Arne Schilling

University of Bonn, Germany

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Open Geospatial Consortium Inc.

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Category: OpenGIS® Discussion Paper

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Draft for OpenGIS® Web 3D Service Implementation Standard

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W3DS Status

Status: internal OGC Discussion Paper (OGC 09-104)

Released: July 2009
Version: 0.4.0

Editor: Arne Schilling

Download: http://portal.opengeospatial.org/files/?artifact_id=35283&version=1
http://portal.opengeospatial.org/files/?artifact_id=35706 (doc)

Package contains also XSD schemas

Presentations at TC Meetings:
January, 18th 2005, OGC TC Meeting, New York City
November 7th 2005 OGC TC Meeting, Bonn
December 3rd 2008 OGC TC Meeting, Valencia

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W3DS

3D Portrayal Service which provides 3D representations of virtual city and
landscape models which can be used in interactive and immersive 3D clients
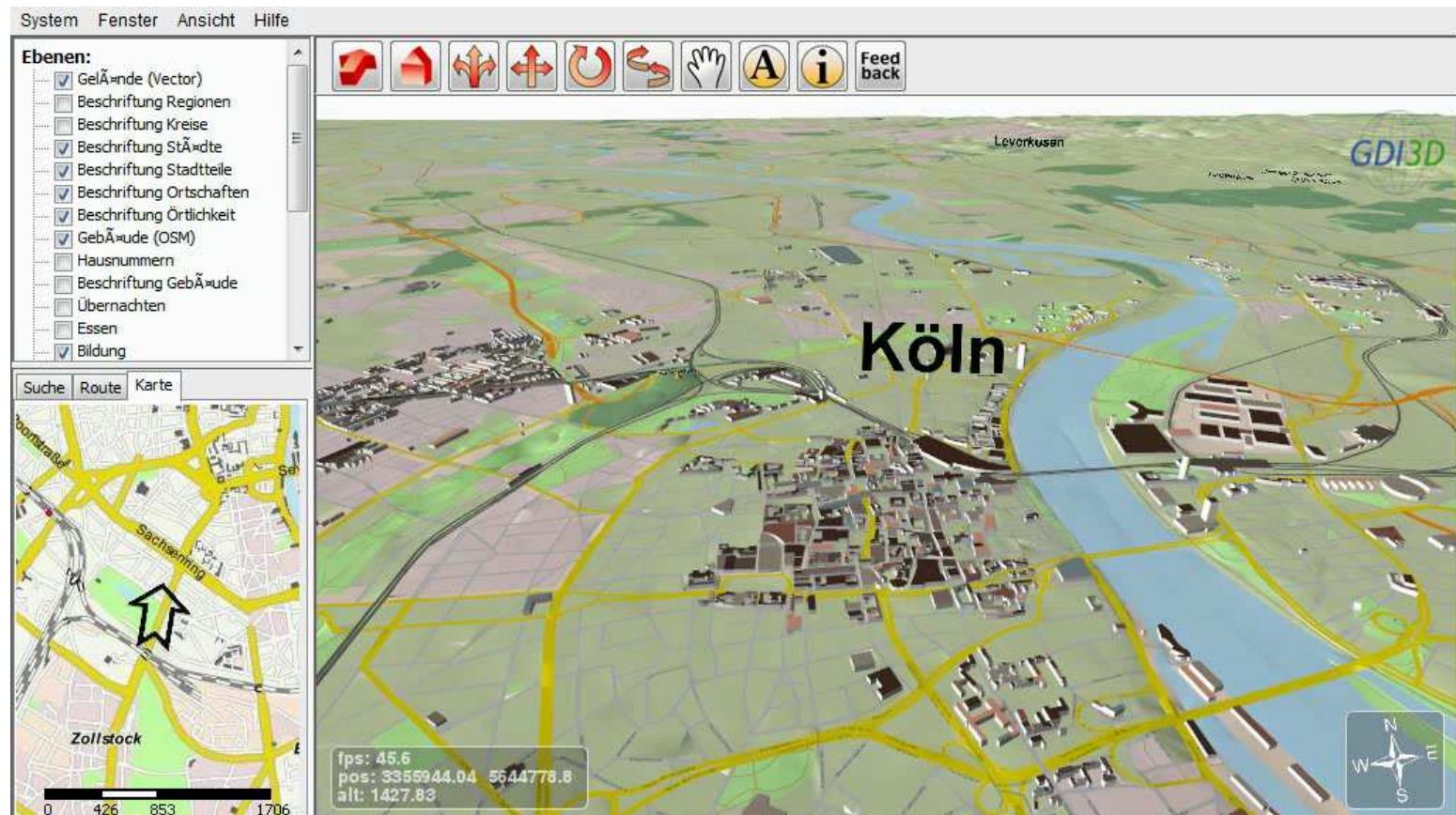
OpenStreetMap3D
Project

www.osm-3d.org

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W3DS Status

Download: http://portal.opengeospatial.org/files/?artifact_id=35283&version=1

Document is almost complete:
• Based on the current OGC template
• Contains all content and chapters required for an OGC specification (except the test suite)
• Package contains also all XSD schemas providing the technical details of the service interface

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This document summarizes recommendations for extending geospatial standards with regard to time-varying information. These proposals are the result of the National Technology Alliance program called Temporal Evaluation and Assessment (TEA).

📄 The Specification Model – a standard for modular specification to encourage implementation	0.9.9	07-056r1	John Herring, OAB, Architecture WG	2007-07-23

This standard specifies some desirable characteristics of a standards specification that will encourage implementations by minimizing difficulty and optimizing usability and interoperability.

📄 Trusted Geo Services IPR	0.9.0	06-107r1	Cristian Opincaru	2007-05-07

The OGC Trusted Geo Services Interoperability Program Report (IPR) provides guidance for the exchange of trusted messages between OGC Web Services and clients for these services. It describes a trust model based on the exchange and brokering of security tokens, as proposed by the OASIS WS-Trust specification [http://docs.oasis-open.org/ws-sx/ws-trust/200512].

📄 Uncertainty Markup Language (UnCertML)	0.6	08-122r2	Matthew Williams, Dan Cornford, Lucy Bastin & Edzer Pebesma	2009-04-08

The Uncertainty Markup Language (UncertML) is an XML encoding for the transport and storage of information about uncertain quantities, with emphasis on quantitative representations based on probability theory.

📄 Uses and summary of Topic 2: Spatial referencing by coordinates	0.3.0	09-076r3	Arliss Whiteside	2009-09-14

This document first discusses the uses for data sharing, and then provides a brief summary, of OGC Abstract Specification Topic 2: Spatial referencing by coordinates. Topic 2 is almost the same as ISO 19111:2007, but includes some corrections. This document includes some best practices for using Coordinate Reference Systems (CRSs).

📄 Web 3D Service	0.3.0	05-019	Udo Quadt, Thomas Kolbe	2005-02-02

The Web 3D Service is a portrayal service for three-dimensional geodata, delivering graphical elements from a given geographical area. In contrast to the OGC Web Mapping service (WMS) and the OGC Web terrain service (WTS) 3D scene graphs are produced. These scene graphs will be rendered by the client and can interactively be explored by the user. The W3DS merges different types (layers) of 3D data in one scene graph.

📄 Web Coordinate Transformation Service	0.4.0	07-055r1	Arliss Whiteside, Markus U. M	2007-10-09

This Discussion Paper describes an interface specification for a web coordinate transformation service that now builds on version 1.1 of the OWS Common Specification [OGC 06-121r3]. All versions of this document specify an

📄 Web Coverage Service (WCS) 1.1 extension for CF-netCDF 3.0 encoding	0.2.2	09-018	Ben Domenico, Stefano Nativi	2009-04-08

This extension of the WCS standard specifies an Information Community data model with the related encoding that may optionally be implemented by WCS servers. This extension specification allows clients to evaluate, request and use data encoded in CF-netCDF3 format from a WCS server.
This document is an extension of the Web Coverage Service (WCS) 1.1 Corrigendum 2 (version 1.1.2) Implementation Standard [OGC 07-067r5]. With small

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Why 0.3.0 needs an Update

1. (Mandatory) output format VRML needs to be replaced by X3D
2. Other emerging standards need to be considered: KML, CityGML
3. 0.3.0 is based on an older OGC template, interface structure has changed since then
4. XML schema documents describing the interface are missing
5. Relationship between W3DS, WFS, WPVS should be described more clearly

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W3DS 0.4.0 Interface

The W3DS interface (currently) specifies 5 operations that can be requested by a client and performed by a W3DS server. Those operations are:

1. GetCapabilities – This operation allows a client to request and receive back service metadata (or Capabilities) documents that describe the abilities of the specific server implementation. This operation also supports negotiation of the standard version being used for client-server interactions.

2. GetScene – This operation allows a client to retrieve 3D Scenes using a bounding box

3. GetFeatureInfo – This operation allows a client to retrieve attribute data of selected features.

4. GetLayerInfo – This operation allows a client to retrieve information on available attribute names and values of a selected layer.

5. GetTile – This operation allows a client to retrieve single tiles using indices.

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W3DS GetTile Request

Idea: better support of virtual terrain and globe application

Virtual Globes mostly implement a tile based communication schema for downloading terrain data.

GetScene uses axis parallel bounding box

Preferred way to access tiles is by using indices

(level, row, column)

General Use Case:

•Terrain tiles are precomputed and stored on the server

•Different resolutions and tile levels are available

•Client downlods tiles based on viewpoint position and

  height

Example:
http://hostname:port/path?SERVICE=W3DS&REQUEST=GetTile&VERSIO
N=0.4.0&CRS=EPSG:26916&FORMAT=model/x3d&LAYER=dem**&TILELE
VEL=4&TILEROW=45&TILECOL=123**&EXCEPTIONS=text/xml

NASA World Wind uses terrain tiles

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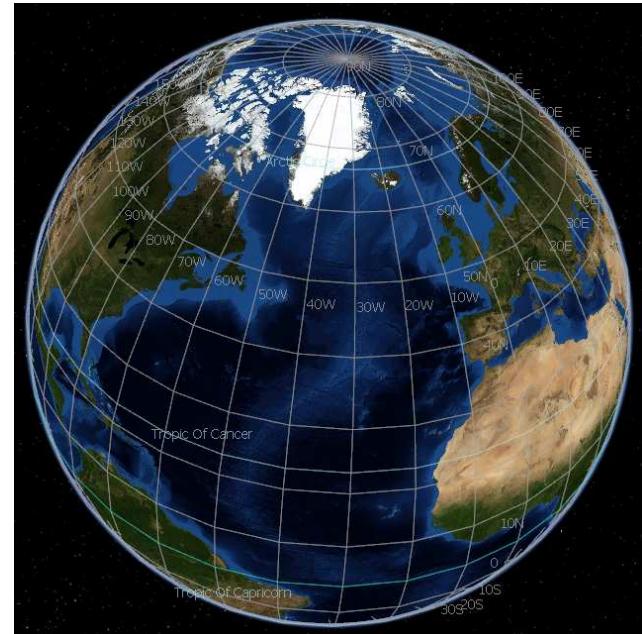
W3DS GetTile Request

NASA World Wind:

Terrain data as raster   plus   Image data as DDS File
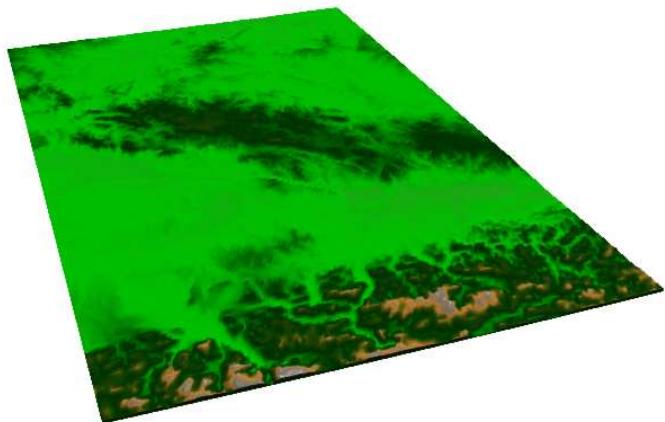
(proprietary format)

+

http://worldwind25.arc.nasa.gov/wwelevation/wwelevation.aspx?T=srtm30pluszip**&L=6&X=620&Y=437**

http://worldwind25.arc.nasa.gov/tile/tile.aspx?T=105**&L=2&X=350&Y=245**

-> Data combined in WW client

NASA World Wind uses terrain tiles

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W3DS TileSet Description

Introduction of TileSet element in service meta data for tiled layer

1. Multiple tile sizes possible (like in a image pyramid)
2. Tile sizes are always related by powers of 2
3. All levels share the same origin (LowerCorner)
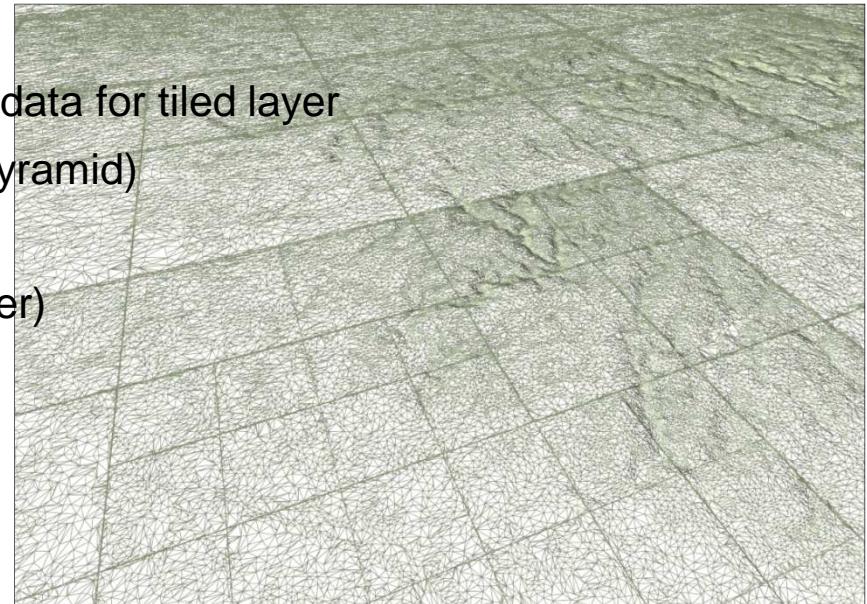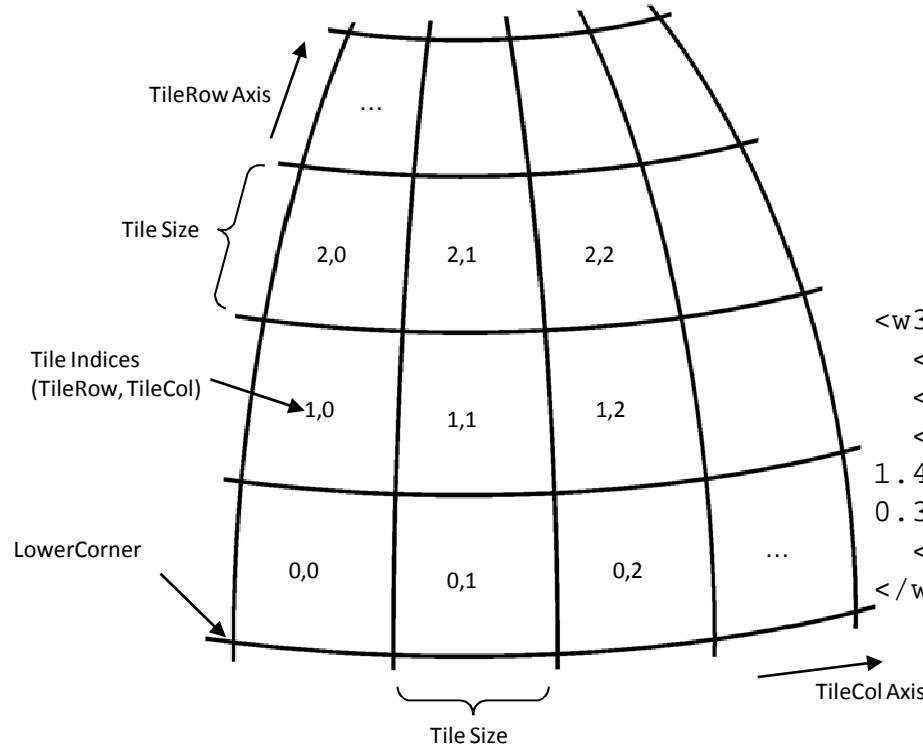

```
<w3ds:TileSet>
  <ows:Identifier>dem_tileset</ows:Identifier>
  <w3ds:CRS>EPSG:4326</w3ds:CRS>
  <w3ds:TileSizes>180 90 45 22.5 11.25 5.625 2.8125
1.40625 0.703125
0.3515625 0.17578125</w3ds:TileSizes>
  <w3ds:LowerCorner>-180.0 -90.0</w3ds:LowerCorner>
</w3ds:TileSet>
```

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New GetScene Parameters in 0.3.1

Styled Layer Descriptors (SLD)

- Enables user-defined Styling. Styles are defined as Styled Layer Descriptors.
  The Symbology Encoding (SE) needs extensions in order to style 3D objects.

  One of 3 alternative parameters possible:

Parameters: SLD=*<string>: URL reference to SLD document*
SLD_BODY=*<string>: inline SLD Document in GET request*
StyledLayerDescriptor=<xml>: inline SLD Document in POST request

Defined in SLD profile of the WMS IS (OGC 05-078r4)

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Styled Layer Descriptor (SLD) Support

- User Styling with SLD is NOT included in version 0.4.0

- Reasons:
  - SLD adds too much complexity to the W3DS Spec.
  - Difficult for developers to support all optional W3DS features
  - User Styles would require 3D extension of SLD which is currently not standard
  - SLD Profile would be almost identical to OGC 05-078r4 (SLD Profile for WMS)
  - 3D Styling possible for any Portayal Service (also WPVS)

Better:

← Portayal Services

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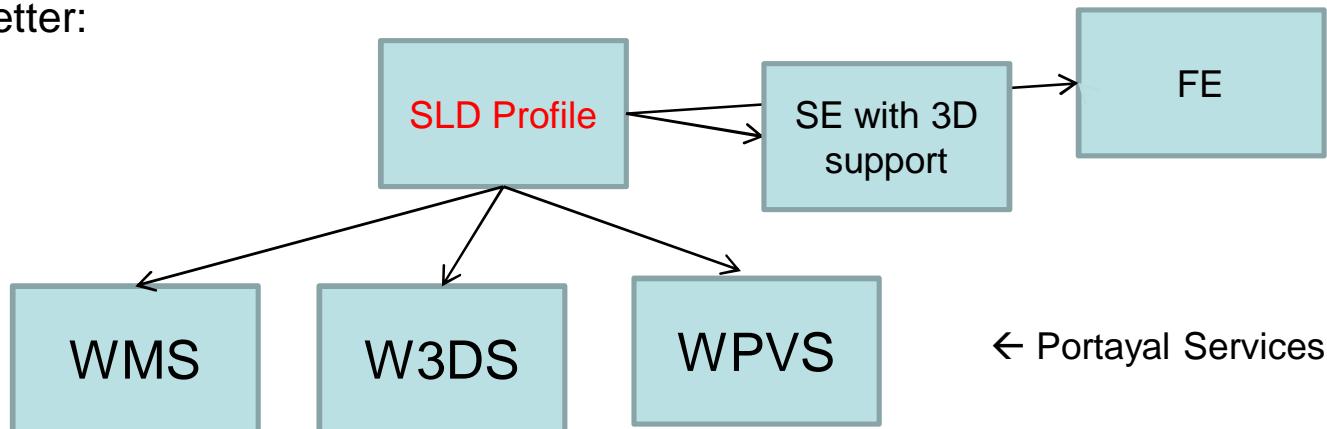
X3D Geospatial Component

Benefits:

Geospatial accuracy (WGS84, UTM, etc.)
True mapping of 3D Geospatial coordinates to X3D's Cartesian X, Y, Z coordinates

X3D Earth Working Group at Web3D Consortium

http://www.web3d.org/x3d-earth/

Presentations at Technical Workshop in 2007:

• OGC CityGML and W3DS - Thomas Kolbe
• OGC 3DIM activities, goals, and collaboration points with Web3D - Tim Case

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X3D Node List

X3D GeoLocation

```
<GeoLocation
  containerField="children"
  geoSystem="&quot;GD&quot;"
  geoCoords="37.45855
    -122.172997 6.5">
  <inline url="building.x3dv"/>
</GeoLocation>
```


Source: Mike McCann (MBARI)
Alan Hudson (Yumetech)

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X3D GeoViewpoint

```
<GeoViewpoint
  description="View1"
  fieldOfView="0.785398"
  geoSystem="GD"
  headlight="true"
  jump="true"
  navType="EXAMINE"
  orientation="1 0 0 -1.57"
  position="51.5 -0.1 1000000"
  speedFactor="1.0">
</GeoViewpoint>
```


Source: Mike McCann (MBARI)
Alan Hudson (Yumetech)

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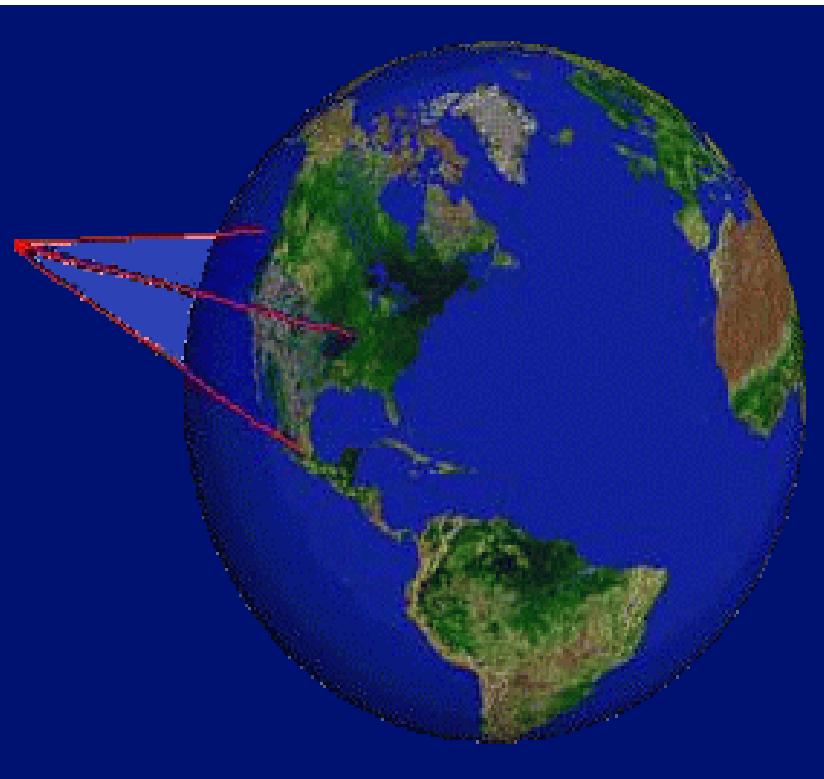
Discussion Topics

Mandatory X3D Format considerations.

1. Just make a reference to the X3D standard (ISO/IEC 19775)

2. Define rules: dictate the internal structure of X3D document (allowed node types, hierarchy) -> X3D sub set

	Advantages	Disadvantages
free	Less complex spec. Allows scenegraph optimizations for better performance	Content is less predicable, could contain unexpected node types. Examples: shader code, Java scripts, inline URLs, NURBS, Humanoid Animations, User Interactions
rules	Possibility to make Geo extensions mandatory Makes object identification easier	Rules must be described for each format Transcription of rules maybe not easy Complex conformance tests

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Next Steps

- ?

- Fix errors, receive Change Requests from 3Dim group

- Make it a public Discussion Paper

- Carsten suggested to publish a white paper on the OGC Network Website (http://www.ogcnetwork.net/), content?

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The End

Fraunhoferstraße 64283 Darmstadt, Hessen, DE
Coord: 3475583.83, 5526469.44, 155.8

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