

GEOSTREAM

Exploiting User-Generated Geospatial Content Streams

http://geocontentstream.eu

Project's mission

With the proliferation of the Internet as the primary medium for data publishing and information exchange, there has been an explosion in the amount of online content available on the Web. In addition to professionally-produced material being offered on the Internet for free, the public has also been allowed and encouraged to make its content available to everyone. The increasing popularity of open online communities and social-networking sites, image and video sharing portals, discussion boards, and community wikis has meant a dramatic drop in the barrier-to-entry for casual computer users to generate and upload their content on the Web.

The volumes of such User-Generated Content (UGC) are already staggering and constantly growing. Thereby the geographic context of the content plays a very important role. GeoWeb 2.0, the geographic embodiment of Web 2.0, describes the next generation of geospatial information publishing, discovery and use on the Web. The vision of GeoWeb 2.0 is to take advantage of the inherent temporal and geospatial context and to provide additional value for the exploitation of information shared over the Web.

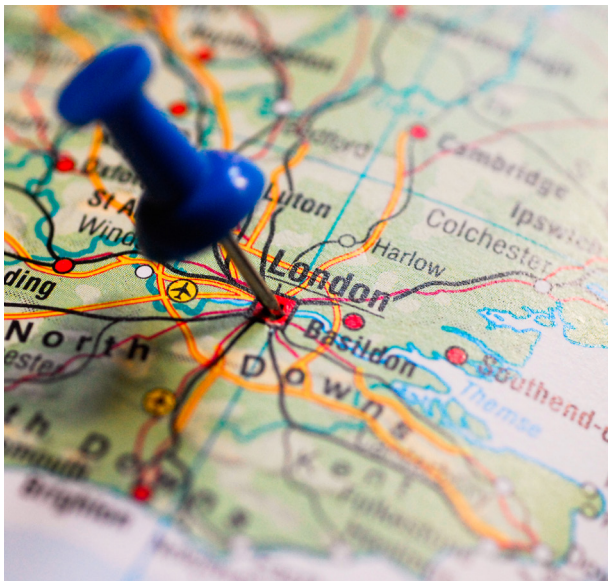
Focus of the project

In this context, GEOSTREAM investigates innovative concepts for geospatial content streams. The aim of the project is to increase the value of already existing user-generated content streams by making hidden geospatial aspects visible and usable.

Overall, GEOSTREAM will provide the participating SMEs with the tools to be able to turn the oncoming geospatial data tsunami into a compelling business advantage. The results will be a user-generated geospatial content compiler, a Web computing platform, a rich authoring tool and a live mobile computing platform.

About

GEOSTREAM is a two-year research project partially supported by the FP7 – Research for SMEs (small and medium sized enterprises) programme of the European Commission under contract number 315631. It is carried out by six international partners working closely together. The project consortium includes three research providers (RTDs) and three SMEs. The project was launched in April 2013 and will end in March 2015.



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Challenges & objectives

Project challenges

Harvesting and exploiting user-generated geospatial content involves several challenges. The content is authored by largely untrained individuals and their actions are almost always voluntary. Hence, the results may not be accurate. A serious concern is therefore the trustworthiness of the data.
A myriad of Web applications producing geospatial data exists today. Each has its distinct data model and means to access the data. This makes it generally difficult to access and compare data from such sources.

User-generated content may never replace quality data sources, but may be used to complement them. In fact, its value may lie in what it can tell about local activities and life at a local level. Various geographic locations are unnoticed by the world's media. Thus, integration of user-generated content with high quality data sources is needed.

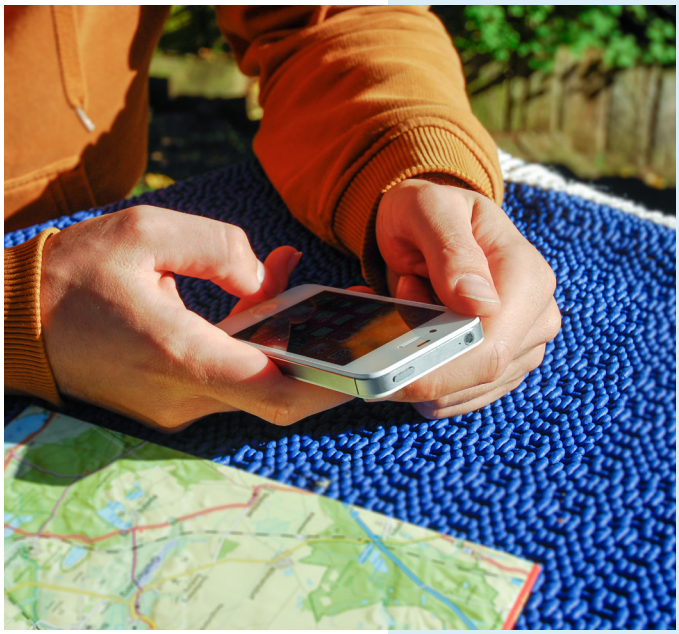
General project objectives

GEOSTREAM will overcome these challenges. For example, methods are developed that allow assigning quality measures for the examined content. Datasets from various sources are aligned with each other. For the comparison and integration each source is described with metadata or schemas.
To overcome the quality problem, tools are created to engage the user in contribution content and assessing the task of quality assessment. These tools should be easy-to-use in order to reach a broad audience. Additionally these tools link new content with already existing sources. Besides a Web authoring tool, a mobile application will provide the user with a convenient and comprehensive means for data collection and distribution.

Objectives

GEOSTREAM aims at providing novel techniques and tools for extracting, processing, and exploiting user-generated geospatial information on the Web. In technical terms, the focus will be on the following objectives:

- Smart **data mining and fusion mechanisms** for user-generated geo-content. The key underlying assumption is that a large number of observations with low accuracy can be combined to generate data of high accuracy.
- Tools that support the user in the **authoring of data** with geospatial aspects and allow the inclusion of as many users as possible.
- Means to **publish content** and provide related services on the Web as well as on mobile devices.



Key concepts & technologies

On the basis of the challenges and objectives, the project concentrates on the following three major research areas.

Geospatial Data Mining and Fusion

This task involves the design and development of algorithms for the extraction and integration of arbitrary geospatial data. The available user-contributed data is processed by data mining and fusion techniques to produce high-quality geospatial datasets.
Approaches for spatial data mining that derive point, line and area features from user-generated geospatial content clouds are developed. They build on the idea that a large number of observations with low accuracy can be combined to generate data of high accuracy. Thus, vast amount of existing content on the web is mined and meaningful datasets are derived from it. Furthermore, the compiled data will be integrated into existing data sources that are already used by the SMEs.

Rich Data Authoring

To assist the user in creation of new data, specifically designed tools for authoring rich user-generated geospatial content are developed. The tools will provide easy-to-use means for integrating geospatial information with content such as text, images, and videos. Intuitive user interface concepts such as drag-and-drop or block layouts will be used to engage the broadest possible spectrum of users and, hence, maximize the amount of collected data.

Content Stream Exploitation

The integration of the content collection, fusion, authoring, and provisioning technologies into a unified application and service framework will provide new ways to exploit user-generated geospatial content. Examples include advanced location-based and other spatio-temporal information services, like live tour guides, and services and applications for geospatial business intelligence.



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Project results

Specific project outputs

The goal of the project is to design, develop and evaluate a complete framework that will enable the exploitation of user-contributed geo-content addressing the specific needs of the participating SMEs. The project results will comprise all the necessary algorithms and software tools, libraries, and APIs in order for the participating SMEs to integrate it in their service offerings after the completion of the project. Consequently, the project results are as follows:

- **UGC^S compiler**
  A UGC^S compiler is developed, i.e., data mining, fusion and integration technology that will take large amounts of data from various available sources and (i) produces integrated datasets, (ii) assesses their quality and (iii) relates them to existing data. Our goal is to offer easy-to-use technology that produces good quality datasets that can be used in various existing commercial products of the SMEs.

- **Web Computing Platform**
  A Web computing framework is developed that will involve any Web user in the UGC^S compiling task. Our goal is to develop a framework that adds computing power to UGC^S compilation tasks and helps the SMEs to collect UGC^S and provides a search service to the general public.

- **Rich UGC^S Authoring Tool**
  A Web-based authoring tool for rich geospatial content is also developed. This refers to the requirement of SMEs to develop specific tools that allows their customers to provide feedback in terms of geospatial data, i.e., relate rich content (text, audio and images) to space. Our goal is to create a simple to use Web interface that (i) will be used by as many users so as to collect (ii) as much relevant UGC^S as possible. The so-collected data will be used for user-generated travel guides or related publications.

- **Live Mobile Computing Platform**
  At last a live mobile guide platform for the collection and delivery of content & services in mobile phones is developed. This platform relies on UGC^S mining and fusion technology in a mobile computing context. Our goal is to create a mobile computing platform that will serve as the basis of future mobile applications related to rich geospatial content.



Project partner
Research Center “ATHENA”, Greece

Profile

The Institute for the Management of Information Systems (IMIS) is the newest institute of Research Center ATHENA. Its mission is to conduct research, to develop applications and products, and to provide services in the areas of data management and large scale information systems. The Geoinformatics department conducts research in the areas of geospatial and spatio-temporal data management, including efficient routing, map generation and fusion, spatio-textual search, and spatial data mining and visualization.

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Role in the project

IMIS/RC ATHENA is the project coordinator of GEOSTREAM, and it also leads the effort in WP1: “User-Generated Content Mining and Fusion”, WP3: “Web computing” and WP4: “Rich Authoring Tools”. IMIS focuses on efficient methods for collecting and mining user generated geospatial content from the Web. This leverages a novel application of the map-reduce computation concept in connection with browser computing. Moreover, IMIS develops rich, user-friendly, Web-based authoring tools to support direct content creation and collection from users.



GEOSTREAM

Project partner
FU Berlin, Germany

Freie Universität Berlin

Profile

The Database and Information Systems Group at Freie Universität Berlin is working on application-oriented as well as fundamental research projects. Currently the group focuses on data management in mobile systems on the one hand and the unstructured-to-structured data area on the other. In both areas research is conducted impacting applications for post-PC (mobile) devices as well as cloud computing and distributed database systems.

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Role in the project

FU Berlin with be involved in all stages of the project starting from the requirements analysis to Mining, Processing, Storage and Management of User Generated Content (UGC). This will support Application Development and SMEs. In collaboration with partner institutions, FU Berlin will develop data mining methods for UGC. FU Berlin will also work on deriving data semantics and methods for quality assessment of data. FU Berlin will focus on uncertainty models and in particular on Geospatial data quality. The goal for such methods will be to allow for fusion and integration of compiled UGC. Lastly FU Berlin's expertise in Geospatial Data Management will be providing a robust storage and data management solution.

Project partner
Fraunhofer FOKUS, Germany

Fraunhofer FOKUS

Profile

The Fraunhofer Gesellschaft maintains 60 self-contained Fraunhofer Institutes throughout Germany with a staff of 20,000 scientists and engineers. Fraunhofer Institute for Open Communication Systems (FOKUS), based in Berlin, develops solutions for the communication infrastructure of the future. In its projects, Fraunhofer FOKUS establishes useful ties between industry, governmental administration, users, and the people. Besides technical infrastructures, Fraunhofer FOKUS creates manifold practical concepts, applications, and prototypes. In particular, Fraunhofer FOKUS is specialized in developing multi-domain networks and inter-operable, user-centric solutions.

Contact

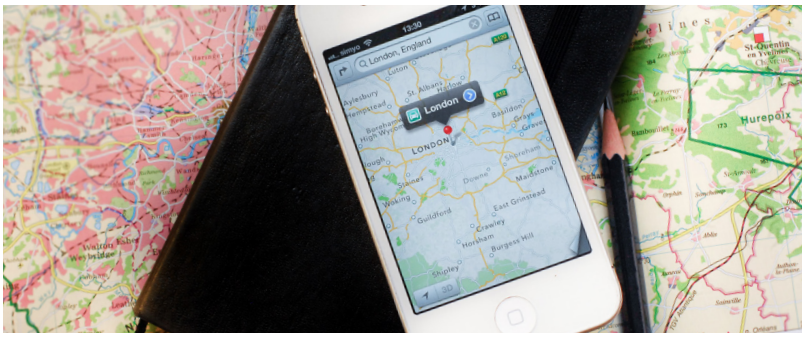
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Role in the project

In GEOSTREAM researchers from Fraunhofer FOKUS are designing a mobile computing framework taking advantage of the geospatial mining and integration technologies of the content platform. The framework will allow for new information to be collected live trough a mobile client and linked to already existing content. To enhance the utility of the system, information about the user's situation will be used. Fraunhofer FOKUS will develop a mobile guide prototype to showcase retrieval, collection, and creation of user-generated geospatial content. The guide will feature a functional and intuitive user interface to make using and sharing geospatial content an easy task.



GEOSTREAM

Project partner
Michael Mueller Verlag, Germany

Profile

Founded in 1979 as a publisher for individual travel guides, the company had early successes such as their Inter Rail compendia. MMV currently employs about 30 people and has a portfolio more than 200 travel guides covering Europe almost completely. In addition new guides have been publishing covering non-European destinations but also city guides and smaller, special interest regions. The guides have high popularity due to their focused travel tips, also allowing for budget travel professional layout and up-to-date information. MMV has become the market leader for specialized travel publications and is a three-times winner of the ITB Award for this market segment.
MMV started publishing their guides as Apps and e-books. Currently 40 titles are available and new ones are added on a weekly basis.

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Role in the project

MMV aims at (i) diversifying its content by adding user-generated content from its loyal customer base via advanced forum software and (ii) upgrade its mobile guide technology by introducing a live data collection and publishing channel. An additional aspect is the introduction of a rich point-of-interest (POI) in its guides.



Project partner
TALENT, Greece



Profile

Talent S.A., founded in April 2003, develops and markets innovative software products and services through the exploitation of state-of-the-art technologies in various sectors of economic and technological interest, with emphasis in:

- Information systems that involve processing of geographic and geo-coded data, like web-mapping and publishing systems, assets and property management systems, crisis management systems, fleet management systems, etc
- New ways of learning for children and life-long learners through the use of innovative computer environments, like dynamic simulations, construction and manipulation of mechanical models, collaborative strategy games, etc

Talent is offering innovative software products, solutions and services, involving online mapping and geographic visualization, geospatial and location aware applications, immersive environments and simulations for Service Providers, for Enterprises and for the Public Authorities.

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Role in the project

Within the GeoStream TALENT will:

- Test applications in collaboration with the SMEs using a limited number of SME customers and clients and evaluate the applications.
- Be responsible for the Web site that showcases the geospatial content collection methods.
- Lead the effort of organizing workshops with interested developers to test the Geostream framework.
- Lead through the partner program the effort to collected additional user feedback and capacities for testing.

Through the GeoStream project TALENT expects to enrich the content base of its geo-portal www.umap.gr and to improve the functionality of the existing portal with respect to user-generated content. TALENT plans to commercialize the technology developed in the project as the basis for the development of mobile information and mapping portals.

GEOSTREAM

Project partner
WIGeoGIS GmbH, Austria



Profile

WIGeoGIS was founded in 1993 by Zoltán Daróczi and Georg Magenschab as the result of a research group of the University of Business Administration in Vienna. It is currently a leading European business in the areas of geomarketing and geocommunication with branches in Munich, Vienna and Salzburg.
Under the heading of geocommunication, WIGeoGIS develops and offers tailor-made information and search services in the Internet and via WAP. The programs are based on digital maps and geographical information systems. The information is readily and easily available through a browser or a mobile phone. The desired information (maps and data) is produced by active user dialog. Geocommunication therefore means: Instantly available information, up-to-date data and ease of operation.
As a refiner of data, WIGeoGIS links digital maps of Austria and Germany with population, business and corporate data. These data packages offer efficient support in marketing and corporate management. Based on geographical information systems, WIGeoGIS develops tailor-made software in addition to standard software packages. Our applications are used in Call Centers, in OLAP- and datawarehouse systems as well as the Internet and Intranet.

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Role in the project

WIGeoGIS acts as sponsor in this project. The research and programming parts, realized by executing team members, are assigned by WIGeoGIS.

WIGeoGIS expects an application that localizes content by using georeferenced information gathered from networking platforms and cloud services.

http://geocontentstream.eu

Plaka Map: Research Center ATHENA
Other images: Fraunhofer FOKUS

GeoStream is partially supported by
the FP7 – Research for SMEs programme
of the European Commission
FP7-SME-2012-315631 – GEOSTREAM



