Technologies for Geospatial Information and Remote Sensing

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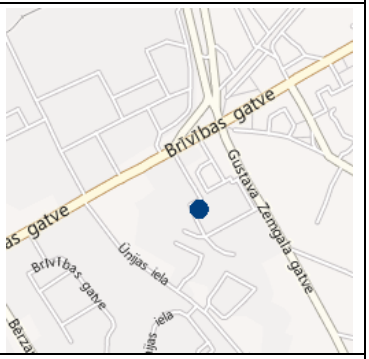
COMPANY OVERVIEW:

What we do:	We offer services in following areas: • delivery and implementation of standard GIS, CAD and database software solutions; • GIS, LIS and database system design and integration; • consultancy and users training in areas mentioned above; • design and implementation data publication solutions via Internet (attribute data, vector data, raster data, 3D reality models, web services).
Who are our Customers:	• State institutions, including Latvian ministries, road administration, cadastre and land registry authorities; • State owned companies, including telecommunications and electric power supply; • Municipalities and their owned and servicing companies; • Private surveyors and surveyors companies; • Architects bureaus; • Road designing companies; • Universities.
Where we are:	We are residing in Riga, capital of Latvia. Our office is at 224 Brivibas gatve, near to Riga city center. It is easy accessible for our customers and partners. Driving time to the airport is 30-40 min, 10 min to the city center. 
Our Goal and Mission Statement:	To develop integrated information systems and offer powerful customer solutions based on global providers of collaborative technologies and software components enabling users to create, manage and publish engineering, geospatial, architectural and construction content. We provide professional services for our software solutions, including implementation, integration, customization and

	training.
Our Specialists:	Our staff personal includes 8 specialists with high qualification as system analysts, database developers, GIS and CAD software experts, project managers, trainers. Thereof work contents varies from project to project, we have great experience to work with subcontractors, foreign experts and participating as subcontractors and experts in the variety of projects.

COMPANY HISTORY:

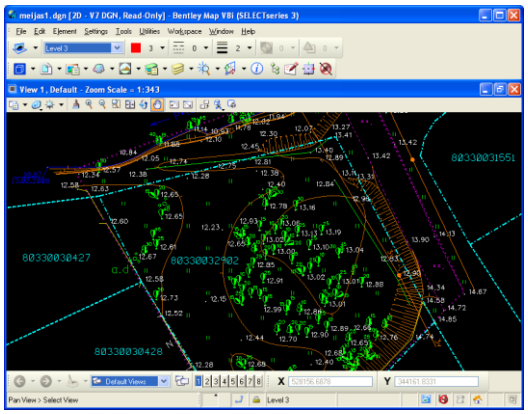
Limited Liability Company MikroKods was founded in 1993 by a group of specialists, who have a significant number of years of experience in fields of engineering, land surveying and information technology. Currently company has 4co-owners.

The initial goal of company was to be a distributor of Intergraph Inc. CAD, GIS and CAM technologies within the country. But requirements of land reform and need to establish cadastral and land registry systems in the country actuate the company for starting of IT systems development originally for managing geospatial information. These activities later were enlarged to the development also legal registrations systems for land registry and notaries as well as system integration.

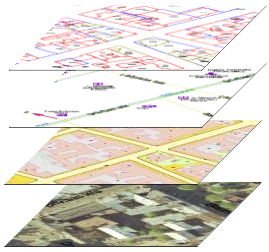
MikroKods is Intergraph solutions Center in Latvia from 1993 and Bentley Business Center from 1995. That includes authorization to resell Bentley and Intergraph software products, Bentley SELECT service program and user training services. We also are Oracle partner from 2004. At 2001 MikroKods was certified as ISO9001 compliant company. We started as Hexagon Geospatial partner for Baltics region at 2014.

Our experts have work experience participating in several large projects in cooperation with such companies as Ordnace Survey (UK), BloomInfo (Denmark), NRD (Norway), Intergraph Danmark, Norconsult (Norway).

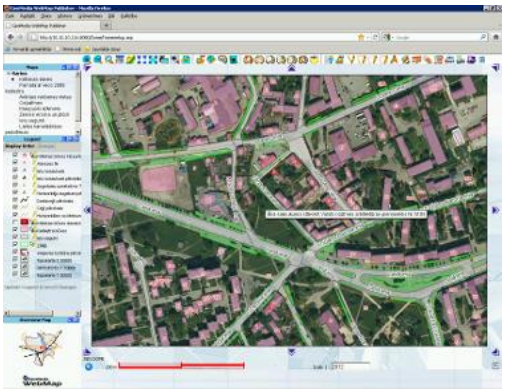
CORE COMPETENCIES:

Computer Aided Design (CAD): 	The Computer Aided Design is area where MikroKods had first competence. The CAD experience is mainly based on MicroStation range of products from Bentley Systems. We offer delivery of wide range of CAD tools for surveyors, territory planners, architects, designers, road designers etc. We also offer support of these products and consultancy as well as adaption of them for different CAD standards. 

Geographical Information Systems (GIS):

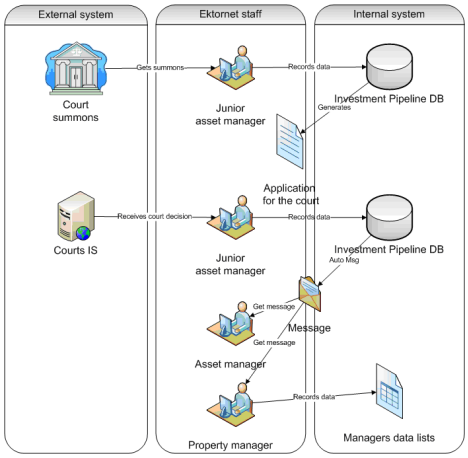


MikroKods has competence to implement CAD based GIS solutions like Bentley Map and pure GIS tools from Intergraph Geomedia series, and ERDAS remote sensing tools. We have unique expertise of spatial data storage in Oracle Spatial object relational database. MikroKods has implement GIS for large city municipalities Riga and Jelgava.



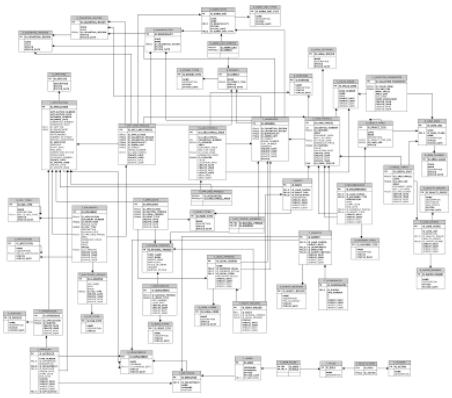
Business Process Analyses:

MikroKods has experience to perform consultancy projects for analyses of current business processes within organization and preparation concept of operations (ConOps) and requirements specification documents for development of new system. These projects were performed in Latvia and our experts also were involved in similar international projects in Macedonia, Azerbaijan, Moldova, Mongolia and Denmark.



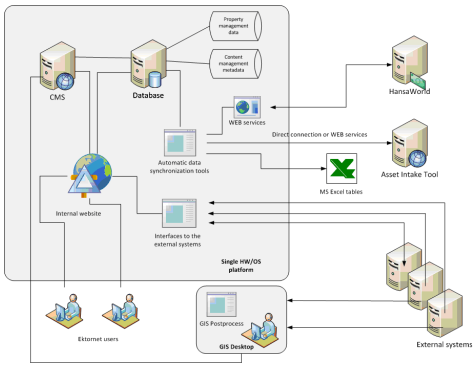
Database Development:

MikroKods has expertize to provide full life cycle of IS development, including requirement analyses, database design, database development, applications development, system implementation, maintenance and support. We have experience to use different project management methodologies: waterfall, iterative, Agile. The core competency we have for Oracle Database, Microsoft SQL Server, MySQL and Postgres.

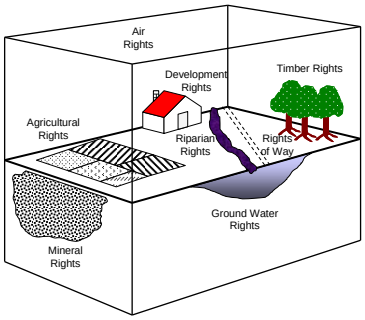


IT Systems integration:

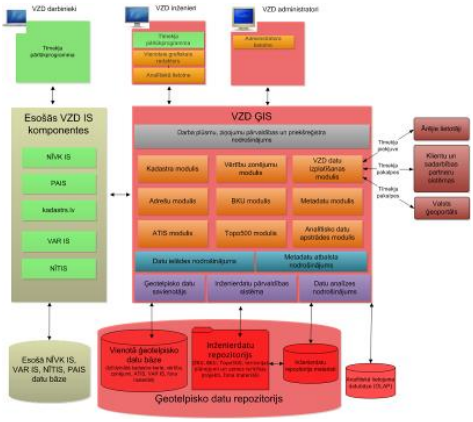
MikroKods has long experience for integration of spatial (graphical) information with alphanumerical data from databases and also connections between different databases. Currently we have solutions based on Service Oriented Architecture (SOA) principles and OpenGIS standards. We have experience on developing Web services.



Land Information Systems:



MikroKods has long experience to work in the Land Information Systems area including Real Property Cadastre and Land Registry (Landbook). We developed the first version of centralized Latvian Land Registry in 2001 and maintained this system for more then 10 years. Recently as subcontractor participated in the improvement of Latvian Land Registry.

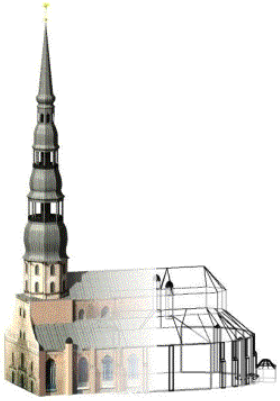


We also are participating in the development of GIS of Latvian Land Cadastre authority. Our experts also were involved in international LIS projects in Macedonia, Azerbaijan, Moldova and Mongolia.

Mobile Solutions:

MikroKods has developed mobile applications for information exchange between geospatial information server and GPS equipped mobile device (smart phone, tablet). Typical usage of such applications is to give opportunity for keeper of mobile device (field worker, general public) to send notification about problem or accident together with location information directly to server and monitor status of problem solving. Such application is implemented in Jelgava city municipality.

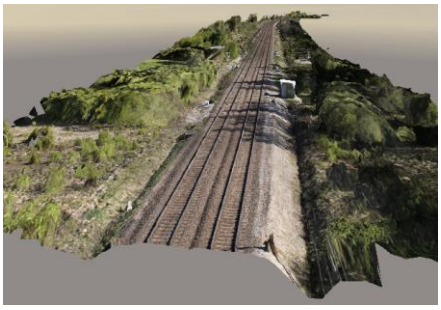
3D Modeling:



We are using Bentley Microstation 3D modeling tools to elaborate close to natural views and animations of existing or disappeared architectural objects. In the different projects we prepared models of architectural monuments of Riga old city, made visualization of destroyed in Second World war Jelgava Trinity church and Karnak 7th Pylon (Egypt). As data source for such type of modeling the field survey data by total stations or laser scanner as well as photos and plans from archives can be used.

Reality modeling

We are experienced to use Bentley reality modeling software for producing highly detailed 3D reality models to provide precise real-world context. The models can be used for design, construction, and operations decisions throughout the lifecycle of projects as well as for inspection, measuring and documentation of real objects on site. As data source for producing 3D mesh models a simple photographs are used taken from ground, vehicles and drones.



Training:

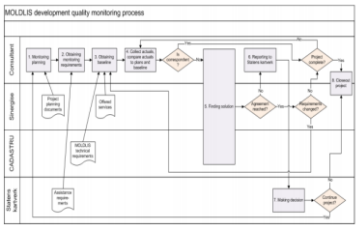
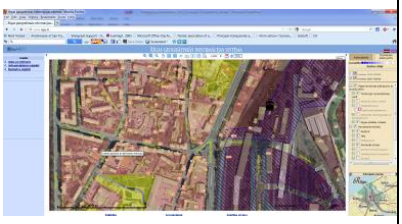
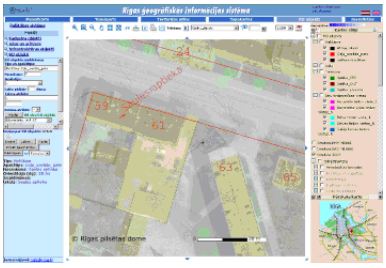
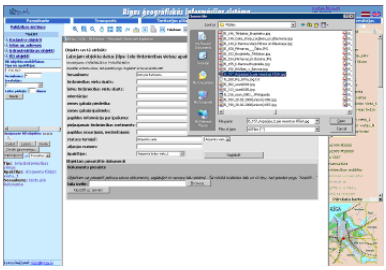
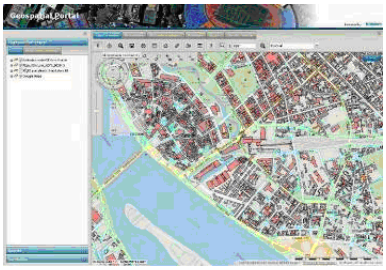
MikroKods has computer class for providing user training sessions. We are offering training on standard CAD and GIS software to users for obtaining basic skills and also advanced training. Trainings can be provided in groups or individually.

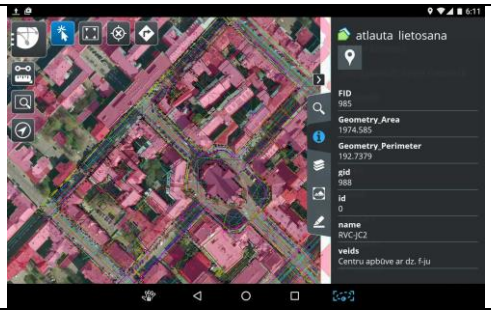
KEY PARTNERS:

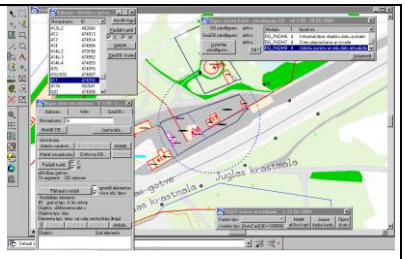
HEXAGON GEOSPATIAL CHANNEL PARTNER	Hexagon is a leading global provider of information technologies that drive dynamic decision making across industrial and geospatial applications. Hexagon Geospatial is part of Hexagon and plays a key role in Hexagon's multi-industry focus, leveraging the entire portfolio for a wide variety of geospatial needs. Hexagon is a leading global provider of design, measurement and visualization technologies. Synergistic thinking is encouraged across all levels and functions across the Hexagon brand network, so that we all respond better and faster to our shared customer's needs. Intergraph® helps the world work smarter. The company's software and solutions improve the lives of millions of people through better facilities, safer communities and more reliable operations. Intergraph is part of Hexagon. MikroKods is Intergraph partner since 1993 and Hexagon Geospatial partner since 2014.	*GIS:* • Geomedia • Geomedia Add-ons • GeoMedia Smart Client *Web GIS:* • GeoMedia WebMap • GeoMedia SmartClient • ERDAS Apollo • Geospatial Portal • Geospatial SDI *Mobile:* • Mobile MapWorks • Mobile Alert • GeoMedia SmartClient *Utilities solutions:* • G/Technology *Transportation solutions*: • Geomedia Transportation Analyst *Remote sensing:* • ERDAS IMAGINE • ERDAS ER Mapper *Photogrammetry:* • ImageStation • LPS
Bentley Channel Partner	**Bentley Systems** is the global leader dedicated to providing architects, engineers, geospatial professionals, constructors, and owner-operators with comprehensive software solutions for sustaining infrastructure. Its solutions encompass the MicroStation platform for infrastructure design and modeling, the ProjectWise platform for infrastructure project team collaboration and work sharing, and the AssetWise platform for infrastructure asset operations – all supporting a broad portfolio of interoperable applications and complemented by worldwide professional services. MikroKods is Bentley partner since 1995.	*For municipalities:* • Bentley PowerCivil for Baltics • Bentley Map *For surveyors:* • Bentley PowerSurvey • MicroStation PowerDraft *Other solutions for engineering and GIS:* • MicroStation • AECOsim • InRoads • STAAD.Pro • Bentley Descartes • Bentley Water • ProjectWise • ContextCapture • LumenRT

ORACLE Silver Partner	For more than three and a half decades, **Oracle** has been the leader in database software. And as it has further developed technologies and acquired best-in-class companies over the years, that leadership has expanded to the entire technology stack, from servers and storage, to database and middleware, through applications and into the cloud. MikroKods is Oracle partner since 2004, but has experience to work with Oracle databases starting with version 6 from early 1990-ies. Due to wide range of Oracle products we refer to those where we have competence – databases, application server and specifically - Oracle Spatial.	*Database servers:* • Oracle Database Standard Edition One Standard Edition Enterprise Edition • MySQL *Application servers:* • WebLogic Suite for Oracle Applications *Enterprise Edition Options* • Oracle Spatial and Graph
planetek italia	**Planetek Italia S.r.l.** provides solutions to exploit the value of geospatial data through all phases of data life cycle from acquisition, storage, management up to analysis and sharing. Planetek Italia operates in many application areas ranging from environmental and land monitoring to open-government and smart cities, and including defence and security, as well as scientific missions and planetary exploration. The main activity areas are: • Satellite, aerial and drone data processing for cartography and geo-information production; • Design and development of Spatial Data Infrastructures (SDI) for geospatial data archive, management and sharing; • Design and development of real-time geo-location based solutions, through positioning systems such as GPS/Gallileo/GNSS and indoor location systems; • Development of software for the satellite on-board data and image processing and for ground segment infrastructures. Planetek Italia is also a dealer of Hexagon Geospatial / Intergraph software and a data provider of satellite images.	Rheticus® is an automatic cloud-based geoinformation service platform, designed to deliver fresh and accurate data and information for monitoring the evolution of the earth's surface. The geoinformation services provided by the platform include services for the dynamic monitoring of the Earth's morphology, vegetation and infrastructure, or coastal seawater and are aimed both at monitoring the environmental and production aspects. Rheticus® provides information by means of graphic indicators, dynamic diagrams and preset reports. The information provided allow to immediately assess the monitored areas. Moreover, the system allows the user to define threshold levels which, if exceeded, trigger alarms that are immediately sent to the user.

TRACK RECORD:

Real Estate Registration System for Moldova:	Oversight project tasks: • Quality control of the deliveries; • Quality control of the implementation preparation; • Knowledge transfer and training Moldova Cadastru staff. Ongoing project together with Norconsult (Norway).	
Riga City GIS:	Project components: • GIS Database design for centralized all data storage in Oracle Spatial; • database development; • data import from CAD files with topology clean-up and harmonization (30 square km in scale 1:2000); • development of module for Single-sign-in; • GIS module for Riga city council users; • development of data automatic data import module for National Cadastre (State Land service); • development of client modules for Microstation Geograhics and Intergraph Geomedia; • development of GIS data distribution system (Geomedia WebMap); • separate development of alpha-numeric WEB cemetery information system with cemetery GIS data input (WebMap based); • development of user and database documentation; • testing; • roll-out; • regular data conversions and support under service agreement with Riga city council. A number of internal and public Geospatial portal modernizations and user interface changes performed between 2005 and 2013. Durarion of the project: 1999-2013	    



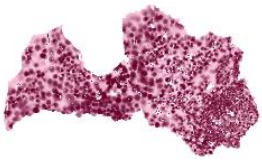
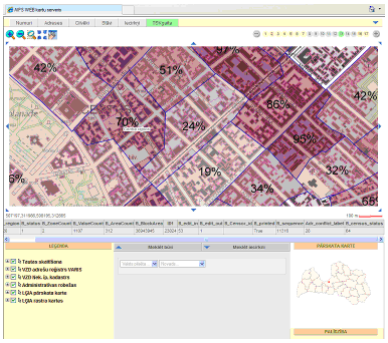
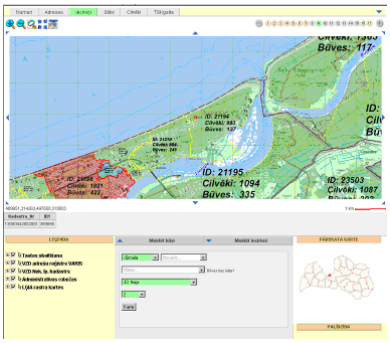
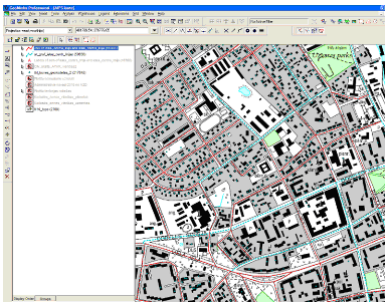
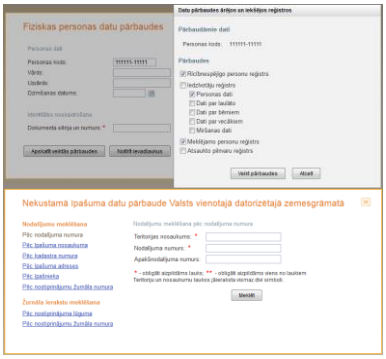


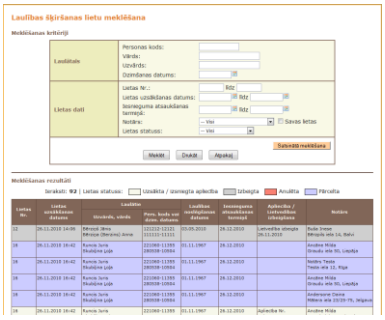
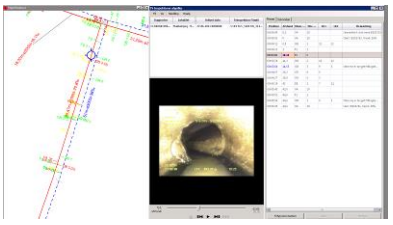
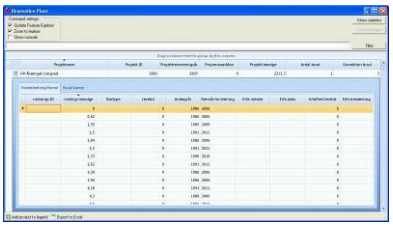
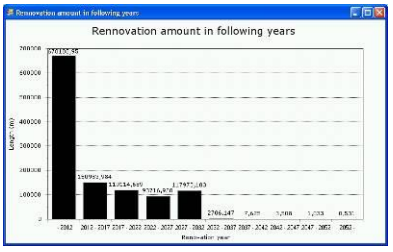
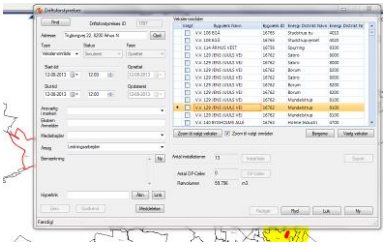
Jelgava City GIS:

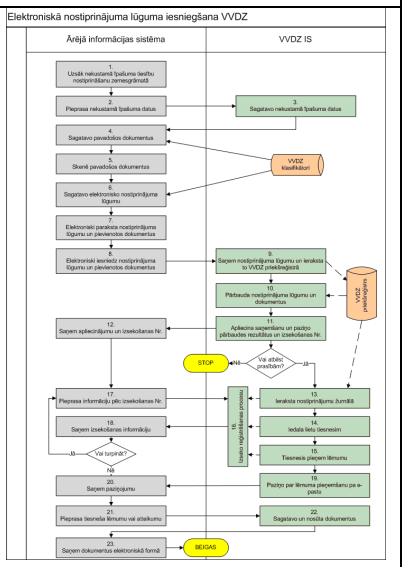
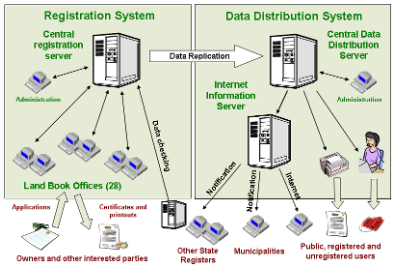
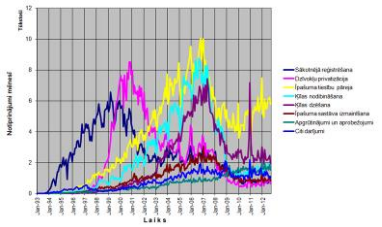
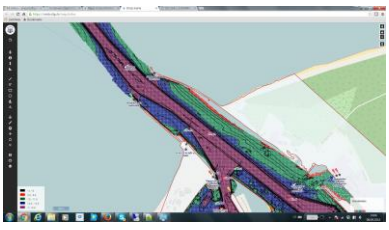
Project outline:

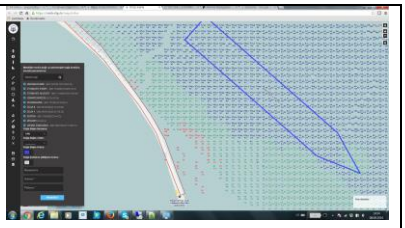
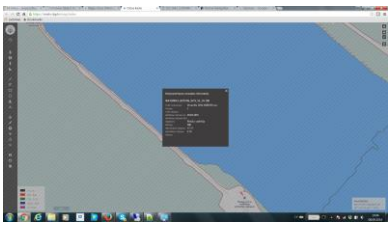
- Support, delivery of Standard software and providing of services for cross-boarder project Jelgava (Latvia) and Siauliai (Lithuania) INTERREG RMIS II "Improvement of Risk Management Information System" as GIS subcontractor.
- Implementation of Intergraph ResPublica „smart" WEB GIS in Jelgava city council providing solution for two level GIS vector/raster data caching in server and client side and workflow based scenario management. Data conversion to centralized Oracle Spatial data storage. Development of WEB (JAVA) vector data editing workflows. System integration (TSoft EMOFF emergency office software and Jelgava GIS and with logistics system) and development of GIS connectors based on SOAP and WMS services with front-end developed on open source OpenLayers technology. Mobile GIS applications for Android, Windows phone and iPod/iPad.

Duration of the project: 2008-2013

Central Statistics Bureau of Latvia 	Project outline: • Design, development and implementation of Latvia Census GIS (2011) system with SQLserver 2005 centralized GIS storage and integration with alpha-numeric data bases and National registers. Data conversion from National mapping agency (LĢIA) CAD map sheets (approx 4000 DGN files in scales 1:10 000 covering 64 000 sq. km. of whole Latvia and other data sources) to centralized database. Development of connectors to National registers – State Land service real property physical register and Population register. • Design of Census blocks automatic generation software on raster GIS (Geomedia GRID) . Census blocks were generated based on natural phenomena like rivers, lakes and local inhabitant density. • Development of Web GIS data distribution system (based on Geomedia WebMap) and automatic PDF format map sheet generation solution based on Geomedia Professional. • User training and support. Project performed in 2009-2011	  
Information system for Latvian Notaries Chamber LATVIJAS NOTĀRS	Project outline: Objectives of Notary Information System (NIS) are: • Maintain registers which are under notary responsibility stated by Law: Register of Inheritance Matters, Register on Revoked Trust Deeds, Register of Wills. • Support for notary daily duties NIS consists from two integrated parts: Notary Central Information System (NCIS) and Notary Individual Information System (NIIS). NCIS is for keeping registers what is accessible by all notaries and also general public, but NIIS is for support duties of each individual notary and access of information there is restricted to notary office. The main functionality of NIS includes: • keeping registers and searching information across them;	

	• providing automatic validation of persons and documents in public registers; • filling document forms with data from public registers; • assisting to the document writing; • monitoring deadlines; • keeping calendar of activities; • management of workflows; • keeping documents archive. Duration of the project: 2005-2015.	 
Custom development for Intergraph G/Technology:	Design and development of custom commands, analysis tools and other extensions for Intergraph G/Technology geofacilities management systems, some of custom implementations: • Geospatial Relations Management, server side processing for automated connectivity and ownership relationship management, pure PL/SQL implementation. • Dual TV Inspection Video Player - custom command that allows for users to watch videos recorded in pipes. Videos are recorded by a robot and contain observations about unusual events in pipes. When these events are found it is possible that repair actions are needed, in order to determine what action is needed videos before and after event happening must be compared. TVI Player allows watching two videos and synchronizing them. Each video inspection has reports, rapport contains observations registered during inspection. TVI player allows to see observation point on the map. • Renovation plans – custom command to analyze/plan	   

	renovation of certain sections of their district heating pipe network. • Malfunctions – solution for registering planned interruptions, renovation, repairs by closing off parts of heating network and tracing affected parts of heating network to find customers affected.	
A State Unified Computerised Land Register:	In accordance with the Land Registry Law all data bases of 28 Land Registry Offices were unified in the State Unified Computerized Land Register. Main principles: • Storage of the all legal data in central database (CDB) • Only data in CDB has legal force stated by Law • Only Land Register staff have read/write access to data in CDB • Separate Data Distribution System to provide Public access of Land Register information Information contains only textual data (legal records), including historical data. Used technologies: Oracle RDBS. MikroKods involvement: 2000.-2001. – development of central database and user interfaces, data migration, development of data distribution system. 2001.-2012.: system maintenance and improvements, including development of Web-services and interfaces to other National registers. 2011.-2013.: participation (as subcontractor) in project for re-engineering of system and adding new functionality: electronic archive and electronic conveyancing.	  
GIS for Riga Port authority	GIS integrated as part of information system of Riga Port authority. Developed using Open Layers and custom JavaScript. OSM used as background map. Main functionality are: • import and display sea bottom depth measuremets; • display generated sea level isolines; • display navigation lights map; • display wharfs;	

	• simple drawing functionality for fairway modelling. All cartographic information comes from the database or shape files and are served as WMS. System is build based on customer requirements and actual business rules. Patterns of existing ships are available from the database. Captains will use them to find the best route based on the size of ship and depth information. Actual metadata information are available about ships and sea bottom data measurements when clicked ond the map. Ongoing project.	 
Ventspils University College VENTSPILS AUGSTSKOLA	Cooperation with Ventspils University College in deforestation and arable land overgrowing research. Participation of "MikroKods" in scientific research project with remote sensing technology (Hexagon ERDAS Imagine) analyses of long term deforestation and arable land overgrowing effects in several Latvia regions. The study areas were chosen with respect of existing Latvia Forest authority forest inventory records and remote sensing results was calibrated and quality assurance procedure completed. Landsat satellite public archive data allowed to perform research from 1989 until 2014 and presentation of change detection results as thematic maps, charts and diagrams. The detailed methodology of forest change detection based on Latvia biotopes was compiled and ERDAS Imagine user interface created during the project.