

## Geoinformatics: needs and responses

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**Аннотация:** Темпус GE-UZ лойиҳаси Геоинформатика мутахасислиги бўйича янги магистратура дастурини яратиш ва татбиқ этишга қаратилган. Лойиҳа 2012 йил 15 октябрда бошланди ва 36 ой давом этади. Ушбу мақолада мутахассисликка бўлган эҳтиёжлар таҳлили, ўқув режаси ва қўлланмаларни яратиш ҳақида маълумот бериш кўзда тутилган. Муаллифлар мутахассисликка бўлган эҳтиёжлар таҳлили, ўқув режаси ва қўлланмаларни яратиш ҳақида қисқача маълумот берадилар. Лойиҳанинг ушбу мақолада кўрсатилмаган фаолиятлари ва кутилаётган натижалари тўғрисидаги маълумотлар бошқа мақолаларда келтирилган.

**Аннотация:** Проект Tempus GE-UZ направлен на разработку и внедрение новой университетской программы в области геоинформатики. Проект был начат 15 октября 2012 года. Продолжительность: 36 месяцев. Целью этой статьи является предоставление общего обзора относительно анализа потребностей и разработки учебных программ проекта GE-UZ. Авторы кратко ознакомят с анализом потребностей, разработкой учебных программ и руководящих принципов. Другие мероприятия и ожидаемые результаты описаны в другой статье.

### 1. Background

The GE-UZ Tempus project is financed by the European Union. The objective of the project is to ensure that Uzbek partner universities have the capacity to offer a Master programme in Geoinformatics that meet Bologna process, international academic quality standards, job market needs and support Uzbekistan in sustainable development.

The project aim is to develop two cycle education in geoinformatics which implies modernization and development of a new Master program. The project **main goals are to develop a successful MSc in Geoinformatics, to ensure that there will be qualified staff available for course which is delivered by organizing train-the-teachers courses.**

The specific objectives are **to ensure the universities have adequate equipments for GIS/geodesy teaching by buying geodetic equipment and GIS laboratories and to sustain the educational environment** with building a sustainable educational network.

At the beginning of the program a needs-analysis was accomplished and it is followed by curriculum development, which is based on the result of the analyses. The overall course definition is discussed by all the partners, and the general rules and templates are set for an elaborated description. The curriculum and syllabus development is followed by development of the learning materials by the Uzbek partners.

## 2. Needs analyses

The aim of the analysis was to make a survey and needs analysis concerning the design of a new MSc curriculum among the scientific and academic staff of Higher education (universities, institutes) and secondary specialized (colleges) institutions. Besides, this analysis has covered in some extent conditions at enterprises and research entities.

The questionnaires were designed and agreed by GE-UZ project partners. The questionnaires were translated into Uzbek for surveying. The survey was held in November 2012 within Uzbekistan with a total of 42 respondents. 76% of the questionnaires were filled in on paper copies by the GE-UZ project members, and 24% were filled in via e-mail. Thirteen respondents work at the universities and 29 responds received from enterprises / organizations. Twenty five of these organizations are governmental and four of them private.

In the analysis the internal and external background of the project was investigated, an essential part was to reveal the required skills and competencies for a GIS expert in Uzbekistan. In the following section a summary of the results will be given.

The internal environments in the universities of the project clearly indicate that there is a strong need for MSc in Geoinformatics. The student recruitment for this course would not mean a difficult task, because each academic year for GIS related study programs more than one thousand students were enrolled. This number increased 2,5 times in last three academic years. Also 85% of the respondent universities stated that students' computer skill is „good” and 1 of the respondents indicated that their students are the best in general computer literacy. Also seven universities indicated that their students don't have problem but four universities have problem with participation on foreign language workshops for their MSc students.

The internal infrastructure is quite differing in the participant universities. Concerning the computer labs 54% of universities indicated in the survey that they have enough computers for teaching and 46% of respondents indicate that they have not enough computers. AutoCAD and ArcGIS are widely used but remote sensing software usage is only mentioned in TIIM. Also open software is not used at all.

The universities stated that existing courses covers knowledge areas like: GIS knowledge, Remote sensing and photogrammetry knowledge, Cadastre and land information knowledge, Cartography skills, GIS skills. Though concerning the following areas Interdisciplinary skills, Database knowledge, Data Integration skills, Spatial Analysis knowledge, Web GIS - Principles and Applications, Spatial management infrastructure knowledge, Programming skills, Spatial database management skills, Skills in remote sensing software, Management skills, Spatial data infrastructure knowledge, International experience universities have some deficiencies.

The teachers were asked to indicate the importance for each of the 18 modules proposed by the needs analyses. Based on this result we proposed 8modules as core for GE-UZ. (See curriculum development)

In the needs analyses also 29 enterprises were questioned about the situation. 25 of the enterprises are governmental and 4 of them private. 11 companies have more than 100 employees 15 have 15-100 employees and 3 have less than 15. There were firms with multiple affiliations towards GIS, Geodesy, Cartography, Photogrammetry etc. Recently there is a moderate level of connection between universities and enterprises. The successfulness in the

labour market of the GE\_UZ projects student would be lie on a good connection between universities and enterprises.

Twenty nine organizations today miss certain professional competences in the company. ? The above mentioned organizations were requested to indicate important knowledge areas / skills in proposed curriculum for MSc in Geoinformatics. The most important is found GIS skills. Less rated are programming, management and interdisciplinary skills.

As the survey highlighted the need for GIS courses are needed in the enterprises, but mostly in the form of short courses, but 29% of the enterprises would favour MSc courses. Recently the staff of the enterprises attended to training courses in GIS software, another most attended training is in computer use skills.

Also the need for MSc students in the labour market was investigated. Respondent enterprises expressed interest in employing MSc graduate in Geoinformatics and indicated that 41% of them might employ 1-2 graduates, 48% of the enterprises- 3-5 graduates, 10% of enterprises – 6 and more graduates.

The survey suggests that in Uzbekistan the concept of spatial data infrastructure is not wide spread. It should have been clarified throughout the GE-UZ project.

### 3. Curriculum development

A main challenge for the project is the accreditation of the curriculum. To secure this issue the Ministry of Higher and Secondary Specialized Education (MHSSE) was integrated in the project consortium and was given a role with the tasks related to curriculum development. The expertise of MHSSE will also be used in the modules development to make sure that they meet national standards and requirements.

Curriculum development is covered by Work Package 3 of GE-UZ project. This work package has 2 objectives: the creation of the new curriculum and the preparation of the necessary documentation for the accreditation.

The curriculum development uses the results of the needs-analyses. The analysis was designed by the European and Uzbek partners. The questioners was developed by UWH and disseminated among the stakeholders by TIIM.

TIIM is the leader of the curriculum development which means development of main concept of two cycle education and a new Master curriculum, the content of courses of MSc, publish teaching materials, implementation of pilot course and refinement.

All other Uzbek partners participate in following activities: analysis of the needs of the university, development of main concept of two cycle education, review of bachelor curriculum, development of new Master curriculum, development of the content of courses of MSc, defining of literature list, develop and publish teaching materials, implementation of pilot course.

The resulting GE-UZ curriculum will contain compulsory core components and optional modules, allowing for the adjustments on the individual student and the institutional programme levels at the various partner institutions. Moderated online workshops will support the formative dialogue-based technique of curriculum development. The curriculum will be reviewed, consolidated and submitted to the Ministry of Education. Upon accreditation and licensing, information materials will be prepared for the public on the new education programme.

Particular attention should be directed to inform undergraduate students of the Uzbek partner universities.

The requirements of the accreditation and all the requisite of the process will be controlled by UWH and TIIM and will be supported by all the partners.

The Centre for GIS and Remote Sensing at University of Greenwich is responsible for developing Learning & Quality Assurance (QA) procedures associated with the curriculum development. It will be in charge of producing appropriate QA documentation, external evaluation and providing training needs for the QA purposes.

In addition to leading the QA procedures, the centre will also collaborate with other partners in the project for the purpose of curriculum and learning development.

The overall course definition was discussed by all the partners in June in the 1<sup>st</sup> training workshop of the project, and the general rules and templates were accepted by the project partners. The curriculum and syllabus development is followed by development of the learning materials by the Uzbek partners. The testing and reviewing of the modules will ensure that it will meet the standards and the needs of the stakeholders. Meanwhile a teacher training process guarantees the quality and sustainability of the master program. In the partner institutions the installation of GIS laboratories and the acquisition of geodetic and GIS equipment will provide the Uzbek partners with up to date teaching environment. Part of the equipment will be jointly used in order to build the basement of network among students and faculties. After its accreditation the master course will be launched, which will represent one third of the project time period. This program will qualify a new generation of highly employable students in Geoinformatics, and also contribute to structural and societal development.

In February 2013, Odil Akbarov, the Uzbek project manager, organized a meeting for academic partners to finalize the first decisions of the project.

In the meeting Uzbek academic partners accepted the curricula of the project with minor changes in subject titles. The accepted curricula:

1. Geoinformation Systems and Science
2. Remote sensing
3. Spatial Data Models
4. Data Acquisition and Data Integration
5. Geodatabases and Distributed Architectures
6. Cartography and Geovisualization
7. Spatial Analysis
8. Project Management and Organization

The project partners are developing learning environment for these modules.

Yet there is no existing title and code in national classificatory for Geoinformatics specialty, a request letter will be submitted to MHSSE to include required specialty title and code.

#### 4. Guidelines

Also connecting to the work packages 3, the “Description of general rules and templates” or Guidelines will be milestone in the project life cycle. This document aims at describing step by step the module development. This will regularize the workflow of the module development,

ensure all the partners are following the same schemes and ease the monitoring of the module development activity. In addition to the rules, the templates will provide the common schemes for the module description. It uses needs analysis as a starting point and goes further with the description of learning materials at lesson level (discussion with in the partnership)., meanwhile the bachelor level training materials will be reviewed and analysed in order to define how can MSc be built on it. Once the lesson description will be completed, the Uzbek partners will follow the description and produce the learning modules. This guidance should be used in conjunction with the quality manual and the programme and module templates.

The development of the MSc in Tashkent has adopted an approach to academic quality assurance that is grounded in the European experience as guided by the Bologna agreement. To that end, the programme of study (the MSc award) will be described and explained by means of a programme specification that will express the overall programme aims, expected learning outcomes, approaches to teaching, learning and assessment designed to achieve the programme level aims, as well as a summary of the courses (modules) comprising the programme. A template for the production of a Programme Specification has been supplied to the Tempus project team. Individual courses (modules) are described in detail using course (module) specifications that describes the course (module) aim(s), expected learning outcomes, approaches to teaching and learning, indicative content, and approaches to assessment. A course specification template has also been supplied to the Tempus project team. Responsibility for production of the Programme Specification lies with the Programme Leader in Tashkent who works with a local team of academic staff members and supporting institutions within the Tempus project; course (module) specifications are the responsibility of local Course Coordinators, also supported by the Tempus project members.

Upon successful approval, the study programme will operate according to internationally recognised academic quality assurance principles. The institutional providers will be engage in annual programme and course monitoring (including student feedback); external monitoring will take place through the appointment of an external examiner and through feedback from professional/industrial representatives.

## 5. Acknowledgements

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## References

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