GeoXBRL: A Web-based Standard for Geospatial and Business Taxonomies

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Agenda

- Geographic Information System
- XBRL
- Scenario
- Geographic XBRL Linkbase
- Sample Application
What’s GIS - Geographic Information System?

- GIS has been researched since 60’s;
- GIS means many technologies together for:
  - Visualization,
  - Maintenance,
  - Distribution and
  - Information Retrieval.
What’s GIS?

• Spurred by:
  – High-speed internet;
  – High-performance processing in devices;
  – Web 2.0:
    • User interaction has been increased;

• New tools and apps has came up:
  – Geovisualization-based Systems in many domains;

There is an increasing demand for continuous auditing and financial analysis through geovisualization.
XBRL

- XBRL Taxonomy
  - XML instance, XML Schema, Xpath, Xlink, Namespaces, ...
Geovisualization-based Financial System

• Related Works:
  – [Lux, 1997] Exhibition of the GDP (Gross Domestic Product) each country, over a global map;
  – [Sylvester, 2008] Geovisualization of market behaviour per area (growth or decline);

None of these works address XBRL
Actual Scenario – XBRL

- **Traditional XBRL** data only identify the company that sends the financial reporting, but these data do **NOT** support any geoprocessing.
Geospatial data represented within XBRL taxonomies based on Xlink, XBRL definitions and GML
First Approach

XBRL GIS – INTEGRATING GEOGRAPHIC INFORMATION IN XBRL INSTANCE DOCUMENTS
XBRL GIS

• Adopted technologies:
  – xLink;
  – GML Instance;
  – XBRL Instance;
XBRL GIS - PRÓS

• Integration about two XML-based languages:
  – GML
  – XBRL

• Preservation of the specifications:
  – GML 3.2/3.3;
  – XBRL 2.1;

• Separation of the complexity inherent to development of both technologies;

• Link between instances developed in common language;
Extending the idea

Geographic XBRL Linkbase: A new Approach to Financial Reporting and Analysis
Geographic XBRL Linkbase

• Objectives:
  – Geodata definiton by XBRL Taxonomy developer;
    • Manipulation of the geospatial elements into XBRL taxonomy;

• Found Scenario:
  – XBRL developer does not have access to geospatial concepts contained in the GML Schemas;
  – It is not possible to:
    • Define any geospatial elements;
    • Manipulate the geodata freely.
Geographic XBRL Linkbase

• Tecnologies adopted in solution:
  – XLink (simple, extended);
    • Linkbase
  – XML Schema;
  – GML Taxonomy 3.2/3.3;
  – XBRL Taxonomy 2.1;
  – Generic Links 1.0;
GeoXBRL

Extend those already specified XBRL extended links
Geospatial data can be represented within XBRL taxonomies based on XLink and XBRL definitions.
The locator element is an already specified element from Extended Link definitions, whose role is to locate another concept within XBRL taxonomies (e.g. it could locate the company that sends the business statement).

A element specified to be a resource (i.e. a XML fragment defined by taxonomist that relates up to other XBRL elements, creating the geospatial semantic). The <geodata> element has to contain GML based data (e.g. it can define a topographic position).

Thus a relationship between XBRL and GML elements is done.
The `<geoDataLink>` is a generic link based on XBRL Generic Link Specification.
Minimum occurrence of a <geodata> element must be defined as one.

This new element (ref="gml:Geometry") is required as a part of Geodata Linkbase (sub element of <geodata> element), which must reference GML based elements;

The namespace "gml" indicates this element is from GML schema.
The Generic Links specification has defined a new linking type (called genericArcType), extending arcType to elements not specified by XBRL 2.1.

The <geoDataArc> element has been specified to create a relationship between those elements contained in Geodata Linkbase, of which one of them is a GML-based data.
Sample: Facebook GeoXBRL

- To exemplify the GeoXBRL usage, a Geodata linkbase has been created and integrated in a Facebook XBRL taxonomy 2016, which is available on US SEC website
The geographic data container

The locator of financial facts or other XBRL definitions

- The geo datas
- Sub elements based on GML

- All attribute values must be defined by XBRL taxonomy developer

The link
A web application has been built in order to show how data from GeoXBRL specification can be used for providing new geodata inputs for the financial auditing and analysis, in a standardized way.
A GeoXBRL-based Web Application
A GeoXBRL-based Web Application

- Some XBRL files have been downloaded from SEC website.
- Companies from different cities and dates, whose business activities is also different, such as:
  - Facebook, Microsoft, Apple, Yahoo, Google, Oxford Technologies, Amerisource Bergen, Black Berry, CVS Health, General Motors, Mc Donald, United Health, Starbucks, Opko Health, FMC, Technologies, Amcon, Big Cat Energy, APX Group.
- Following the GeoXBRL specification, for each company’s taxonomy a Geodata Linkbase file has been built and added in it.
- Google Maps API has been used for providing a virtual map as a user data output.
A GeoXBRL-based Web Application

- There are XBRL files from Facebook in the repository that the financial element (whose label is “Accounts Receivable, Net”) is higher than 1000 and the date is 2016/03/31.
A GeoXBRL-based Web Application

- Search for all companies and all dates
Conclusion

• Geo XBRL is a Geospatial Representation in XBRL Context;

• Specification for Geospatial and Business data integration is a way of standardizing the relationships among geospatial and business data;

• Handling of Concepts from GML Schema within XBRL Taxonomy represents the possibility of defining the geospatial elements in XBRL taxonomies based on GML standard;
Conclusion

• Adaptable in Current XBRL Taxonomies:
  – it means the adaptability of the solutions in XBRL taxonomies already in use in the financial systems;
  – It means the GeoXBRL based representation does not affect the processing of those XBRL reporting already in use in business systems, because even though GeoXBRL is a new specification, its structure is based on international standards (i.e. XBRL 2.1, Generic Links 1.0 and GML 3.2/3.3);
  – XBRL tools are easily adapted to handle Geo XBRL data
Thanks!

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