Interactive Cyberspace - TECFA whitepaper

Daniel K. Schneider*
TECFA,† Faculte de Psychologie et des sciences de l'education,
University of Geneva, Email: Daniel.Schneider@tecfa.unige.ch

April 24, 1996

DRAFT - Version 0.1

Abstract

Virtual Environments for Education, Research and Life are interactive cyberspaces where many users can communicate and collaborate in various way. They also can build virtual like offices, books, blackboards, artificial persons and more. VEs should also provide optimal support for information storage, retrieval and manipulation.

This is a white paper written primarily for internal use, however it addresses general issues too. It's major goals are to:

1. assemble few things (definitions, questions, pointers) in order to write a more substantial text.
2. prepare TECFA's[1] research and developpement in "Cyberspace".
3. Implications for the curriculum of the (STAF diploma[2]).
4. produce a few ideas on how to set up our information and communication infrastructure in the future.

This position paper is available over the WWW at:
http://tecfa.unige.ch/tecfa/research/CMC/cspace/cspace.html
It is best to have a WWW browser ready for accessing various pointers.

*http://tecfa.unige.ch/tecfa-people/schneider.html
†http://tecfa.unige.ch/
[1] http://tecfa.unige.ch
[2] http://tecfa.unige.ch/tecfa/tecfa-teaching/teaching-overview.html#postgrad

Contents

1 What is Cyberspace?

Any concept like this is a target for controversial definitions: Here we give:

- our own version
- pointers to cyberspace indexes on the Web
- pointers to some general literature.
- pointers to a few recent events

Cyberspace has two aspects:

1. Cyberspace space is the set of multi-user virtual environments in which users can be, navigate and talk, and collaboratively create, own and manipulate objects.
2. "Cyberspace is an interconnected computer-mediated environment in which all prior media are represented" ([Hughes, 1995, p.38]).

Cyberspace is not: The World Wide Web or any other passive media.

Cyberspace (or cyberspaces) of the future will be "a globally networked computer-sustained real-time interactive environment in rendered three-dimensional form in which users can collaborate and view and manipulate information" ([Hughes, 1995, p.35]).

CyberSpace Indexes:

- Educational VR[3]
- (more needed here !!, c.f. Daniel's Bookmarks)

Literature:

- Kevin Hughes' "From Webspace to Cyberspace" [Hughes, 1995] is probably the best overal reading available on-line. (Version 1.1 is available from Tecfa (locally) in PDF format)
- You can also search Daniel's Online Bibliography Database[4] with keywords like **VEs, VR, MUD, Cyberspace**.
- VRML Guru Mark 's "VRML, Browsing and Building Cyberspace" ([Pesce, 1995]) is nice reading for grasping VRML essentials but also includes good conceptual thoughts on cyberspace and cyberspace building.
- Other recommended books about cyberspace are: "Cyberspace: First Steps" ([Benedikt, 1991]), "The Virtual Community: Homesteading on the Electronic Frontier" [Rheingold, 1993], "Computers as Theatre" [Laurel, 1995],

Recent Events about Cyberspace: There have been recent other interesting workshops and conferences in the past (though real documentation might be hard to get)

- WWW Workshop: Virtual Environments and the WWW[5]. Papers are are available in raw form[6] and within a WOO documentation system[7].

[3] http://tecfa.unige.ch/edu-comp/WWW-VL/eduVR-page.html
[4] http://tecfa.unige.ch/tecfa/general/bib-query.html
[5] http://tecfa.unige.ch/moo/paris96/
[6] http://tecfa.unige.ch/moo/paris96/papers/
[7] http://spsyc.nott.ac.uk:5555/

- the doors of perception 3 conference[8] (VR oriented)
- The International Workshop on CSCW and the Web[9]
- European Workshop on Interactive Distributed Multimedia Systems and Services[10] (mostly technical issues)
- Cyberstar'95[11] (A competition on interactive concepts)
- Workshop on Simulation and Interaction in Virtual Environments[12]

2 The technology layer

This section is not exhaustive and does not cover exhaustively advanced research. Also it is sometimes hard to separate technical from non-technical research.

2.1 Major currently available CMC and Information Systems

Text-based social virtual reality (Muds) is almost Cyberspace: MUDs (and specially the MOO variant [Curtis, 1993]) can be be characterized by:

- Many persons can connect simultaneously to a server.
- The MUD has a spatial organization, e.g. people interact with people or objects primarily within "rooms".
- Within a MOO, many real time communication actions exist, like "saying" or "emoting" things publically to the persons in a "room", paging people elsewhere, "whispering" messages, using a "CB" channel, etc.
- Asynchronous communication tools include internal e-mail, Newsgroups, News papers, tutorial rooms, "notice boards", etc.
- MOOs are extensible, and most imaginable (text-based) objects and features can be programmed. Moos also can be used as backend for various network services. A good example are http servers.

Asynchronous Collaboration Tools

- The WWW-based HyperNews[13], see also Tecfa's HyperNews main Page[14].
- WWW server (Access): The Web can be regared as collaboration system for people who are able to publish on it. It even has been conceived that way! See also the http(?) "Upload File" directive.
- Lotus Notes

CSCW Tools

- Whiteboards
- Application Sharing

[8] http://www.design-inst.nl/DOME/workshops/reports.html
[9] http://orgwis.gmd.de/W4G/
[10] http://www.fokus.gmd.de/ws/idms/cfparticipation.html
[11] http://viswiz.gmd.de/VMSD/PAGES.en/actual.cyberstar.html
[12] http://www.cs.uiowa.edu/%7Ecremer/sive95.html
[13] http://union.ncsa.uiuc.edu/HyperNews/get/hypernews.html
[14] http://tecfa.unige.ch/HyperNews/get/server.html

Internet Classics Email, News, Ftp and such

Voice and Video Conferencing Tools There exist several kinds:

- Low bandwidth (CUSEME)
- Medium bandwidth (Mbone)
- High Bandwidth (ATM based)

2.2 Interesting Technical Research Areas

Artificial Agents on the Net

- INDEX: The @gency[15]
- See also the the WWW5 workshop on Artificial Intelligence-based tools to help W3 users[16]

2D and 3D VEs

- E.g. Moondo

Immersive VR Systems

- Headmounted Displays, Data Gloves, etc.

Advanced MUDs

- ColdX[17]: A potential successor for MOOs.
- Distributed architectures (Munchkins)

Multi-User CSCW Tools Stuff that goes beyound whiteboards, e.g. whole distributed (technical) design systems or collaboration and interaction systems like Mushroom[18].

2.3 Internet Trends

To sum it up: The World-Wide Web is breaking a part somewhat and there is an explosion of available tools for providers.

WWW - Mobile Code:

- Java
- JavaScript
- INDEX: Mobile Code[19] (at W3c). There are many other alternatives

WWW - HTML embedded scripts:

- PHP/FI[20]

[15] http://asterix.info.unicaen.fr:80/ serge/sma.html
[16] http://www.info.unicaen.fr/ serge/3wia/workshop/
[17] http://www.cold.org/
[18] http://www.dcs.qmw.ac.uk/research/distrib/Mushroom/CSCWWeb.html
[19] http://www.w3.org/pub/WWW/MobileCode/
[20] http://www.vex.net/php/

WWW - Diversification of Formats:

- e.g. PDF, Shockwave.
- Look at all the Netscape PlugIns[21]

WWW - All-in-One WWW browsers Look at what Netscape does (News, Email, standard plugins, plugin support)

WWW - Embedded WWW browsers Word 8 might have that (no smilie here)

WWW - HTTP-based Collaboration Tools:

- Index: WWW Collaboration Projects[22] (D. La Liberte /NSCA)
- Index: Collaboration, Knowledge Representation and Automatability[23] (W3C)
- Example: HyperNews[24], see also Tecfa's HyperNews main Page[25].

WWW - Gateway and DB Technology: Both "light" and "heavy" (interfaces to industrial strength DBs) versions exist:

- Index: Accessing a Database Server via the World Wide Web[26]
- A good example for a "light" WWW-DB System is Wilma[27]. See Agora's (at Tecfa) "Index"[28]
- The most popular public domain "medium" heavy DB is mSQL[29] and its various gateways.

WWW - Specialized WWW service packages

- E.g. various tools for education (authoring, forums)

WWW - VRML: VRML/ is *the* 3-D extensions to the WWW. Right now rendering is very slow, but the VRML standard and VRML clients integrate well the Web. In addition VRML 2 has animation and communication extensions.

WWW - Smart Indexing and Smart searching You don't need all the crap Alta Vista spits out :)

CSCW Tools:

- Netscapes new whiteboard
- NCSA's Collage might be reintegrated / distributed with Mosaic
- Annotation Tools

---

[21] http://home.netscape.com/comprod/products/navigator/version_2.0/plugins/index.html
[22] http://union.ncsa.uiuc.edu/HyperNews/get/www/collaboration.html
[23] http://www.w3.org/hypertext/WWW/Collaboration/
[24] http://union.ncsa.uiuc.edu/HyperNews/get/hypernews.html
[25]
[26] http://cscsun1.larc.nasa.gov/%7Ebeowulf/db/existing_products.html
[27] http://www.edoc.com/wilma/
[28] http://tecfa.unige.ch/swiss-edu/wilma/
[29] http://Hughes.com.au/product/msql/

	Tools at TECFA			
Type	Source	Hardware	Installed	Used
MOO	free	ok	yes	yes
WWW Server	free	ok	yes	yes
WWW Upload	??	ok	-	-
WWW HyperNews	free	ok	yes	no
WWW Mail Gates	free	ok	yes	no
News	UniGe	yes	yes	no
Lotus Notes	UniGE	yes	no	no
MailingLists	free	no	no	yes
CUSEME	free	4 cam	no	no
Whiteboards	UniGe/free	yes	yes	(y)
3D (VRML)	-	no	yes	no

Table 1: Some Software at Tecfa and UniGE

Voice Talk and low-bandwidth Video:

- e.g. Netscape's Atlas cooltalk

WWW - Specialized HTTP Servers:

- Woos
- CL-httpd
- Built-in http in data bases

2.4 The software situation at TECFA

Here a short list of some software available and some information about availability, installation and use. Note that "use" does not include "use" in publications or for tests or demos.

3 Issues for Research and Development of Cyberspace

Essential Elements for Interactive Cyberspace:

- Persistant storage (objects created remain alive)
- Multiple real-time communication channels
- Text-based communication for non-intrusive work
- Multi-Users having virtual identities
- Places
- Security and ownership
- Asynchronous communication tools
- Generics and tools for "building"
- Useful objects (in particular information objects)
- Collaborative data visualization and manipulation tools
- Integration with other (all) Internet Services

Issues that came up for the WWW workshop on VEs and the Web:

1. *Special properties of VEs*
   (a) What is the common denominator?
   (b) Social text-based VEs vs. full 3-D VR and everything in between
   (c) Immersion
2. *General architecture*
   (a) Navigation
   (b) Organization of space (consistency, magical features, ...)
   (c) Responsiveness feedback)
3. *VEs and the Real world*
   (a) Real world metaphors in design
   (b) Integration of external standard available CMC
   (c) Interaction with real devices and simulations of real devices
4. *Interfaces*
   (a) Interfaces and clients (kind of)
   (b) Interfaces and clients (ease of use)
   (c) Intrusiveness
   (d) Negotiation of communication channels (between clients)
5. *Technical issues I*
   (a) Low level implementation (languages and formats) (JAVA, VRML)
   (b) WWW Integration
   (c) (Technical) Decentralization
   (d) Responsiveness (speed), network latency
6. *Technical issues II*
   (a) Extensibility and programmability
   (b) Scalability
   (c) Decentralization (fitting together multiple worlds)
   (d) Construction facilities, tools and languages
7. *The role of users / user management*
   (a) VEs as praxis (user defined environment)
   (b) User adaptation
   (c) Ownership, access and security
   (d) Characters/Avatars (including identity)
   (e) Customization of different views / multiple views
   (f) Communities and social interaction
8. *Communication and collaboration*
   (a) Collaborative Environments for education and work

(b) Virtual work space

(c) Integration of of conferencing and CSCW tools (also integration or abstracting of the "real" world)

(d) Internal CMC

(e) Multiple sessions (parallel comm channels used for different purposes)

(f) CSCW tools

(g) Cooperative (3-D) design tools

9. *Objects*

   (a) Smart Agents

   (b) Rich 3-D worlds

   (c) Objects in VEs (generally)

   (d) Objects in VEs (what levels of details, what info is always needed)

   (e) Integration of various data streams (media types)

   (f) Consistency of object interfaces

   (g) History (walls that "talk")

10. *Information*

    (a) Architectures of representations, ideas, concepts

    (b) Living documents / collaborative hypertext

11. *Practical Issues*

    (a) Costs

Virtual Communities and Virtual Worlds:

1. Government

2. User centered VE design

3. Efficiency vs. "Meeting nice people" and Communication Overload

4 Potential R and/or D Projects for Tecfa & Friends

Things that could be initiated *now*.

4.1 Global R&D Projects

CMC Systems for Distance Education: Can we make something out of STAF ? Also, do some more action research and use the tools we allready have some more ?

VEs for collaborative work and learning: E.g. The TecfaMOO project

Collaborative learning by doing environments MemoLab on-line ?

Intelligent Agents over and on the Net:

Virtual Communities for Research and Work: E.g. the VMDL /ESF project continued ?

4.2 More "Focussed" Research Questions

Social Grounding:

Constructivism via object manipulation

Immersion: What does social ("being there") or sensual immersion ("VR") bring to learning.

How to "encode" incentives for collaboration?

Situated Learning in a VE: How do we design an environment for that ?

Cooperation tools for specific tasks: e.g. negotiation, choice, design, etc.

Navigation: both general (orientation, finding things, etc.) and focussed (e.g. within a Living Document)

Simulations and Interactive Exhibits: a la Ticinse Village or PEPS.

Agents: Starting points in the MOO world: Ken's turing bots and Daniel's LISP-MOO Client.

VE Client Interfaces What's the decent minimum ?

3-D / VRML extensions to the MOO That should not be too hard technically speaking, but when does it make sense ?

5 Strategic Planning

5.1 cyberspace training in STAF

Staf14 / Staf2.x reform needed ?

5.2 Resources, Past Work and Interests at Tecfa

[to do]

5.3 Potential Funding Sources

1. National Fund
2. European Forth Framework
   - Telematics2C (TELEMATICS Applications) Third call for proposals[30]: Publication 15.09.96 / Closing Date: 15.01.97. See also: The 4th RTD Framework Programme[31]
   - Training and Mobility of Researchers (TMR)[32]: Publication: 15.09.1996 / Closing date: 01.02.1997
   - Building the Information Society: the 1996 ESPRIT Workprogramme[33] (not too interesting maybe)

[30] http://www.cordis.lu/cgi/node.pl?language=en&node=//telematics_2c/tele_prop2
[31] http://www2.cordis.lu/cordis/02.htm
[32] http://www2.cordis.lu/tmr/home.html
[33] http://www2.cordis.lu/esprit/src/wp96.htm

3. Other European programs: Multimedia educational software[34] (any more information on this?) - Activities related to the establishment of the Information Society: MPACT, TEDIS, INFO2000, IDA, Community participation in the G-7 pilot projects. - Socrates (where is the on-line information ?) - See also:EC Information Society Project Office Webserver[35]

4. Private Foundations, e.g. Schmidheiny

5.4 Collaboration Partners

- CUI / University of Geneva
- Thomas Wehrle (FPSE)
- Pasquier /University of Fribourg
- Jenifer Tennison and Jola Tromp, University of Nottingham
- Richard Godard (TecfaMOO Wiz in chief)
- Chris Hand (University of De Montfort)
- Who else ?

References

[Benedikt, 1991] Benedikt, M. e. (1991). *Cyberspace: First Steps.* MIT Press, Cambridge.

[Curtis, 1993] Curtis, P. (1993). LambdaMOO Programmer's Manual. Xerox Parc.

[Hughes, 1995] Hughes, K. (1995). From Webspace to Cyberspace. EIT WWW publications. URL: http://www.eit.com/%7Ekevinh/cspace/ or http://www.scit.wlv.ac.uk/kevinh/ (UK Mirror).

[Laurel, 1995] Laurel, B. (1995). *Computers as Theatre.* Addison-Wesley.

[Pesce, 1995] Pesce, M. (1995). *VRML, Browsing and Building Cyberspace.* New Riders, Indianapolis. URL: http://www.mcp.com/newriders/internet/vrml/ (source code, ordering information and patches).

[Rheingold, 1993] Rheingold, H. (1993). *The Virtual Community: Homesteading on the Electronic Frontier,.* HarperPerennial Paperback, also Secker and Warburg (UK), Addison Wesley (German and French Translations).

[34] http://www2.cordis.lu/cordis/cicu8011.html
[35] http://www.ispo.cec.be/