

Tomaž Podobnikar – Curriculum Vitæ

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academic and research, technical solutions, public service IT, space, environment and conservation sectors

I am fascinated by innovation and science. What could be nicer than solving something that someone claims is unsolvable? Understanding the natural and social phenomena in (geo-)space over time is paramount before discovering feasible technical solutions. Taking into account a very broad perspective, I discovered that art and science make excellent bedfellows.

Geospatial Information Expert – **Scientific Councillor, Assoc. Prof.** (PhD, MSc, BSc Geodetic Engineering), **currently a Sustainable Development Officer with 25+ years of productive working experience** in the areas of geoinformatics and applied sciences including GIScience, **environmental and social sciences**, Earth observation, hazard and risk management, teaching and **supervising, project/programmes evaluation**, etc. at 13 academic, governmental, NGO, IGO (UN) and consulting organizations in 9 countries. **Simplifier and constructor** in the process of discovering new knowledge. I can build everything from the front-end to the back-end and everything in between. Career highlights include **strong leadership and people management** (head of the dept., GIS chief); fieldwork in ecological, archaeological, anthropological and geomorphological mapping, various geodetic survey; designed and delivered courses in management of spatial data quality, GIS and digital terrain modelling (DTM). Documented innovative methods and technical solutions: spatial data integration with semantic enrichment to **reduce the cost of DTM up to 25-times**, realized for the National DTM; geomorphological MVI techniques for spatial feature detection and recognition, visualization and photography enhancement, used in the Esri World Topographic Map. Awarded with over 25 competitive grants including **Fulbright** and Skolkovo Innovation Center.

Core Skills and Qualifications

- **Team leader** (Head of the dept., Chief GIS and other leaderships) and **team player; cross-disciplinary and multicultural** involvements; governance.
- A proficient, self-motivated **researcher, officer, teacher** (lecturer, supervisor), **trainer, consultant, communicator**.
- **Publications:** [Google Scholar](#), [Semantic Scholar](#), [ORCID](#), [ScopusID](#), [ResearcherID](#), [COBISS](#); **1450+ citations H-index 17** with the most cited paper being cited 112-times; **editorial board of 7 journals**, edited 8 monographs/special issues, **reviewed 210+ papers**.
- **Designed and managed** 30+ and contributed to 90+ international projects, of which 18+ with industry.
- **Evaluated** 75+ scientific and industrial international projects.
- **Applied sciences** (natural, social, environmental, engineering), Geosciences, Geoinformatics, Geomatics, GIScience, GIS, Earth Observation Information Science, spatial analytics, geospatial data science, geostatistics, spatial statistics, SDI, spatio-temporal, geodesign, algorithm design, database design, GIS, remote sensing, geomorphometry, cartography, image processing, geovisual analytics, network analysis, location-based services, GeoAI and machine learning implementation, application development.
- **Applied fields:** Environmental geography, hazard and risk management, spatial modelling for conservation (environment, cultural heritage), climate change issues, landscape archaeology, palaeoenvironmental analysis, space research.
- **Quantitative and qualitative research** with the development of own methods: spatial data analysis, spatial statistics; mathematical modelling; processing various spatial data layers, satellite imagery; Monte Carlo simulations; predictive analytics and spatial data mining; spatial data conflation, integration, and multi-method approaches; photographic processing, spatial generalization, digital photography/imagery enhancement, spatial reasoning, cognition and decision making.
- **Geodetic** (and GNSS) surveying and mapping, computer programming, spatial databases, cloud GIS, VM.
- **Computer applications:** CAD and database management since 1990, GIS, cartography and RS since 1994, (spatial) statistics since 1996, ALS since 2003, various visualization software since 1994; familiar with programming languages to bring research ideas beyond the limits of common off-the-shelf analytical software.

- **Programming with algorithms development** (software), **coding** and **spatial data processing** (Visual Basic, Fortran, C, C++, Python (including ArcPy, PyGRASS, OpenCV computer vision, and APIs for GDAL, QGIS and SAGA GIS), RPL using RPN (Reverse Polish Notation for HP), MATLAB and Octave, SQL, SQLite, Data Analysis Expressions (DAX), UML, LaTeX, HTML and JavaScript; programming with scripts for AutoCAD, ArcGIS [previously AML – ARC Macro Language] (including ArcGIS Pro, ArcInfo Workstation, FME, ArcGIS Server, ArcGIS Online, ArcGIS Enterprise portal, ArcSDE), open source GeoServer, eCognition, Google Earth Engine, Idrisi, ERDAS Imagine, Global Mapper, GRASS GIS, SAGA GIS, QGIS; for dashboards (Power BI, ArcGIS Dashboards); TensorFlow; geostatistical programming languages R (including ggplot2), SPSS, Orange; database programming languages dBase, MS Access, MS Excel, (PostGIS, PostgreSQL); implementation of libraries like GDAL, ImageMagick and FFmpeg; more creative programming scripts for visualization IrfanView, PaintShop Pro, CorelDRAW, Adobe CS now CC (in particular Adobe Acrobat, Photoshop, Illustrator, Bridge), and for video editors Adobe Premiere Pro and DaVinci Resolve, etc. Microsoft Office 365 skills.
- **Operating systems:** MS Windows (CMD Shell, PowerShell), Linux (Bash), Unix (Unix Shell), Android.
- **Links:** [ResearchGate](#), [ACADEMIA](#), [Portfolio](#), [SCGIS](#)

Professional Experience

United Nations, ESCWA, Lebanon

2021-09 – current

Sustainable Development Officer (GIS), Regional Advisor

Currently work for ICTS. Worked Cluster 4: Statistics, Information Society and Technology (2021-2022), and Cluster 1: Arab Centre for Climate Change Policies; Climate Change and Natural Resource (2021-2022). In particular, developed solutions for numerous projects aimed to deliver state-of-the-art GIS and remote sensing solutions. Prepared and provided training, lectures, and consultancy on numerous geospatial topics, from GIS roots and concerning cartography, geodesy, photogrammetry, remote sensing, image processing, databases development, analytics, geovisualization, visual analytics, etc. Collaboration with UN-GGIM – Arab States. Promote interdisciplinarity and cross-lateral solutions and systematic “geospatial reasoning”. Collaboration with many other UN agencies, especially in Lebanon in the fields of GIS, cartography and geodesy.

Key achievements (ongoing):

- Elucidated the background of geospatial history and contemporary progress to take advantage of geospatial development.
- Reviewed and implementation UN-GGIM documents to ESCWA.
- Developed and improved algorithms and procedures to improve performance in ongoing projects.
- Developed and implemented a sustainable geodesign for ESCWA, starting from effective spatial ETL to spatial analysis and services.
- GIS capacity building to member states and in-house training.
- As Regional Advisor provided advisory services to Member States on selected geospatial topics.
- Capacity development: Proposed and collaborated in GIS sustainable development tactics and strategy for ESCWA.
- Proposed and developed a scalable and sustainable SDI (now develops towards Spatial Knowledge Infrastructure – SKI) solution for the new ‘ESCWA Geospatial Data Ecosystem’ (Geospatial Hub). Coded a toolset for spatial ETL with QC/QA procedures based on FOSS4G.
- Contribution with geospatial approach to the interdisciplinary project: ‘Human development, poverty and multiple shocks in the Arab region – A geospatial analysis’.

University of Ljubljana, Slovenia

2020-09 – 2021-09

Associate Professor

Teaching in the doctoral study ‘Built Environment’, for two courses that I developed: “Digital terrain modelling for natural hazards assessment” (mainly for civil engineers); “Management of spatial data quality” (mainly for geodesists).

Key achievements:

- Supervised international and other PhD students.

- As editor of national and international research and scientific journals, exposed my membership of the editorial board of ISPRS Journal of Photogrammetry and Remote Sensing and MDPI.

Faculty of Information Studies in Novo Mesto, Slovenia

2008 – 2021-09

Associate Professor

Lecturing, supervision and research in the postgraduate program. Deliver innovative and effective teaching, teaching curriculum (courses), and learning materials, attracting students from different disciplines and involve GIS in new disciplines curricula. Teaching activities, two courses: “Quality of Information” (lectures, tutorials, lab work); “Geographic Information Systems” (lectures, tutorials, lab work).

United Nations, MINUSMA, Mali

2020-01 – 2020-08

Chief GIS, Geospatial Information Officer

Leadership and HR management. Within the GIS Unit, FTS (Field Technology Section) took responsibility for incorporating gender perspectives. Worked collaboratively cross-disciplinary with MINUSMA colleagues to achieve organizational goals. Solicited input by genuinely valuing others’ ideas and expertise. Supported and acted following final organization decision. Shared credit for team accomplishments and accepted joint responsibility for team shortcomings. Technological Awareness: Employed in-depth knowledge of the latest technological developments in GIS, image processing, internet of things (IoT), GNSS and web applications. Understood applicability and limitation of technology to office work. Kept abreast of available technology and actively sought to apply it to appropriate tasks.

Key Achievements:

- Engaged with technical and administrative leadership of the GIS Unit. By learning about the ongoing work of the unit staff members, their dynamics with clients, I managed them and took advantage of higher level of motivation and participation.
- Proposed and started to implement improvements to geoportal (hub) and cartography techniques.
- This period was also marked by the arrival of coronavirus, which changed some work priorities. Proactively advised a design of the COVID-19 geospatial platform and so initiated numerous activities on this important topic within MINUSMA. Several dashboard prototypes and final solutions were created and deployed for different purposes. Consulting to Mali WHO Country Office on the COVID-19 platform. Outreach of this work is presented in publication “Geospatial for Humanity: Prevention, Response and Recovery of the World from the Pandemic COVID-19”, UN-GGIM, 2021.
- Strongly involved in various projects activities, especially in Unite Aware and Unite Maps Initiative.

United Nations Global Service Centre, Italy

2019-05 – 2020-01

Geospatial Information Officer

Managed geospatial databases and provided geospatial platforms, solutions and services to clients. Outreach, business partnerships and partnership with field missions and UNHQ. Supported NYHQ goals for the “Cloud-first” initiative and managed cloud instances as per guidance from NYHQ and SGITT. Employed efficient project and service management. Complied with organizational security regulations. Strengthen the institutionalization of FTS project/program management and associated Governance Process.

Key Achievements:

- Solved various issues that were not resolved for a longer time (governance, program codes, quality assurance, and project designs).
- Engaged in supporting and designing the governance process and documentation for managing and deployment of UNGeoPortal ([Unite GeoPortal](#)) in Field Missions.
- Performed duties with enthusiasm. Managed to provide valuable input to the definition of processes and guidelines to streamline management of UNGeoPortal. Guided to coordinate and deployed UNGeoPortal Hubs to four missions according to a plan and timeline.
- Created a catalogue of all running UNGeoPortal services to allow better management and provide transparency.
- Professional and timely contribution. Delivered results based on assigned tasks with expected quality. Provided a valuable technical contribution to team efforts and projects given to the team. Appreciated team member.

University of Ljubljana, Slovenia

2009-11 – 2019-06

Associate Professor

Worked for Faculty of Civil and Geodetic Engineering, Research Institute of Geoenvironmental and Hydrological Threats – RIGHT (2014-2019), and Department of Geodetic Engineering (2009-2014). As a researcher, developed advanced methods for spatial models, particularly in fields of geomorphometry, spatial statistics, AI, georadar, and spatial data integration, mostly in the field of degradation of landscapes and hazard management due to climate changes. As a professor, developed courses and taught and supervised students at different levels, such as “Photogrammetry II” (tutorials for graduate students), and many others. Proposed research ideas in the field of flipped and collaborative learning.

Key Achievements:

- As a supervisor attracted the best students in generation from different disciplines. Mentored 15 BSc, 1 MSc, 5 PhD, 1 young researcher.
- Obtained several international research projects and contributed to 10 others, and therefore attracted experts to develop research fields.
- Developed and improved methods for digital elevation model (DEM) production through data and methods integration, with applications. Development geomorphometric methods for natural hazards assessments.
- Published numerous high-level scientific research results. Member of various editorial boards and launched special issues.
- Established a database of historical maps for the area of Slovenia and owned many originals.

Oxford Policy Management Ltd, United Kingdom

2013 – 2018

External Consultant

Consulting in the fields GIS, spatial predictive modelling, spatial statistics, and environmental science for developing countries, e.g. for “Identifying Frontiers of Digital Financial Services in Tanzania”.

Key Achievements:

- Brought an added value to IT systems and governance.

School of Advanced Social Studies in Nova Gorica, Slovenia

2008 – 2013

Assistant Professor

Delivered innovative and effective teaching, teaching curriculum (courses), and learning materials, attracting students and involve GIS in new disciplines curricula. Teaching activities: “Quality of Information” (lectures, tutorials, lab work).

Key achievements:

- Taught students with a social science background on methods of spatial data quality and information quality assessment.

Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia

1995-11 – 2013-06

Scientific Councillor (Research Advisor), Head of the Department

Through leadership, management, mentoring, lecturing and supervising, conducted international teams, of researchers, students, technical staff and other stakeholders, and engaged them for projects, programmes, innovative advanced research, studies, applications, conferences, etc. Ensured development methods in the fields of natural and cultural environment spatial analysis in GIS, geomorphometry, advanced archaeological prediction modelling to optimise the fieldworks, integration of geodetic survey and GIS-based mapping techniques for the fieldworks, etc. Apart from delivered lectures for students, global public and professional audience and fellows, ensured educating the following subjects for individual postgraduate students: Cartography, GIS and environment, GIS and dialectology, GIS and habitats, at the Faculty of Civil and Geodetic Engineering, Biotechnical Faculty and the Faculty of Philosophy (University of Ljubljana), since 2008.

Key achievements:

- Head of the Department of Environmental Studies, 2008 – 2013 and member of the Science Council of the Institute of Anthropological and Spatial Studies, 2004 – 2008. HR activities to build teams.

- Successfully organized several national and international conferences, symposiums and team meetings, e.g. for ISPRS, Mars Express project. Acquired numerous projects and business agreements, as well as funds used for the development of research activities in the institution.
- Interdisciplinary research results in various fields of sciences and business: Developed innovative data **integration method** and produced a high accuracy Digital Elevation Model (DEM) of Slovenia and its surroundings in 2005, which was integrated into both the European model and Google Earth model. Designed an inventive online **archaeological mapping technique** for Maya settlements in Yucatan, Mexico, 2004-2005. Designed and applied a large number of innovative GIS layers through **palaeo relief simulations and historical maps reconstruction**, which were used for a film “Nature and the City”, produced by the City Museum of Ljubljana, 2006. Initiated and setting up a web GIS server platform for **Cultural and Natural Heritage Database**, which was used for national purposes and later on for Archaeological Cadastre of Slovenia (ARKAS), and Maya heritage in Yucatan, Mexico, 2002. Designed an **Archaeological database of Central Dalmatia**, Croatia, 1994. Produced a **special DEM** of Slovenia for mobile communication network planning at national mobile operator Mobitel, and produced numerous derived maps of Slovenia, Europe and Earth for commercial POP TV 2000/2001. Produced a seamless **DEM and bathymetric model** for Central Dalmatia, Croatia with my own data integration techniques for the project Adriatic Islands. Similarly, integrated a global bathymetric model using ETOPO and own datasets, for the commercial television station.
- My research outreach, animated simulation effects of sea-level rise on the Slovenian coast, was presented during the visit of Nobel Laureate Al Gore in Slovenia, 2008.
- Research results were conducted for local communities in Albania, Central America, Croatia, North Macedonia, Papua New Guinea, Slovenia and elsewhere.
- Designed a GIS system for the entire organization, based on Esri solutions and best national topographic data.
- Supervised 2 Leonardo da Vinci Programme students, 3 young researchers, since 2001. Lecturer and developed courses for GIS and DEM, Erasmus – Socrates Programme, RESPAL (REmote Sensing for PAst Landscapes), 2006.

Mura Regional Development Agency Ltd, Slovenia

2012-10 – 2013-09

Project Manager and Consultant

A leader and consultant for the application of advanced research in regional development through the EU development project “REG-NET, Slovenia – Hungary”. Preparation and management of project workshops.

Key Achievements:

- Designed and developed a web geostatistical/GIS server.
- Proposed and developed environmental indices for natural/social environment assessment.

University of Nova Gorica, Slovenia

2008-10 – 2011-08

Assistant Professor

As a fellow at the School of Environmental Sciences in higher education, developed and lectured two courses: “Environmental Information Systems and GIS” with tutorials for undergraduate students, and “Geographic Information Systems” with tutorials for postgraduate students. In addition, lead a team of researchers in an interdisciplinary field after successfully acquired an international project. Managed this project.

Key Achievements:

- Advanced research results of the multidisciplinary project, as well as for the local community, especially in the field of historical maps time series analysis research and applications in different disciplines.
- Successfully supervised 2 BSc students, one of them got awards.

Vienna University of Technology, Austria

2007-01 – 2008-12

Project Assistant

With my expertise, I was employed to contribute as researcher, supervisor and project manager in the series ESA Mars Express projects, as well as in Christian Doppler Laboratory “Spatial Data from Laser Scanning and Remote Sensing”, at the Institute of Photogrammetry and Remote Sensing”. The main research topics were: planet Mars exploration, developing algorithms for enhanced digital terrain model (DTM) production and methods for lidar applications development. They included development methods for quality control,

geomorphological extraction of different terrain features, and geovisualization. Other research activities included: remote sensing applications in invasive plants, applications in environmental archaeology, and natural hazards and risks management applications (launched all 3 projects).

Key Achievements:

- Developed an image processing multi-applicable generic method “**Multidirectional Visibility Index**”, **MVI** that is primarily used for analytical shading enhancement. The method has been used for topographic maps enhancement, quality control procedures, and photography. A generic algorithm for the MVI was used in mountain peaks recognition and applied in ESRI World Topo Map. Also designed methods for **automatic recognition of various geomorphological features**, and for **enhanced visual quality assessment**, as well as for **cartographic visualization, geovisualization** and **visual analytics**.
- Scientific papers with all specialist of lidar techniques and applications for Comprehensive Utilization of Airborne Laser Scanning in Natural Hazard Studies in Alpine Areas.

Ministry of Environment of the Republic of Slovenia, Slovenia

1995-08 – 1995-11

Civil Servant

At the Surveying and Mapping Authority of the RS, involved in operative work, research and administration in various fields, such as geodesy, GIS, photogrammetry, land surveying, cartography, remote sensing, spatial database design and management, national coordinate systems transformation.

Key Achievements:

- Developed and implemented a catalogue of corners for topographic maps in Slovenia for scale 1:25,000.
- Developed various applications for geodesy, land surveying, cartography, and land cadastre.

International mobility (postdocs, research visits)

Realized **9 research periods** of at least 1 month, altogether 15 months:

- **Fulbright Visiting Scholar Program** (grant); Department of Marine Geosciences - Rosenstiel School of Marine and Atmospheric Science, University of Miami, USA, 2019
- **Quality Researcher** (grant); C.N.R.S., Laboratoire de Chrono-écologie, Université de Franche-Comté, Besançon, France, 2006
- **Research Expeditions** (National Geographic Society CRE grant); South Campeche, Reserva de la Biósfera de Calakmul, Yucatán and Mexico City, Mexico, 2004 and 2005
- **Visiting Researcher** (grants); Institute of Photogrammetry and Remote Sensing, Vienna University of Technology, Austria, 1999, 2000 and 2001
- **Visiting Researcher** (grant); Faculty of Geodesy, Delft University of Technology, The Netherlands, 1997
- **Research Expedition** (grant); Island of Brač, Croatia, 1994

Education

PhD (Doctor of Science)

University of Ljubljana

1998 to 2001

MSc in Geodesy

University of Ljubljana

1995 to 1998

BSc (Bachelor of Geodetic Engineering)

University of Ljubljana

1991 to 1995

Trainings and Certification

Organizer of 15+ conferences, trainings and workshops.

Attended training:

- 15 leadership and ethics trainings, since 2007
- 7 management trainings, since 2010
- 15 pedagogical (didactics) trainings, since 2014

- 7 media and communication trainings, since 2010
- 30 UN trainings, 2019-2020

Attended other training:

- **The use of patent databases and patent information**, by The Slovenian Intellectual Property Office (SIPO), Slovenia, 2017
- **Introduction to ArcGIS Pro for professionals**, by ESRI, UC Davis, USA, 2015
- **Web GIS: Using the ArcGIS Platform**, by ESRI, UC Davis, USA, 2015
- **SIST/ISO standards**, by Slovenian Institute for Standardization (SIST), Slovenia, 2014
- **Perspectives on Spatial Analysis in the Social Sciences**, by Center for Spatially Integrated Social Science, UC Santa Barbara, USA, 2000
- **Introduction to SPSS**, by University of Ljubljana, Slovenia, 1998
- **User applications of ERS SAR Data**, by ESRIN, Frascati, Italy, 1995

Professional Membership

- **ELISE** (The European Location Interoperability Solutions for e-Government), since 2020
- **European AI Alliance**, since 2018
- **SCGIS** (Society for Conservation GIS), since 2015
- **IUGG** (Slovenian Association of Geodesy and Geophysics), since 2012
- Geomorphological Society of Slovenia, since 2010
- Section for Cartography at the Association of Surveyors of Slovenia, since 2009
- **ICA Commission on Cartography in Early Warning and Crises Management** (International Cartographic Association), since 2009
- **ICA Commission on Generalisation and Multiple Representation** (International Cartographic Association), since 2009
- **ICA Commission on Mountain Cartography** (International Cartographic Association), since 2007
- **EGU** (European Geosciences Union), since 2007
- **IAHS** (International Association of Hydrology Sciences), 2007-2010
- **AGILE** (Association Geographic Information Laboratories Europe), 1998-2012

Leadership

- **GIS Chief** of GIS Unit, Field Technology Section (FTS), United Nations, Mali, 2020
- **Co-founder** of Vedomec, Institute for the Spatial Culture, Slovenia (on my initiative), 2011-2015
- **Head of the Department of Environmental Studies** of the Institute of Anthropological and Spatial Studies, Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia (established on my initiative), 2007-2013
- **Science Council** member of the Institute of Anthropological and Spatial Studies, Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia, 2004-2008

Editor

Editorial Board and member of the scientific committees: Remote Sensing journal, MDPI, [Topic Editor](#), since 2021, and Section Editor "[Remote Sensing in Geology, Geomorphology and Hydrology](#)", since 2019; Geoinformatics FCE CTU, since 2016; IJEES, since 2015; ISPRS Journal of Photogrammetry and Remote Sensing, 2013–2016; Journal of Geodesy, 2010–2014; Geographical Information Systems in Slovenia, since 1997 (also organized biennial symposiums). **Edited** following monographs and special issues:

- [Spatio-Temporal Analysis of Urbanization Using GIS and Remote Sensing](#), Special issue, MDPI, 2022
- [Perspectives on Digital Elevation Model Applications](#), Special issue, MDPI, 2021
- [Advances in Global Digital Elevation Model Processing](#), Special issue, MDPI, 2020
- [Universal Ontology of Geographic Space: Semantic Enrichment for Spatial Data](#), monograph, IGI Global, 2012
- Geographical Information Systems in Slovenia, monographic series, ZRC Publishing, 1998, 2000, 2002, 2004, 2006 (5 monographs)

Expert tasks: Reviewer, Evaluator and Board Membership

A reviewer of 49 international journals. Reviewed 210+ papers. Refereed 2 monographs, 7 national and 5 international projects. An **evaluator and a referee** (wrote experts' reports) of **55+ national and 15+ international programmes and projects** (basic research, applied science and industry – R&D) since 2003 (Slovenia, Czech Republic, Belgium, Bulgaria, Croatia, France, Montenegro, Netherlands). Registered an active **expert, evaluator or board member** of:

- MCST (Malta Council for Science and Technology), 2021-2025 (evaluator board)
- Fulbright: Fulbright Senior Award, 2019, 2021 (evaluator board)
- IBF International Consulting, since 2018
- Montenegrin Ministry of Science, since 2018 (evaluator board)
- COST (European Cooperation in Science and Technology), since 2018 (expert board)
- MSCA-IF (Marie Skłodowska-Curie Individual Fellowships), 2017 call (evaluator board)
- Ministry of Economic Development and Technology, Slovenia, since 2017 (evaluator board)
- SPIRIT Slovenia (Public Agency for Entrepreneurship, Internationalization, Foreign Investments and Technology), since 2017 (evaluator board)
- Ministry of Science and Education, Croatia, since 2017 (evaluator board)
- CMEPIUS, 2016-2020 (evaluator board)
- REGIO (to support Cohesion Policy, regional and urban development) of the European Commission, since 2016 (experts board)
- Horizon 2020 Advisory Groups (European Commission), since 2014 (evaluator board)
- Ministry of the Environment and Spatial Planning of the Republic of Slovenia, "Preparation of the starting points for the recording terrain with lidar", 2010-2011 (Independent government consultant for the high-resolution lidar terrain models)
- ARRS (Slovenian Research Agency), 2003-2008 (evaluator board)

Innovation

Multi-source spatial data conflation (merging with enrichment) novel methodology and computer application for digital elevation model (DEM) production with integration. I have built everything from front-end to back-end and everything in between. The derived landform map has been used nationwide in all high schools and integrated into the European model (EuroDEM – EuroGeographics) and Google Earth model. The reduced cost of the final product up to 25-times has been realized for the [National DEM of Slovenia](#) (32 data sources!) and Central Dalmatia. The improved solution received "Spatial data integration, Space Technologies and Telecommunications" and "Information Technologies" grants with excellent scores from the Skolkovo Innovation Center (2018). This methodology is one of the future trends in geospatial technology.

Multidirectional Visibility Index (MVI). The generic and multimodal solution is based on a novel [geomorphometric technique](#). I developed the MVI for analytical hill shading and adapted it for predictive modelling (alluvial fans/talus cones), feature recognition and description (mountain peaks, karst depressions), geovisualization (visual quality control) and photography (imagery enhancement with image processing). The solution for the recognition of the geomorphological peaks was used in the Esri World Topographic Map.

Mapping process with real-time quality control that employed surveying, GNSS, data sampling and spatial analytics. The [challenges](#) in conducting this method have been in poor resources. I developed that innovative method for ancient Maya settlements models and maps in the Yucatan, Mexico, which led to significantly better surveying accuracy and faster mapping.

Time-series based algorithm for generating GIS-layers that involve palaeo relief simulations, automated historical maps analysis and cartographic methods. The results were used for the film "Nature and the City", produced by the City Museum of Ljubljana.

Participatory management on the relation between individual and group tasks. The method is based on spatial statistic pattern research, which was involved in crowdsourced data. The main findings were that individuals had better respond to constructive critical judgement, have a deeper understanding and a more useful approach to creative thinking. Groups are more successful in finding unique differences, where the

synergy effect is an important factor. The findings have been used for didactics, mapping purposes, as well as better capacity building.

Funding and Research Projects

Very successful in **obtaining research grants** at national, regional, EU and other international levels. Active participation as a major team player, in **90+ national and international cooperation projects** in Slovenia, Croatia, North Macedonia, Italy, Austria, Hungary, France, Russia, Mexico, as well as in a project covering the entire Earth and the planet Mars. Worked in different types of groups and alone. This has given me access to very good networks of people from EU countries and other parts of the world.

Successfully designed and raised competitive research funds for 20+ projects, managed and executed them (e.g. co-financed by the ERDF: FP6, FP7), and participated in **18+ joint cooperation projects with industry**, co-financed by Skolkovo Foundation, Telekom, DARS, etc. The work includes numerous basic research projects co-financed by FFG/ALR, ASAP, ARRS, etc. Highlighted projects with their acronyms: OBSERVE, PARAMount, TransEcoNet, TMIS.plus.II, TMIS.morph, CAENTI, SISTEMaPARC, Alpine Windharvest, AQUADAPT, ArchaeDyn, Adriatic Island Project, National Program of Water Management – in the framework of Interreg programs, Central Europe, Inter-American Development Bank, National Geographic (CRE grant).

Accepted **9 competitive start-up projects in the industry** on spatial data handling topics with the following acronyms: SmartDEM (UiG, 2021; Future 4.0, 2020; Skolkovo Foundation, 2014, 2017, 2018) and Top Topography (INITS, 2019). Using project management tools (MS Project, PlantUML, Open Workbench, JIRA, etc.).

Spatial analysis and survey-related studies

Quantitative and qualitative research with the development of my methods for spatial data analysis, spatial statistics, geostatistics; mathematical modelling; the processing of various spatial data layers, satellite imagery; Monte Carlo simulations; predictive analytics and spatial data mining; spatial data conflation, integration, and multi-method approaches; digital photography/imagery enhancement; QC/QA and uncertainty management with my approaches to data/information and organizations.

Spatial database development and management: storage, access, transform, analyse, interpret, and implement for the massive amounts of data (spatial ETL – e.g., Power BI, RapidMiner, MS Access, ArcGIS); documentation. Good experience in establishing or maintaining a database containing large data sets and a multi-dimensional array of data (OLAP cubes), which is particularly evident in the setting up of a web GIS server platform for the Cultural and Natural Heritage Database in Slovenia (2002-2006), and a Web GIS/Geostatistics portal for the Pomurje region, NE Slovenia (2012-2013), an Archaeological data base of Central Dalmatia, Croatia (1994-1998); geospatial metadata bases for ZRC SAZU (2001-2013), UN spatial metadata base (UNGSC 2019, ESCWA 2021-2022); Database for digital elevation models processing (since 1998); Standard fundamental spatial data themes data base from various sources for the Arab region (2022), and many others.

Studies, based on various spatial databases: geodetic **surveying** and mapping (total stations, levels, etc.) including satellite geodesy (GNSS) (since 1994); transformation of coordinate systems and map projection (since 1993); web design and development – now DNN, WordPress (since 1997); individual house design plans (since 1985); experience in working with AWS cloud-based servers (since 2017). Knowledge of design and implementation of the internet of things (IoT), and video surveillance and protection technology (since 2014). Initiated an idea of a COVID-19 (coronavirus) spatial platform in the UN and realized for Minusma on live **survey** data spatial dashboard (2020). Proposal and development of the statistical methods on **survey** data and research methodology for the project “Influence of daily individual meteorological parameters on the incidence of the acute coronary syndrome” (2018-2019). Contribution with a spatial approach to the ESCWA interdisciplinary project ‘Human development, poverty and multiple shocks in the Arab region – A geospatial analysis’ where I manipulate HDX, ACLED, DHS **survey** data, topographic data and highly pre-processed spatio-temporal data like as land cover (2022). From **survey** data in various countries (Croatia, Slovenia, Mexico, Albania, Austria) I modelled mental maps and maps from predictive models based on social and environmental variables (since 1994).

Fieldwork and research expeditions

Having contributed to several fieldwork projects own scientific outputs were improved during the process. The main areas of fieldwork are **ecological, archaeological, anthropological and geomorphological mapping**, based on my **geodetic survey**, including various land cadastre, **GNSS and lidar measurements**, and other **survey and geospatial data**. The archaeological fieldworks (1994–2005) lasted between one and eight weeks and included geodetic measurements, online mapping using innovative GIS-based quality control, design and creation of databases, archaeological prospection, etc., all of which served as a basis for further spatial analysis. Also, participated in fieldwork (archaeological reconnaissance, anthropological survey, geodetic surveying and advanced mapping, ecological and speleological investigations, etc.): in particular on the island Brač, in Makarska, and Cetina Valley in Croatia (1994 and 1999); at Tonovcov grad in Slovenia (1996); and in South Campeche, Yucatán, Mexico (2004 and 2005). Other experiences with fieldwork included GNSS (GPS) campaigns in Slovenia and (North) Macedonia (1994–1998), which usually lasted 10 days: EUREF'94, Slovenia'95, EUREF MAK'96 to name a few. The other types of fieldworks included the measurement of trees position for lidar data calibration and making detailed relief measurements for lidar data control (2004), anthropological surveys in Albania (2007), mapping of invasive plants in Slovenia (*Fallopia japonica* and *Robinia pseudacacia*) (2009–2011), geomorphological survey (2014), and fieldwork for stabilization purposes in Mali (United Nations, 2020).

Teaching Experience, Supervision

Solid **higher education teaching expertise** in the geoinformatics, geomatics, and GIScience. Allowed to **develop and deliver innovative and effective teaching lectures and curricula**, and learning materials, I attracted students and colleagues **from different disciplines to involve** GIS in the curricula of new disciplines. My well-designed and delivered lectures, tutorials and lab work enabled me to offer courses that are more dynamic, for digital terrain model production and applications; data quality and information; photogrammetry and cartography. Delivered GIS lectures for the Erasmus – Socrates Programme in 2006, as well as on Environmental Information Systems and GIS for undergraduate and postgraduate students at the University of Nova Gorica, Slovenia. Delivering lectures on Quality of Information for postgraduate students at the Faculty of Information Studies in Novo Mesto, Slovenia, and at the School of Advanced Social Studies in Nova Gorica, since 2008.

In addition to lecturing, teaching the **following subjects for individual postgraduates** in the GI and: spatial analysis, DEM/DTM, photogrammetry, cartography, geodesy, spatial data quality, landscape ecology, dialectology, landscape archaeology, habitats, and other environmental topics – at the University of Ljubljana, Slovenia (Faculty of Civil and Geodetic Engineering, Biotechnical Faculty and the Faculty of Arts), since 2008. **Responsible for setting the contents of all listed courses**, which have successfully passed accreditations at individual faculties and universities.

Supervised 2 Leonardo da Vinci Programme students and 4 young researchers, as well being as a regular informal mentor. A public examiner of 17 BSc, 1 MSc and 5 PhD theses.

Publications as Main Author

Written, participated in, or actively contributed in more than **55 original scientific papers** for journals, 27 monographs, 54 popular science articles, 7 national and 60 international conferences and meetings. A complete list of publications (currently 615 records) is documented in COBISS, [Personal Bibliographies](#). The representative publications in chronological order (all references are available upon request):

- Šarlah, N., **Podobnikar, T.**, Ambrožič, T., Mušič, B. 2020: Application of Kinematic GPR-TPS Model with High 3D Georeference Accuracy for Underground Utility Infrastructure Mapping: A Case Study from Urban Sites in Celje, Slovenia. *Remote Sens*, 12(8). DOI: [10.3390/rs12081228](https://doi.org/10.3390/rs12081228) (cited 10 times)
- Šarlah, N., **Podobnikar, T.**, Mongus, D., Ambrožič, T., Mušič, B. 2019: Kinematic GPR-TPS Model for Infrastructure Asset Identification with High 3D Georeference Accuracy Developed in a Real Urban Test Field. *Remote Sens*, 11(12). DOI: [10.3390/rs11121457](https://doi.org/10.3390/rs11121457) (highly accessed article in July and August 2019) (cited 10 times)

- **Podobnikar, T.**, Štefančič, M., Verbovšek, T. 2019: [A GIS-based approach to karst relief cyclicity by using Fast Fourier transform](#). *AGILE 2019 – Limassol, June 17-20, 2019*, 5 p.
- **Podobnikar, T.** 2018: Palaeotopography concerning sea level changes to rethink past human activities in Central Dalmatian islands, Adriatic Sea. *Acta hydrotechnica*, 31(55), 143-156. DOI: [10.15292/acta.hydro.2018.09](#)
- Šturm, T., **Podobnikar, T.** 2017: A probability model for long term forest fire occurrence in the karst forest management area of Slovenia. *Int J Wildland Fire*, 26(5), 399-412. DOI: [10.1071/WF15192](#) (cited 12 times)
- **Podobnikar, T.**, Székely, B. 2015: Towards the automated geomorphometric extraction of talus slopes in Martian landscapes. *Planet Space Sci*, 105, 148-158. DOI: [10.1016/j.pss.2014.11.019](#) (cited 7 times)
- **Podobnikar, T.** 2012: Detecting Mountain Peaks and Delineating Their Shapes Using Digital Elevation Models, Remote Sensing and Geographic Information Systems Using Autometric Methodological Procedures. *Remote Sens*, 4(3), 784-809. DOI: [10.3390/rs4030784](#) (cited 44 times)
- **Podobnikar, T.** 2012: Multidirectional Visibility Index for Analytical Shading Enhancement. *Cartogr J*, 49(3), 195-207. DOI: [10.1179/1743277412Y.0000000012](#) (cited 14 times)
- **Podobnikar, T.**, Vrečko, A. 2012: Digital Elevation Model from the Best Results of Different Filtering of a Lidar Point Cloud. *Trans GIS*, 16(5), 603-617. DOI: [10.1111/j.1467-9671.2012.01335.x](#) (cited 46 times)
- Dorigo, W., Lucieer, A., **Podobnikar, T.**, Čarni, A. 2012: Mapping invasive *Fallopia japonica* by combined spectral, spatial, and temporal analysis of digital orthophotos. *Int J Appl Earth Obs*, 19, 185-195. DOI: [10.1016/j.jag.2012.05.004](#) (cited 105 times)
- **Podobnikar, T.** 2009: Methods for visual quality assessment of a digital terrain model. *S.A.P.I.EN.S.*, special Issue 2(2), [15-24](#) (cited 113 times)
- **Podobnikar, T.** 2009: Georeferencing and quality assessment of Josephine survey maps for the mountainous region in the Triglav National Park. *Acta geod geophys Hung*, 44(1), 49-66. DOI: [10.1556/AGeod.44.2009.1.6](#) (cited 63 times)
- **Podobnikar, T.**, Schöner, M., Jansa, J., Pfeifer, N. 2009: Spatial analysis of anthropogenic impact on karst geomorphology (Slovenia). *Environ geol*, 58(2), 257-268. DOI: [10.1007/s00254-008-1607-3](#) (cited 27 times)
- **Podobnikar, T.** 2005: Production of integrated digital terrain model from multiple datasets of different quality. *Int J Geogr Inf Sci*, 19(1), 69-89. DOI: [10.1080/13658810412331280130](#) (cited 90 times)

Honours and Awards

Awarded with 25+ competitive grants including **Fulbright** and Skolkovo Innovation Center, as well as:

- Certificate of Outstanding Contribution in Reviewing of the ISPRS Journal of Photogrammetry and Remote Sensing, 2014
- Prešeren Award of University of Ljubljana for best students (as supervisor of Obu, J.), 2011
- Alumnus Optimus, Award for best student of School of Environmental Sciences, University of Nova Gorica (as supervisor of Jež, E.), 2010/2011
- Gisdata/Esri Award for exceptional students' results in the development and using of the geographical information systems (as supervisor of Obu, J.), 2010/2011
- First prize for the poster; Čeh, M., Smole, D., Podobnikar, T. Geodata: Are they accessible and usable?, 2004; 7th AGILE Conference on Geographic Information Science, Heraklion, Greece. The prize encouraged our team to pursue research on the topic of the universal ontology of geographic space. Proud to be asked to edit a monograph on the topic, which was published in 2012.

Languages

English: fluent speaking, writing and reading

Slovenian: mother tongue

Serbian and Croatian: conversational

German: basic

Italian: basic

Spanish: basic

Russian: basic (I read Cyrillic)

French: basic

Arabic: basic

References

To be provided upon request