3D Portrayal Services
Use Cases

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Purpose of Document

1. Input for discussion on the standardization activities
2. Focus on WPVS, W3DS, and Styling (SLD)
3. Provide examples of selected use cases / scenarios
4. Outline the technical interactions with OGC services for 3D Portrayal
5. Identify missing functionality
6. Document could become a Best Practices Paper

Document available on OGC Portal / Pending Documents (08-140)
http://portal.opengeospatial.org/files/?artifact_id=29649&version=1
Use Case #1: Get 3D Map

Concept

“Standard” Use Case as described in the W3DS specification
Get static 3D scene of a specific area
3D scene is “complete” (contains lights, viewpoint, legend)
Result ready for exploration or publication
Use Case #1: Get 3D Map

Interaction

GetCapabilities Request
Layers, Styles, Meta Data
http://www.myw3ds.org/w3ds?request=getScene...

GetScene Request
Data Base
Lights Viewpoints Legend...

W3DS
Engineer
http://www.myw3ds.org/w3ds?request=getScene...

W3DS Server
Layer Meta
VRML/X3D

CS-W
Use Case #2: Get Perspective View on 3D Map

Concept

“Standard” Use Case as described in the WPVS specification
Get perspective image/view of a specific area
Advantage: server can implement complex rendering algorithms
(ray tracing, soft shadows, radiocity, caustics etc.)
No need of 3D plugin, can be used by any client
Result ready for publication (high quality)
Use Case #2: Get Perspective View on 3D Map

Interaction

http://www.mywpvs.org/wpvs?request=getView...
Use Case #3: Serve Virtual Globe Application

**Concept**

For each Tile:

\[
\text{request} = \text{GetScene} \\
\text{bbox} = \text{(Tile.bbox)} \\
\text{layers} = \text{DEM} \\
\]

\[
\text{VRML 2.0} \\
\]

\[
\text{request} = \text{GetScene} \\
\text{bbox} = \text{(Tile.bbox)} \\
\text{layers} = \text{Buildings} \\
\]

\[
\text{VRML 2.0} \\
\]

\[
\vdots \\
\]

\[
\text{one request} \\
f\text{or each layer} \\
\]

-> dynamic browsing and navigation using open standards for 3D SDI
Use Case #3: Serve Virtual Globe Application - Concept

Video dsfds285-100.avi
Use Case #3: Serve Virtual Globe Application

Prerequisites

Spatial Selection of Features
- avoid redundancy

Default: Select by Intersection with bbox

Select by center point

Intersect features with bbox
Use Case #3: Serve Virtual Globe Application

Interaction

W3DS

Data Base

GetScene Requests

VRML/X3D

User

Initial Position

New Position

Updated Virtual Globe

Integrate Data

Identify missing Data

Updated Virtual Globe
Use Case #4: Get Custom Styled 3D Map

Concept

- Use Styled Layer Descriptor (SLD) for controlling the map style
- Styling is controlled and defined by the user
- SLD document must be transmitted with GetScene or GetView request
- Styling is based on available feature attributes
Use Case #4: Get Custom Styled 3D Map

Prerequisites

- Portrayal Service must be capable of processing the attached SLD document
- Additional request for obtaining information about available feature attribute names and values

DescribeLayer Operation specified in SLD Profile of the WMS Implementation (OGC 05-078r4)

GetDescription Operation specified in WPVS sixth draft

GetResourceByID in OWS Common (OGC 06-121r3)

GetLayerInfo (W3DS unofficial draft)

--> Need for Harmonization?
Use Case #4: Get Custom Styled 3D Map

Interaction

Server applies styling based on SLD document and feature attributes

Render Image

GetCapabilities Request

Layers, Styles, Meta Data

Select Layer

GetLayerInfo Request Attribute Names

Pick Attribute for Styling

Attribute Values Style Editor GUI

User adjusts -distribution of values,-styles

Application creates SLD document

GetScene or GetView Request

Render Image

Data Base

W3DS

Analyst

styled 3D Map
Use Case #5: Integrate Planned Object into 3D Map

Concept

- User (e.g. an Architect) has a 3D CAD drawing of a planned object
- He wants to integrate the CAD model into the city model provided by a 3D Portrayal Service
- 3D CAD model can be exported into CityGML

-> existing object on the server needs to be replaced by the planned object
Use Case #5: Integrate Planned Object into 3D Map

Prerequisites

GetFeatureInfo Request (as defined in WMS)

- **Purpose**: for retrieving attribute information of a selected feature

- **Basic Operation**: clicking on object on screen, pointing on object (VR environment)

- **Result**: complete list of attribute names and values of selected feature(s)

- **Selection method**: up to implementation
Use Case #5: Integrate Planned Object into 3D Map

Interaction

Server applies styling based on SLD document and feature attributes

GetCapabilities Request
Layers, Styles, Meta Data
User selects layers and a region around planned object
Application creates SLD document containing FE

GetScene or GetView Request
Render Image
DataBase
W3DS
Server applies styling based on SLD document and feature attributes

Identify / click on Feature
User selects a unique ID from the Attributes
User selects a CityGML file

GetFeatureInfo Request Feature Attributes
User selects a CityGML file

SLD document containing FE
Use Case #6: Roaming between Portrayal Services

Concept

- Mobile User (PDA or integrated system) is downloading 3D maps while being on the road.
- He is always connected to the internet (Wifi, mobile network)
- 3D Portrayal Service is assigned dynamically using the information from a Catalogue Service

- Switching between different Portrayal Services (Roaming)
- same Map Style should be used (defined as SLD)
Use Case #6: Roaming between Portrayal Services

Interaction

OpenLS Route Service

Mobile User

Routing Application

Static SLD Document

CS-W

3D Portrayal Service Region A

3D Portrayal Service Region B

SLD

SLD
Conclusion

• Complex client server interactions are possible
• Not just static images or scenes
• But: need to work on additional service operations
• Higher degree of realism and interactive frame rates can be achieved compared to WFS
• Both WFS/CityGML and 3D Portrayal Services have pros and cons - > different application areas.
The End

Discussion?