



# InterPARES 2 Project

International Research on Permanent Authentic Records in Electronic Systems

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*Waking Dream*

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## A. Overview of Case Study

The focus of the *Waking Dream* case study is a multimedia performance art piece involving dance/movement, soundtrack, and live and pre-recorded video, as well as remote controlled interactions between performers and various digital and analogue technologies. Due to the obsolescence of the program code written for this piece and to the fact that no records of the performance exist in any form, there are currently no means of preserving the authenticity of *Waking Dream* as an intellectual work or of staging an accurate reproduction of it by outside performers/producers.

## B. Statement of Methodology

Gathering the data necessary to answer the twenty-three researchers' questions was done through the following activities: attending one rehearsal and one performance of *Waking Dream*; photographing the important technologies used in the performance; conducting two interviews with Professor Sidney Fels, the primary co-author of the piece; analyzing the contents of the interview transcripts; reviewing the *Waking Dream* Web site; and studying Professor Fels' responses to the questionnaire given to him concerning the creation and maintenance of the digital components of *Waking Dream*.

## C. Description of Context

### Provenancial

*Waking Dream* was created through the collaborative efforts of three people. Professor Fels wrote the program code used in the performance and is responsible for much of the intellectual rationale behind the piece. The pre-recorded video footage and the sound samples used in creating the soundtrack are the work of Baerbel Neubauer. Sachiyo Takahashi used these sound samples to compile the soundtracks for *Waking Dream*, and is also largely responsible for the direction of her movements throughout the performance. In addition, Professor Fels created the *Waking Dream* Web site, which he considers to be conceptually a part of *Waking Dream*. Creative responsibility tends to follow the specific talents of the authors, although each person gives input into all areas of creation.

### Administrative

In co-creating *Waking Dream*, Professor Fels enlisted the assistance of Electrical and Computer Engineering students from the University of British Columbia to write program code and to construct the mechanical inventions that are used in the performance, such as the remote control device and head mounted video camera. Professor Fels' position as an associate professor in the Engineering department gave him access to these students, and although their labour was unpaid and did not earn them college credit, his role as their instructor as well as co-author of *Waking Dream* defined the administrative context of the creation of this piece.

## **Procedural**

Professor Fels wrote the code used in *Waking Dream* and maintains it on his computer. The video footage and original sound samples were captured by Baerbel Neubauer, although they are now maintained by Sachiyo Takahashi. Ms. Takahashi sequenced these samples into the various versions of the soundtrack, and she was also largely responsible for the direction of her movements throughout the performance.

## **Documentary**

Professor Fels keeps performance notebooks that detail lighting and basic choreographic schemas. His computer holds two directories of textual records as well: *Funding* and *Publications*. The funding directory contains detailed explanations of the technical working of the piece, as well as the intellectual rationale and thematic descriptions of *Waking Dream*. These were written as part of the process of applying for grant money and constitute the best explanations of the piece available. His publications directory contains a variety of documents associated with this production, such as the programs of the various performances.

## **Technological**

*Waking Dream* is based on interactions between two human performers, various digital and non-digital technologies, and the audience. During a performance of the piece the audience sits in complete darkness watching the movements of two dancers, as well as a large suspended screen onto which video and still images are projected. There are three video sources used: one contains pre-recorded imagery; another captures the movements of the dancer as she climbs down a flight of stairs and crouches at the bottom; and a third is connected to a head-mounted camera/display which she wears. This headpiece broadcasts footage of the other performer's movements, of stage scenery, and of the audience onto the projection screen and onto a small display affixed to its interior. This allows the dancer, who is moving about in darkness, to "see" where she is going. The dancer is also able to control what the audience sees on the screen by using a remote control device that opens/closes a dowsers (via custom written program code) on the video projector. When closed, the dowsers obscures projected video images, intermittently darkening the screen. A person behind the scene can also manipulate the audience's visual experience by alternating between the various video sources and a still image embedded in a power point file. Infrared lighting is used to enable the capture and transmission of live video images to the projector while also keeping the performers/audience in darkness.

## **D. Narrative Answers to the 23 Core Research Questions**

### **1. What activities of the creator have you investigated?**

We have investigated the activities involved in the production of *Waking Dream*, including the development of the computer programs, the selection and refinement of the technology, the definition of the interaction among images, music, dance, and technology, as well as one rehearsal and one performance of the piece.

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

The digital entities used in *Waking Dream* (code, two video documents, CD soundtrack, and a power point file) are all generated by these activities.

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

- The code written for *Waking Dream* reads a remote control device worn by the performer (see photo), allowing her to remotely douse the shutter on the video projector so that the projection screen is intermittently darkened.
- The PowerPoint file is linked to the two video documents, and this enables a person behind the scenes to switch between them, changing what the audience sees on the screen.
- The audio and video files are components of the performance, part of the direct experience of the audience.

**4a/b. What form do these digital entities take? (e.g., e-mail, CAD, database) What are the formal elements, attributes, and behaviour (if any) of the digital entities? What are the digital components of which they consist and their specifications?**

The digital entities used in *Waking Dream* consist of program code, one video (.avi) file, a CD soundtrack, and a power point file.

The program code was written in a version of Visual Basic Project Manager developed to run on a Windows 98 platform. The code changes with each new projector.

One pre-recorded and edited video footage is viewed alternately with two live video sources. During the performance a person behind the scene uses a computer to switch back and forth between them. The video footage is stored as an AVI file.

There are two types of audio files. The first is the soundtrack; it is a component of the performance and can be modified using ProTools. The second type of audio files contain the original sound samples from which the soundtrack was composed.

The PowerPoint file enables Professor Fels to switch between the two video documents, changing what the audience sees on the screen (i.e., the video document is viewed alternately with live video broadcast as Professor Fels uses his computer to switch back and forth between them.)

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

The technical components of *Waking Dream* are an integral part its intellectual aspects in that they create the environment which the audience experiences and interacts with.

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

The digital entities are uniquely identified with file names and, when changes have been made, with version numbers.

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

The digital entities are kept in three separate directories: a program directory, which manages the program code base; a video directory, containing video footage; a sound directory, holding the original sound samples from which the soundtrack was composed. The code is stored in the laptop of Professor Fels, the computer scientist who developed it, as well as in a backup computer, and in off-site storage. Sachiyo Takahashi, the dancer, also keeps audio and video files on the hard drive of her computer.

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

This organizational system is the same method Professor Fels uses for all the material he generates and reflects the mode in which he works.

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

The program code used for *Waking Dream* was created using Visual Basic software. The video documents were filmed with a video camera, and extracted, edited, and stored on a computer hard drive. The soundtrack was created by sequencing a series of electro-acoustic sound samples into a continuous soundtrack.

**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?**

There is no system in this case study. Digital entities are created on any number of computers, using a variety of software applications.

**6. From what precise processes or procedures, or part thereof, do the digital entities result?**

The digital entities in this piece are the result of collaboration between its three co-authors. They have evolved over time and are occasionally the result of accident (the snowy effect seen in one of the video documents).

**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 4b.

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

Documentary process: See 4b.

Technological process: The digital entities are stored on computer hard drives, which makes retrieval and access of them simply a matter of opening the directories in which they are held, assuming the computer in question contains the necessary application.

Specifically, the program code is stored in Professor Fels' laptop, a backup computer, and in off-site storage. Sachiyo Takahashi keeps audio and video files on the hard drive of her computer. The finished version of the soundtrack is burned onto an audio CD.

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

These processes are not documented.

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

No real measures are taken to ensure the quality, reliability and authenticity of the digital entities because they tend to be changed with each performance.

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

No, Professor Fels worries that they may be altered by future producers of *Waking Dream* to an extent that they will no longer be recognizable as his and his co-authors' intellectual property.

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

The video, music, and PowerPoint files are played simultaneously to create a multi-sensory experience in the performance of *Waking Dream*.

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

Changes to the digital entities are made with application software. See 4b.

**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?**

External users have access to the *Waking Dream* Web site but cannot make changes to it. Florian Vogt, performer and technical assistant, has access to the program and Power Point files on Fels' computer, although he does not have copies of his own. Professor Fels' students have access to all of his computer directories, but such access is "read only."

**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?**

Although responsibilities have tended to be collaborative, the creators have divided themselves according to their various technical skills and areas of interest.

Professor Fels wrote the program code used in *Waking Dream*. The original video footage and original sound samples were captured by Baerbel Neubauer. Sachiyo Takahashi sequenced these sound samples into the various versions of the soundtrack, and she largely determines the direction of her movements throughout the performance.<sup>1</sup>

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

Because the work is a collaborative effort, access rights are shared equally amongst its authors and performers. Theoretically, no restrictions are made, although access is controlled by what copies of files each person has on their own computer. Also, not everybody has copies of all the application software needed to modify each type of file.

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

None of the digital entities used in the performance of *Waking Dream* is considered to be a record, although Professor Fels does maintain two computer directories of textual records concerning funding, rationale, and related publications

**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?**

The digital entities are kept in simple directories and are not entered in any sophisticated recordkeeping system.

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

Not applicable.

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

Not applicable

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<sup>1</sup> The term *choreography* has not been used here because there is no written notation of dance movements. The ideas for where and how Takahashi will move are not formal and rely largely on improvisation or on what has been discussed orally with Sidney Fels.



**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?**

The digital entities are organized to reflect the creation process. They are kept in three separate directories: a program directory, which manages the program code base; a video directory, containing video footage; a sound directory, holding the original sound samples from which the soundtrack is composed.

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

Not applicable.

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

No metadata are consciously captured.

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

Professor Fels maintains his program code by recoding it when necessary. (This has become problematic, however, with the obsolescence of Windows 98).

The audio and video aspects of the piece have not needed to be changed yet, but will eventually be transcoded, or changed from one format to another.

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

Very little is being done currently in terms of preservation strategy. The digital aspects of *Waking Dream* are simply preserved with backup copies. An idea of what a performance looks and sounds like is captured in video footage of each performance. However, as much of the performance takes place in infra-red light, and some parts occur in the dark among the audience, no video can capture the entire performance.

**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?**

At present no policies or procedures are in place to control creation, maintenance, preservation, or use of these digital entities.

**Do these policies, procedures, and standards need to be modified or augmented?**

Not applicable.

**21. What legal, moral, 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?**

An ethical issue has arisen between Professor Fels and Sachiyo Takahashi concerning artistic expression and the nature of *Waking Dream*, which could have an effect on later productions of the piece. Fels believes it to be a straightforward theatrical performance that can be staged by any director/cast while still retaining its identity. Takahashi views *Waking Dream* as a performance art piece defined by her role as performer. This view precludes performances of the piece without her involvement. It could also have implications for copyright and intellectual property rights.

**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?**

No descriptive or metadata standards are currently being used. There is no recordkeeping system being used.

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

Not applicable.

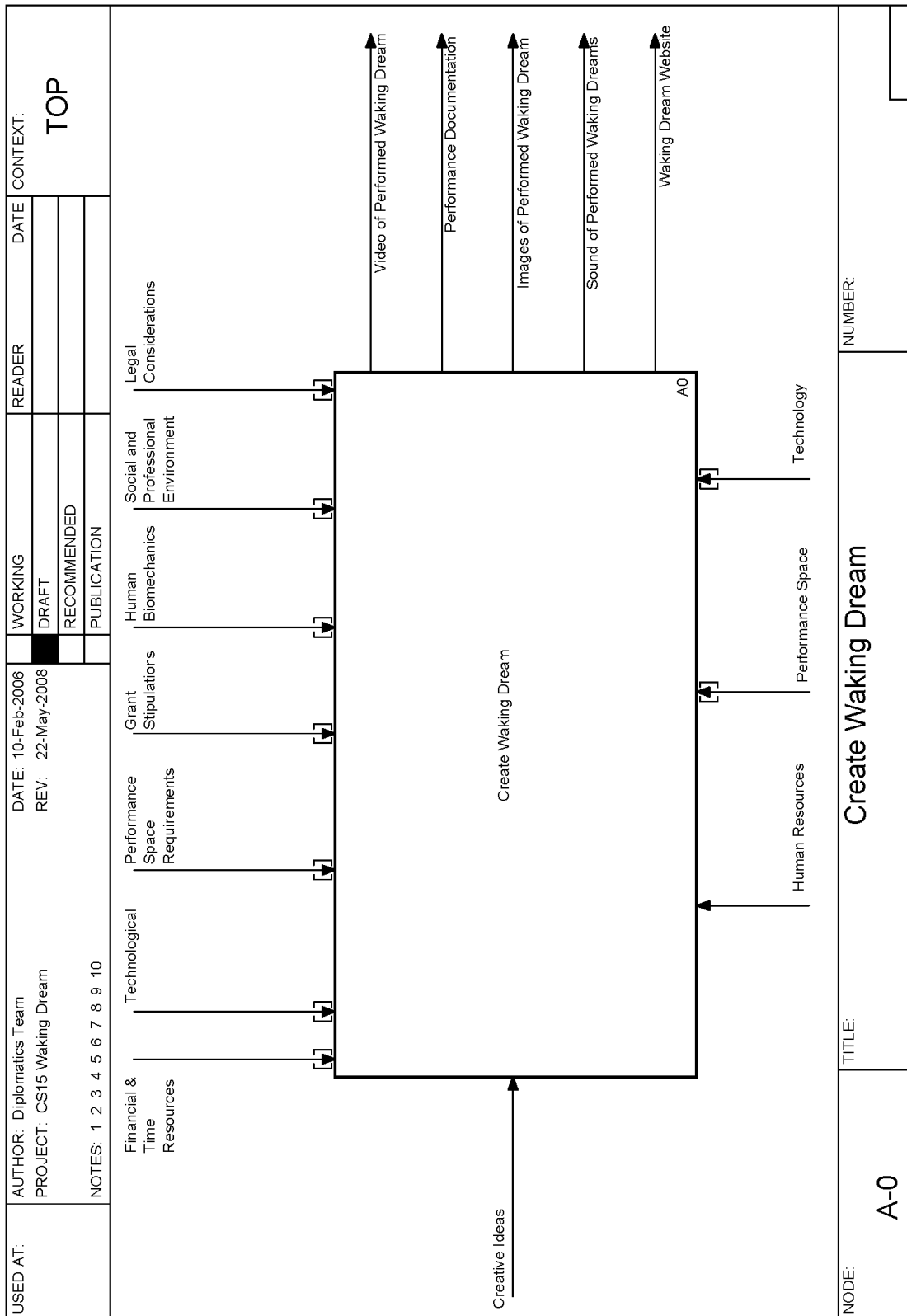
## E. Glossary of Terms

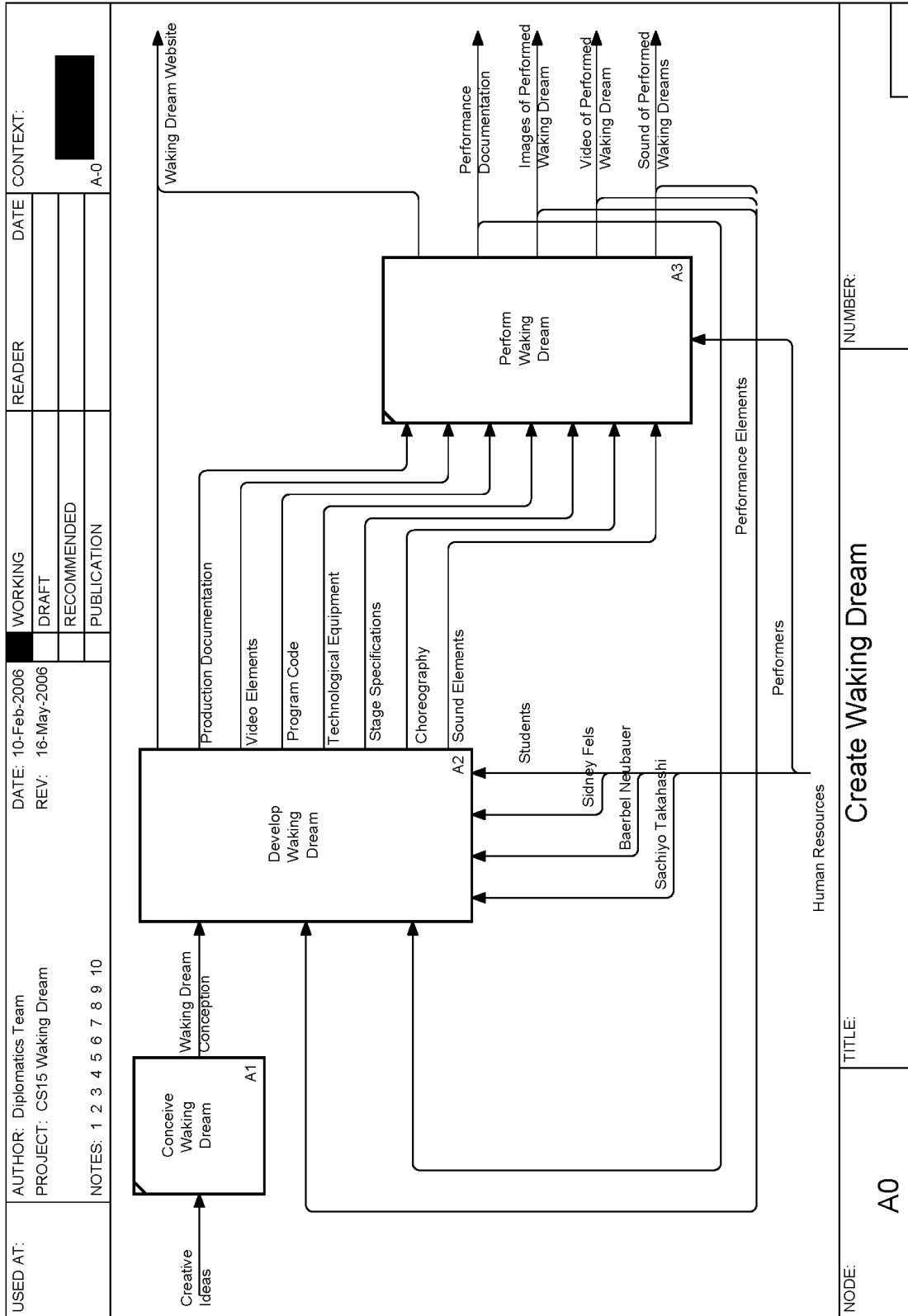
- author** Person(s) competent to create and revise *Waking Dream*.
- avi** Audio Video Interleave (avi) is a format developed by Microsoft Corporation for storing video and audio information. It is considered a *de facto* standard in the industry. AVI files are limited to 320 x 240 resolution, and 30 frames per second. AVI does not require any special hardware, making it the lowest common denominator for multimedia applications, able to reach the largest base of users. AVI uses lossy compression algorithm; it has no user-defined metadata fields, but property sheets are included. Microsoft has dropped support for AVI and focused its resources on the newer Windows Media format. As a result, continued development of the AVI format should cease.<sup>2</sup>
- creator** Here synonymous with *author*.
- dowse** To momentarily extinguish projected video footage by closing a shutter over the end of the projector's lens.
- dowser** A homemade shutter mechanism on the end of the video projector's lens. It is opened and closed by remote controlled devices worn on the body of one of the performers. Closing the dowser leaves the audience in complete darkness until it is reopened.
- entity** A set of real or abstract things having common attributes or characteristics, a unique name with always the same meaning, and any number of relationships with other entities.
- sample** A digital recording of a sound that can be shortened or looped and manipulated in a variety of ways (pitch-shifting, speeding up, slowing down, adding reverberation, compressing, etc.).

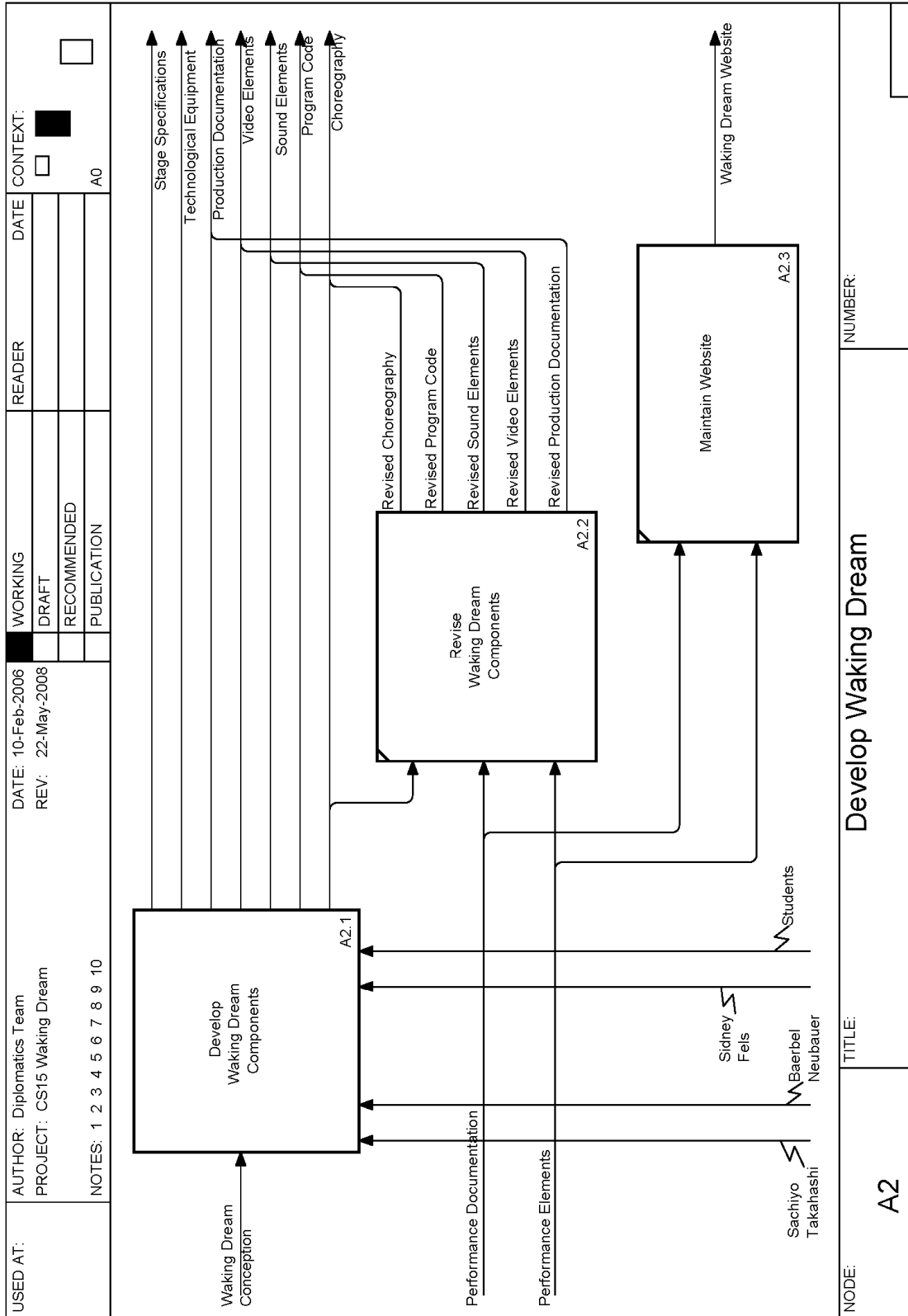
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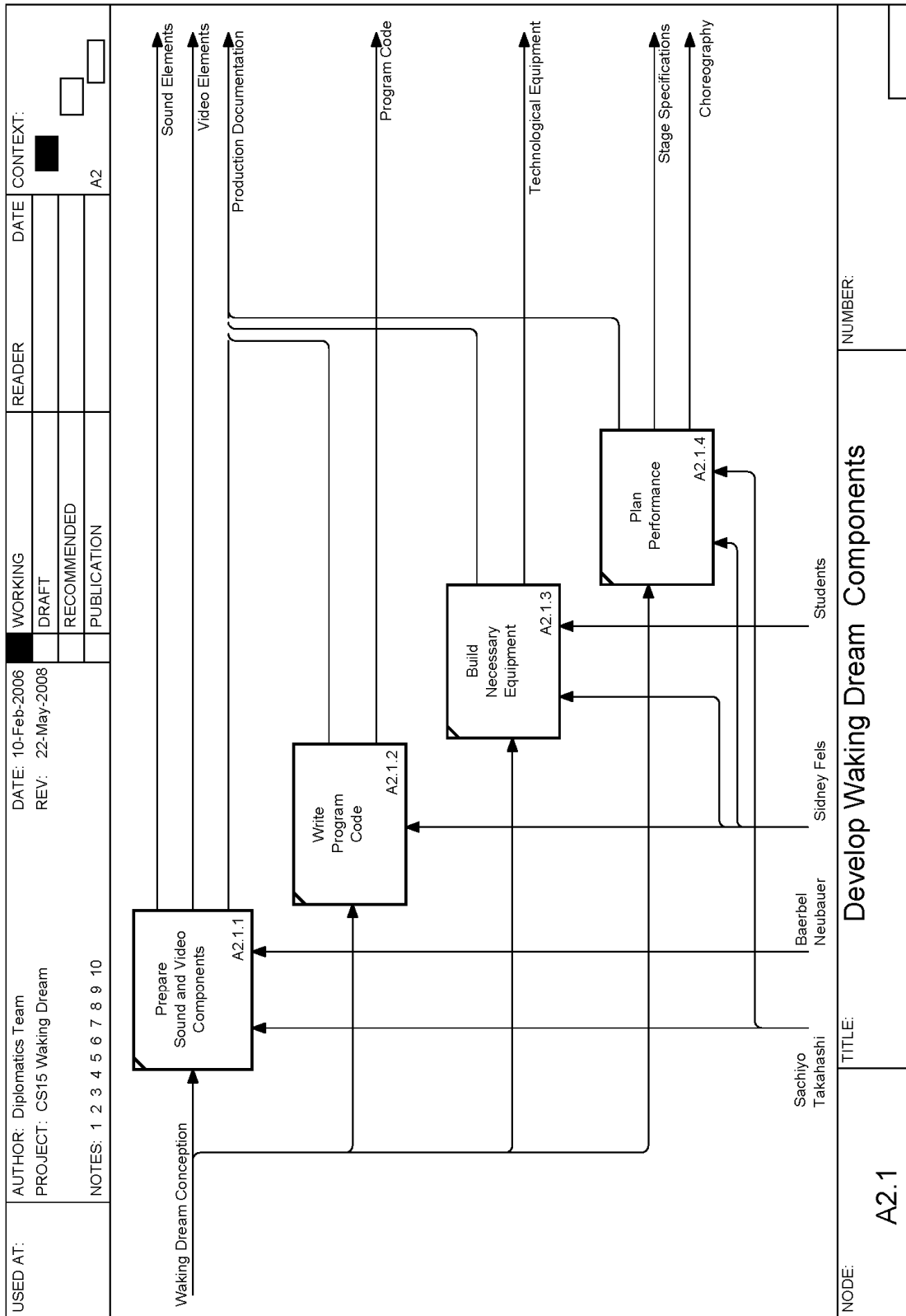
<sup>2</sup> From an internal NA report.

### F. IDEF0 Activity Model









NODE:	TITLE:	NUMBER:
A2.1	Develop Waking Dream Components	[ ]

USED AT: AUTHOR: Diplomatics Team PROJECT: CS15 Waking Dream NOTES: 1 2 3 4 5 6 7 8 9 10	DATE: 15-May-2006 REV: 22-May-2008	WORKING DRAFT RECOMMENDED PUBLICATION	READER:	DATE:	CONTEXT: TOP A-0
<pre>                 graph TD                     A0[Create Waking Dream A0] --&gt; A1[Conceive Waking Dream A1]                     A0 --&gt; A2[Develop Waking Dream A2]                     A0 --&gt; A3[Perform Waking Dream A3]                     A2 --&gt; A21[Develop Waking Dream Components A2.1]                     A2 --&gt; A22[Revise Waking Dream Components A2.2]                     A2 --&gt; A23[Maintain Website A2.3]                     A21 --&gt; A211[Prepare Sound and Video Components A2.1.1]                     A21 --&gt; A212[Write Program Code A2.1.2]                     A21 --&gt; A213[Build Necessary Equipment A2.1.3]                     A21 --&gt; A214[Plan Performance A2.1.4]                 </pre>					
NODE:	A0	TITLE:	Create Waking Dream	NUMBER:	[ ]



<b>Case Study 15: <i>Waking Dream</i> IDEF0 Model: Activity Definitions</b>			
<b>Activity Name</b>	<b>Activity No.</b>	<b>Activity Definition</b>	<b>Activity Note</b>
Create Waking Dream	A0	To conceive, develop and perform Waking Dream.	
Conceive Waking Dream	A1	To form initial creative ideas as to the intellectual, physical, mechanical, and aesthetic aspects of Waking Dream.	
Develop Waking Dream	A2	To develop and revise Waking Dream components and maintain website.	
Develop Waking Dream Components	A2.1	To prepare sound and video components, to write program code, to build necessary equipment, and to plan performance.	
Prepare Sound and Video Components	A2.1.1	To capture and edit sound samples and video footage.	
Write Program Code	A2.1.2	To write program code to allow performer and technical director to control video source and projector dower.	
Build Necessary Equipment	A2.1.3	To build remote control devices, head mounted video camera, and video projector dower.	
Plan Performance	A2.1.4	To plan performance, develop ideas as to where and how performers will move about the stage or interact with the audience, and determine stage requirements.	
Revise Waking Dream Components	A2.2	To revise components as necessary.	Examples include, rewrite portions of the program code, repairs or changes to the technological equipment, remix sound samples, and make changes to performers' movements as necessary.
Maintain Website	A2.3	To maintain and update the content of the website after each performance, adding new images and information as available.	
Perform Waking Dream	A3	The actual performance in front of a live audience.	

<b>Case Study 15: <i>Waking Dream</i> IDEF0 Model: Arrow Definitions</b>		
<b>Arrow Name</b>	<b>Arrow Definition</b>	<b>Arrow Note</b>
Baerbel Neubauer	The individual who chose and captured the original sound samples and video footage.	
Choreography	The planned movements of the performers in <i>Waking Dream</i> .	
Creative Ideas	The conceptions and plans for the intellectual, physical, mechanical, and aesthetic content.	
Financial & Time Resources	The time and money that the authors have available.	
Grant Stipulations	Conditions set forth in the grants received.	
Human Biomechanics	Limitations on physical movement imposed by the equipment used in performance.	
Human Resources	Authors, students and performers involved in the creation of <i>Waking Dream</i> .	
Images of Performed <i>Waking Dream</i>	Images taken during the performance of <i>Waking Dream</i> .	
Legal Considerations	Relevant rules and laws.	Such as copyright, intellectual property, and software licensing agreements.
Performance Documentation		
Performance Elements	Video, Sound, images from actual performance (Jean-Pascal)	
Performance Space	The specific venue requirements for <i>Waking Dream</i> .	
Performance Space Requirements	The physical constraints and stage requirements such as size, shape, infrared lighting, and existence of a downstairs area and room for suspension of a projection screen.	
Performers		
Production Documentation	Documentation pertaining to the performance of <i>Waking Dream</i> .	This includes the performance and notes.
Program Code	The program code that controls the dowsers and allows Fels and Takahashi to switch between video feeds during the performance.	
Revised Choreography	Choreography revised when necessary.	
Revised Production Documentation		

<b>Case Study 15: <i>Waking Dream</i> IDEF0 Model: Arrow Definitions</b>		
<b>Arrow Name</b>	<b>Arrow Definition</b>	<b>Arrow Note</b>
Revised Program Code	Program code rewritten when new video projector is to be used.	
Revised Sound Elements	Sound samples remixed into new soundtrack version.	
Revised Video Elements		
Sachiyo Takahashi	The individual who sequenced the sound samples into various versions of the soundtrack.	
Sidney Fels	The individual who wrote the program code.	
Social and Professional Environment	The environment related to Fels position as professor in the Electrical and Computing Engineering department at UBC.	
Sound Elements	Original sound samples gathered by Neubauer.	
Sound of Performed Waking Dreams		
Stage Specifications	The stage specifications required to perform <i>Waking Dream</i> .	
Students	Students in Fels program who assisted in the creation of <i>Waking Dream</i> .	
Technological	The technology available to produce the desired effects.	Due to changes in technology, obsolescence is an issue.
Technological Equipment	The built remote control devices, head mounted video camera, and video projector dower.	
Technology	The technology used in the creation of <i>Waking Dream</i> .	This includes: 2 computers, video projector, remote video cameras, CD player, infrared lighting.
Video Elements	Original video footage gathered by Neubauer.	
Video of Performed Waking Dream	The videos taken during the performances of <i>Waking Dream</i> .	
Waking Dream Conception	The artistic ideas as to the intellectual, physical, mechanical and aesthetic aspects of <i>Waking Dream</i> .	
Waking Dream Website	The website maintained by Fels to document and publicize the creation and performance of <i>Waking Dream</i> .	