

ACRONYM - TITLE

DigMap - Digital Map Excerpt Software

COORDINATOR

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Summary

DigMap solution enables easy and standardized way to disseminate spatial and non-spatial data. DigMap is innovative service offered both to the public and the private sector. Service is cloud-based in a way that allows an operational implementation based on open interfaces (OGC WPS - Open Geospatial Consortium Web Processing Service), leading to interoperability and portability. DigMap will enable the provision of re-useable service components which have appropriate data security feature. DigMap shell provide a set of use cases and best practices, especially in field of Cadaster, Transport and Environment protection, which could be broadly deployed as National Spatial Data Infrastructure. DigMap will improve interoperability between administrations across borders (not only across national borders, but also across local/regional borders). The Digital Agenda for Europe promotes the creation, production and distribution of digital content and services for a vibrant single market. DigMap is aligning with Open Data objective. Public sector information represents a major digital content resource for innovative applications and services. Geographic Information (GI) is an important component of Public Sector Information. GI is not only a primary source of data, but also an important means for creating innovative services. DigMap will deliver standardized way for on line GI delivery, and enable easy and standardized way of offline storage on user's computers. DigMap is built on state-of-the-art technologies and offering new standardized WPS service. DigMap lead to an easier use of geographic information available for use in innovative applications and services, draw together datasets from various different sources.

Domain(s)

Domains address by the project:

- 1 - Transport
- 2 - Health
- 3 - Environment
- 4 - Financial
- 5 - Bottom-up: all INSPIRE (Infrastructure for Spatial Information in the European Community) defined themes

DigMap will contribute to making available harmonized information related to one or more of the specific themes enumerated in annexes I-III of the INSPIRE Directive and to fostering the development by the private sector of innovative value-added services based on this interoperable information on a cross-border or pan-European level.

ANNEX I

- 1 Coordinate reference systems
- 2 Geographical grid systems
- 3 Geographical names
- 4 Administrative units
- 5 Addresses
- 6 Cadastral parcels
- 7 Transport networks
- 8 Hydrography
- 9 Protected sites

ANNEX II

- 1 Elevation
- 2 Land cover
- 3 Orthoimagery
- 4 Geology

ANNEX III

- 1 Statistical units
- 2 Buildings
- 3 Soil
- 4 Land use
- 5 Human health and safety
- 6 Utility and governmental services
- 7 Environmental monitoring Facilities
- 8 Production and industrial facilities
- 9 Agricultural and aquaculture facilities
- 10 Population distribution and demography

- 11 Area management / restriction / regulation zones & reporting units
- 12 Natural risk zones
- 13 Atmospheric conditions
- 14 Meteorological geographical features
- 15 Oceanographic geographical features
- 16 Sea regions
- 17 Bio-geographical regions
- 18 Habitats and biotopes
- 19 Species distribution
- 20 Energy Resources
- 21 Mineral Resources

1. Technical Excellence

DigMap solution based on FOSS (free and open source software) enables easy and standardized way to disseminate spatial and non-spatial data through digitally signed pdf report with maps and embedded spatial data. DigMap is innovative service offered both to the public and the private sector. Service is cloud-based in a way that allows an operational implementation based on open interfaces (OGC WPS - Open Geospatial Consortium Web Processing Service), leading to interoperability and portability. DigMap will enable the provision of re-useable service components which have appropriate data security feature.

Dig Map is aligned with directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE). INSPIRE is an EU initiative to establish an infrastructure for spatial information in Europe that is geared to help to make spatial or geographical information more accessible and interoperable for a wide range of purposes supporting sustainable development.

The Digital Agenda for Europe promotes the creation, production and distribution of digital content and services for a vibrant single market. DigMap is align with Open Data objective enabling standardized, interoperable and secure geographic information dissemination. As support for many public services connected with delivery of geospatial data DigMap is going to be availability online.

According to the eGovernment benchmark method DigMap is highest maturity stage that supports forth transaction, and finally fifth as well, which is the highest targetisation level. DigMap supports transactional maturity model - also called full electronic case handling – where the user applies for and receives the service online, without any additional paper work, which is increasingly becoming mainstream. DigMap also supports the fifth level, targetisation, which provides an indication of the extent by which front- and back-offices are integrated, data is reused and services are delivered proactively.

1.1. Background and concept

At the moment DigMap is an elaborated idea waiting for further development and appropriate funding. Idea's author has contributed to implementation of digital map excerpt in Republic of Macedonia, Agency For Real Estate Cadastre, where it is possible to make map print on AREC webgis portal. AREC map excerpt is missing robust software parameterization, encapsulation into pluggable extension and other main characteristics of DigMap like interoperability, authenticity and data billing. Also similar need is identified in Armenian Cadastre during ARPIS project, as well as in Cadastre of Republic of Croatia and Bosnia and Herzegovina.

DigMap integrates open source technologies within a comprehensive toolkit promoting interoperability through the use of OGC and other open standards for data exchange and services. This allows for independent development and functionality deployment provided by different web-services.

DigMap is at experimental ie. proof of concept stage. DigMap is based on two main world's leading FOSS technologies: GeoServer for digital map production and JasperReports as reporting tool. Final DigMap solution should be pluggable FOSS extension to the referent OGC service map server implementation, named GeoServer. Wider deployment would be made through second phase, by DigMap development and implementation in different areas and various institutions and enterprises; it would go into demonstration in relevant and operational environment.

1.2. Objectives

DigMap „digital map excerpt“ goal is to enable easy distribution and use of spatial data as part of public or private sector for creation of value-added services through infrastructure powered by FIWARE GEs.

Probably most widely and recognized usage would be for printing out digital cadastral map excerpt composed from several layers (most common digital ortophoto, land use, parcels and buildings) used to locate, inventory, and appraise all owner's property. Maps and map data are also important for other governmental agencies, the public, and the land information community (such as realtors, title companies, and surveyors). DigMap PDF enables easy view of geospatial data and feature attributes while DigMap embedded files can enhance the capability to manage, analyse, summarize, display, and disseminate geographically referenced information.

Create technical GIS IT infrastructure by expanding existing spatial data solutions primary open source solution GeoServer with extension/plugin in that will enable easy data dissemination through digital map excerpt (DigMap) and enable “one stop shop” approach for geospatial data.

Support full online availability for many public services connected with delivery of geospatial data, full electronic case handling – where the user applies for and receives the service online, without any additional paper work. Enable online “one stop shop” approach to many public electronic services even when complexity of geospatial data is involved.

DigMap will contribute to making available harmonized information related to one or more of the specific themes enumerated in annexes I-III of the INSPIRE Directive and to fostering the development by the private sector of innovative value-added services based on this interoperable information on a cross-border or pan-European level.

DigMap will offer wide range of predefined templates ready to use after setting basic configuration parameters (organization name, heading title, etc.) and more advanced custom design can also be easily done with user friendly GUI tools.

The specific Dig Map project objectives (POs) are to design, develop, test and demonstrate the use of tool for digital map excerpt that support:

- PO1. Authenticity - use issued DigMap for legal purpose it must be signed with digital signature
- PO2. Standardization - enable sharing spatial data in standardized .pdf format embedding .gml
- PO3. Interoperability - based on wide accepted OGC SLD, WMS, WCS WFS and WPS standard
- PO4. Data billing – implement different billing rules (eg. by area, size in MB, number of points...)
- PO5. FOSS (free and open source software) - wide spread at low cost, no vendor lock

DigMap will be built and published as a FOSS enabling wide spread at low cost, enable integration and interoperability, further development according to users’ needs and vendor independence. Also European interoperability framework for Pan-European eGovernment services is based on open standards and encourage the use of open source software.

1.3. Technical description

DigMap milestones are following software development lifecycle including: functional specification – create use cases and documentation that describes the requested behaviour of DigMap, technical specification - this activity will define the system architecture of the DigMap infrastructure and determine final FIWARE GE and frameworks used in project, implementation for development according to functional and technical specification and finally testing . Agile software development method will be used offering adaptive planning, evolutionary development, early delivery, continuous improvement and rapid and flexible response to change. Detailed project planning will be done after functional and technical specifications are finished (ie. scope is determined), and accordingly necessary resources are estimated as well as costs. DigMap will be managed according to a Guide to the Project Management Body of Knowledge by certified Project Management Professional Mr. Krunoslav Hrnjak. Project will be executed in given one year time frame through four FINODEX phase. Rough effort estimation for minimal viable product are based on 1,5 man/years (team of 3-4 people could carry out work in a half year period).

1.4. Open data requirement

Dataset name	Dataset origin	Dataset license	Comments (if any)
Data on Transport	Open Street Map https://www.openstreetmap.org	ODC-ODbL	Used as base layer
Data on Meteorology	Open Meteo Forecast https://openmeteoforecast.org/	ODC-By	Used to produce sample excerpt for weather forecast as PoC
Any domain	Any source	Any kind of open license	Proof ability to work with and data model and format

2. FIWARE usage

DigMap can use any geo-data source through OGC services. DigMap is focused on data dissemination, regardless of information model or data format. DigMap can reuse OGC services from third-party systems. DigMap can consume datasets provided by a third party (as Open Data or not) using third party data access drivers or generic access over OGC services. DigMap process and publish only one part of original datasets. Access controls to these datasets are handled through OGC service setup. It could be possible to use the CKAN platform for the purpose of managing and publishing datasets. CKAN has Vector Storer extension that allows users to upload vector geospatial data, store and publish through OGC services. DigMap can reuse those services to provide new WPS service for digital map excerpt delivery. However there is FIWARE GEs - GIS Data Provider - Geoserver/3D that can be used for publishing OGC services, as well as CKAN, and maybe more suitable than CKAN since DigMap can be deployed as Geoserver extension or standalone application. In that case it is possible to modify existing FIWARE GE to provide additional functionality for data dissemination, or to create new DigMap FIWARE GE.

DigMap will enable users to generate reports and visualize geographic data. Initially JasperReport java reporting framework was used for experimenting, but also the FIWARE Data Visualization and Analysis GE (reference implementation: SpagoBI) can be used for this purpose by publishing signed PDF with embedded GIS dataset in form of image and GML data inside PDF file using SpagoBI capabilities combined with third party open source framework like iText for creating digital signature.

DigMap require additional component to represent GIS information through a Web 2D or 3D User Interface. GIS Data Provider - Geoserver/3D is just a perfect fit for that purpose. User can visualize whole GIS dataset and select area or object (feature) of interest using Geoserver/3D and request map excerpt for selected area/object by issuing WPS call to DigMap application/Geoserver extension.

There is already built in authorization framework in Geoserver/3D GE based on Spring Security, so theoretically using Spring Security OAuth it is possible to adopt OAuth 2.0 for implementing authorization.

DigMap itself represent part of GIS cloud infrastructure. DigMap is designed as interoperable application and can be build using different technologies (using GeoTools and Geoserver, or PyWPS or ZOO Project) and different programming languages (like Java or Python). In case of Java development it would require only Geoserver/3D GE, and additional GeoTools framework combined with reporting tool like JasperReport or SpagoBI. It is planned to deploy DigMap on the FIWARE Lab Cloud in order to perform development and testing. DigMap itself can be used as additional FIWARE GE for spatial and non-spatial data dissemination.

2.1 FIWARE Usage Summary

FIWARE technology (name of the Generic Enabler GE and/or Specific Enabler –SE and/or platform)	Are you using the existing online implementation via FI- LAB? (Yes/ No-Explain why)	Why use it in the project?	What are the expected benefits of its usage in the project?
GIS Data Provider - Geoserver/3D	Yes	Add DigMap as Geoserver extension	Providing out of the box OGC services and UI
Data Visualization and Analysis	Yes	Framework for publishing reports	Easy to use PDF creation
IaaS Resource Management	Yes	Hosting DigMap as standalone application	Low cost infrastructure

3. Impact

DigMap clearly contributes to the following impacts:

- It fosters wider use of spatial data, by public and private organisations, through value added services.
- It promotes the use and re-use of harmonised and interoperable data sets, related to a number of themes within annexes I-III of the INSPIRE directive, made or being made available, through different companies or institutions.
- It delivers enabling services for dissemination and visualisation of information.
- It implements processing services using related standards (WPS).
- Facilitate cross border use and data/service integration.

DigMap contributes to the following EU political objectives and policies:

- Directive 2003/98/EC on the re-use of PSI: providing value added services on top of existing OWSs.
- Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE).
- The Digital Agenda for Europe, Pillar II: Interoperability & Standards and Pillar III: Trust & Security
- Initiatives from EEA (European Environmental Agency) including EIONET - European Environment Information and Observation Network: improving management of environmental data.
- SEIS principles: specifically referring to open source solutions supporting information sharing and processing.
- Current objectives of European Space Agency (ESA): in terms of interoperability and eInfrastructure.
- Current objectives of Joint Research Centre (JRC): in terms of interoperability, support to INSPIRE and ESDI.
- Policies set by the United Nations Spatial Data Infrastructure (UNSDI): contributing to the objective of enhancing spatial data and information sharing between UN agencies and programmes directly through partner CCSS which is UNSDI national coordinator.
- European interoperability framework for pan-European eGovernment services

DigMap is aligned with EU INSPIRE initiative and it will help to establish an infrastructure for spatial information in Europe that is geared to help to make spatial or geographical information more accessible and interoperable for a wide range of purposes supporting sustainable development.

The three adjectives (smart, inclusive and sustainable) characterizing the EU2020 strategy request for major change in the way of defining the way of being competitive and at the same time keeping under control the unbalances connected to regional disparities, but even to look for more effective and efficient solutions in the use of digital data. In fact, this way, especially those connected to the definition of smart solutions for the economic growth of European cities, city-regions and major scale territories, is strictly connected to the proper design of an EU Digital Agenda (DA).

DigMap outcomes are to identify in set of tools, services and policies that will contribute to major horizontal tasks connected the EU digital Agenda (e.g. access of data owing to public sector information, and enhancing the EU innovation capacity), but, at the same time, the project's outcomes will affect and impact on the realms of interoperability and standards of spatial data and trying to propose effective solutions for spatial data wide dissemination to public and citizens. These latter realms constitute key pillars of the DA for Europe. Outcomes, indeed, will depend on what is going to happen during the project's evolution and implementation.

Moreover, citizens are, thanks to new mobile devices, are ready to consume Internet base services like DigMap. With regard to this, those DigMap smart services involving citizens will strongly help for delivery of digital map excerpts (innovative ways of government), like cadastre excerpts.

DigMap aims to innovate the capacity to facilitating the development of EU wide markets for innovative ICT-based products and services and exploitation of digital content and DigMap looks at the stakeholders in order to mobilize the suitable financial and human resources needed to carry out DigMap development and application in operating environment.

Concluding, DigMap output answer to the questions connected to inter-regional/cross border dissemination of geo spatial data, those connected to the indications for the design of trans-national services (the market is definitively global)

3.1 Value proposition

The overall aim of the proposed project is to provide easy to use interoperable software for creation of digital map excerpt, digitally signed based on free and open source software.

DigMap will provide functionality for “printing” maps in portrait or landscape on the format up to A3. DigMap is not a real print out but a PDF file generated on server side and downloaded over HyperText Transfer Protocol on client computer’s.

The printing shall utilize the resolution of the print unit not restricted by the resolution of the screen image. Print scale can be limited to the same scale as the one set on the screen zoom or by best fit zoom for particular map object. When activating the DigMap print button a print menu will appear with printing preferences as:

- Title: Option to write a title/header for the map
- Initials: Option to sign map by initials and name
- Text: A text field for optional text.
- Check boxes for:
 - Legend (shall legend be printed or not)
 - Map scale (shall Map Scale be printed on the map or not)
 - Date (shall current date be printed on the map or not)
- Format/orientation: A drop menu where the users can select between:
 - A4 portrait
 - A4 landscape
 - A3 portrait
 - A3 landscape
- Embedded data format:
 - GML
 - KML

Sample web application is available at: <http://digmap-lab.yottabyte.hr/> . At the moment application doesn’t support digital signature or embedding data into PDF file. It’s primary purpose is to show possible look and feel and basic functionality covering the most straightforward use case scenario – report about particular Country shown on the map.

3.2 Market scope

There are various commercial solutions on the market for creation of geo spatial reports offered by GIS top vendors like ESRI, Oracle, Intergraph, MapInfo and many others, and still we are missing free and open source solution that would be suitable for small and medium companies that have a need for easy to use, affordable solution. DigMap easily avoids vendor lock in by using open source and open standards (OGC services).

In case of setting up GIS web portal on Oracle, whole system stack should be purchased from Oracle including: operating system: Oracle Linux, database: Oracle Enterprise database with spatial option, web map server: Oracle Fusion Middleware - MapViewer, available as a feature of Oracle WebLogic Server, with additional licences for reporting and publishing. Licences for whole system stack costs several hundred thousand dollars for medium

installation (based on one database and one application server). Rather same situation is in case of other commercial GIS software vendors.

Small and medium enterprises and government institutions would be the main target market for DigMap. DigMap is offering free and open source solution combined with professional implementation and support services at affordable prices following open-source software business model.

Digital map excerpt can be built on top of various free and open source technologies, integrated together in software development process. DigMap would offer bundled package ready for installation and configuration without software development or integration process, that fore saving efforts, time and money.

3.3 Customers

DigMap is a tool for geospatial data dissemination. Mr. Hrnjak had opportunity to work with Agency For Real Estate Cadastre (AREC) of the Republic of Macedonia during development of Web Portal for Dissemination of Spatial Data and Services. The idea of implementing such system by AREC is a result of the need to simplify the procedures, also, shortening the time to gain the needed information. One of the main requirements was setting up digital map excerpt. At the moment it is possible to get digital map excerpt on AREC web GIS portal, but only informal version (version without full legal credibility). AREC web portal was paid on commercial base. Also similar needs have been reported from Armenian and Croatian Cadastre.

Geo-Meteo is Croatian Meteorology Company which would like to use DigMap solution for presenting, distribution and selling meteorological fields like temperature, clouds, precipitation etc. Existing graphical service, grads, for presenting grib2 files is very rude and not proper for making images with media quality requirements. There are several benefits in using such DigMap solution:

- DigMap can combine various open data sources (like base maps layers – satellite images or topographic maps) with Geo-Meteo meteorological fields.
- Presentation of the various meteorological fields is much better on real geographical maps and it can be used for publishing in various media. This provides better position of Geo-Meteo in meteorological market.
- Graphical products made by DigMap service can be faster delivered to the customers because they will be produced on the cloud and ftp protocol computing machine-server-customer can be avoided.
- New meteorological graphical products, a different kind of maps, on demand buying service could be established.

Croatian Environmental Protection Agency (hrv. AZO - Agencija za zaštitu okoliša) would like to enable online issue of permits and provide excerpts from the Agency registry containing geo spatial data using DigMap. Such approach would bring huge advance to existing Agency service level by:

- Creating online one stop shop for issuing multiple permits and registry excerpt (with geo spatial data)
- Easy disseminate data from AZO information catalogue
- Providing Agency services on 24/7 base
- Reduce staff costs and increase productivity

From the customer's perspective, the ability to use open-source technology under standard commercial terms and support is valuable. Customers are willing to pay for the legal protection (e.g., indemnification from intellectual property infringement), "commercial-grade QA," and professional support/training/consulting that are typical of commercial software built on top of the innovation and independence that comes with open source.

DigMap can be made as a standalone application or embedded into GeoServer ad software extension. By creating GeoServer extension DigMap becomes add-on on top of the today's leading open source software for mapping with more than 232 thousands¹ download from the beginning of the year. This gives an overview of potential DigMap users who want to disseminate their spatial data and made them ready for offline usage.

A huge number of state agencies in the European Union use geospatial information to improve operations, meet missions, and communicate with the public. DigMap enables easy geospatial data publishing in formal and official

¹ <http://sourceforge.net/projects/geoserver/files/stats/timeline?dates=2014-01-01+to+2014-12-16>

manner. Local governments serve citizens while reducing costs with tiny budgets. DigMap can be a perfect fit into geospatial open source environment. Moreover, DigMap could be a new FIWARE GE for data dissemination bringing awareness and the reachability in the market.

DigMap software will be released as Free & Open Source Software (FOSS). This will ensure continuing development of the core value added services. This approach will bring a further advantage to DigMap which will leverage on the Open Source (OS) community in order to exploit the enormous potential of the OS world in terms of actual software component development and further dissemination. The OS community channel will amplify the potential adoption of the technology to a broader audience. This will ensure that costs of further developments of processing functionalities, built on top of the DigMap framework, will be carried on at low costs by public administrations or private industries according to their specific needs.

DigMap commercialization should come from selling professional services for DigMap development and implementation to selected prospects according to the open source business model by selling consulting, implementation and education services.

Service type	Basic	Standard	Premium	
Installation and configuration	✓	✓	✓	
Commercial support and maintenance	✓	✓	✓	
User and administrator training	✓	✓	✓	
Consultancy hours included		✓	✓	
Dedicated development			✓	
Price per year	3.000,00 €	5.000,00 €	12.000,00 €	TOTAL
Number of customers 1 st year	2	1	1	23.000,00 €
Number of customers 2 nd year	4	2	1	34.000,00 €
Number of customers 3 rd year	7	5	2	70.000,00 €

There is a need for one or two referent customers to try out DigMap services during the development and tuning phases. There is an interest from several Croatian companies like Geo-Meteo as well as state Agency for environment protection to try out DigMap.

3.4 Social impact

Consumers are becoming increasingly demanding, especially as regards level of comfort and speed of public and private services delivered over Internet. DigMap smart services involving citizens will strongly help for delivery of digital map excerpts (innovative ways of government), like cadastre excerpts in real time as a self-service. DigMap can enhance growth, competitiveness, and jobs. DigMap promise a yet greater productivity boost. Europe's ambition is to create new business opportunities and accelerate the transformation of its business landscape through novel digital technologies, like DigMap, in order to increase growth and create employment.

One of the principle missions of the European Commission is to promote the competitiveness of the ICT industries and services and to support the take-up of ICT and e-business practices by European enterprises. Innovations are regarded as crucial for ensuring the competitiveness of European industries in the knowledge economy.

The European Commission tabled on 26 June 2012 its strategy to boost the industrial production of Key Enabling Technologies -based products, e.g. innovative products and applications of the future. The strategy aims to keep pace with the EU's main international competitors, restore growth in Europe and create jobs in industry, at the same time addressing today's burning societal challenges.

4. Experience

DigMap is in its initial phase, elaborated as idea and presented in demo lab. DigMap paper proposal for general track presentation titled “DigMap - digital map excerpt as a part of ICT GIS infrastructure » has been accepted for presentation at FOSS4G-Europe 2014, as well as proposal for “Geo Reports” workshop. Presentation and workshop have taken place on FOSS4G-Europe 2014 conference in Bremen, Germany from 15th-17th July 2014. Project was also presented on HR-OSGeo Meetup on 2nd October 2014, in Ljubljana on JavaSi '14 international conference on 20th October 2014 as well on Javantura v2 conference, in Zagreb, on 15th November 2014. Stakeholders and academic representatives from Europe have expressed their interest in project participation.

4.1 Personnel description

Krunoslav Hrnjak – project coordinator

Krunoslav Hrnjak, M. Sc. E.E., MBA, PMP works as independent consultant and court witness expert. He has more than ten years of experience in ICT field acquired in regional and international companies (Siemens, KING-ICT, Geofoto, Infosistem) in various roles as: developer, solution architect and project manager. He teaches Linux and Ruby at the Computing University Centre. Mr. Hrnjak has a long history of education and training experience. Relevant project experience include projects like AREC – development of public portal for spatial data dissemination in Republic of Macedonia, ARPIS – implementation of digital Cadastre in Armenia, PRAGMA - development of GIS cloud platform and solutions for local government and KIR - development of web based GIS solution for geodetic survey.

Tihana Hrnjak

Tihana Hrnjak, M. A. in Political Science, certified EU funded project manager, provides logistic support for service-oriented businesses, tailor services to the particular client, act as a key account manager promoting company's services and taking care about marketing approach and client targeting. Tihana is irreplaceable in building a personal relationship with clients. She has experience in private entrepreneurship and currently is engaged in Erasmus+ program for entrepreneurship experience exchange.

Siniša Sovilj

Siniša Sovilj was a Ph.D. researcher and teaching assistant at the University of Zagreb (UNIZG), in Croatia where he worked at for last eleven years and currently he works as a freelancer and System Dynamics (SD) Consultant - Expert for Economy and Business Simulation Modelling. He has developed a Business Dynamics Simulation Model for Technology-based Startups, SMEs and New Projects. Mr. Sovilj is also a participant and member of the well-known Founder Institute - the world's largest entrepreneur training and startup launch program, helping aspiring founders across the globe build enduring technology companies.

4.2 Earlier projects

AREC

AREC (Agency For Real Estate Cadastre of the Republic of Macedonia) is public portal developed by InfoMax for spatial data dissemination in Republic of Macedonia. Portal offers 2D and 3D spatial data view for whole Republic of Macedonia. Mr. Hrnjak was in charge for processing and publishing different vector (parcels, building, geodetic point ...) and raster data (digital areal images and scanned maps). Data loading was done using Linux scripting and FOSS tools for spatial data processing. Mr. Hrnjak was part of the team for data styling and visualization according to customer requirements. Mr. Hrnjak made on the job training to AREC employees.

<http://webgis.katastar.gov.mk/arec/?lang=en>

ARPIS

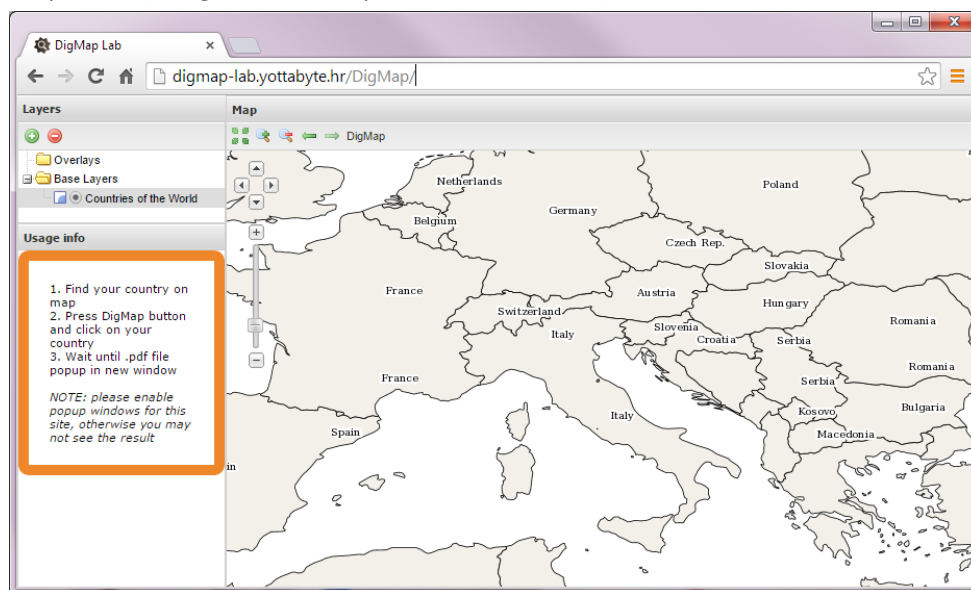
ARPIS was not only technical challenge but also very important project for company branding as cadastral solution provider. Project includes building complex digital web based cadastre management system on highly available IT infrastructure. Mr. Hrnjak was project manager for development of Armenian Real Property Information System. His role was to set up project environment and project teams, manage project execution and prepare project integration plan.

<http://www.e-cadastre.am/en/map#>

DigMap

Information about DigMap idea is also available online, divided into three main parts:

- General presentation: <http://digmap.yottabyte.hr/>
 - DigMap general presentation contains all relevant information about project, including project description, impacts, core team member and invitation to join.
- Tutorial: <http://digmap.wordpress.com/>
 - DigMap tutorial shows how to produce reports with maps using today's world leading free and open source software for web mapping and reports, GeoServer & JasperReport, respectively.
 - Tutorial goes through a series of steps increasing a level of complexity with various integration options: from command line application setup, over web application to GeoServer extension.
- Lab: <http://digmap-lab.yottabyte.hr/>
 - DigMap lab is made as a try out free to use demo. IT is based on Boundless Open Geo Suite, consisting of PostGIS database, GIS web server named GeoServer, and OpenLayers front end framework. Additionally code is written in Java using JasperReport and GeoTools frameworks, Eclipse IDE (integrated development environment) and Maven build automation tool.



Picture 1 DigMap Lab at <http://digmap-lab.yottabyte.hr/>