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Types of Digital Visuals in E-Learning

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TYPES OF DIGITAL VISUALS

in E-Learning

Objectives

- ☐ Discuss dimensionality (1D to 4D) in digital imagery

- ☐ Highlight some affordances of digital imagery

- ☐ Introduce some types of digital imagery used in e-learning

- ☐ Highlight some rarer technologies for capturing and creating digital imagery for e-learning

- ☐ Offer some pedagogical insights regarding the use of digital imagery in e-learning

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Dimensionality

1D to 4D …

Image Dimensionality

- Spatial depiction of imagery

- 1D: a pixel

- 2D: an image with length and width, along the x and y axes

- 3D: an image with length, width and depth; along the x, y and z-axes

- 4D: a 3D image with movement added

Types of Digital Visuals in E-Learning

2D Visuals

- ☐ Sketches, drawings, diagrams
- ☐ Timelines
- ☐ Charts, tables
- ☐ Icons, symbols
- ☐ Screenshots
- ☐ Photographs, montages
- ☐ Non-photorealistic images and depictions
- ☐ Video grabs
- ☐ Satellite imagery
- ☐ Acoustical imagery

Types of Digital Visuals in E-Learning

3D Visuals

- ☐ 3D metaworlds

- ☐ Fractals

- ☐ Haptic-visual interfaces

- ☐ Augmented reality, ambient spaces

- ☐ 3D video

- ☐ Holography

Types of Digital Visuals in E-Learning
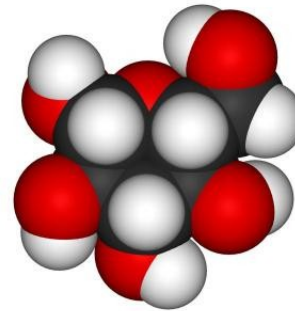
4D Visuals

- ☐ Video

- ☐ Animated agents, avatars, maquettes / models

- ☐ Live data-fed images

Types of Digital Visuals in E-Learning

Some Affordances

The Power in Visualization

- Representative, descriptive (realistic, high-fidelity…or fictional…or low-fidelity, symbolic); low stylized (natural) or high stylized (artificial)
- Born digital or from-world
- Process dynamism and high change vs. static; continuous vs. discrete
- Holistic or partial depiction, image decomposition / disaggregation
- Macro- or micro- perspectives
- Extreme visualizations (nano v. mesoscale; microscope vs. telescope; small-scale vs. large-scale)

Types of Digital Visuals in E-Learning

The Power of Visualization (cont.)

- Mental modeling
- Visual memory (short-term and long-term) activation
- Designs and blueprints
- Phasing of projects, processes
- Brainstorming
- Integration of complex information

- The digital reconstruction of events
- Digital cartography / mapping
- Deformation and animation of soft objects
- Projections into the future

Types of Digital Visuals in E-Learning

Data Culling

- Hyperspectral imaging
- Tumor cross-sections
- Projections into the future over time
- Simulated gas dispersion in simulated accidents
- Forensic analysis
- Disaster response planning

- 3D camera capture
- Facial identifications of live video feeds
- Traffic patterns analysis

Types of Digital Visuals in E-Learning

Digital Data Enhancement

- De-noising image data

- Orthographic corrections

- Color eliminations to highlight visual aspects

- Spatial data overlays

- Computerized recognition

Types of Digital Visuals in E-Learning

High Tech Affordances

- Informational structure mapping (ontologies, taxonomies; spatial layouts (bubble graphs, node-link diagrams); knowledge systems; mental mapping

- Greater informational complexity and spatial overlays (user-directed)

- Multiple channels

- Full-sensory simulations and experiences (sequential, branched)

- Situated cognition

High Tech Affordances (cont.)

- Interactive

- Complex movements and animations

- 3D immersive spaces (x, y and z axes), scripted 'bot behavior in digital enclosures

Types of Digital Imagery

In E-Learning

Image Maps

- ☐ Offers spatial information (and relationships)

- ☐ Offers some interactivity

- ☐ Integrates text and images

Types of Digital Visuals in E-Learning

Glyphs or Icons

- A sculptured figure or relief carving

- A font type as an element of writing

- A visual object that contains one or more data variables (coded in the shape, color, transparency, orientation, or other aspects)

- Used in map-making, logic, semiotics (the study of signs and symbols) and pictorial information systems

Photomosaics

- Aerial or seabed photos that are aligned to form a composite image

- A visual effect in which a large image is comprised of many smaller images

- Sometimes used for forensic analysis

Types of Digital Visuals in E-Learning

Screen Captures

Screenshots

- ☐ Representative of the visual on the computer screen
- ☐ Static, non-motion, non-dynamic (or) dynamic; may include voice overlays
- ☐ Annotatable

Screencasts

- ☐ Process-oriented, sequential, annotated
- ☐ Used to show computer interfaces
- ☐ Captures of live, synchronous interactive experiences (with voice, video, slides, text, and live annotation)

Types of Digital Visuals in E-Learning

Fractals

- Geometric, elegant, relational, representative of mathematical formulas
- A kind of machine art
- May show relationships and trends
- Self-similarity in design (at least stochastically)
- Tends towards irregularity and recursiveness
- Meaningful at both the macro and micro levels
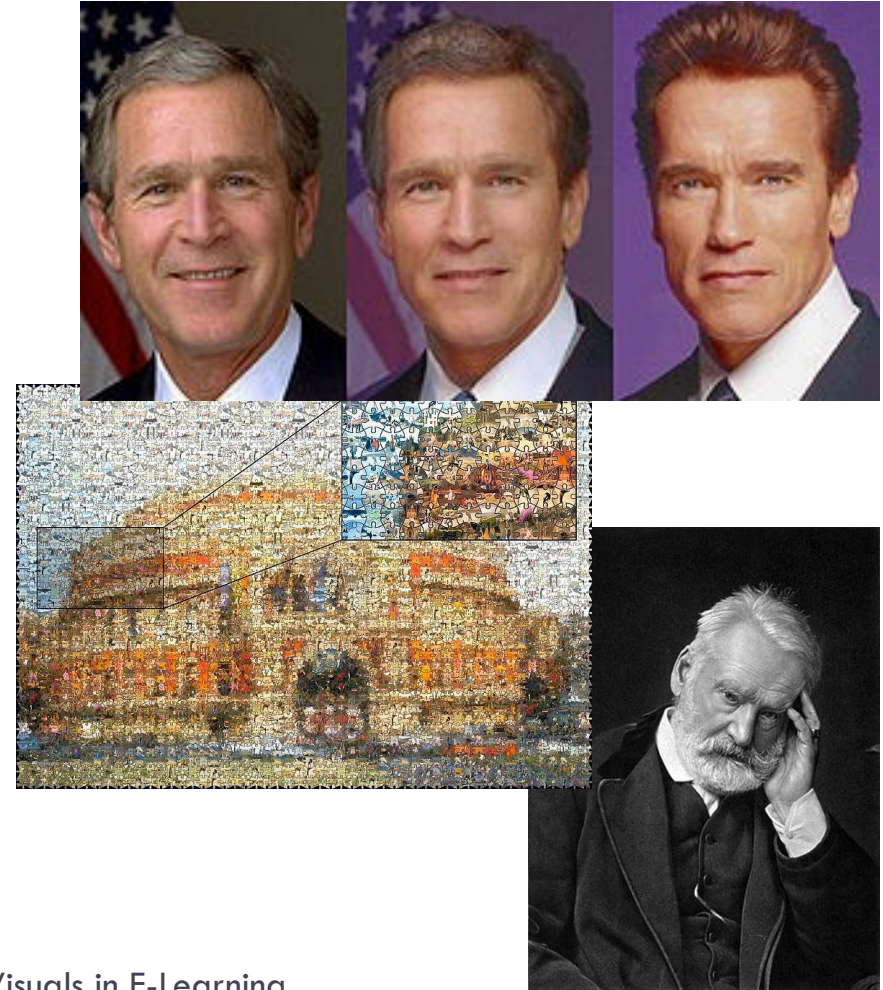
Photorealistic Images

- Scans, digital photo captures, machine-captures
- May be microscope or telescope-enhanced
- True color required based on a correct white balance
- May be editable
- May be overlaid with information
- May be realistic, illustrative, decorative, or used in other ways
- May be mixed modes

Non-Photorealistic Images

- ☐ Image morphing
- ☐ Photo-mosaicing
- ☐ Cartoon rendering from images
- ☐ Computerized drawing
- ☐ Fictional avatars
- ☐ Photogravure effects / intaglio print-making / etching simulation

Non-Photorealistic Images

- Machine art
- Acoustic-created synced imagery
- Digital sculpting
- Theoretical modeling and visualizations
- Synthesized image overlays (real images overlaid with info)

Types of Digital Visuals in E-Learning

Digital Video

- Involves color, movement, sound

- May be realistic or stylized (on a continuum)

- May be interactive if interspersed with Flash or other types of digital objects

- May be segmented for easier deployment (as in webisodes)

Types of Digital Visuals in E-Learning

Avatars

Human-Embodied

- [ ] Human or animal or symbolic shapes—animate or inanimate; playable characters

- [ ] May interact with others in multi-sensory ways (voice, sound, text, gestures, and deictic movements)

AI-Driven Agents

- [ ] May be AI-driven avatars ("intelligent agents") with full personalities, emotions, back-stories, and other motivating and autonomous elements

- [ ] Artificial life (a-life) entities and beings based on biological life (with flocking, herding)

Types of Digital Visuals in E-Learning

Live Multi-stream Data-feed Images

□ Remote sensor-fed, database-fed representations for multi-variate, multi-source and integrated data

□ Evolving and changing

□ Real-time

Visual Simulations

- ☐ Digital wetlabs

- ☐ *Machinima* (machine + cinema), role-plays, avatar acting

- ☐ Virtual fly-throughs of structures and landscapes

- ☐ Fantasy landscapes

Machine-Generated Art

☐ Based on formulas

☐ Synthetic art

☐ "Chaos tools," "morphogenesis," "cellular machines," "neuronal co-evolution," and visualization algorithms

Immersive and Persistent Virtual Worlds

- Live, unpredictable, human-embodied avatars

- True serendipity

- May be interspersed with AI-driven robots ('bots)

- Multi-sensory information

- Real-time scene updates

Types of Digital Visuals in E-Learning

Augmented Reality

□ Real-space with an overlay of digital images and sound through wearable computers or head-mounted devices

□ Used for coordinated multi-participant practices in real-space

□ May be location-sensitive and place-sensitive or fully mobile / place agnostic

□ May involve visual enhancements overlaid on real spaces in real time

Types of Digital Visuals in E-Learning

Ambient Intelligence

- In-built electronic environments

- People aware

- Adaptive

- Anticipatory of unique human needs

- May be built into furniture, textiles and clothing for tactile and haptic interfaces

- Digital installations, smart rooms and houses,

Technos for Capturing and Creating

Digital Imagery

Digital Image Capturing Technologies

- Cameras (on telescopes, on microscopes, panopticon angles, automated foveations)
- Scanners
- Mobile devices, in-field devices
- Sensors (in the field)
- Studio setups
- Computational photography (enhanced image capture through digital sensors, optics, lighting, and other strategies)

Digital Image Capturing Technologies

(cont.)

- ☐ Computer screen captures

- ☐ Pen and tablets

- ☐ CAD / CATIA

- ☐ Data visualization software

- ☐ Thermal imaging

- ☐ Deep sea sonar captures

Types of Digital Visuals in E-Learning

Pedagogical Insights

… authenticates

Types of Digital Visuals in E-Learning

… aids visualization
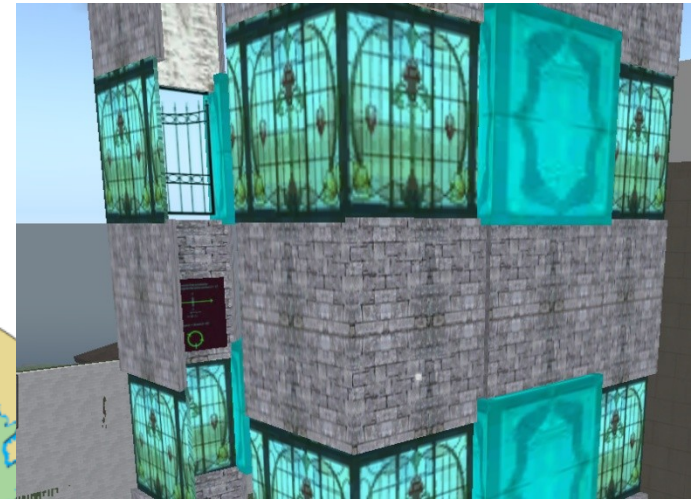
mental modeling

comparison and contrast

understanding
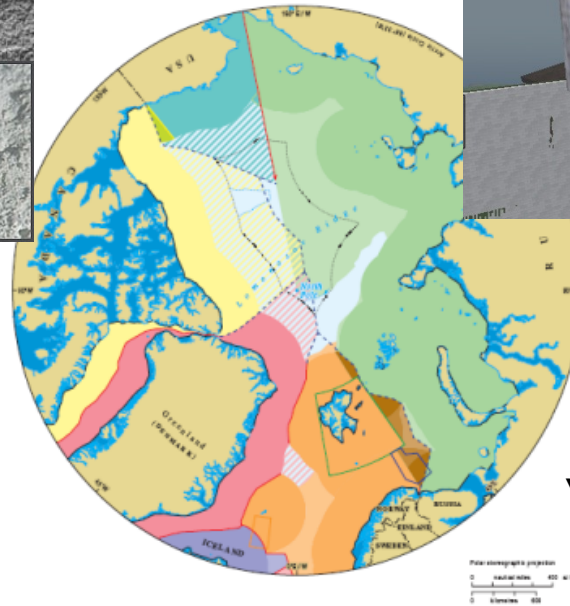
visual textures and sensations

Types of Digital Visuals in E-Learning

… expresses creativity
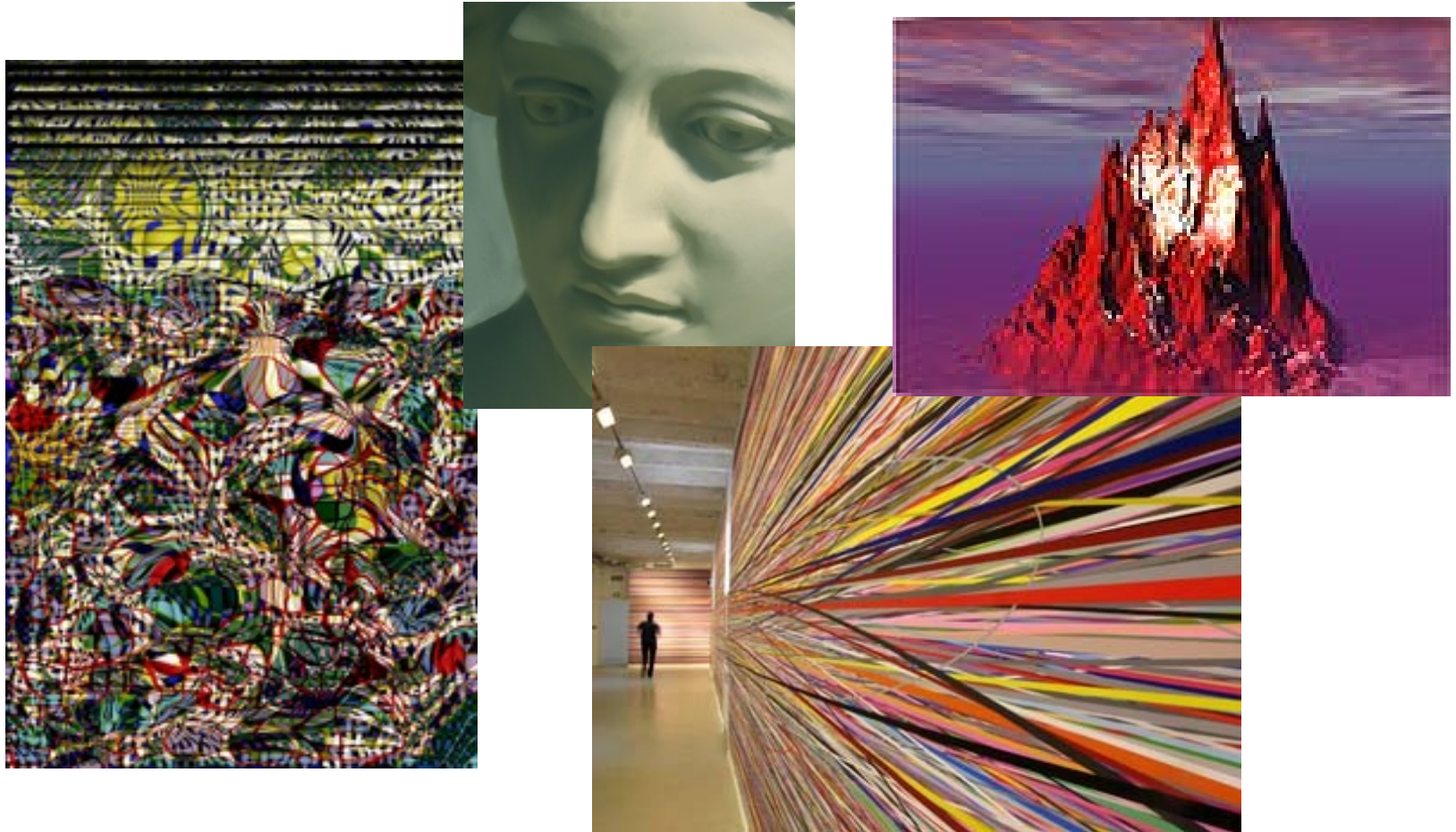
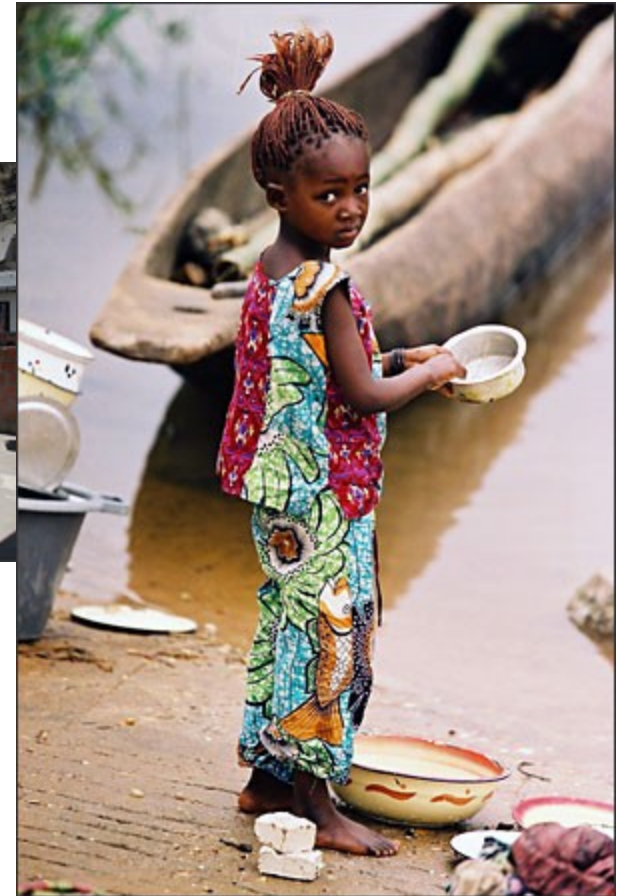Types of Digital Visuals in E-Learning

… manages complex ideas
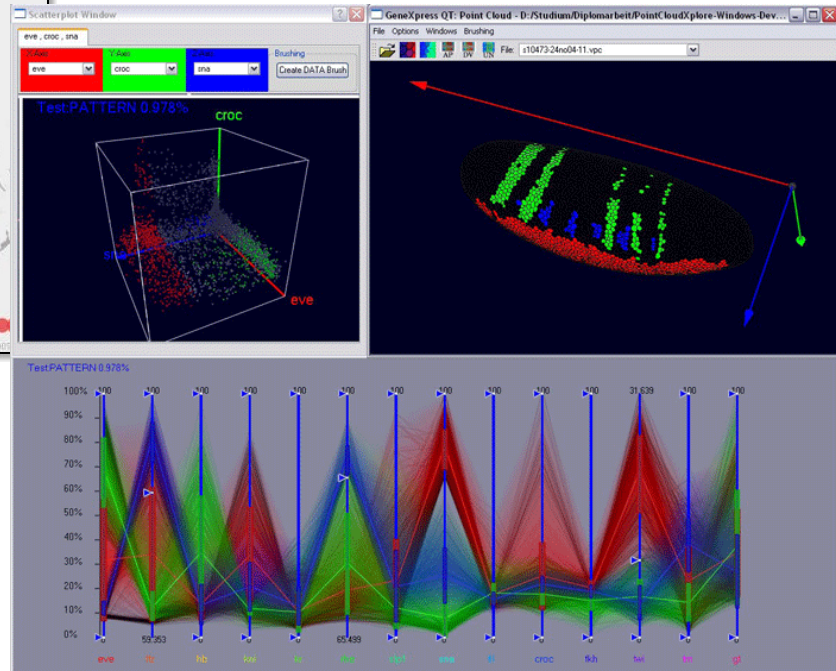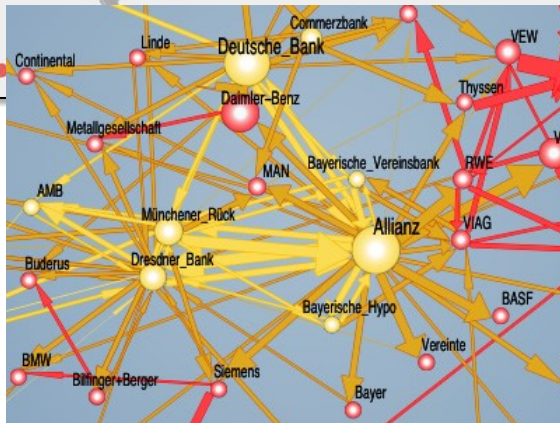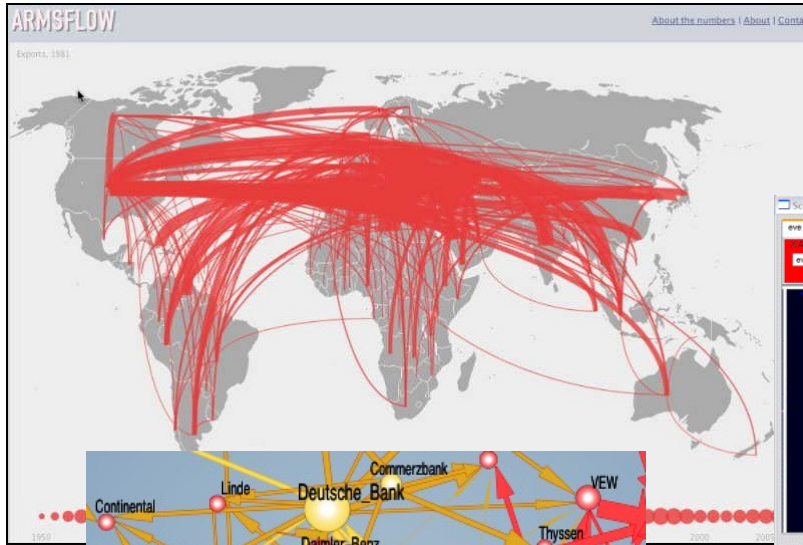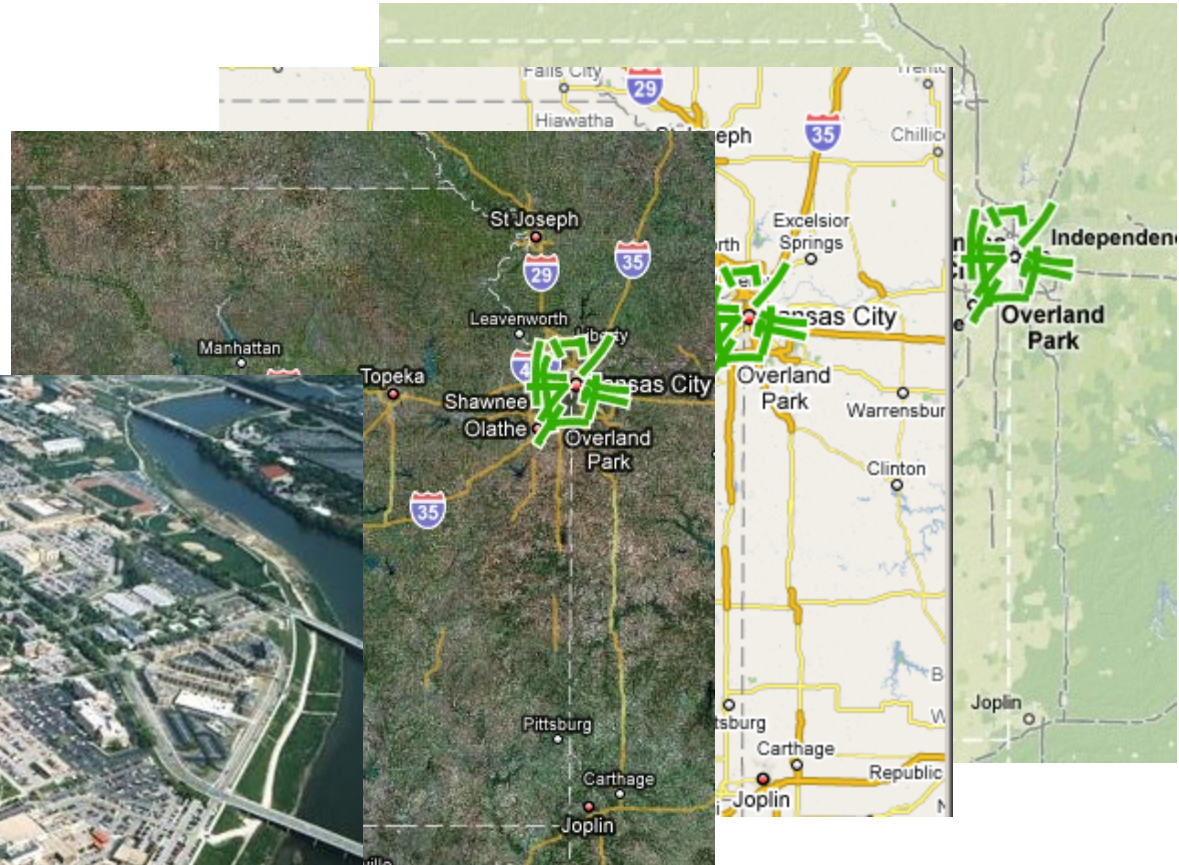
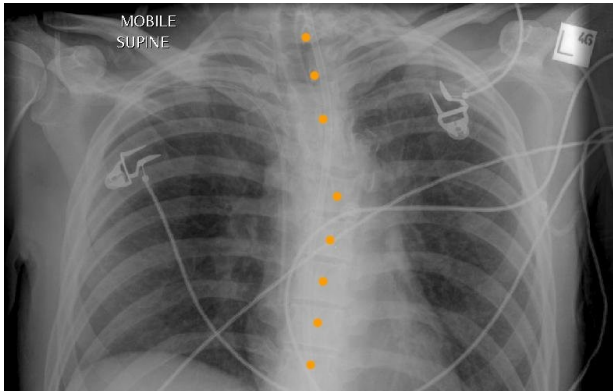Types of Digital Visuals in E-Learning

… humanizes and personalizes

direct address

calls to action

… captures new information

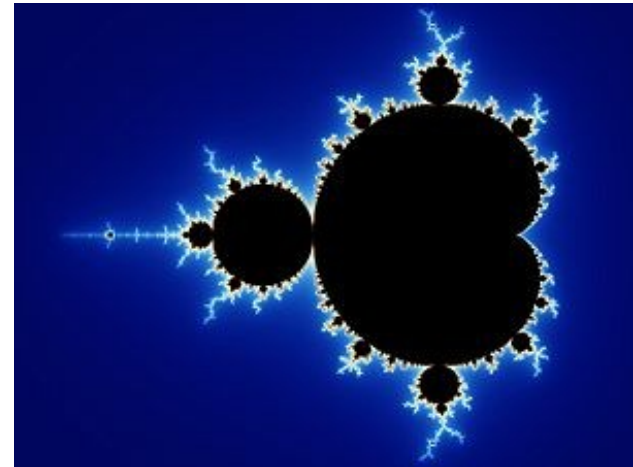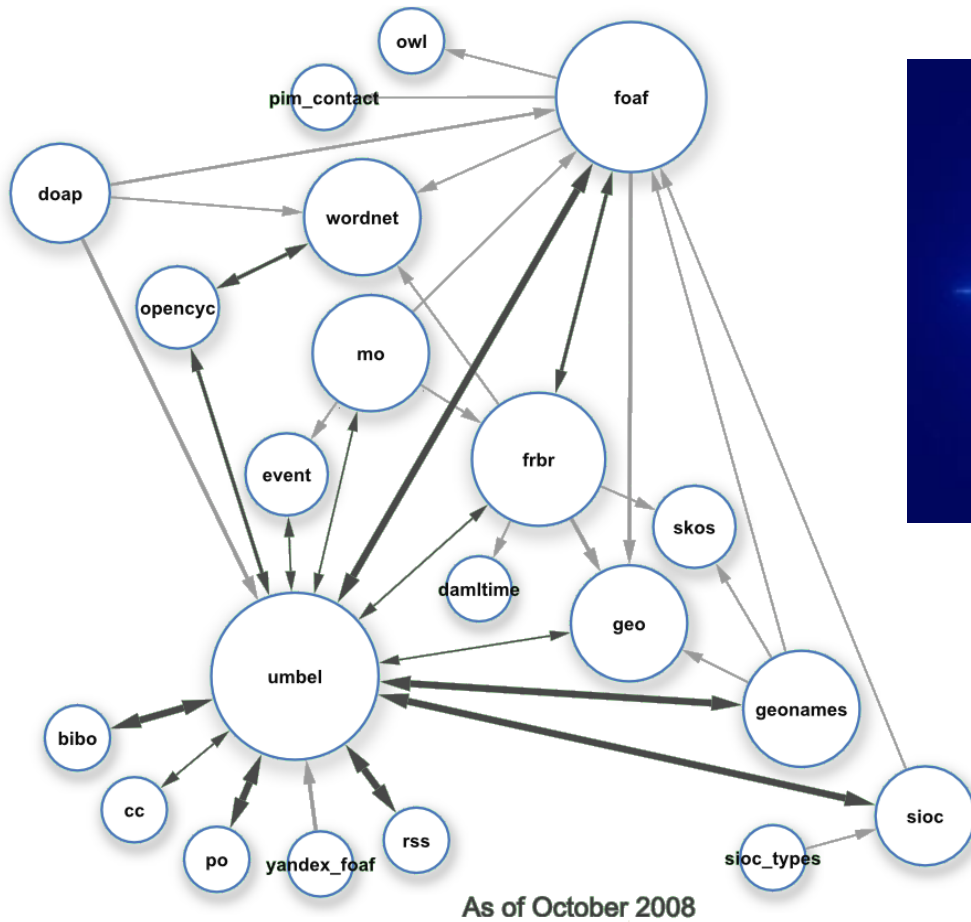Types of Digital Visuals in E-Learning

… conveys structured information

As of October 2008

multiple data points

user-manipulable systems
for deeper understandings
of relationships

Types of Digital Visuals in E-Learning

… entertains and engages

Types of Digital Visuals in E-Learning

… immerses (in digital time and space)

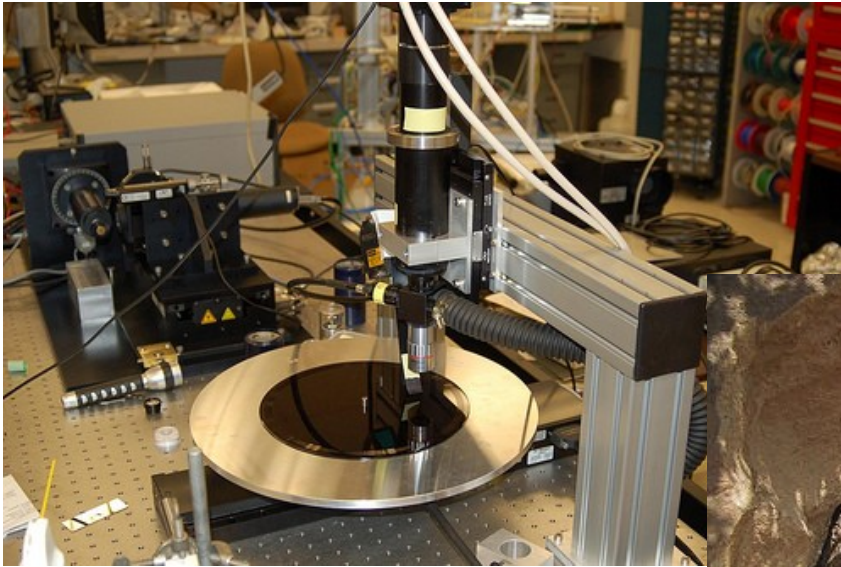Types of Digital Visuals in E-Learning

… supports social engagement

… and collaboration

…and interactivity

Types of Digital Visuals in E-Learning

… archives and preserves the real

in a context of "slow fires"

Applied Uses of Imagery in E-Learning

- Digital storytelling
- Digital wetlabs
- Medical analysis
- Outer space exploration
- Aerial image analysis
- Museum and art preservation

- Video 'tooning
- *Manga* illustrations
- Architectural designs
- Geographical mapping
- Machine art
- Simulation spaces / design …

Types of Digital Visuals in E-Learning

Conclusion and Contact Information

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Note: A few of the slides are derivative of a slideshow "Building Mental Models with Visuals for E-Learning" that the author presented at MERLOT in Aug. 2008. The images here were all either public domain or released through Creative Commons^{TM} licensure.