



# ***X3D: Extensible 3D***

## ***ISO Model and Scenario Interchange***

Federal Consortium of Virtual Worlds 2010

*Nicholas F. Polys, Ph.D., Virginia Tech*

*Don Brutzman, Ph.D., Naval Postgraduate School*

*David Colleen, Planet9 Studios*



VirginiaTech

# Session Outline

1. Introduction to Extensible 3D (X3D)
2. Technical Review : X3D
3. 4D Presentation w/ X3D: Medical Briefing
4. Install X3D-Edit
5. Raygun demo
6. X3D Report Card: Shared Virtual Worlds
7. Simple Authoring DIS + HTML 5
8. Questions & Discussion

# Information Ecology in the Metaverse

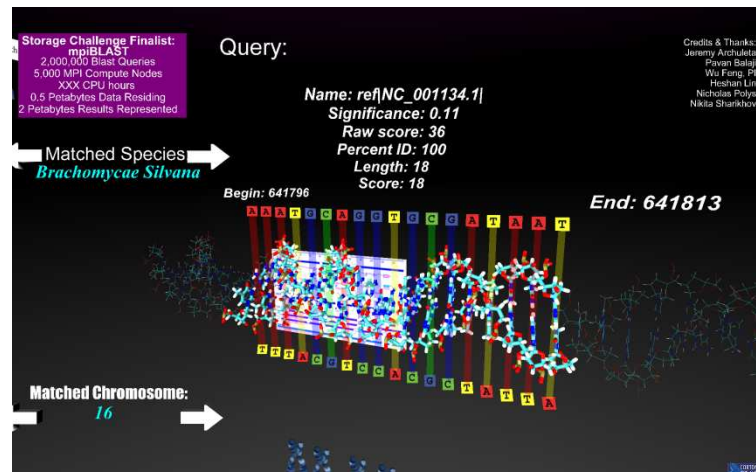
## *Foundations and Overview*

- Integrated Information Spaces
- X3D (from 30,000 feet)
- The Web3D Consortium



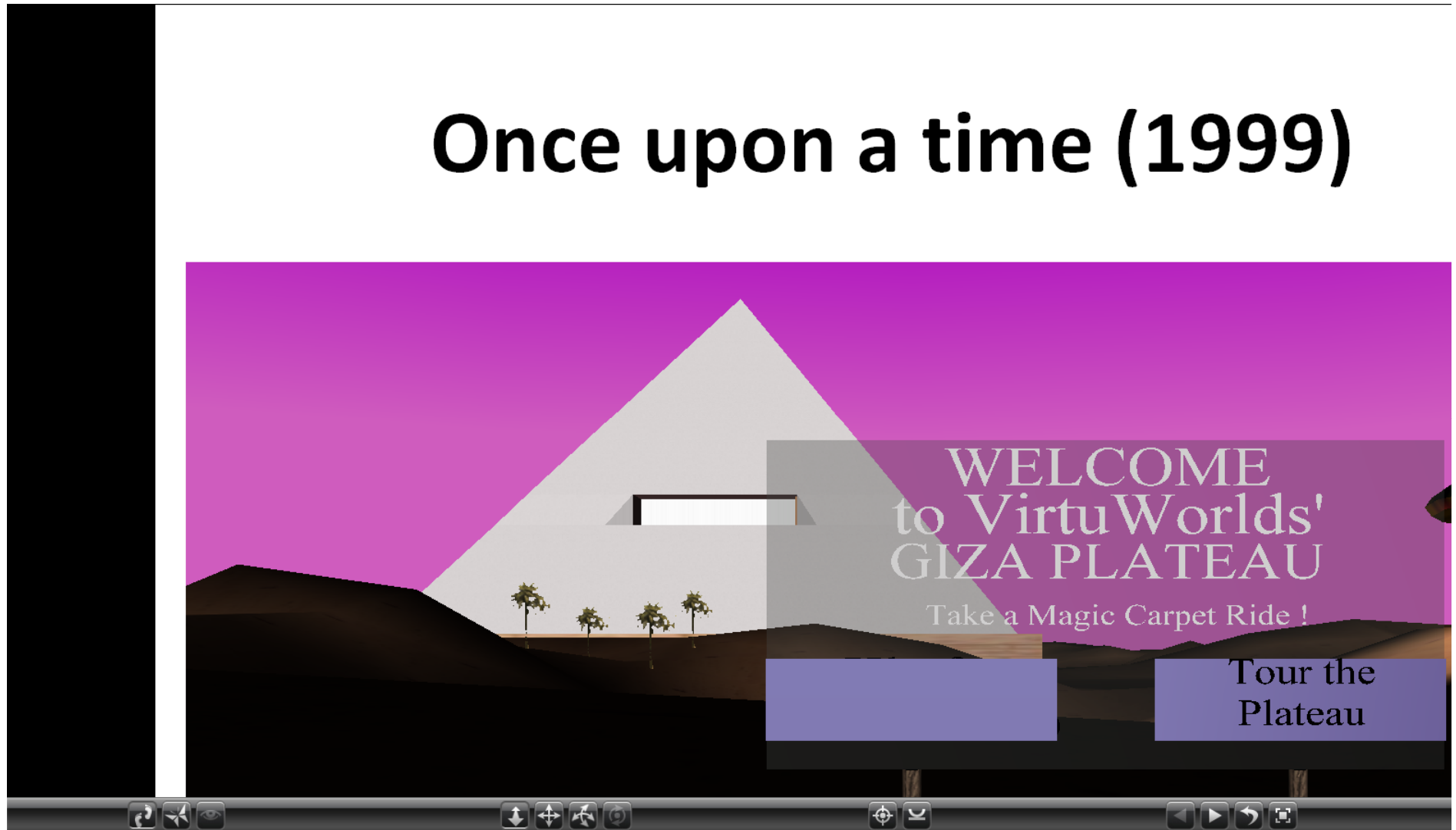
# Inexorable climb

- Hardware power & speed
- Commodity platforms
- Informatics integration
- Compelling Content



# Once upon a time (1999)

## Once upon a time (1999)



# Today:

## 4D is a first-class citizen

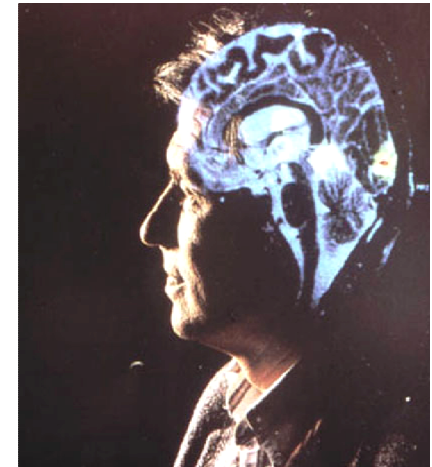
### *What's new?*

- Networked 3D digital assets
  - Objects and components
  - Appearances & materials
  - Environments
- Animation and Timeseries databases
- Metadata & web-aware referencing
- Interaction semantics

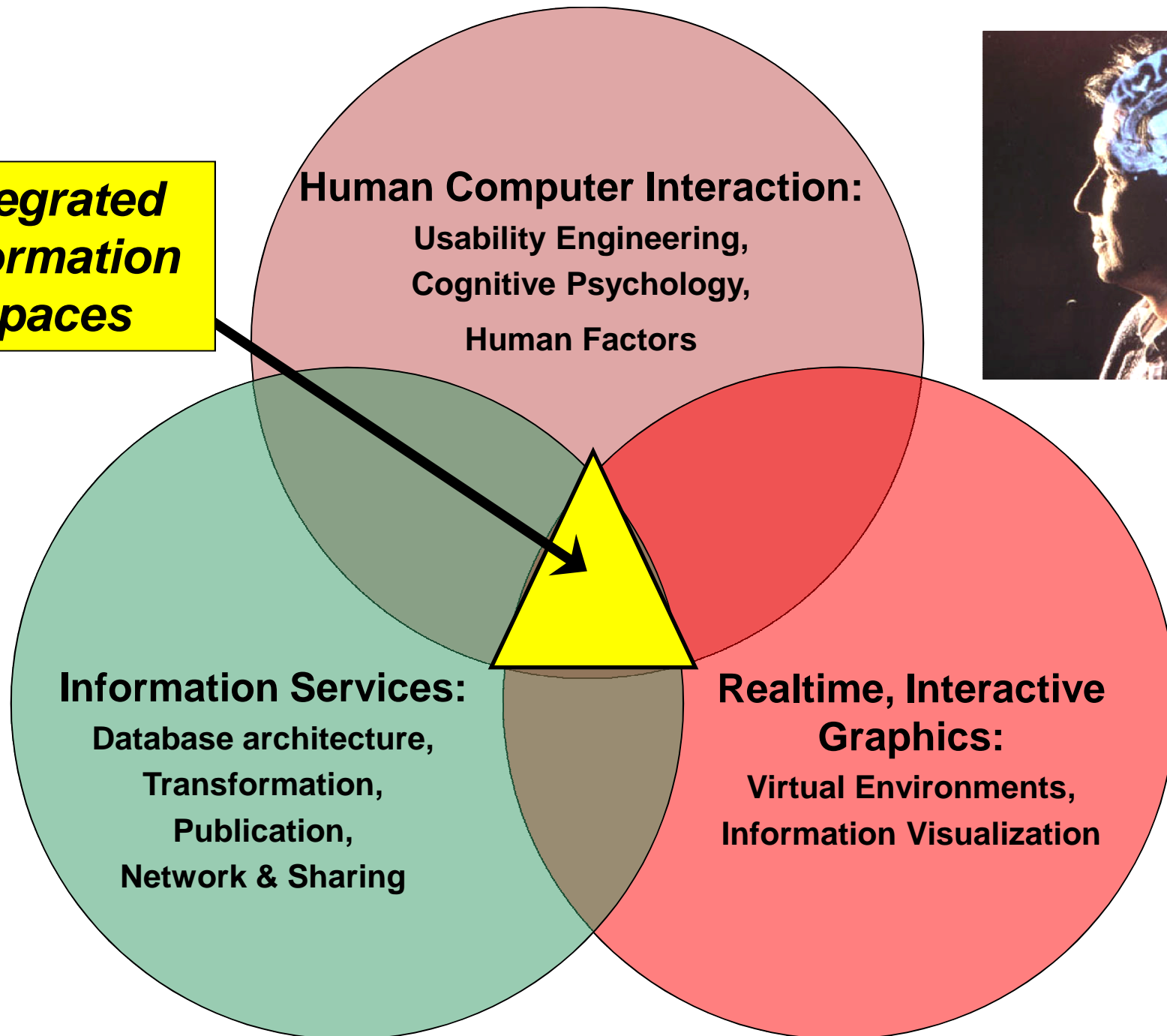
# Deep Media Convergence

## *Integrated Information Spaces*

- Represent objects, systems and properties  
(real, imagined or simulated)
- Contain spatially-located data and media resources (e.g. audio, video, animations)
- Interactive online spaces that evolve over time
- Hyperlinked worlds
- ... CyberSpace and the Metaverse!



***Integrated  
Information  
Spaces***





# Interoperable and Ergonomic Visualization: A Broad-based Need

*Improved visualization support is a recognized challenge:*

- NSF / NIH Report - 2006
- Visual Analytics Initiative – 2006
- New Media Consortium Horizons Report
- National Academy of Engineering (NAE)
- Many other agencies are facing the same problem: making sense of large, heterogeneous data sets



# Web3D & X3D

## Proven Innovation

- **Real time interactive graphics**
  - Lights, cameras, text, meshes, textures and materials
  - Animations, sensors, volumes & style
- **Interoperability** with web
  - distributed resources referred via URL/URI
  - E.G. images, sounds, videos, models, worlds
- **Durability**
  - ISO Specifications:
    - Abstract Spec (scenegraph)
    - Encodings
    - Bindings
    - H-Anim



<http://www.web3d.org/x3d/specifications/>

# ***Bitmanagement Video***

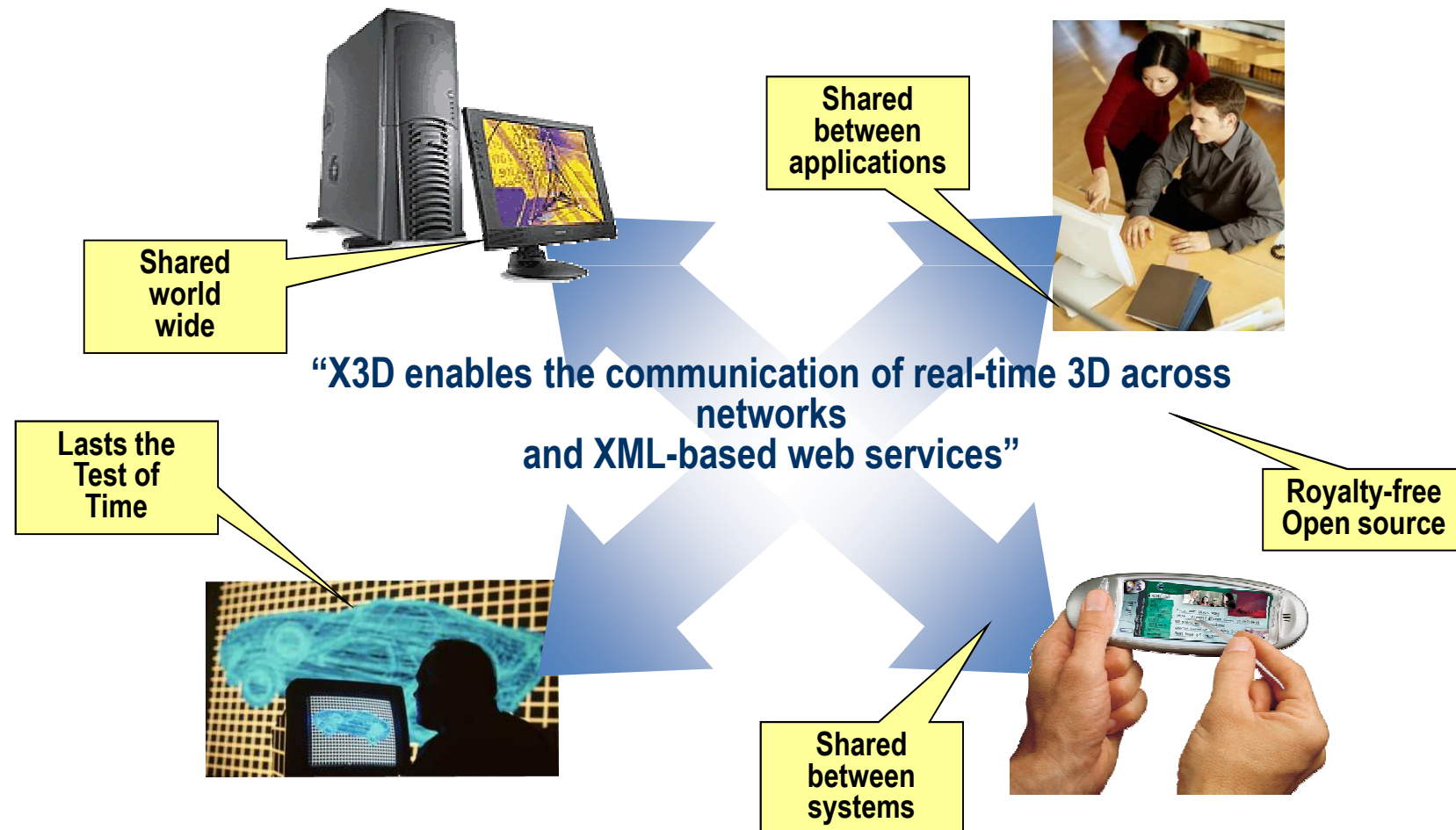


# Features at a Glance



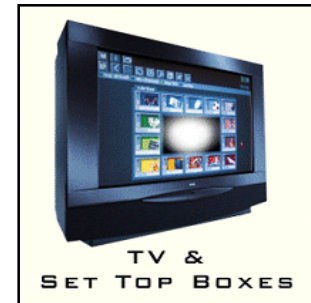
- ***Extensible 3D (X3D):***
  - ISO spec suite describing 4D assets, behaviors and interactive scenarios (scenegraph)
  - Profiles aggregate Components
  - Multiple Encodings and APIs
- ***Efficiency: Binary encoding, compression***
- ***Fidelity: double precision, floating origin, units***
- ***Portable: Hardware & Platform Independent***
- ***Interoperable: WWW, Semantic web, ...***
- ***Durable: archive-quality format***
- ***Proven: Network-aware, Enterprise-ready, Royalty-free***

# The ISO Standard for interactive 3D worlds across the Web





# Hardware Independent

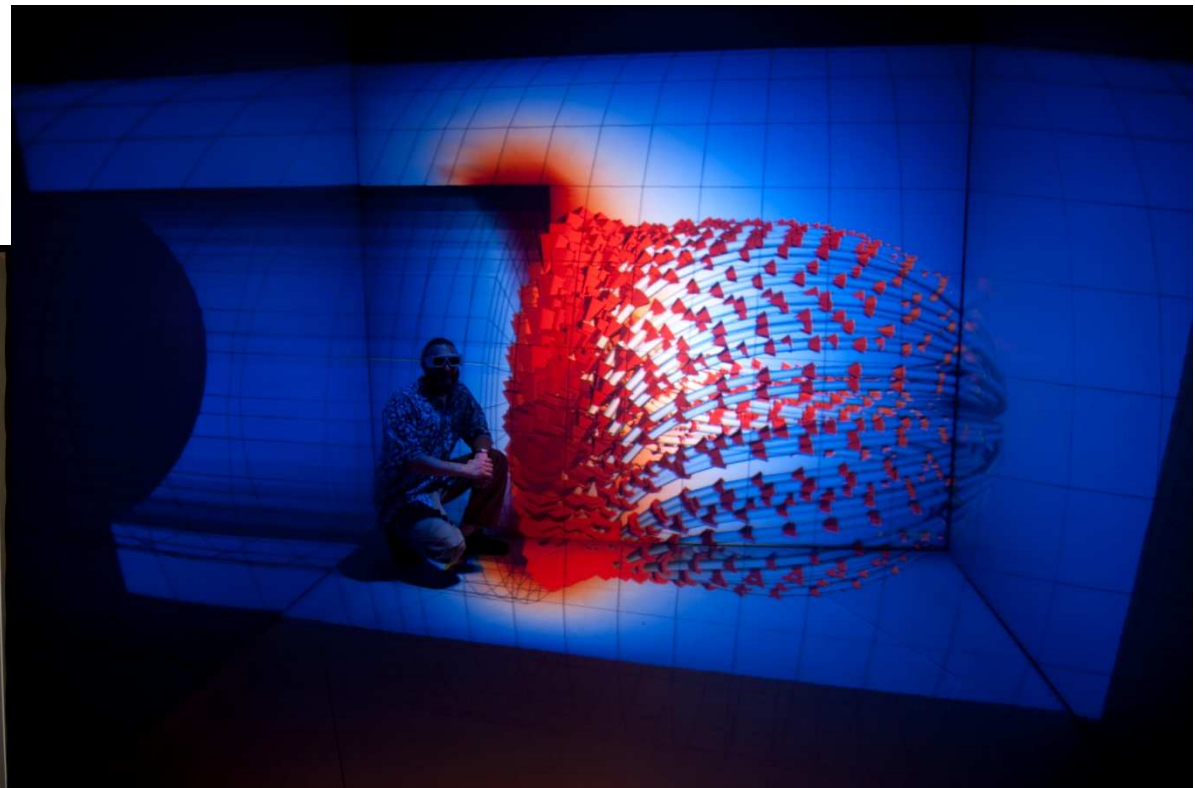
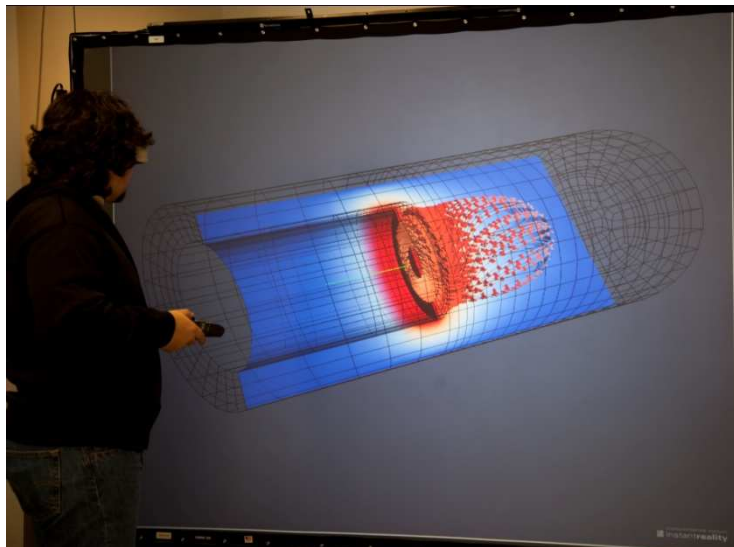
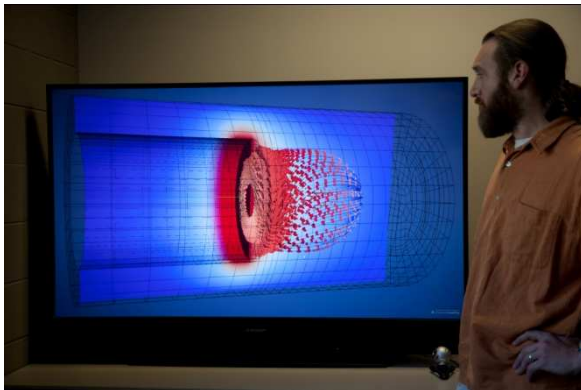




# X3D: Extensible 3D

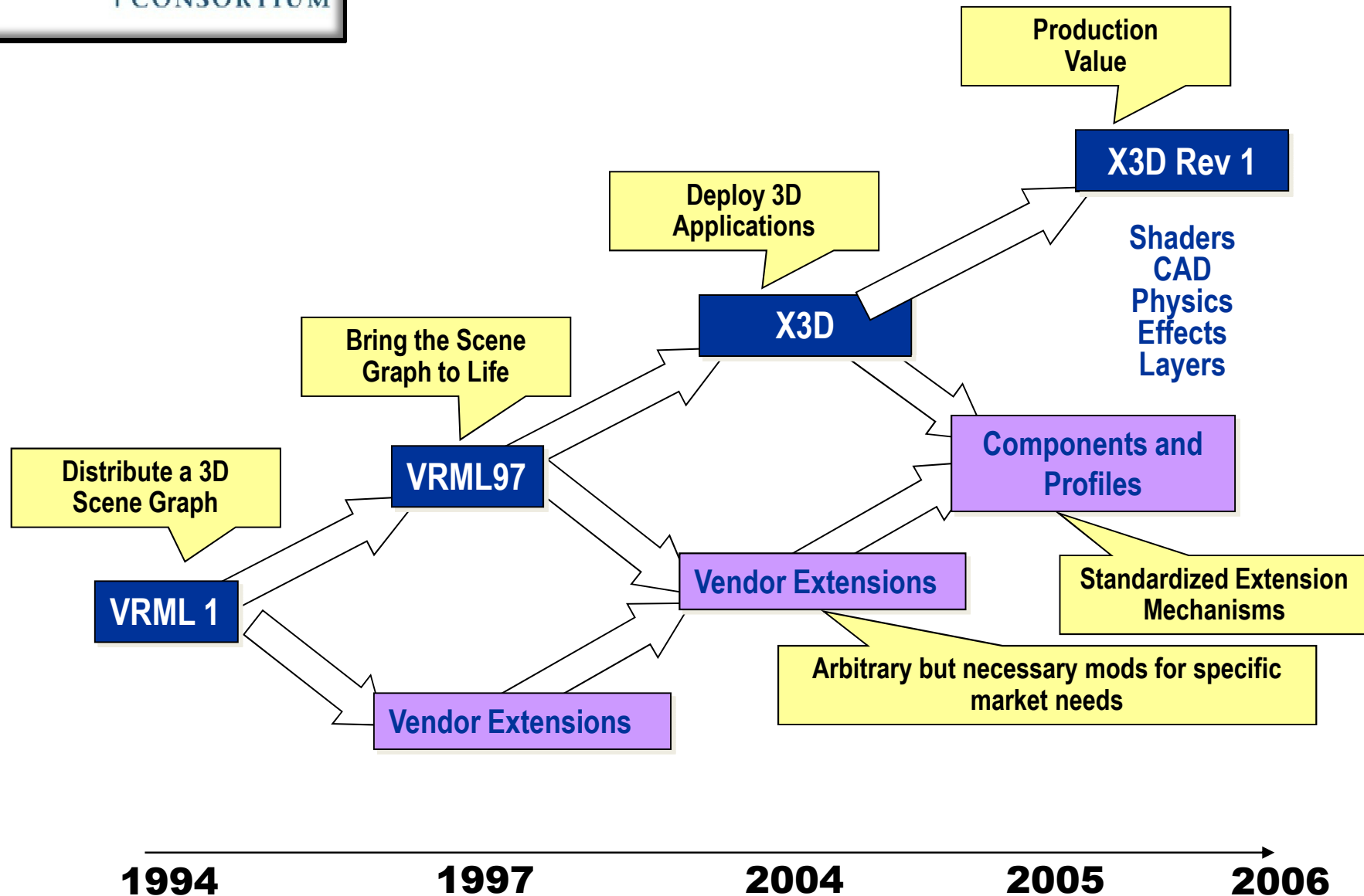
## Cross-Platform Virtual Environments

web|3D  
CONSORTIUM





# The Road to X3D





# X3D Encodings and Bindings

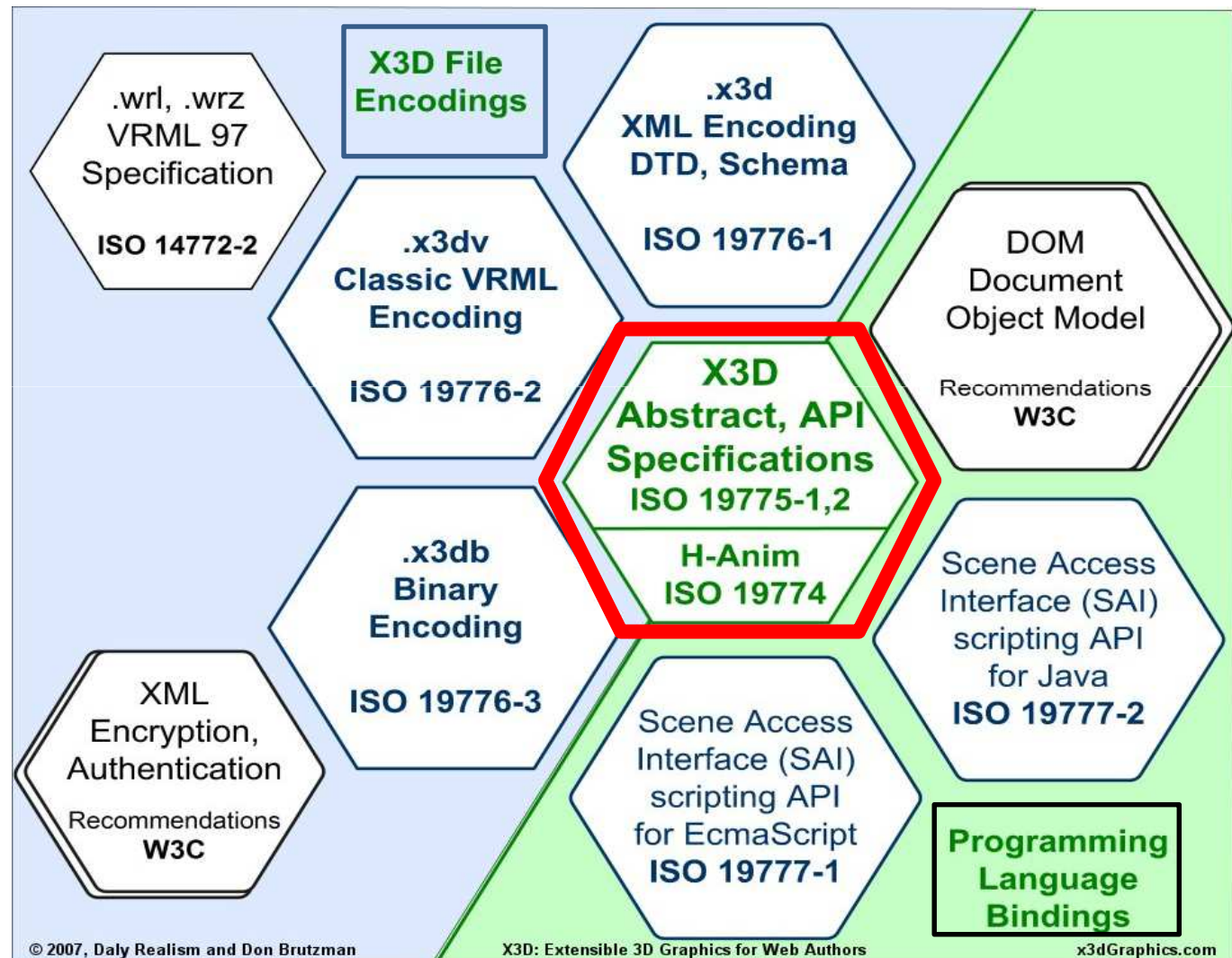
An equivalent X3D  
scenegraph  
can be:

**encoded in**

and

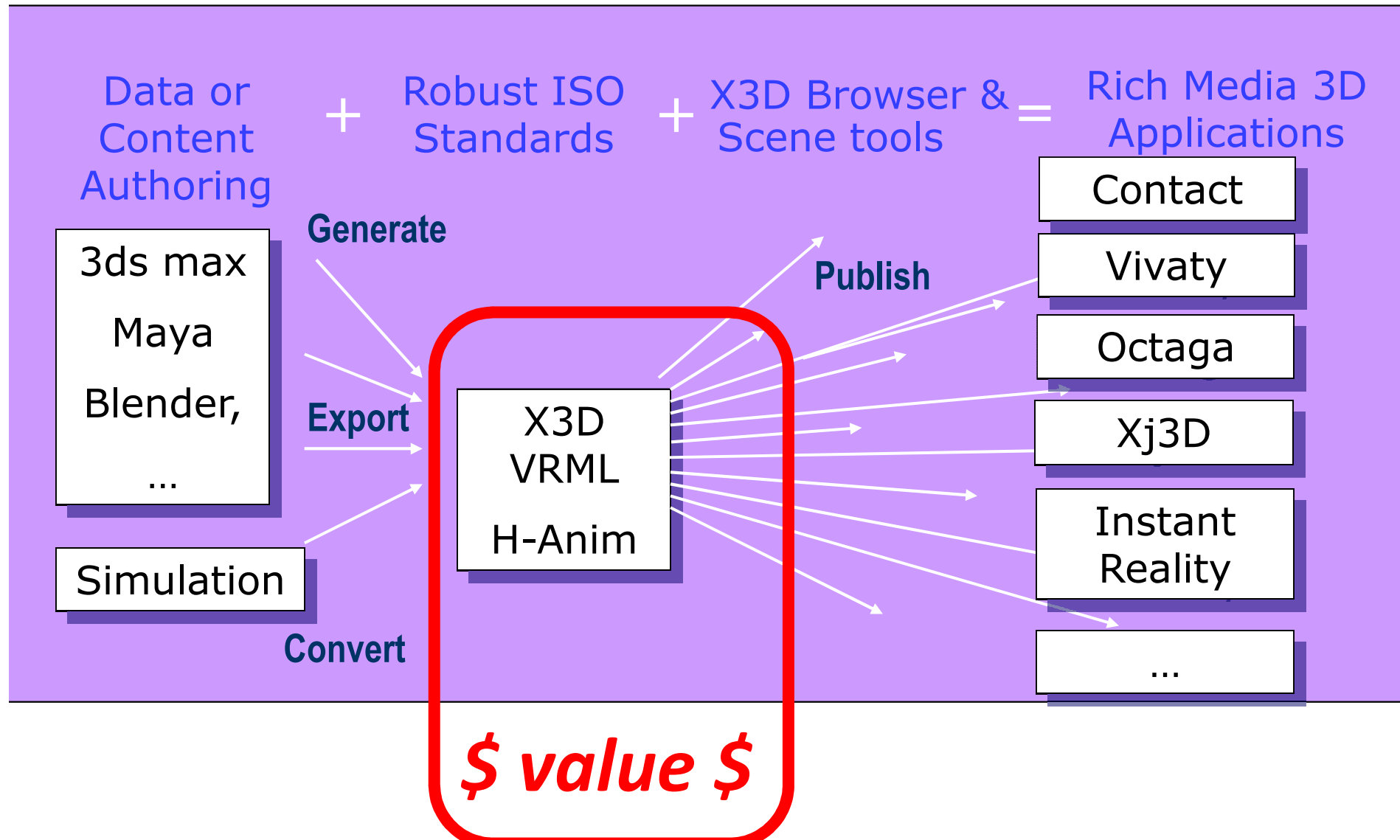
**manipulated by**

multiple  
Languages !

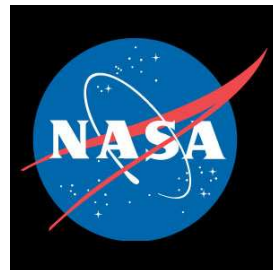


<http://www.x3dgraphics.com>

# Tool Independent Workflow



# International Adoption



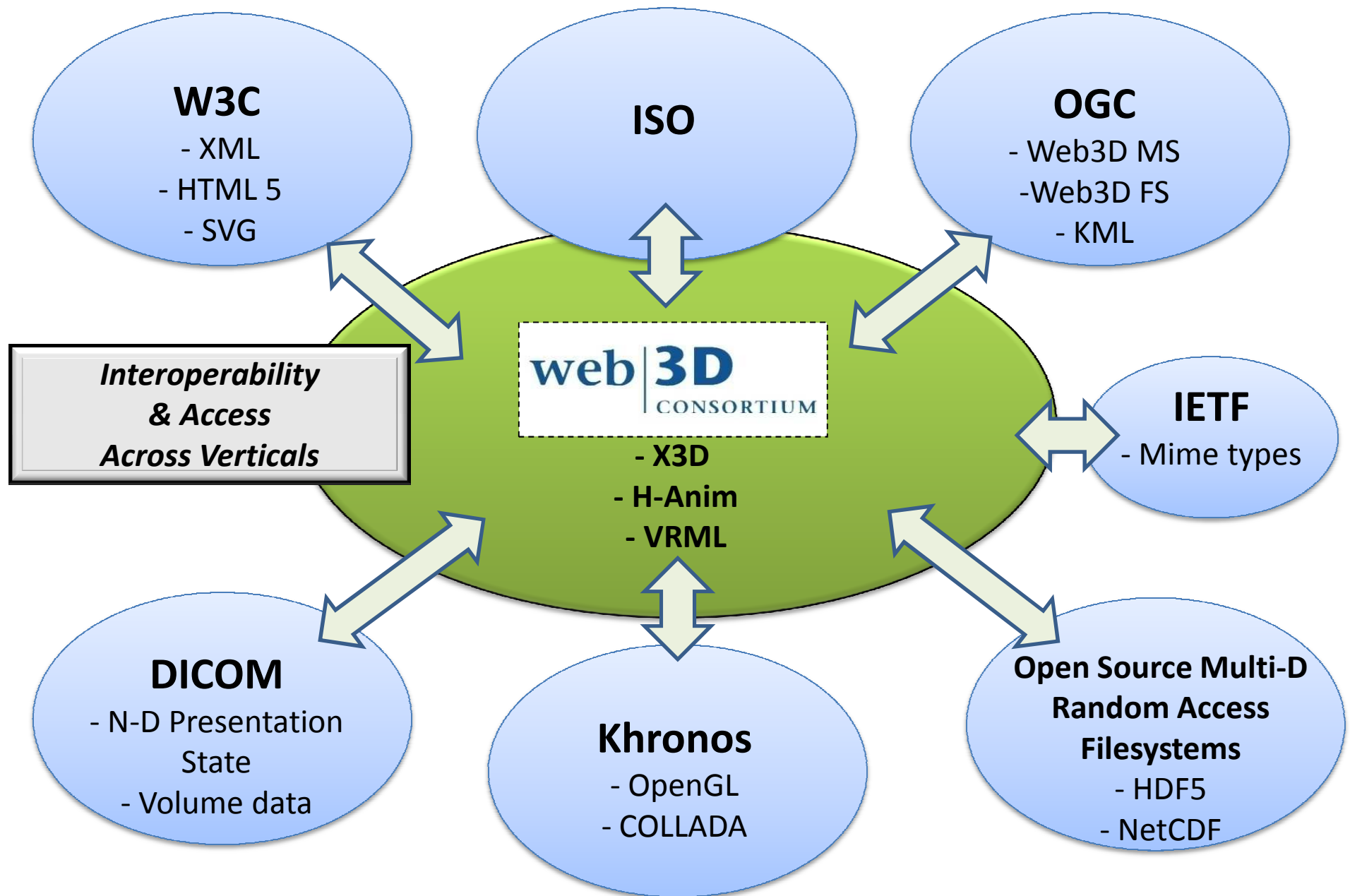
# The Web3D Consortium

A not-for-profit organization that develops and maintains ISO standards for the description and transmission of 4D data over telecommunication networks.

The X3D, H-Anim and VRML standards specify both a **file format and a runtime specification** that are open and royalty-free

[www.web3d.org](http://www.web3d.org)







# Features at a Glance



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# The Technology of a 3D Standard

- Real-time 3D scene graph
- Meshes, lights, materials, textures, shaders
- Integrated video, audio
- Animation
- Interaction
- Behaviors
- Scripts
- Application programming interfaces

# Brutzman Slides



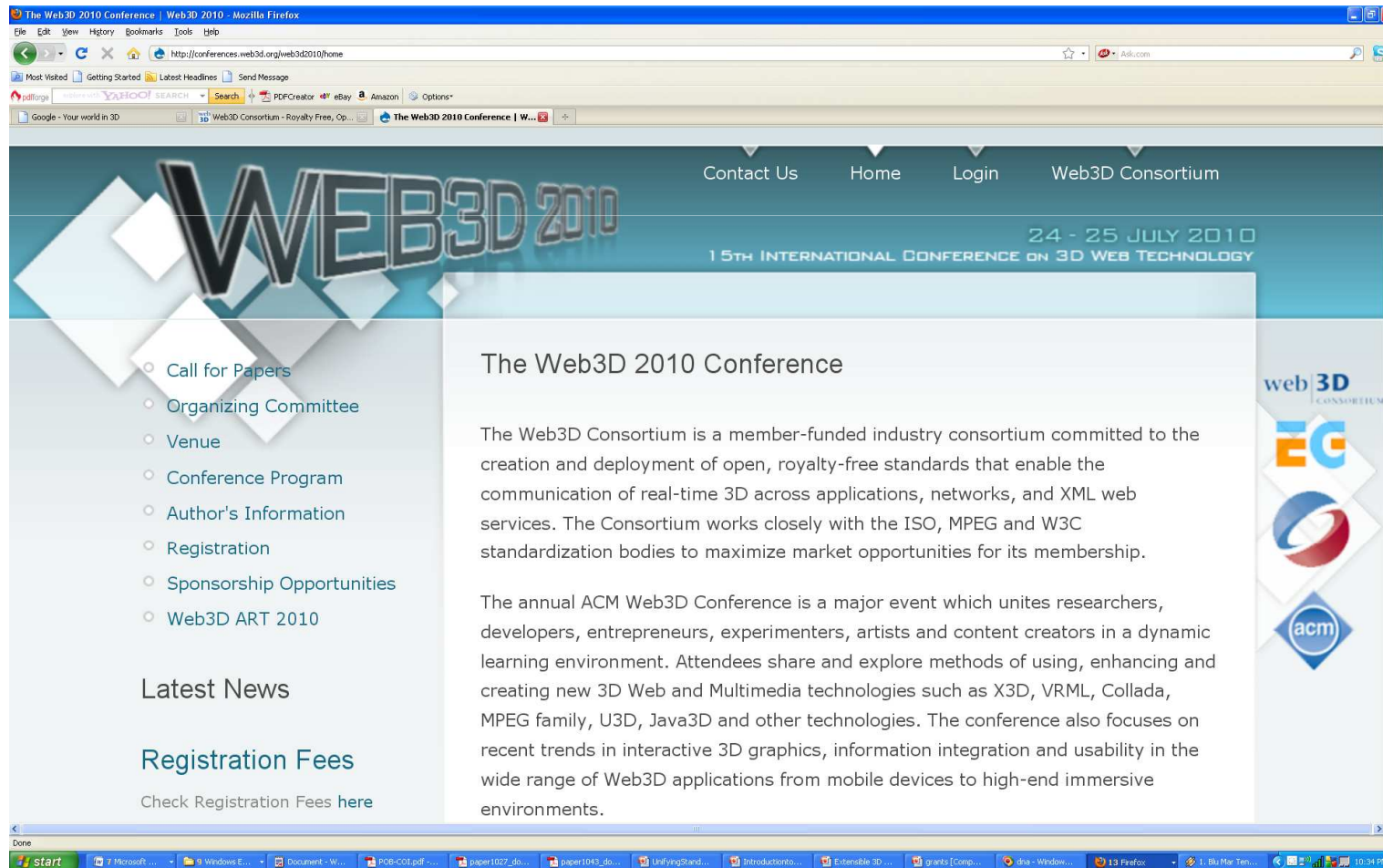
# Future Forward

- X3D Scene Graph
  - Adoption
  - Conformance
- Specifications:
  - Avatar Interchange (i.e. H-Anim)
  - network protocols for shared virtual worlds
  - n-D Presentation of Medical data
- JOIN US and build the next generation of specifications and standards!



# Web3D 2010

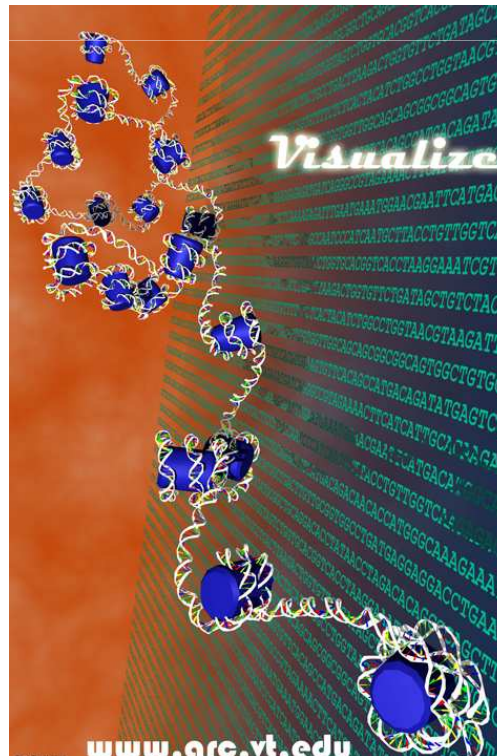
15<sup>th</sup> Annual ACM Conference  
Co-located with SIGGRAPH in LA  
July 24, 25





# VirginiaTech

- Advanced Research Computing:
  - [www.ARC.VT.EDU](http://www.ARC.VT.EDU)
- Visionarium Lab: Immersive Venues



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Questions? Comments?

Collaboration?

- [npolys@vt.edu](mailto:npolys@vt.edu)



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