmaster_id (PK) (FK)	Webmaster identification	Gary Zebington
	mmp_id (PK) (FK)	Muscle Machine Project identification	Muscle Machine Project
	mmp_copyright_notice (PK) (FK)	Muscle Machine Project copyright notice	
	mmp_date (PK) (FK)	Muscle Machine Project date	June 26 2003 and July 1, 2003
	mmp_title (PK) (FK)	Muscle Machine Project title	Muscle Machine Project
	pa_proposal_id (PK) (FK)	Performance artist's proposal identification	Stelarc proposal for Muscle Machine Project
	website_photographs	Website photographs	.gif and .jpg files
	website_animated_digital_files	Website animated digital files	.gif files
	website_text	Website text	Text documents, html
	website_software	Website software	Html, VCe,