



Collaviz[®]

The World in the Browser

XML3D & Ray Tracing

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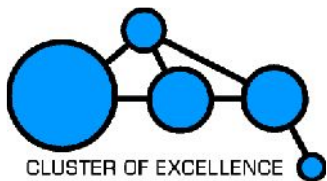
German Research Center for Artificial Intelligence (DFKI)
Intel Visual Computing Institute
Saarland University



Computer Science On Saarland Campus



UNIVERSITÄT
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Multimodal
Computing
and
Interaction



Visual
Computing
Institute



max planck institut
informatik



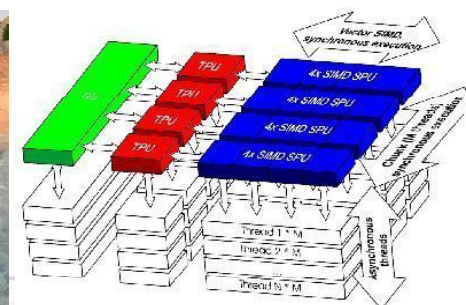
Max
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Institute
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Software Systems



German Research Center for Artificial Intelligence (DFKI)

- **Motto**
 - „Computers with Eyes, Ears and Common Sense“
- **Some Key Facts**
 - The largest application-oriented CS research institute in Europe
 - 4 Locations in Germany
 - Saarbrücken, Bremen, Kaiserslautern, Berlin
 - ~370 researchers (~700 with students)
 - More than 30 M€ revenue per year
 - More than 50 spin-offs







Realtime Ray Tracing

- Realtime Ray Tracing
 - Now in the main stream
- Fierce competition
 - Intel, Nvidia, ...
 - Building best HW for ray tracing
 - New many-core HW announced





3D-Internet: DualReality & SmartFactory



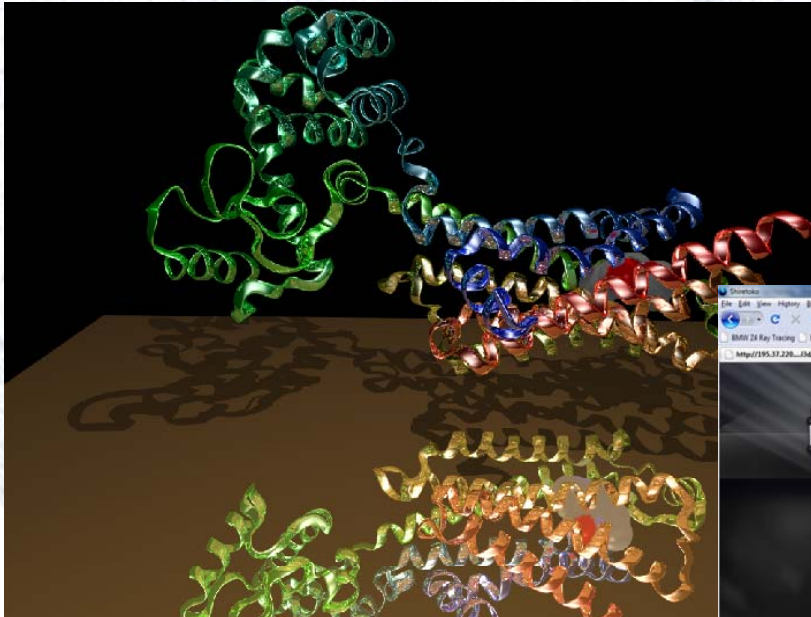


3D-Internet: New Interaction Techniques

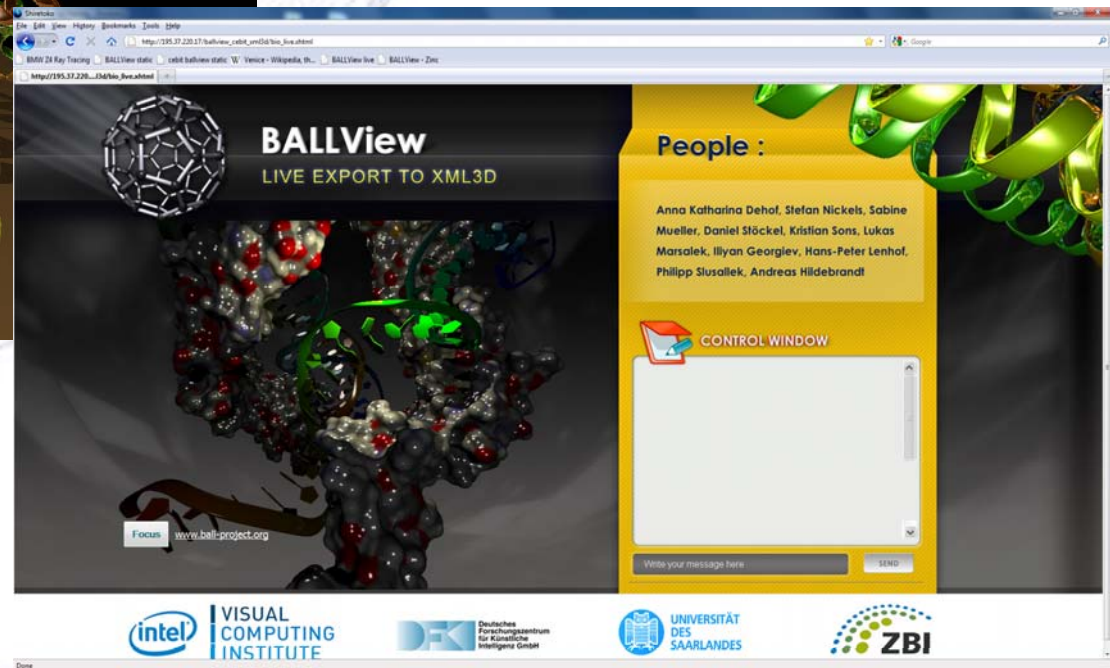




3D-Internet: Collaborative Engineering



Betablocker docked to
Beta-2 GPCR membrane
molecule





Why 3D-Internet?

- Two key corner stones of IT
 - Everything moving to the Internet
 - Rise of Many-core Processors
- Internet
 - Web browser: most used application, open all day
 - Most content must (also) be published here
- Many-Core (Graphics) Processors (GPUs)
 - Defining new processor architectures
 - Soon all devices will embed many-core processors
- Ubiquitous 3D graphics is finally possible
 - BUT



Why 3D-Internet?

- Two major trends – BUT no common ground
 - There is hardly any 3D content on the Web !!

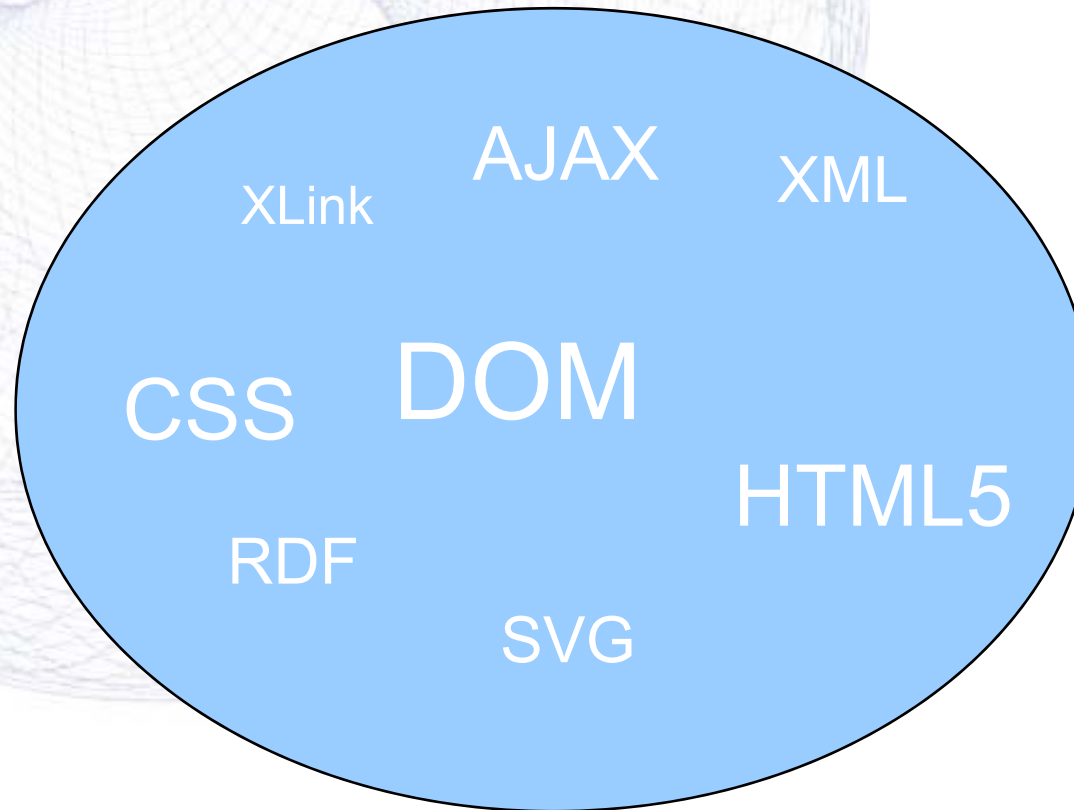


Why 3D-Internet?

- Two major trends – BUT no common ground
 - There is hardly any 3D content on the Web !!
 - What is available is NOT document-centered
 - WebGL, O3D, game-engine plugins, ...
- Our goals
 - Interactive 3D-graphics as a first class data type
 - Like HTML with text, images, audio, video, ...
 - Fully integrate 3D content into the document
 - Freely provide necessary Internet technology
 - Browser, server, protocols, ...



The Web

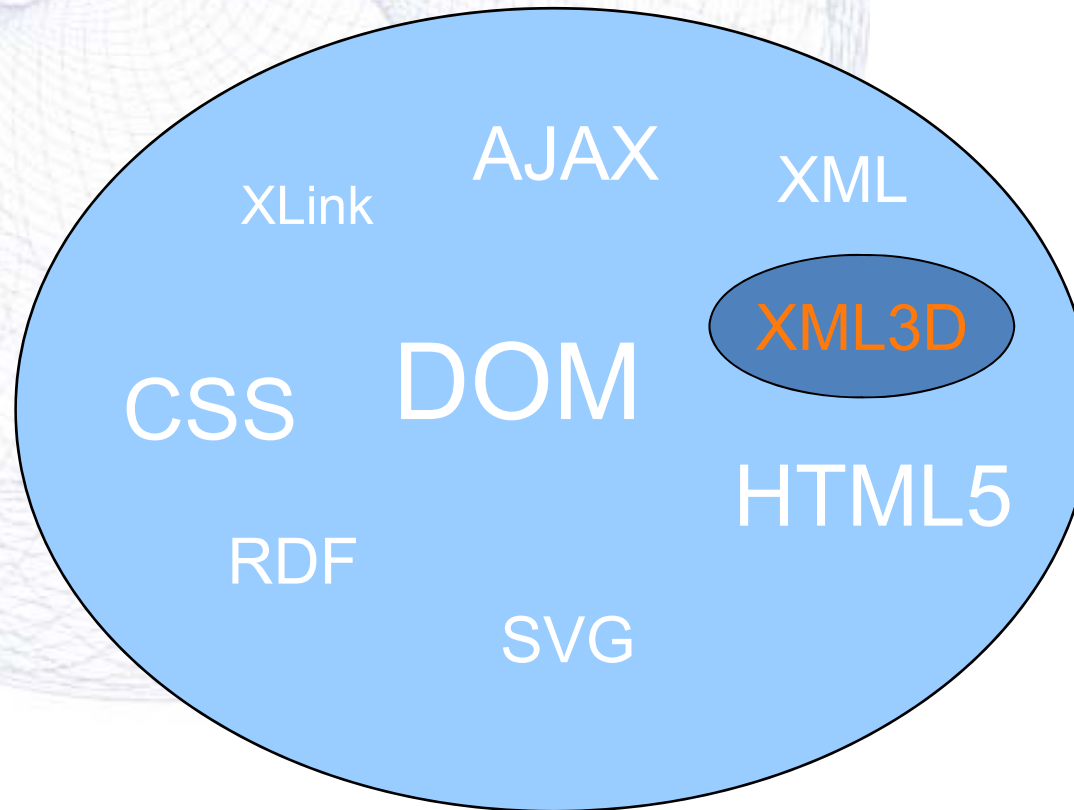


W3C

Millions of Web programmers



The Web



W3C

Millions of Web programmers



XML3D

- **Novel Approach to Interactive 3D Graphics**
 - Minimal extension to HTML/DOM for interactive 3D
 - Declarative approach for geometry, materials, interaction, ...
 - 2D and 3D integrated within the same document
 - Can reuse images and nested HTML for textures
 - Industrial-strength: physically-based and scalable
 - Highly realistic rendering (OpenGL & Realtime Ray Tracing)
 - Very large models and stream processing on GPU
 - Uses DOM as API
 - Well known by all Web programmers (millions!)
 - Fully integrated with Javascript and DOM



XML3D

- **Novel Approach to Interactive 3D Graphics**
 - Full interactivity
 - Events (e.g. “onmouseover”) can also be applied to 3D
 - Application programming in Javascript
 - CSS to separate content from style
 - Simple and powerful specification
 - Used for materials, transformations, ...
 - Full support for programmable GPUs
 - Programmable shading (materials, animation, ...)
 - HW-oriented data formats
 - Portable material descriptions via AnySL
 - Unified shaders for ray tracing & rasterization (JIT)



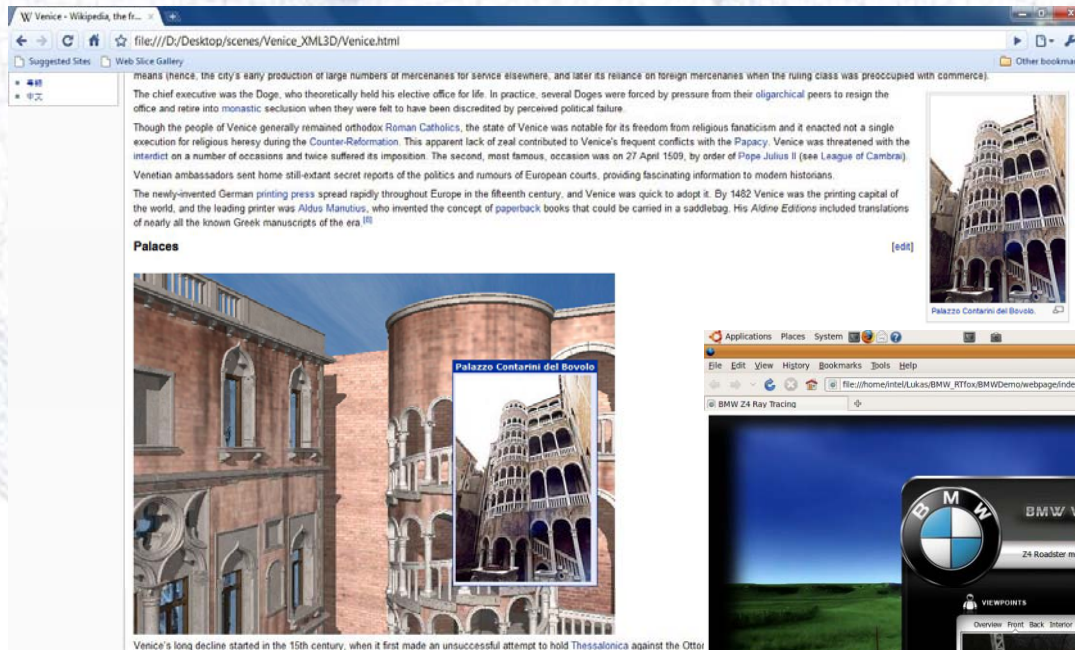


XML3D – Status Quo

- **Several implementations**
 - Native in modified Firefox
 - Native in modified WebKit
 - Google Chrome, Apple Safari, most OpenSource browsers
 - WebGL based (reduced functionality)
 - Any browser with WebGL
 - QtWebKit for standalone applications (in progress)
- **XML3D will be freely available**
 - Enable new innovations on common SW platform
 - DFKI helps you get started

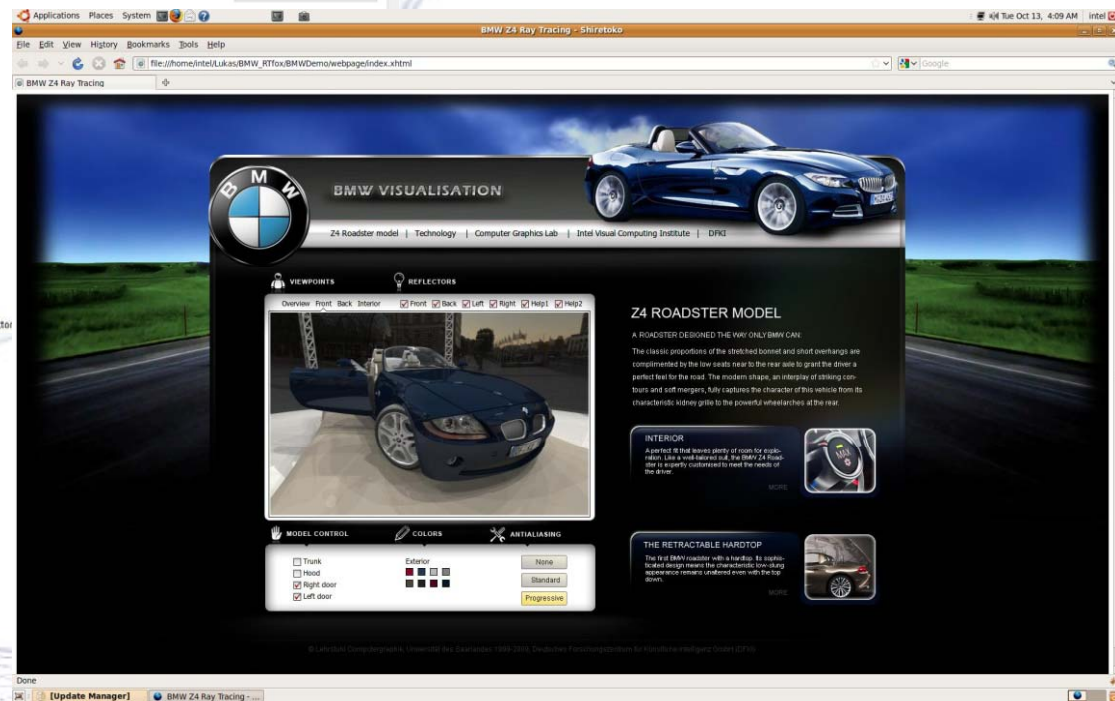


XML3D in Firefox and WebKit



Wikipedia page on Venice
Allows interactive
exploration of
Venetian palace

Web-based car configurator
All user interaction via HTML



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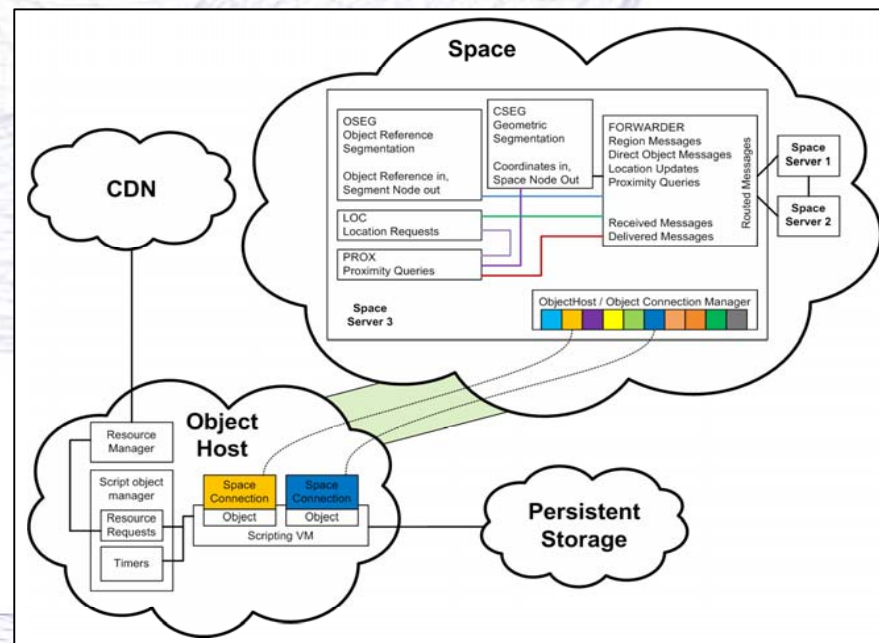
Forum TER@TEC, 16 juin 2010

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XML3D and Collaboration

- Sirikata Architecture (with Stanford)
- Realtime Collaborative Interaction
 - Efficient update and coordination protocols





Conclusions

- Infrastructure for 3D is now becoming available
 - 3D processing and output devices, fast Internet
- Need to define document formats for 3D
 - Fully integrated with Web (HTML, CSS, JS, ...)
 - Allows full interactivity

