XML 3D Formate
X3D und XVL

Seminar
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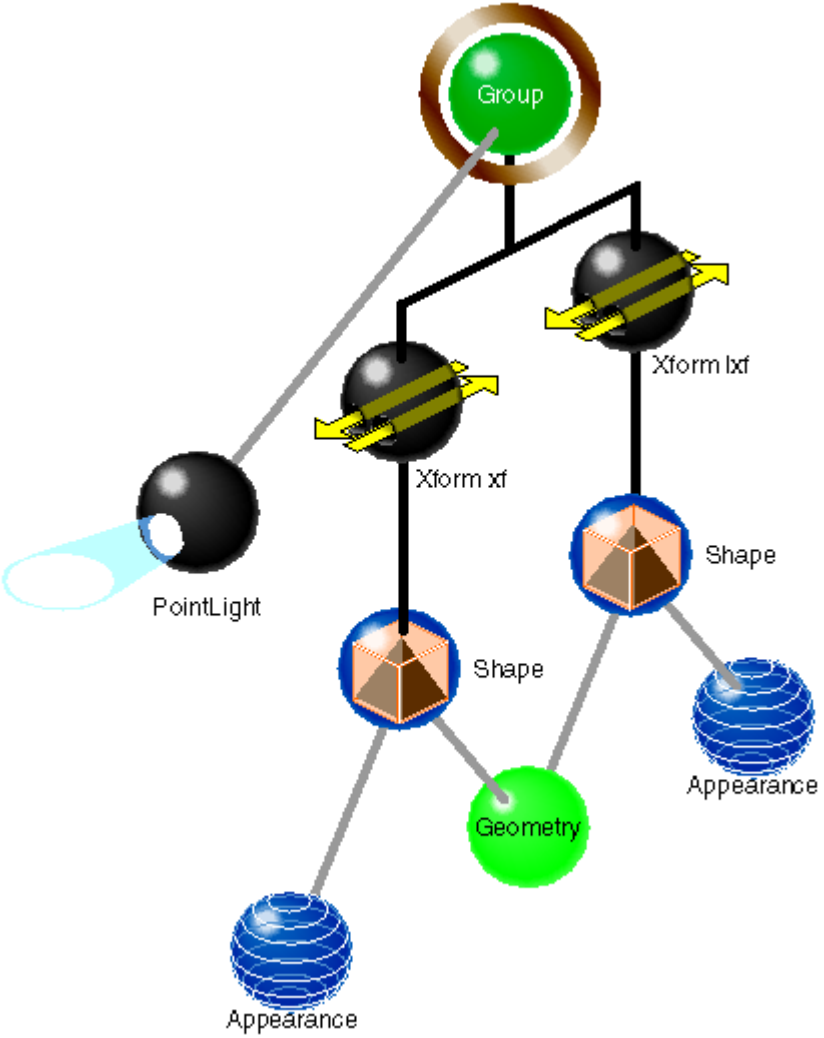
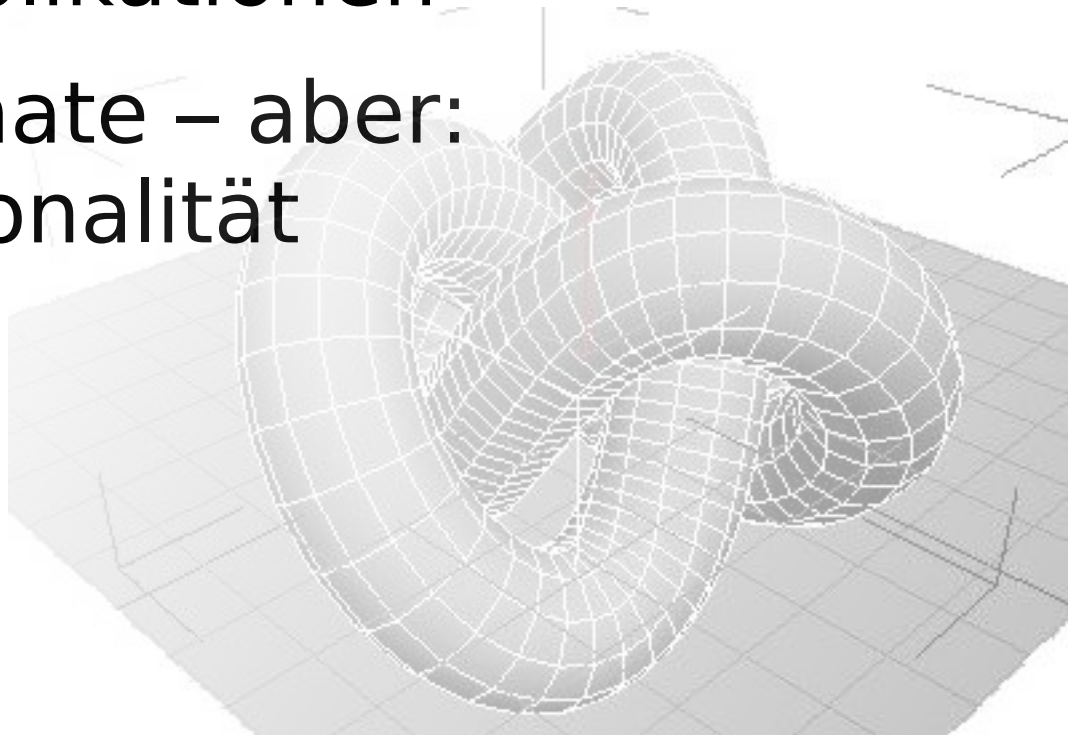


Motivation

- Wachsende Bedeutung von 3D in allen Bereichen
- Datenaustausch zwischen verschiedenen Applikationen
- Ständig neue Formate – aber: Kaum neue Funktionalität



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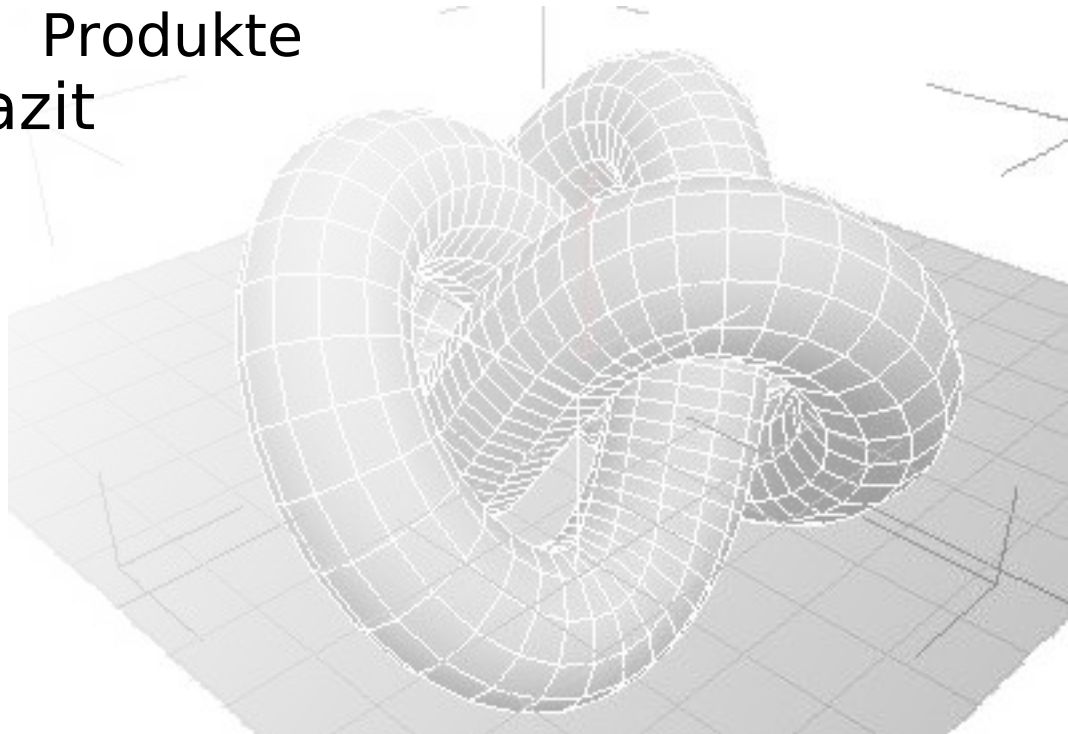
Fazit

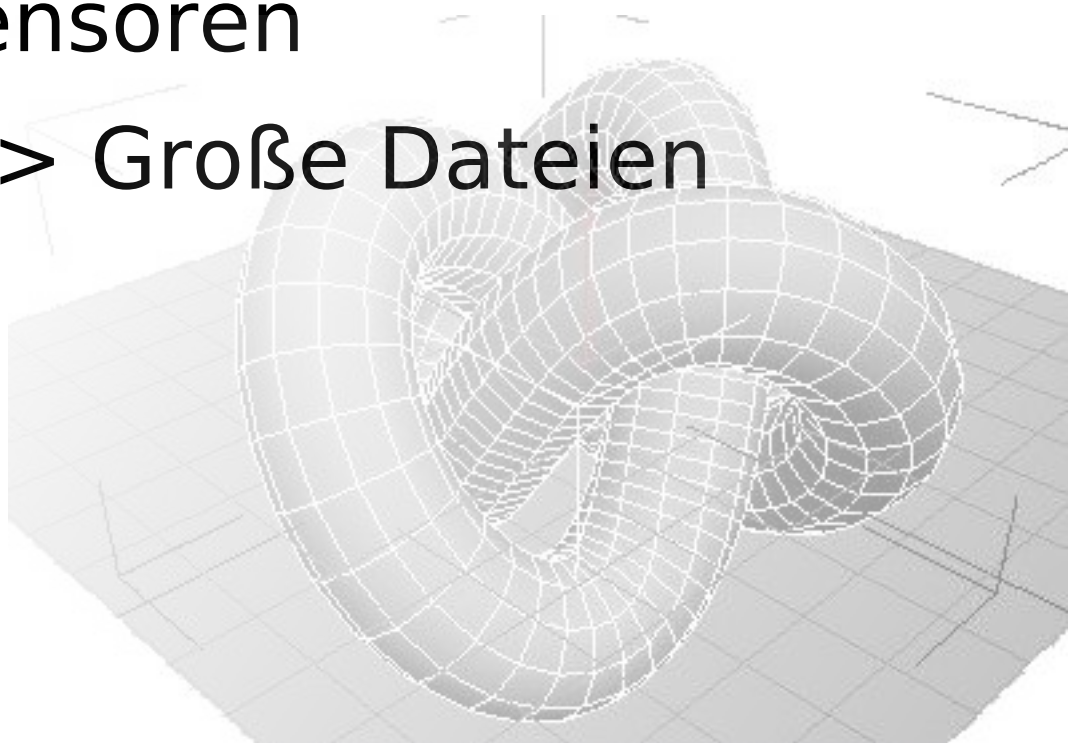


Was bisher geschah

- CAD/CAM
  - Entwicklung, Fertigung bis in den Verkauf
  - Hohe Genauigkeit
- Echtzeit
  - Film, Spiele, Präsentation
  - Schein wichtiger als Sein

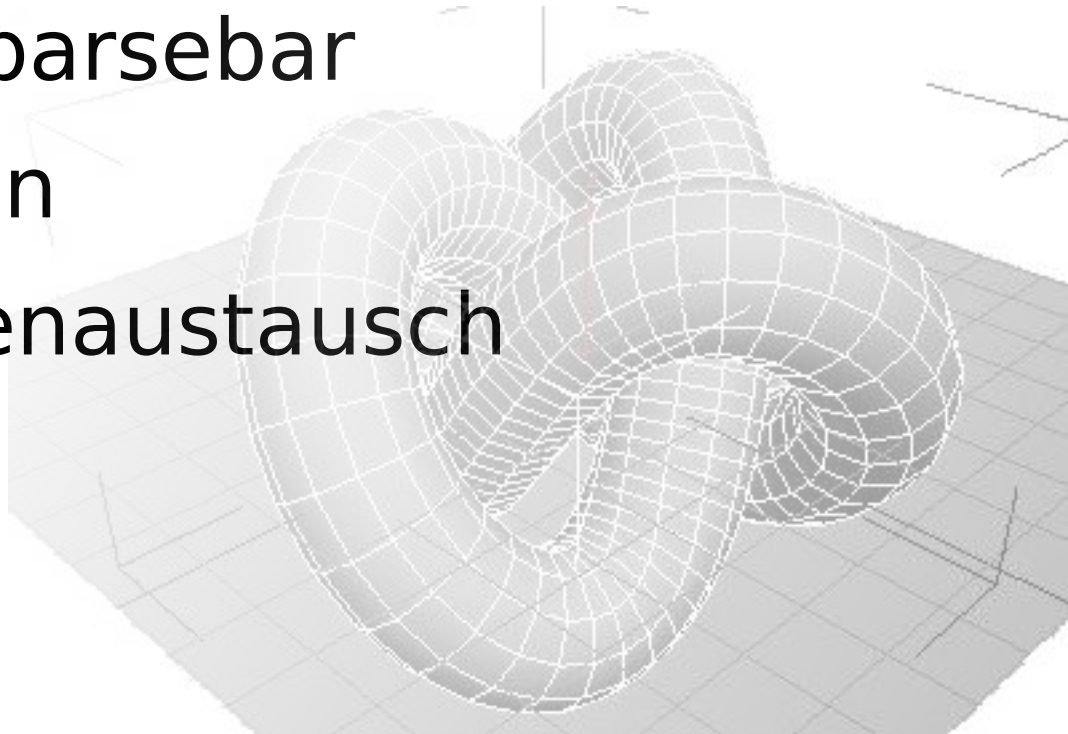
VRML

- Erstmals offener Standard
- Basierend auf Szenengraph
- Einfache Geometrie, Materialien, Transformation, Sensoren
- Stark strukturiert -> Große Dateien
- Kein Streaming
- Es fehlen Features



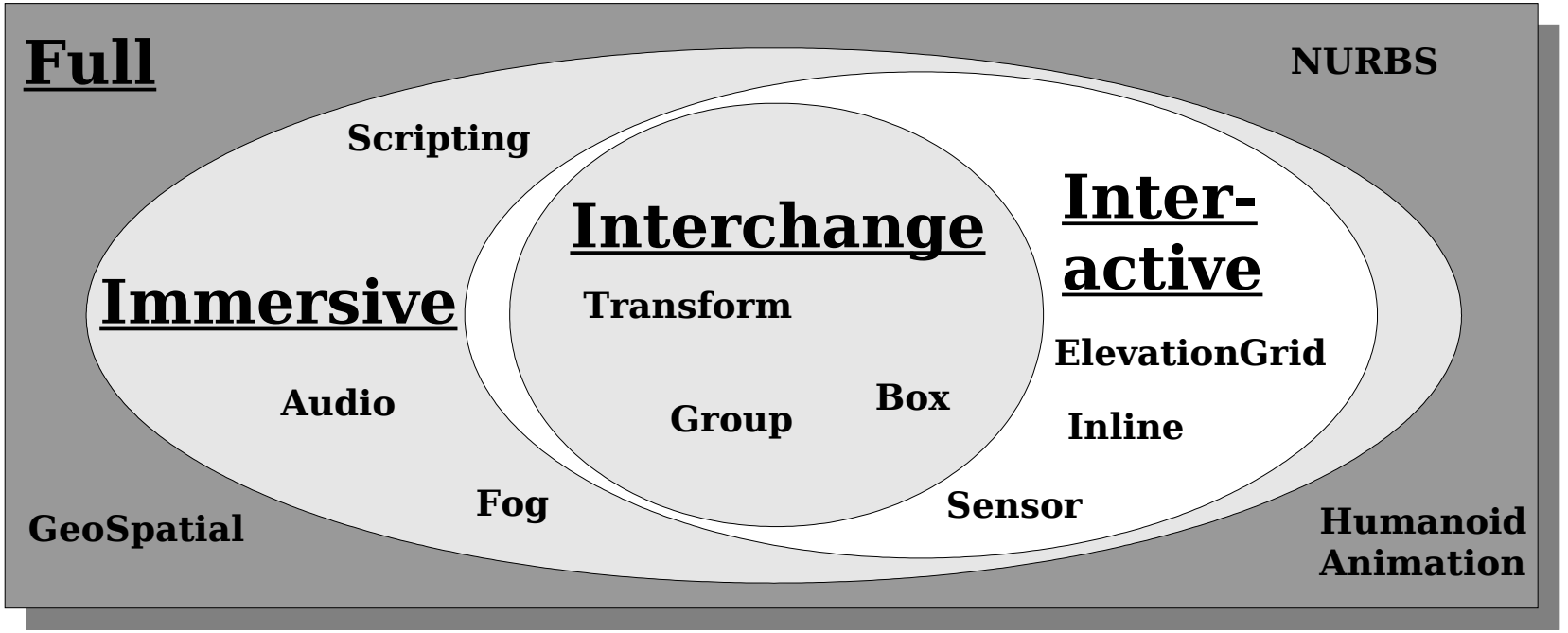
Warum XML?

- Reine Auszeichnungssprache
- SGML Dialekt
- Reines Textformat - Human readable
- Mit “Bordmitteln” parsebar
- Nahtloses Einbetten
- => Ideal zum Datenaustausch



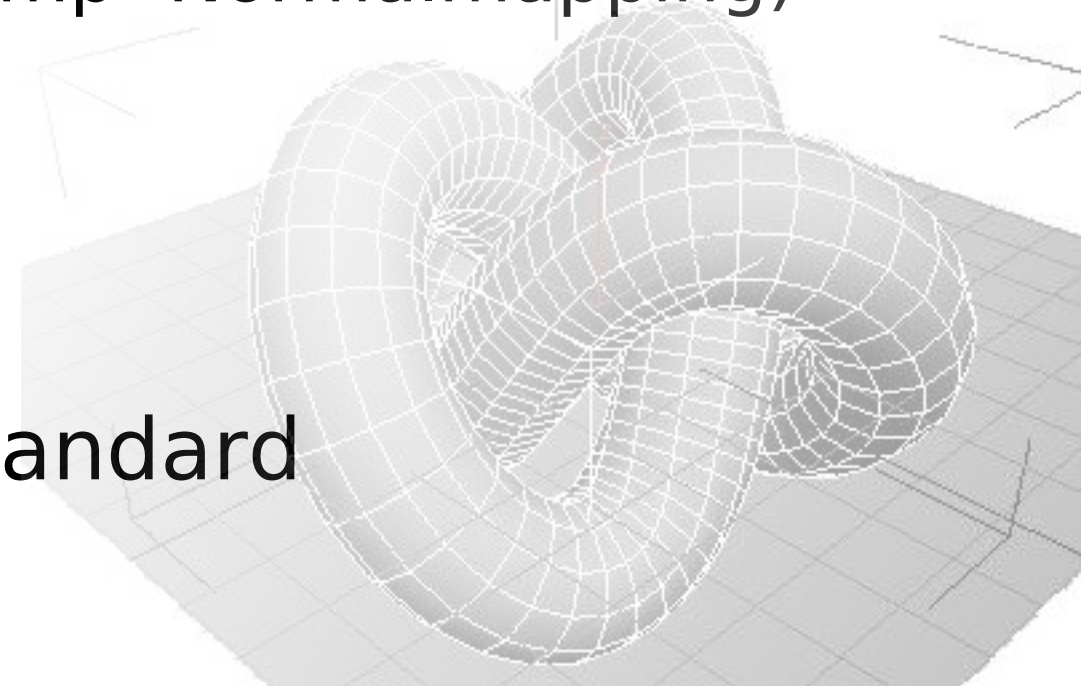
X3D – eXtensible 3D

- Nachfolger von VRML (Web3D Consortium)
- XML-basierend
- Modular durch Profile



X3D – eXtensible 3D

- Sehr “lebendiges” Format
  - Extensions
- Großer Featureumfang
  - Multi-Texturen (Bump- Normalmapping)
  - Shader
  - Streaming
  - ...
- Wirklich offener Standard

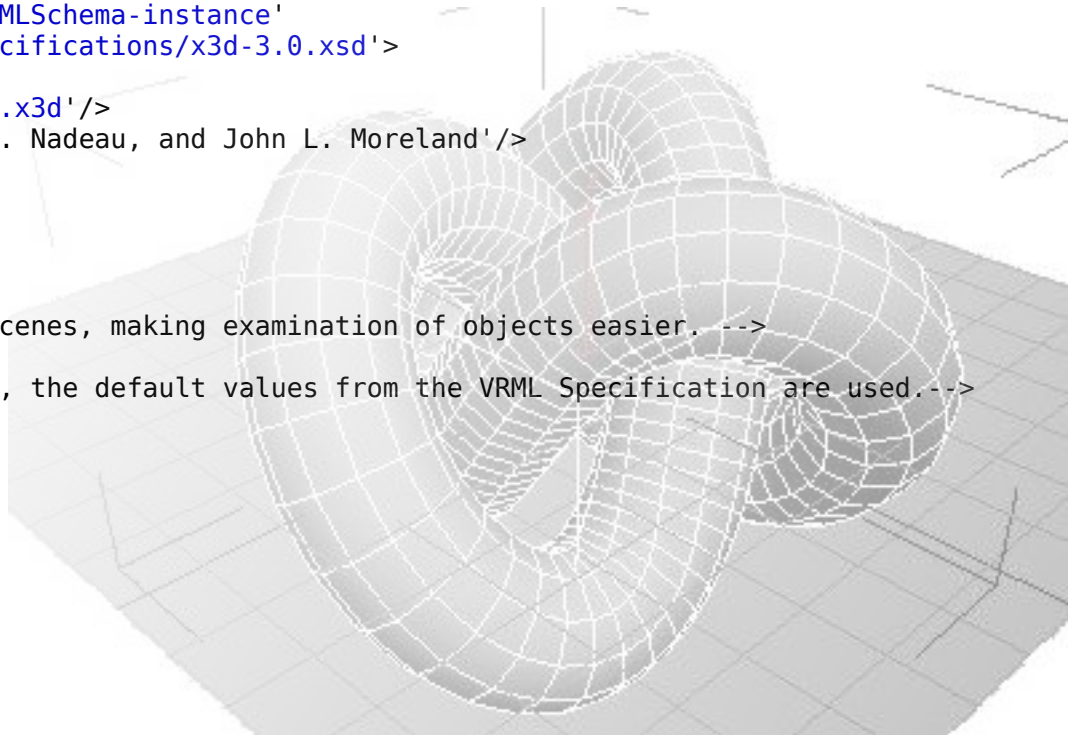


X3D – eXtensible 3D

- Große Dateien
- USE/DEF

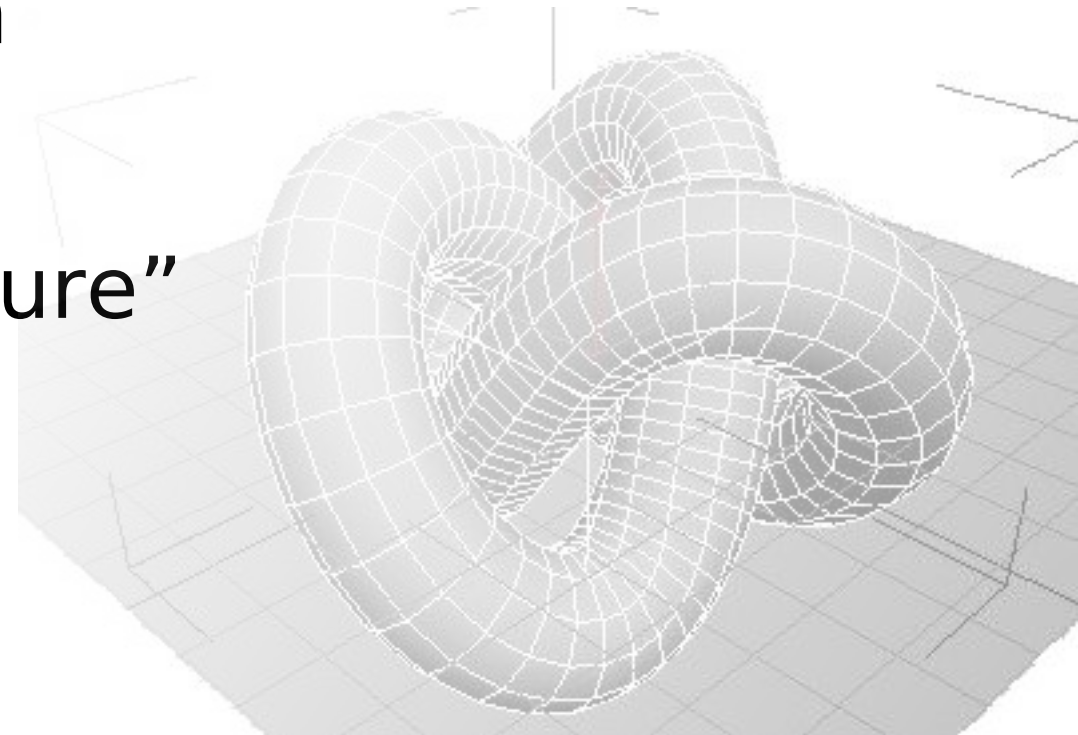
```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE X3D PUBLIC "ISO//Web3D//DTD X3D 3.0//EN"   "http://www.web3d.org/specifications/x3d-3.0.dtd">

<X3D profile='Immersive' xmlns:xsd='http://www.w3.org/2001/XMLSchema-instance'
     xsd:noNamespaceSchemaLocation='http://www.web3d.org/specifications/x3d-3.0.xsd'>
    <head>
        <meta name='filename' content='Figure03.01DefaultBox.x3d'/>
        <meta name='author' content='Andrea L. Ames, David R. Nadeau, and John L. Moreland'/>
        <meta name='translator' content='Don Brutzman'/>
        <meta name='created' content='6 August 2000'/>
        <meta name='revised' content='28 September 2004'/>
        <meta name='description' content='Default Box.'/>
    </head>
    <Scene> <!-- This NavigationInfo node is added to many scenes, making examination of objects easier. -->
        <NavigationInfo type='"EXAMINE" "ANY"'/>
        <Shape> <!-- When attribute values are not specified, the default values from the VRML Specification are used.-->
           <Appearance>
               <Material/>
           </Appearance>
           <Box/>
        </Shape>
    </Scene>
</X3D>
```



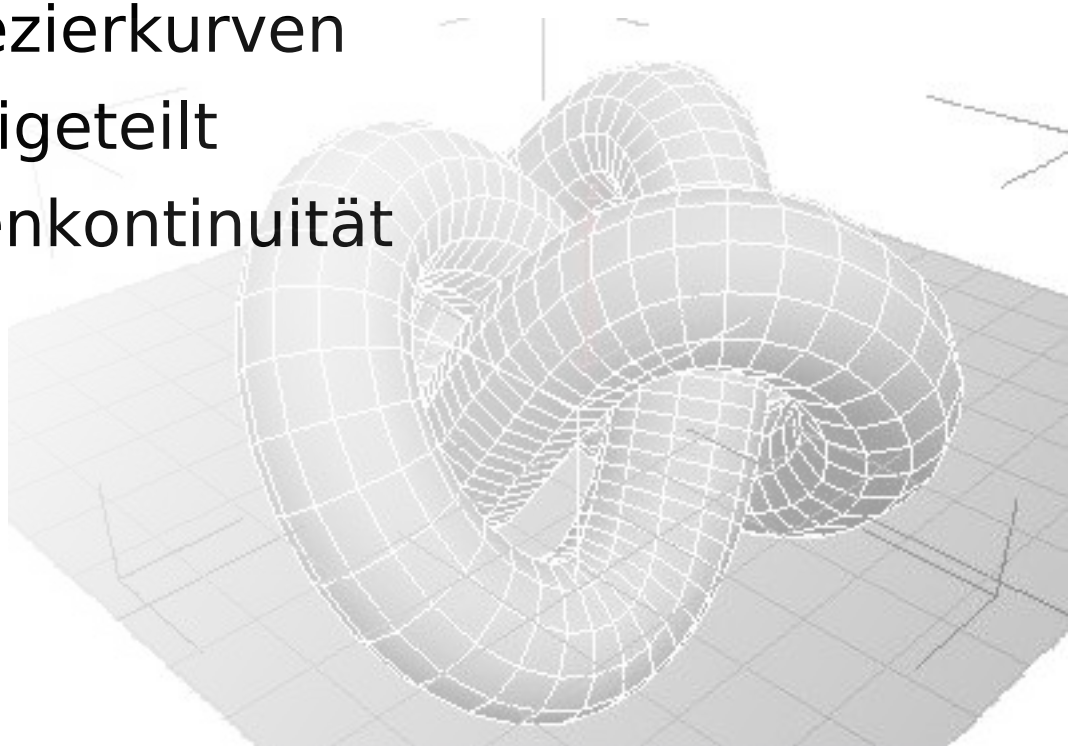
XVL - eXtensible Virtual world description Language

- Entickelt von Lattice
- Konstruktionsdaten durch komplette Prozesse nutzen
- Hohe Kompression
- Hohe Genauigkeit
- => “Lattice Structure”



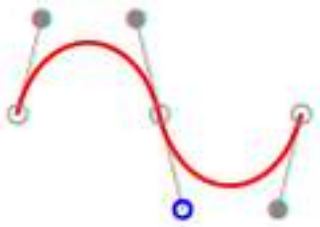
XVL – Lattice Structure

- Freiformoberfläche
- Lattice Mesh + Lattice Structure
  - Gregory Patch
    - Erweiterung von Bezierkurven
    - Kontrollpunkte zweigeteilt
    - Bessere Oberflächenkontinuität
  - Kontrollnetz
    - Polygonnetz
    - Vertexattribute



Patches

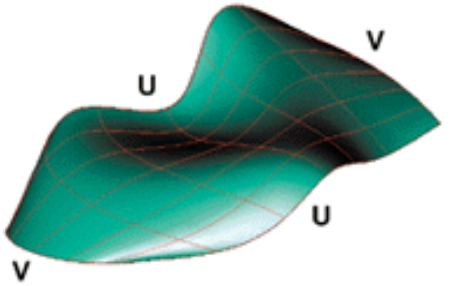
Kurve: f:u->(x(u), y(u), z(u))



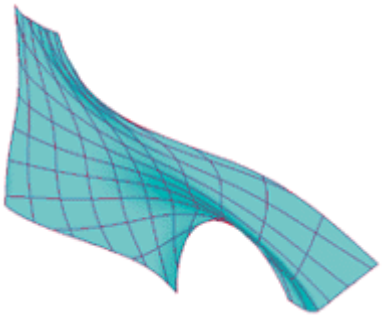
C1-Kontinuität: x1'(u) == x2'(u)

Patch: f(u,v)

Coons Patch: 4 Kurven



Gregory Patch: 5+ Kurven

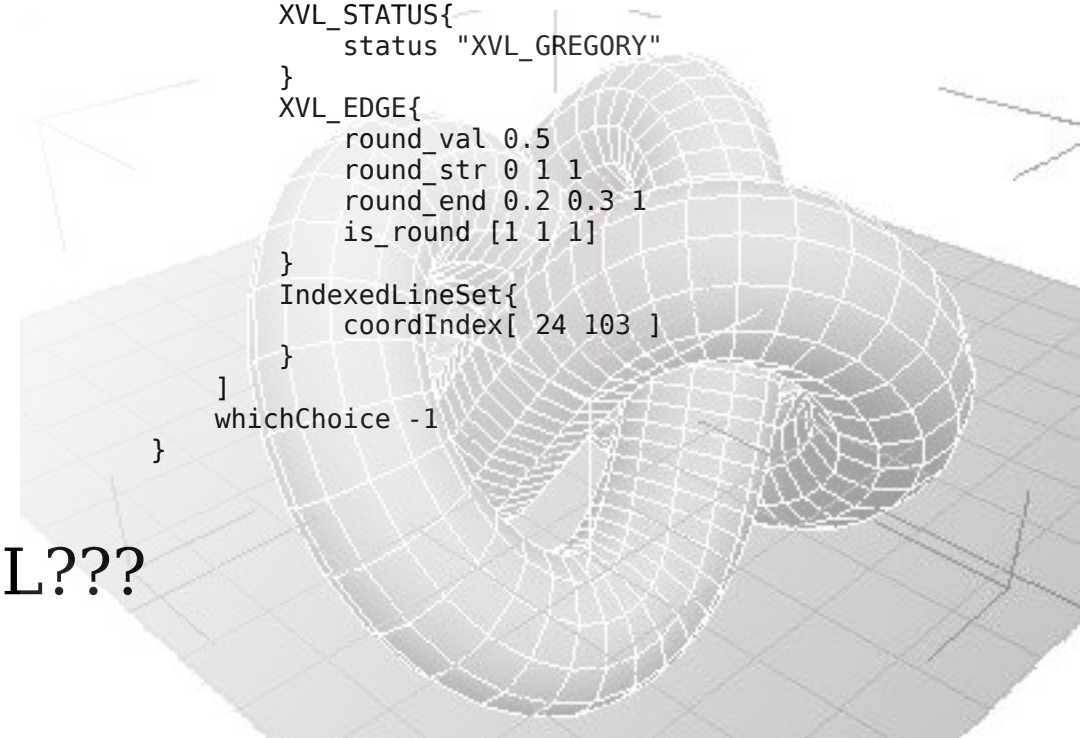


XVL - Dateistruktur

- Erweitertes VRML
- Kontrollnetz darstellbar in VRML97-Browsern

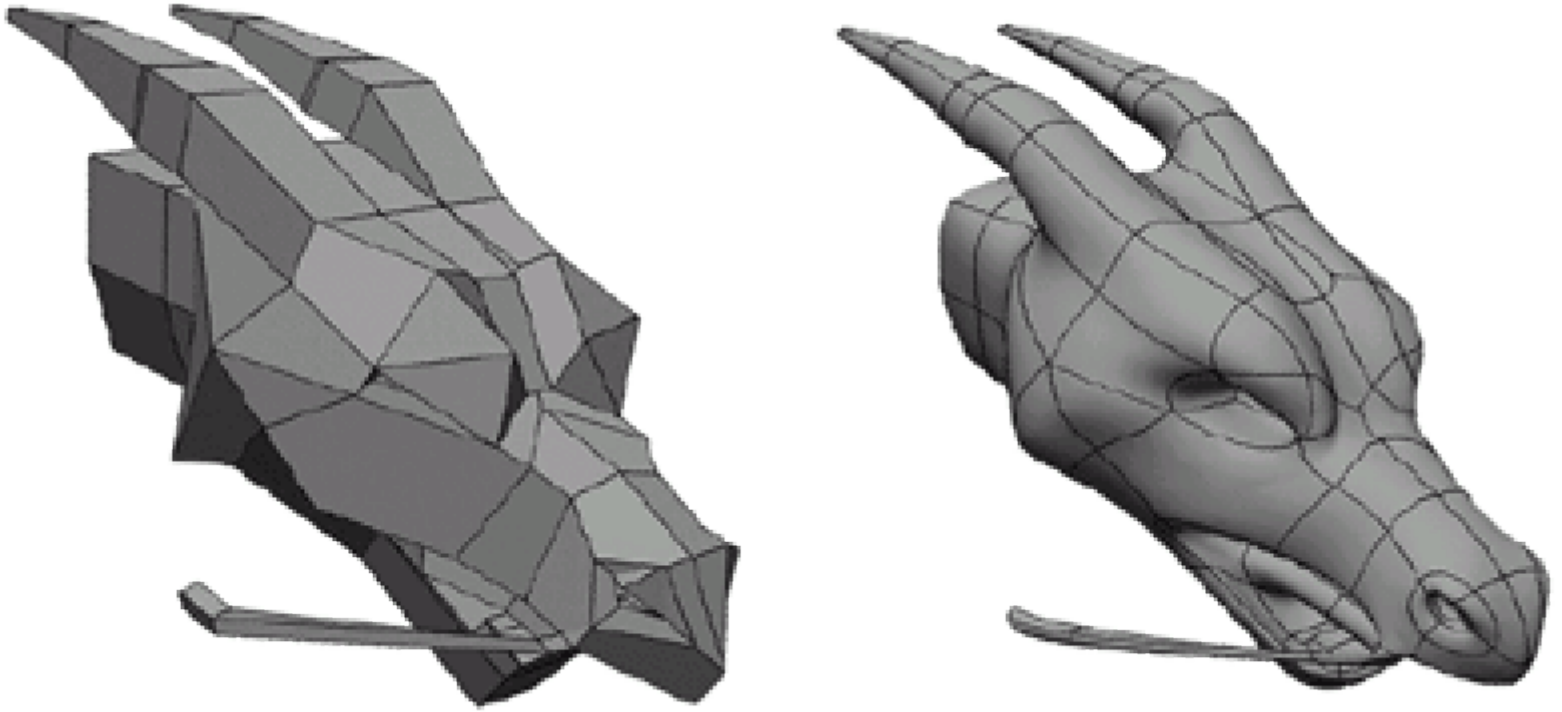
```
Group{
    children[
        Shape{
            geometry IndexedFaceSet{
            ############################
            ## coordinate information ##
            ## of Lattice Mesh ##
            ############################
            }
        }
    ]
},
```

```
Switch{
    choice[
        XVL_STATUS{
            status "XVL_GREGORY"
        }
        XVL_EDGE{
            round_val 0.5
            round_str 0 1 1
            round_end 0.2 0.3 1
            is_round [1 1 1]
        }
        IndexedLineSet{
            coordIndex[ 24 103 ]
        }
    ]
    whichChoice -1
}
```



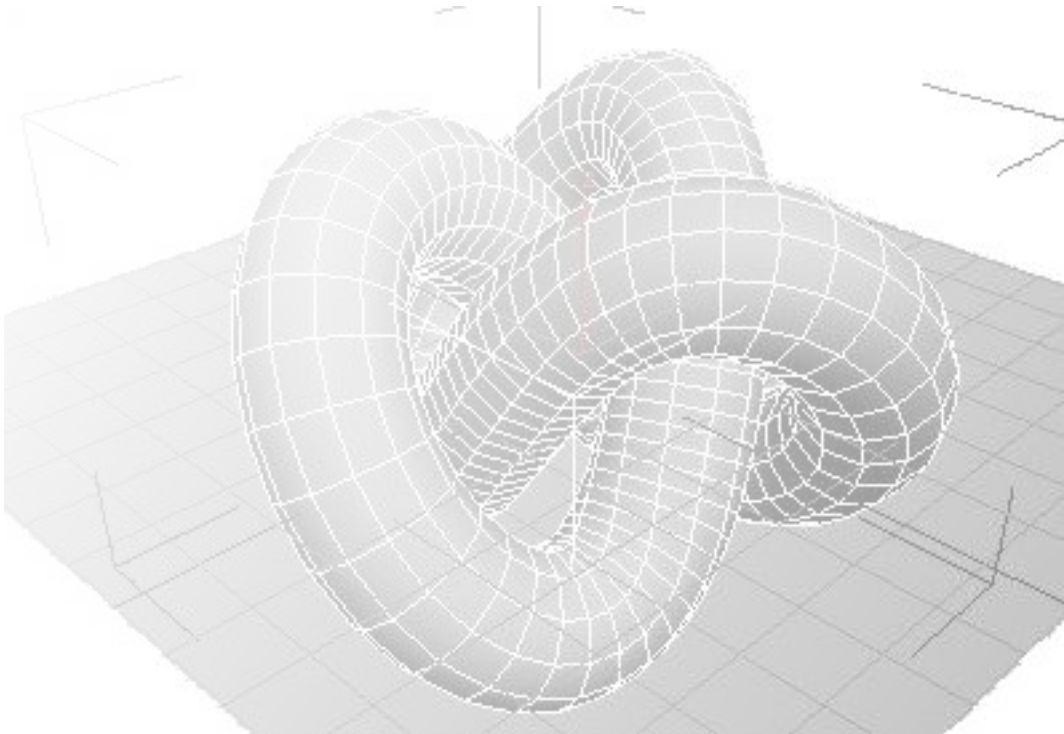
XML???

XVL - Beispiel



XVL - Produkte

- Komplettes Framework
  - Kernel
  - Designer
  - Browser-Plugins
  - Signer/DRM
  - Konverter



Fazit

- Vielzahl möglicher Anwendungsbereiche
- Spezielle Datenformate sinnvoll
- Datenaustauschformat nötig

X3D
- Offen, lebendig
- Featurereichtum
- Große Dateien

XVL
- Große Marktdurchdringung
- Hohe Kompression
- Kein XML
- Proprietär