Computable Geospatial Model

Concepts and Design

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Grifinor Project
General Purpose Software Infrastructure

**INFRASTRUCTURE**
- Formatted: Idea
- Standard Specification

**PLATFORM**
- Formatted: Idea
- Standard Specification

**APPLICATION**
- Formatted: Idea
- Standard Specification

**COMPONENT**
- Formatted: Idea
- Standard Specification

- Compute elementary tasks
- Vector libraries
- Raster libraries
- CityGML parser
- Slippy map, Mobile apps
- Tool with an effect greater than those provided by individual components involved
- Text editor
- Mail client
- Calendar
- GIS, Web browsers, IDE
- Provider of a common computational context for various applications

- .NET
- Mac OS
- Android
- SAAS/PAAS/... solutions
- Scalable set of linked instances collaboratively providing an important computational context

- TCP/IP
- binary data, sending to IP address
- WWW
- web document, requesting linked URI address
- Bitcoin
- key to coins, transaction to wallet address
- "Geospatial solution (GS)"
- "content units?", "computational context?"

30th January ’15, DATA MODELLING AND MODEL DRIVEN IMPLEMENTATION OF DATA DISTRIBUTION – GST.DK, Copenhagen
Let’s think through GS

“Geospatial solution (GS)” → “content units?”, “computational context?”

Do we have all the technology we need?

Would technology-related law help finding a GS?

Is ability to accommodate new types of models a primary requirement?
1. Do we have all the technology we need?

1. No evidence we have - no reference design available
2. Heterogeneous spectrum of data models
3. Several competing alternatives
4. Complex data models
5. Content unit is Geospatial Model
6. Unifying computational context is missing

“Geospatial solution” ➔ geospatial model, “computational context?”
2. Would technology-related law help finding a GS?

1. From technological perspective it does NOT matter
2. Technology is governed by laws of nature
3. Tendency to use what works best
4. From financing perspective YES
5. From political perspective YES

“Geospatial solution” → geospatial model, “computational context?”
3. Is ability to accommodate new types of models a primary requirement?

1. If we want flexible solution >> YES
2. Solution that “survives” for longer time >> YES

It is not the strongest nor the most intelligent who survives, but the one most adaptable to change. — Charles Darwin

• Handling both complexity change is hard
Heterogeneity & Complexity of Data Models
Complexity of Implementation
3. Is ability to accommodate new geospatial models a primary requirement?

1. If we want flexible solution >> YES
2. Solution that survives for longer time >> YES

It is not the strongest nor the most intelligent who survives, but the one most adaptable to change. — Charles Darwin

• Handling complexity is a problem
• GS must address COMPLEXITY and CHANGE

“Geospatial solution”  ➔ geospatial model, “computational context?”
Request typed link via URI address
Specs. at the level of data model (ontology)
GS on top of Linked Data

Request typed link via URI address

Specs. at the level of data model (ontology)

Solves distribution of data with complex model

Change is NOT solved at application level

What is contained in the GS ‘software stack’?

How to enforce a single coordinates sys.?
GS using Computable Geospatial Model

Specs. on the level of computation and geographic space

Implicit reference via points in geographic space

Specification of Functionality and of Geospatial
GS using Computable Geospatial Model

Connection

Proximity Query

Skeleton Scene Graph (SSG)

Query Manager

GMO Class-Loader

Local GMODB

GMOBDB

FDB

GIX

CDB

daemon

IP, TCP

Applications

API

Applications

Server

VM

Mediator

Connection

Proximity Query

Skeleton Scene Graph (SSG)

Query Manager

GMO Class-Loader

Local GMODB

GMOBDB

FDB

GIX

CDB

daemon

IP, TCP

Applications

API

Applications

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Computable Geospatial Model

Applications

API

A1

I1

A2

I2

A3

I3

A4

I4

Am

Im
Computable Geospatial Model

- Security
- Time
- 2d / 3d
- ArcGIS support
- Performance
- Mobile devices
- INSPIRE
- Source code
- Scale
- Spatial queries
- WWW
- Competitive adv.
- Supported apps.

GRIFIN
Conclusions

• Unifying geo computational context is missing

1. **Request typed link via URI address**
   Specs. on the level of data model (ontology)

2. **Implicit reference via points in geographic space**
   Specs. on the level of computation and geographic space

• Think for long-term solution
• Seek leadership
• Not ways to enforce geospatial solutions.