

# Combining ontology and data visualization techniques to generate interactive map legends for online geological maps

## 1 Motivation

Current Web Map Service (WMS) techniques provide the legend of a map layer as a static image and further applications are limited. We aimed to develop interactive map legends of geological time scale for WMS layers of geological maps, such that make the visualization not only output of data analysis, but also an effective tool for exploring new information.

## 2 Methods & Materials

- 1 An ontology of geological time scale encoded in Resource Description Framework (RDF) and Web Ontology Language (OWL);
- 2 A Flash animation visualizing the developed ontology.

## 3 Pilot system & Results

- 1 Functions obtaining style information of geological time features from a WMS map layer and then filter the Flash animation;
- 2 Functions using the filtered Flash animation as a operation panel to filter & generalize geological time features in a WMS map layer, with a thorough case study of the online 1:625k onshore bedrock age map of United Kingdom in a pilot system.

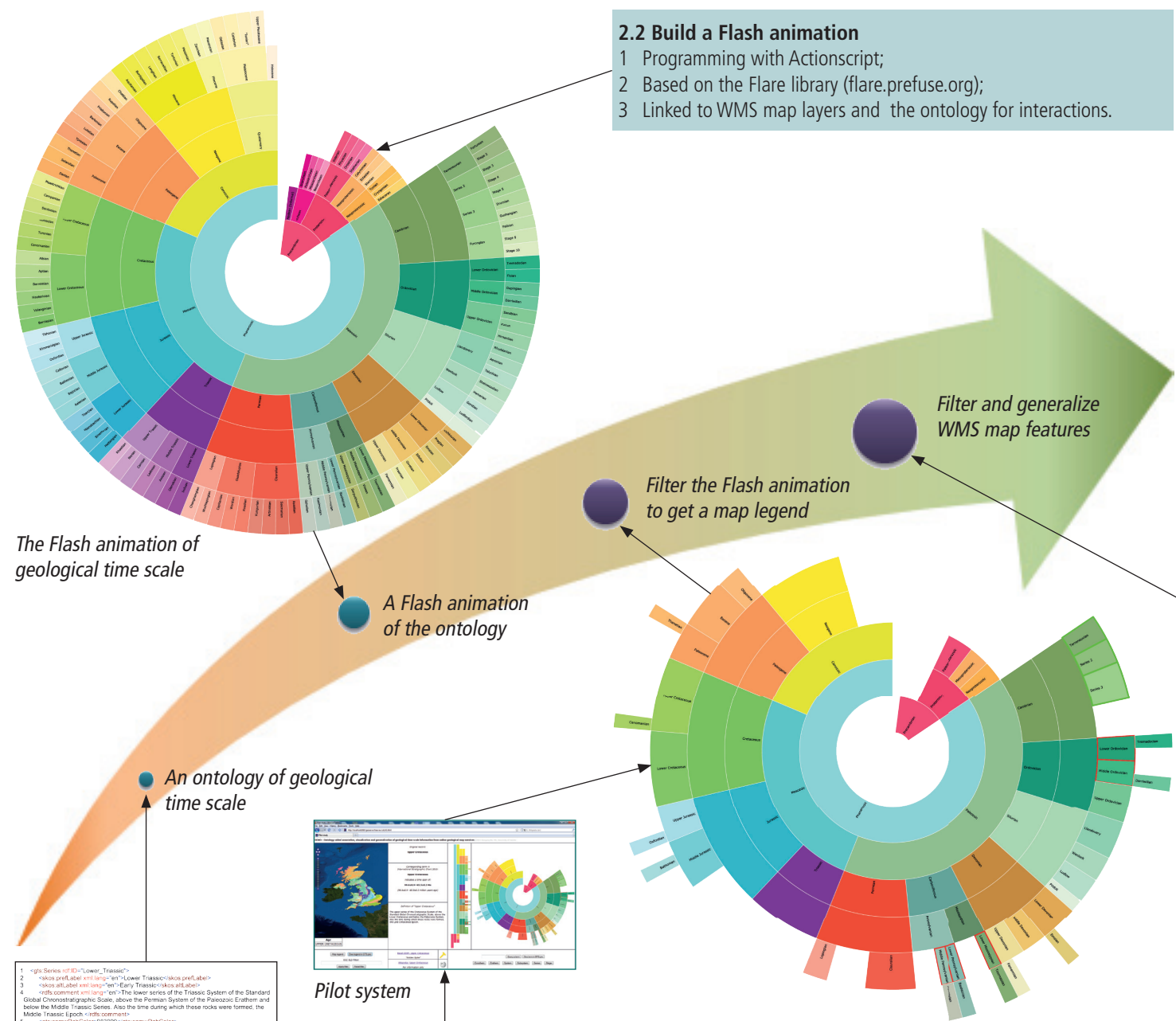
Global Boundary Stratotype Section and Point (GSSP) information

Int'l Stratigraphic Chart 2010

Glossary of Geology

RGB codes of geological time concepts

- ### 2.1 Model and encode the ontology
- 1 Model the ordinal hierarchical structure of geological time scale;
  - 2 Collect definitions of geological time concepts from reliable sources;
  - 3 Encoded in RDF/OWL.



**"Lower Triassic": An example concept in the ontology**

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- ### 3.1 Filter the animation to get a map legend
- 1 Get style information of geological time features from a WMS map layer;
  - 2 Parse the style information and get a list of geological time concepts covered in the map layer;
  - 3 In the Flash animation, show concepts in the list while hide others.

- ### 3.2 Filter & generalize map features of geological time
- 1 Click a node in the filtered animation;
  - 2 Filter out map features of a single geological time concept, or together with its child concepts;
  - 3 Generalize map features of a concept, or all concepts at a certain geological time level;
  - 4 Functions realized by interacting with the ontology and then sending Style Layer Descriptor (SLD) files to the WMS map layer.

Mesozoic only

Mesozoic with child concepts

Mesozoic generalized

Generalization at Erathem level

Generalization at Eonothem level

Generalization of Precambrian and Phanerozoic

Filtering and generalizing geological time features in the 1:625k onshore bedrock age map of United Kingdom

- ## 4 Conclusions
- 1 Ontology and data visualization techniques can be used to set up interactive map legends for geological map layers on WMS servers;
  - 2 Visualization can be used not only as output of data analysis but also a flexible tool to retrieve new information.