

Georgia Institute of Technology

ASE 6003: Modeling & Simulation for Systems Engineering



Module 12: Games and Virtual Worlds

Roger D. Smith, Ph.D.

Modelbenders LLC

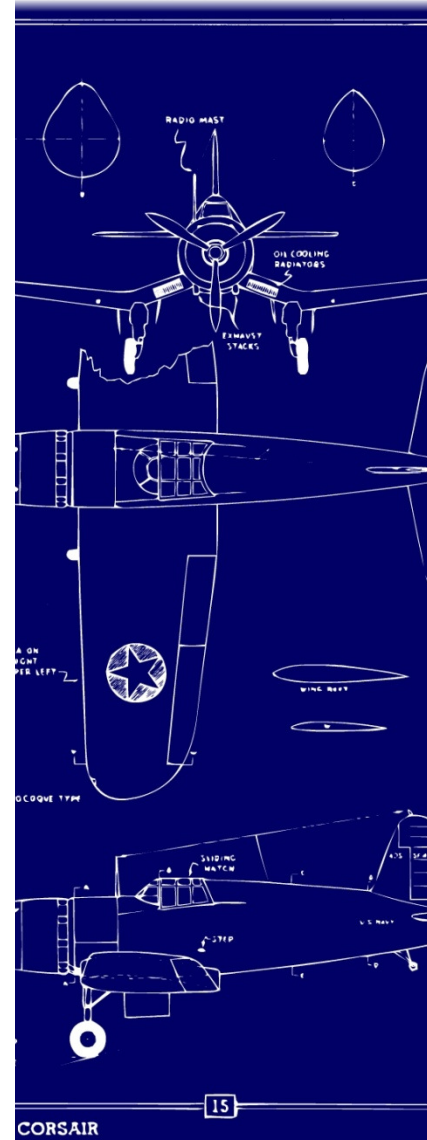
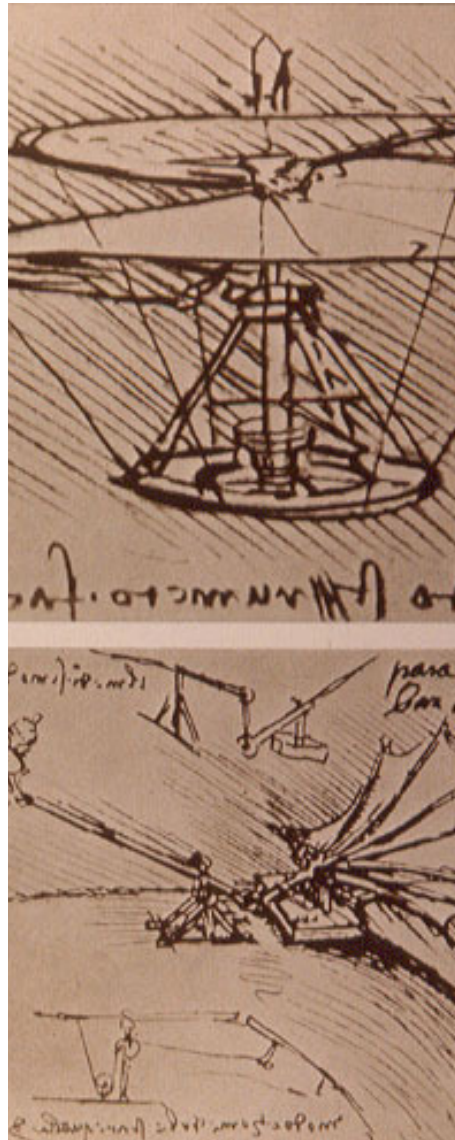
<http://www.modelbenders.com>



References

- Abt, C. (1970). *Serious Games*. New York: The Viking Press.
- Beck, J.C. and Wade, M. (2004). *Got game: How the gamer generation is reshaping business forever*. Boston, MA: Harvard Business School Press.
- Bergeron, B. (2006). *Developing serious games*. Charles River Media.
- Bushnell, N. (August 1996). Relationships between fun and the computer business. *Communications of the ACM*, 39(8), 31–37.
- Chatham, R.E. (July 2007). Games for training. *Communications of the ACM*, 50(7), 37–43.
- Federation of American Scientists. (2006a). R&D challenges for games in learning. Washington D.C.: Author.
- Federation of American Scientists. (2006b). Summit on educational games: Harnessing the power of video games for learning. Washington D.C.
- Herz, J. and Macedonia, M. (April 2002). Computer games and the military: Two views. *Defense Horizons*, 11.
Online at <http://www.ndu.edu/inss/DefHor/DH11/DH11.htm>
- Kelly, H., et al. (July 2007). How to build serious games. *Communications of the ACM*, 50(7), 45–49.
- Kushner, D. (Aug 2002). The wizardry of id. *IEEE Spectrum*, 39(8), 42–47.
- Lenoir, T. (2003). Programming theatres of war: Gamemakers as soldiers. In Latham, R. (Ed.)
Bombs and Bandwidth: The emerging relationship between information technology and security. New York: The New Press.
Online at http://www.stanford.edu/dept/HPST/TimLenoir/Publications/Lenoir_TheatresOfWar.pdf
- Michael, D and Chen, S. (2005). *Serious games: Games that educate, train, and inform*. New York: Thompson Publishing.
- Orbanes, P.E. (2004). *The Game makers: The Story of Parker Brothers*. Boston: Harvard Business School Press.
- Postigo, H. (2003). From Pong to Planet Quake: Post-industrial transitions from leisure to work.
Information, Communications, and Society, 6(4), 593–607.
- Prensky, M. (2001). *Digital game-based learning*. New York: McGraw Hill.
- Sheff, D. (1999). *Game over: Press start to continue*. Wilton, CT: Cyber Active Publishing.
- Smith, R. (January 2006). Technology Disruption in the Simulation Industry. *Journal of Defense Modeling and Simulation*, 3(1),
Online at <http://www.scs.org/pubs/jdms/vol3num1/JDMSvol3no1Smith3-10.pdf>
- Steinkuehler, C. (January 2007). Massively multilayer online video gaming as participation in a discourse. *Mind, Culture, and Activity*, 13(1), 38–52.
- Zyda, M. (July 2007). Creating a science of games. *Communications of the ACM*, 50(7), 27–29.
- Zyda, M. (September 2005). From visual simulation to virtual reality to games. *IEEE Computer*, 38(9), 30–34.
- Zyda, M. (June 2006). Educating the next generation of game developers. *IEEE Computer*, 39(6), 25–32.

Engineering Tools are Generational



Digital information in its primitive form

```
GET /asp30/05/header_refresh.asp
HTTP/1.1 200 OK
Server: Microsoft-IIS/5.0
Date: Sat, 01 Jul 2000 21:09:53 GMT
Refresh: 3
Connection: Keep-Alive
Content-Length: 79
Content-Type: text/html
Set-Cookie: ASPSESSIONIDQQGGGYZC=KGGLDLCDDAOELPOLCDJD
Cache-control: private

<b>Response.AddHeader "Refresh", "3" </b><HR color=CC
7/1/2000 5:09:53 PM

Connection to host lost.

Press any key to continue...
```

TELNET

```
ls: opening ASCII mode data connection for /bin/ls.
226 Transfer complete.
- 544 2003-02-04 16:29 2426 AssemblyInfo.cs
- 744 2003-02-05 13:17 3381 FtpAsyncResult.cs
- 544 2003-02-04 16:29 4093 FtpControl.cs
- 544 2003-02-04 16:29 2949 FtpData.cs
- 544 2003-02-04 16:29 4891 FtpEvents.cs
- 544 2003-02-04 16:29 7840 FtpException.cs
- 744 2003-02-05 18:51 84613 FtpMain.cs
- 744 2003-02-05 18:51 4960 FtpMisc.cs
- 744 2003-02-05 14:41 4776 FtpParse.cs
- 544 2003-02-04 16:29 10343 FtpProxy.cs
- 744 2003-02-05 15:12 11369 FtpStream.cs
- 744 2003-02-05 19:07 7680 FtpTest.exe
- 544 2003-02-04 16:29 19077 FtpWebRequest.cs
- 544 2003-02-04 16:29 3613 Item.cs
- 544 2003-02-04 16:29 7821 List.cs
- 544 2003-02-04 16:29 10170 ListParse.cs
- 544 2003-02-04 16:29 8573 ProxySocket.cs
- 544 2003-02-04 16:29 3257 Socks4.cs
- 544 2003-02-04 16:29 6338 Socks5.cs
- 744 2003-02-05 19:13 65024 rbxFtpLibrary.dll
ftp> chmod 755 rbxFtpLibrary.dll
200 CHMOD command successful.
ftp> pwd
257 "/home/lukasp/RebexFtp" is current directory.
ftp> disconnect
Disconnecting...
221-You have transferred 0 bytes in 0 files.
221-Total traffic for this session was 20770 bytes in 13 transfers.
221-Thank you for using the FTP service on karma.
```

FTP

```
Mailbox is '/var/mail/root' with 2 messages

 1 Sep 17 Patrick J. Volkerd (174) Welcome to Linux (Slackware 5
0 2 Sep 17 (45) Register with the Linux count

You can use any of the following commands by pressing the first charac
d)delete or u)ndelete mail, m)ail a message, r)eply or f)orward mail,
To read a message, press <return>. j = move down, k = move up, ? = l

Command:
```

E-MAIL

```
West of House 0/0

ZORK I: The Great Underground Empire
Infocom interactive fiction - a fantasy
story
Copyright (c) 1981, 1982, 1983, 1984,
1985, 1986 Infocom, Inc.
All rights reserved.
ZORK is a registered trademark of
Infocom, Inc.
Release 52 / Serial number 871125 /
Interpreter 8 Version J

West of House
You are standing in an open field west
of a white house, with a boarded front
door.
There is a small mailbox here.

>_
```

ZORK

Digital information in its visual form



Georgia Institute
of Technology

Spreadsheet

			C	D
	ITEM	QU.	UNIT	COST
1	MUCK	43	12.95	556.85
2	BUZZ	15	6.75	101.25
3	TOE	250	49.95	12487.50
4	EYE	2	4.95	9.90
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				
61				
62				
63				
64				
65				
66				
67				
68				
69				
70				
71				
72				
73				
74				
75				
76				
77				
78				
79				
80				
81				
82				
83				
84				
85				
86				
87				
88				
89				
90				
91				
92				
93				
94				
95				
96				
97				
98				
99				
100				
101				
102				
103				
104				
105				
106				
107				
108				
109				
110				
111				
112				
113				
114				
115				
116				
117				
118				
119				
120				
121				
122				
123				
124				
125				
126				
127				
128				
129				
130				
131				
132				
133				
134				
135				

[illegible]

3D Game Engine



The screenshot displays a 3D game engine interface. At the top, a large black banner reads "3D Game Engine". Below this, a 3D scene shows four pixelated characters in a dark, industrial environment. The characters are wearing dark armor with red accents. The interface at the bottom displays various stats:

- AMMO:** 50
- HEALTH:** 0%
- ARMS:** 2, 2, 1; 5, 5, 2
- ARMOR:** 0%
- Items:** BULL (50), SHOT (200), ROCK (50), CSOL (50, 300)

```

PINE 3.87      COMPOSE MESSAGE
-----
To      : jsmith@mhppcc.edu
Cc      :
Attchmnt:
Subject :
----- Message Text -----

```

^R Rich Hdr ^K Del Line ^C Postpone
 ^J Attach ^U UnDel Line ^T To AddrBk

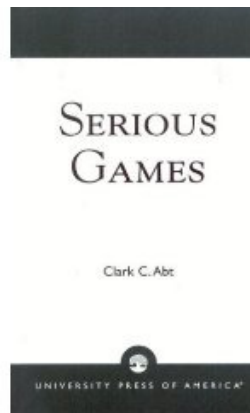
Web Browser

1970 Serious Games Definition

“Reduced to its formal essence, a game is an activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context. A more conventional definition would say that a game is a context with rules among adversaries trying to win objectives.

“We are concerned with serious games in the sense that these games have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement.”

Abt, C. (1970). *Serious Games*. New York: The Viking Press.



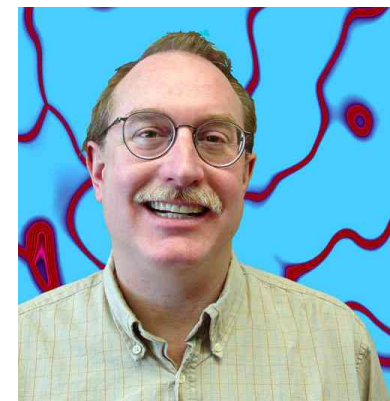
2005 Serious Games Definition

Game: “a physical or mental contest, played according to specific rules, with the goal of amusing or rewarding the participant.”

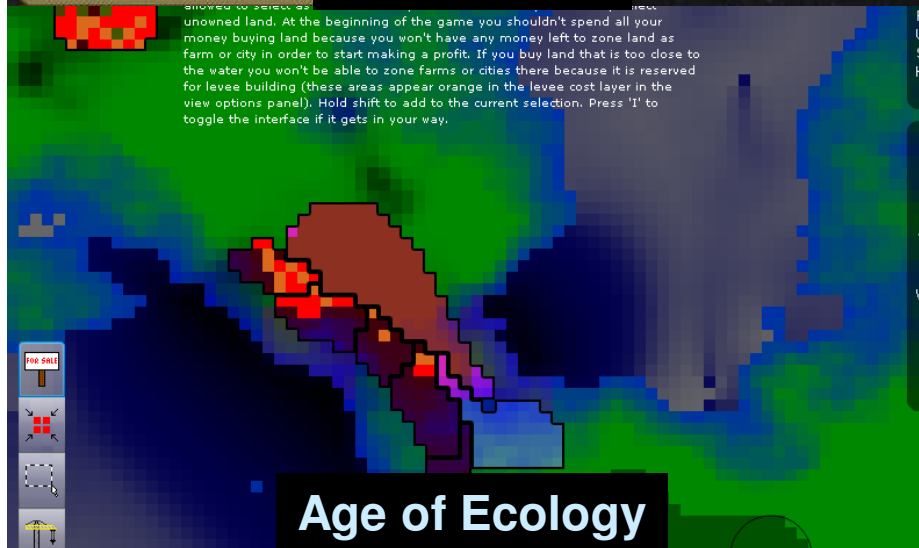
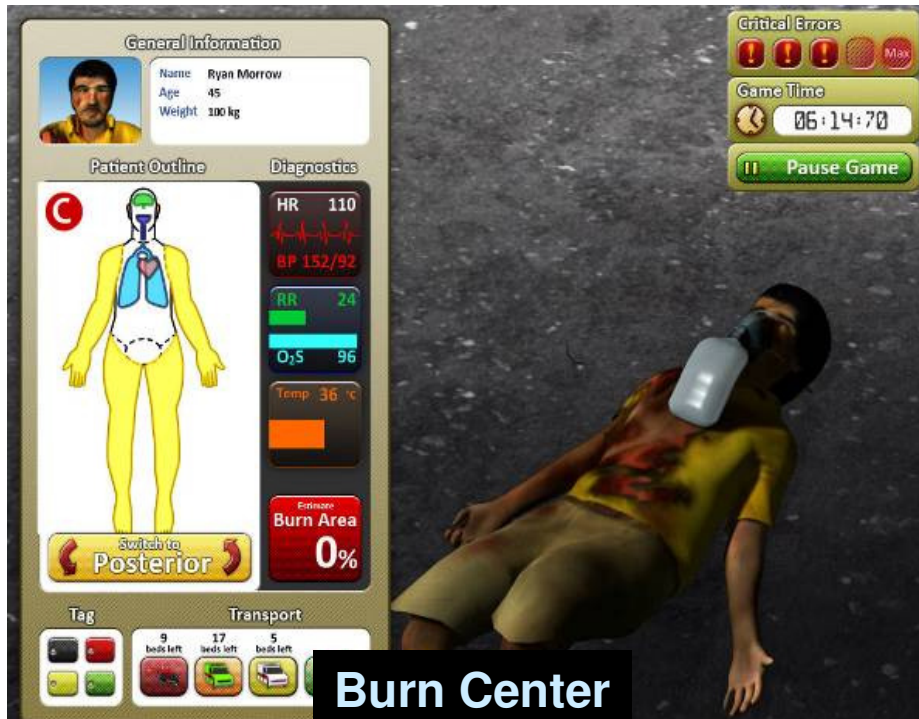
Video Game: “a mental contest, played with a computer according to certain rules for amusement, recreation, or winning a stake.”

Serious Game: “a mental contest, played with a computer in accordance with specific rules that uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives.”

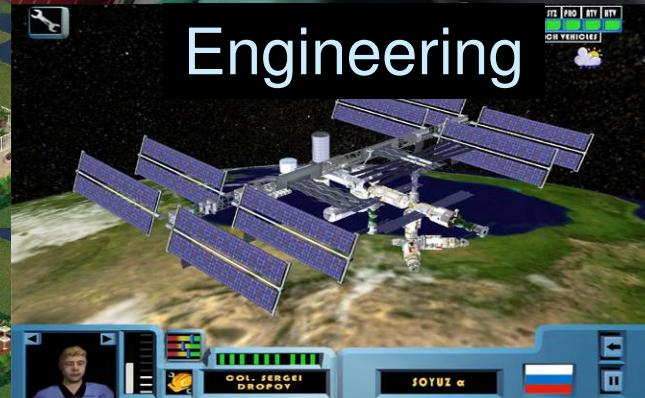
Zyda, M. (September 2005). “From visual simulation to virtual reality to games”.
IEEE Computer.



Serious Games Examples



Industries Adopting Serious Games



Military Serious Games

Full Spectrum Warrior



America Army



VBS2



Tactical Iraqi



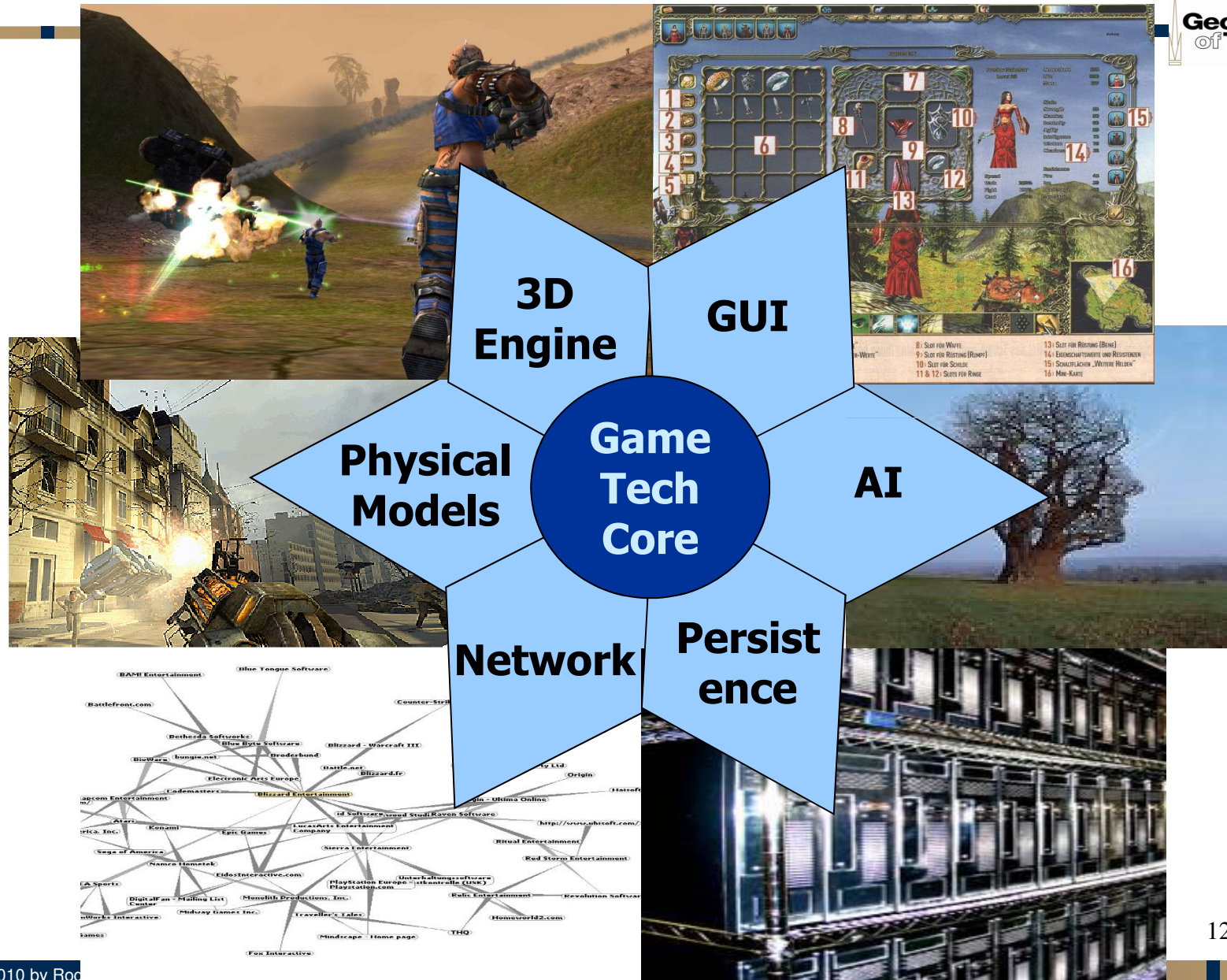
TC3



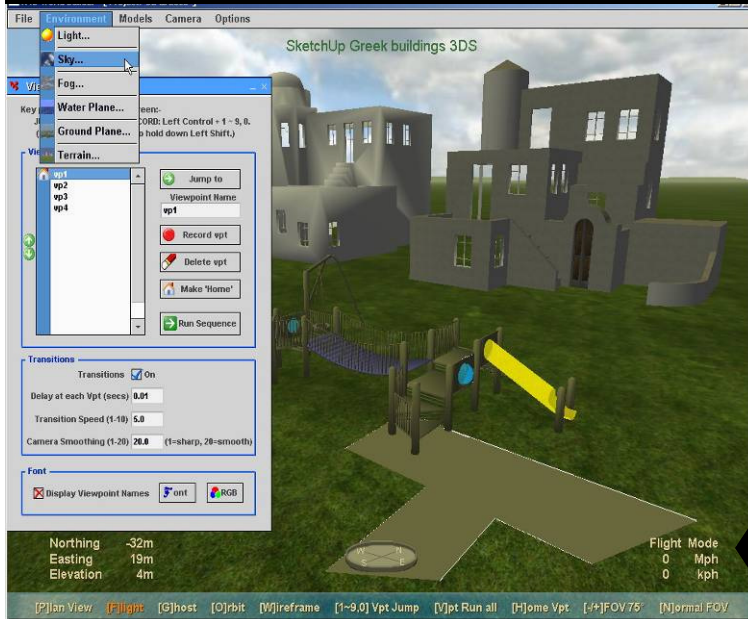
Tactical Questioning



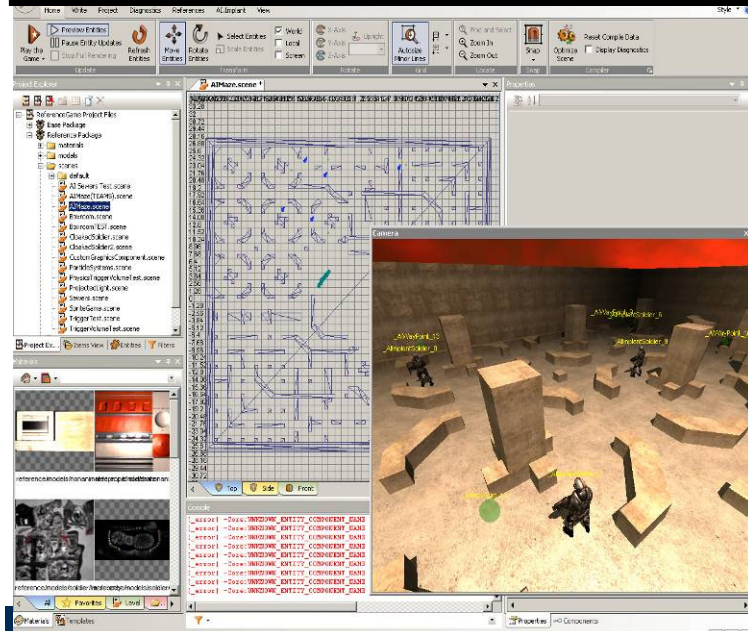
Game Technologies



World Building Tools



Behavior Scripting



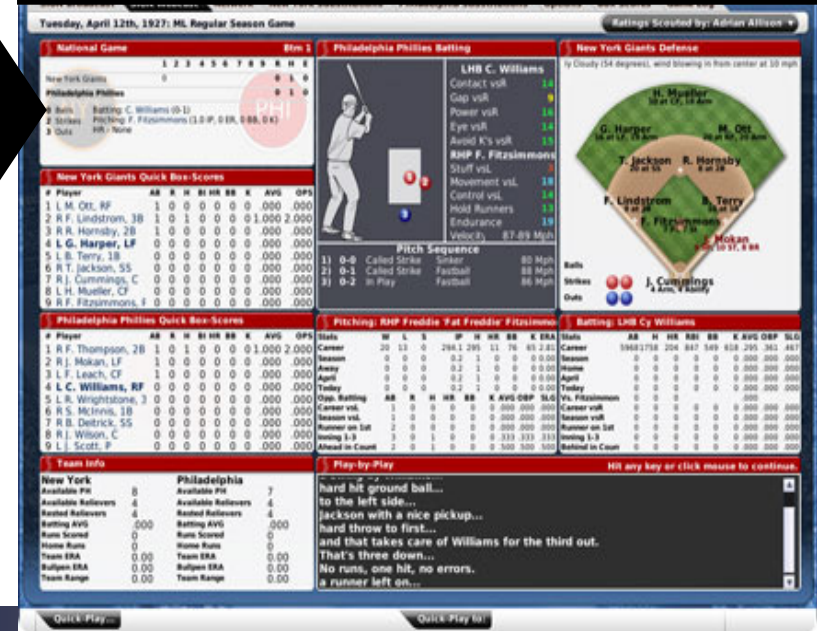
Pre-Game

Post-Game

Game Recording



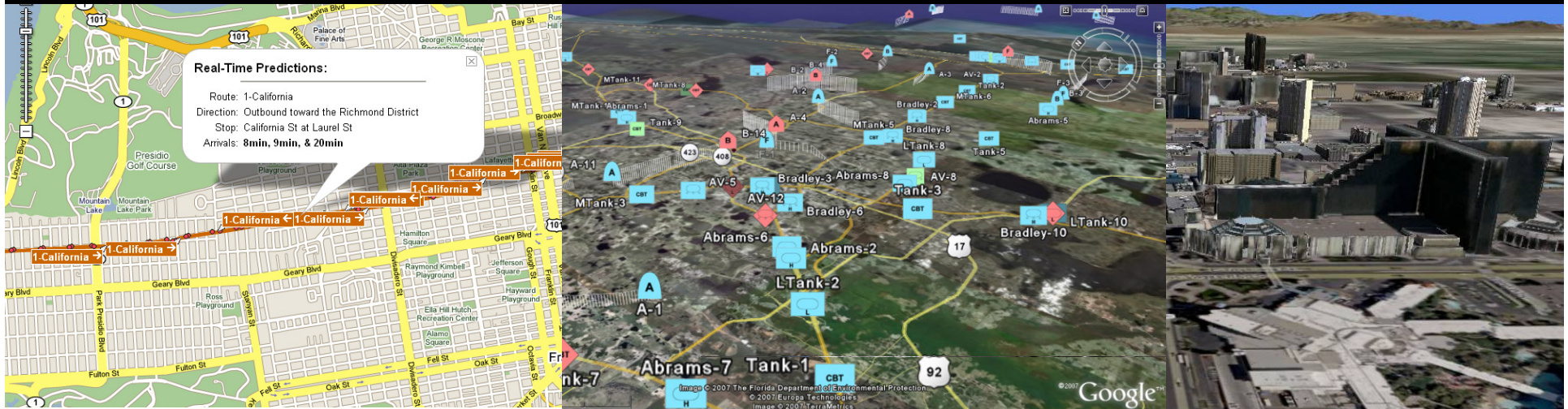
Player & Team Stats



Games Organize & Animate Data

Organize

Place objects and features into spatial context.



Animate

Enable dynamics with cause-and-effect.



Create a Sense of ...

PLACE

Map, Google Earth, Game Levels, Virtual Worlds



PERSON

Second Life, Virtual World Avatars



PURPOSE

Missions, Quests, Puzzles, Objectives



3D Shooters ... Right Here, Right Now.

Focus has been on very short time periods and very small virtual spaces.



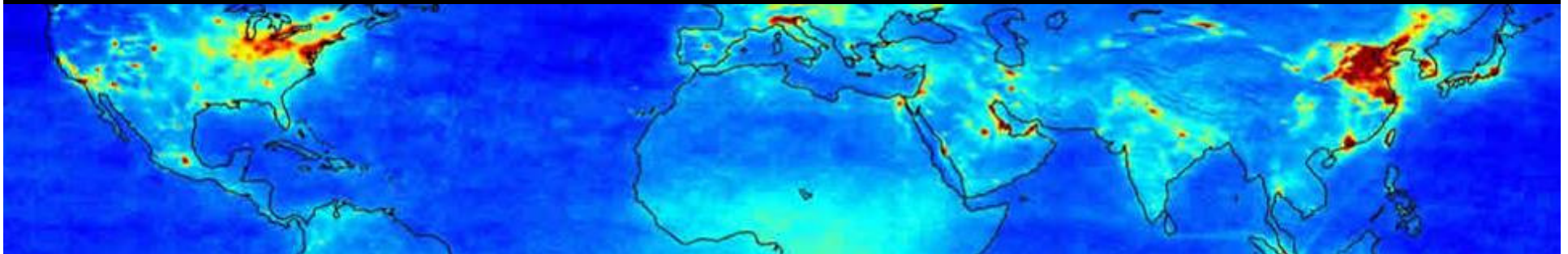
MMOGs ... Connect Past, Present, and Future.

Make other places and other times relevant to each other.

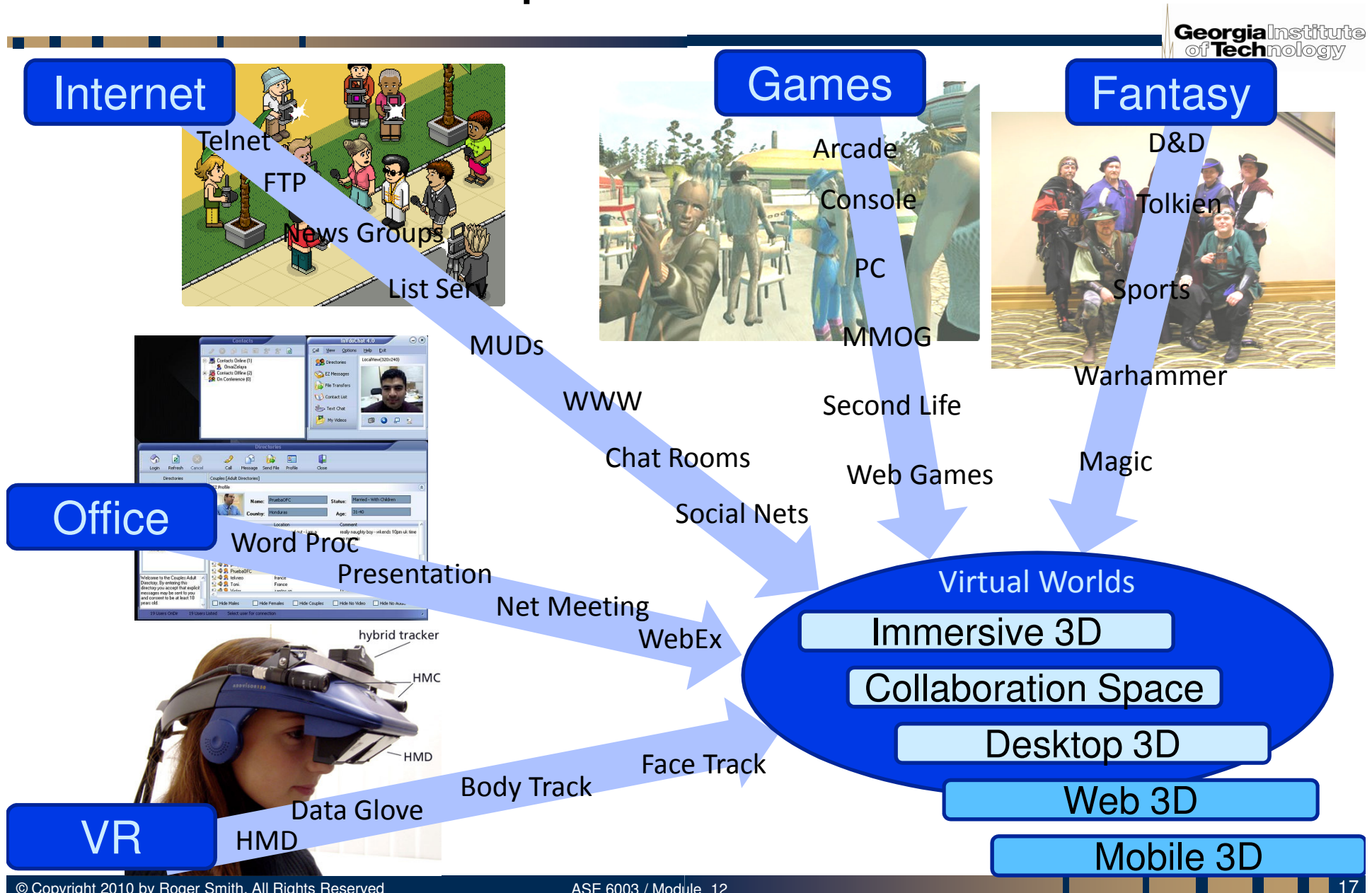


Virtual Worlds ... Create Context, Connections, and History.

A digital world that is big enough to handle important issues.



VW Perspective & Evolution



VW Product Focus

Primary VW Capabilities

3D Exploration

Graphical Beauty

User Created Content

Self Expression

Social Networking



These capabilities attract and satisfy a small user base.
These are not the kinds of capabilities that business
people want and need.



Digital User Needs

Information

Collection and display of daily data feeds. News feeds and Blogs.

Office

Reading, Creating, and Managing office documents.

Maps

Viewing and Navigating maps and geographic data.

Social

Maintaining and Using Social Networks.

Entertainment

Delivering Entertainment. Movies and Music.

Games

Interactive, Immersive Entertainment.

Virtual Worlds

Representing and Integrating Large World Data Sets.

Interoperable Virtual Worlds

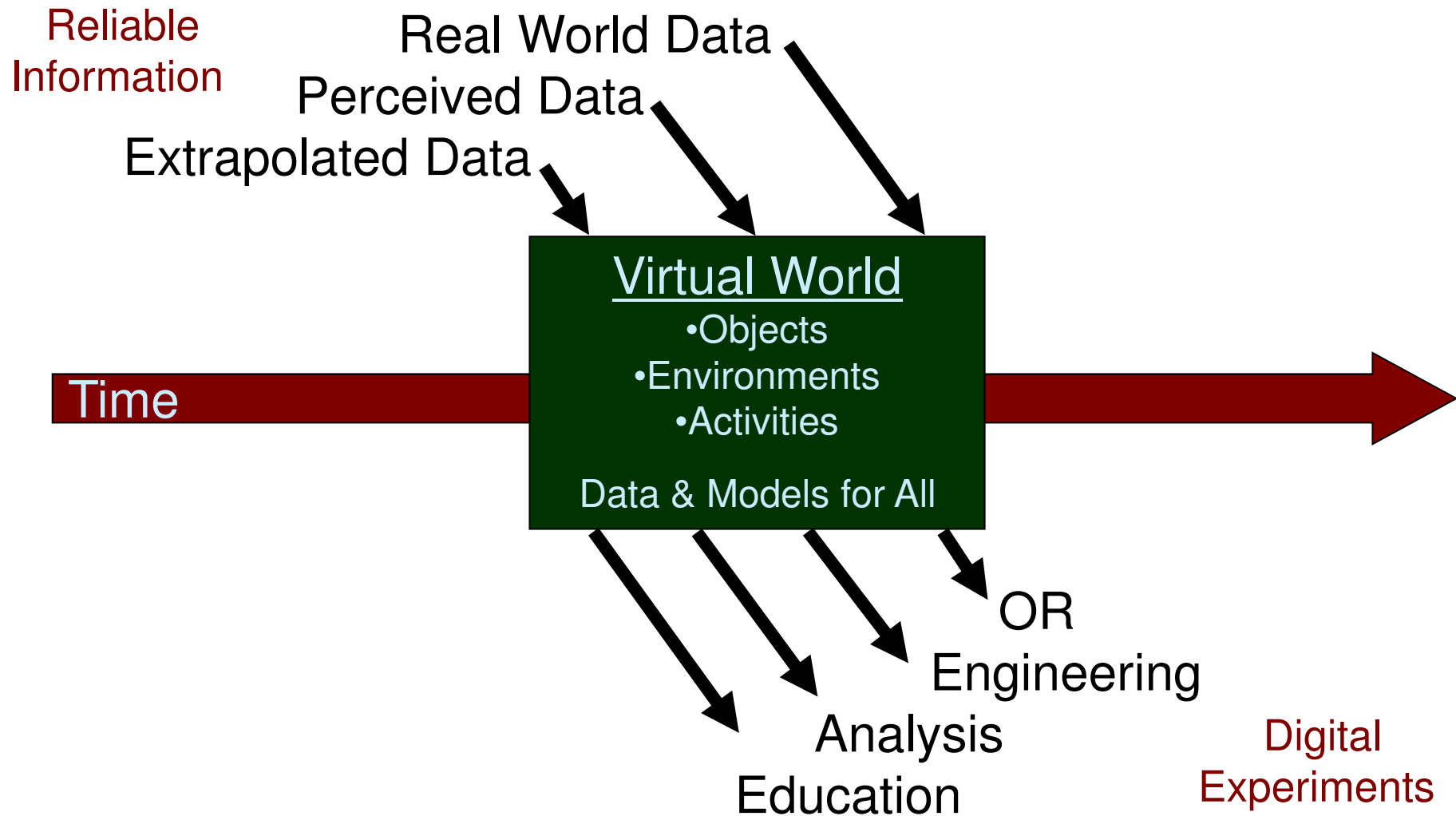


Games create models appropriate for the purpose and environment. Simulations try to use one model for every object. Unique from data values.

Virtual Worlds need many heterogeneous models with an infrastructure that can enable them to work together. Similar to work that has been done on Agent standards.



Real-time Real-world Data Integration



Virtual World Data & Models

Data – Consistent, Integrated, Dynamic

About terrain, vegetation, cityscape, building interiors



Models – Heterogeneous, User Supplied, Modifiable

Of object behavior, communication networks, human behavior, group dynamics



Needed: Standards for the data, models, and infrastructure in the Virtual World

Scope of the Virtual World



Personal	Digital Buddy	Family	Group	Company	City	World
Corporate	CEO	Leadership Team	Department	Competitor	Industry	Market
Defense	Commander	Staff	Unit	Army	Battlefield	Theater
Intelligence	President	Cabinet	Government	Populous	Country	Alliance

Conclusion



Games are an expression of new technologies which can be applied in hundreds of ways.

We will leverage this technology in the same way we have leveraged previous technologies for education, engineering, business, and the arts.

