

# **The ECDL-GIS programme. The role of skill certification programme to support the development of ESDI.**

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## **SUMMARY**

The ECDL-GIS ( European Computer Driving License ) program as designed and recently initiated is presented in the paper which previously discuss the status of the academic and scientific debate about the professional certification for GIS. The EDCL-GIS relationships with t EC, national and local initiatives regarding GI is also discussed in order to meet the real user needs of public administrations and final users.

## **FOREWORD**

The paper has been written by the authors with the contribution of the working group on the specific issue. [PRE]

## **STATUS OF THE ART AND STRATEGIC PROBLEMS RELATED TO CERTIFICATION**

The GI scientific, academic, professional and industrial communities have paid since some five years a duly attention to the issue of recognition of certification of professional skills and to the accreditation of courses and curricula in GIS. [FIN]

Several ideas have been authoritatively expressed, some of them oriented to the recognition of such need and some of them, mainly based on the difficulty of treating the broad GIS applications, less positively oriented to recognize that need.

The major actors in this debate come from the English spoken native community, thus in US, [KEMP] [OBER] due to some specific reasons which may be summarized in: the professional societies functioning system for forming the professional rosters, the coordination among schools and universities in the GIS field and some other general but relevant aspects such as the common language, availability of common geodata, the higher education system itself.

In Europe the professional certification in GIS has been slightly explored during some of the previous conferences of AGILE [AGI] and in some EUGISES conferences [EUG] where the issue of the differences within Europe in approaching the higher education in GIS has been addressed, and clusters of different approaches ( GIS/informatics, GIS/topography and geodesy, GIS/social science and planning, GIS/ ITC) have been identified.

It should also be reminded some attempts to coordinate the supply of educational courses, mainly based on distance learning, at European level: the EU funded project MUTATE [MUT] has realized an efficacious system for offering via the web GIS Modules produced by different academic EU institutions in several languages to achieve an European recognized academic degree in GIS.

Nowadays the UNIGIS [UNI] offers *de facto* an effective solution at EU and worldwide level for the postgraduate curriculum in GIS. Numerous other academic and industrial initiatives are on the way at the present time and demonstrate the great interest in the sector.

The last five years have been largely characterised by the broad pervasion of GI in the public administration sector at EU, National and Local level, widely demonstrated, just to give the legal framework reference, by the set up of INSPIRE [INS] proposed directive which, in the work programme preparatory phase 2005-2006 as far as known at the moment, should clearly address the need of adequate training and education in order to achieve the necessary competencies regarding GI. A real must to let the SDI effectively functioning.

Specially at Local level the importance of professional competency has become a major concern within the GIS community, as demonstrated by some specific activities already put in place by local authorities through courses finalised to give to the employees the adequate skills to treat the electronic information. In Italy some regions [SIC] are at the moment organising specific courses for training the employees and functionaries in GIS and some other Regions (e.g. Tuscany, Emilia Romagna) accept credits in GIS obtained in certified courses.

The competency of public employees in the ITC applications, which is a crucial aspect of the public administration functioning and of e-government programmes and services, has found in the "core level" professional skills certification the powerful tool for avoiding any problem due to the ignorance and/or misinterpretation of the basic knowledge and techniques applied to IT from the side of internal users.

At the mean time it is well known that the basic or core level competency is requested to functionaries for routinely treating the GI and related services, as it is also well known that the presence of not clearly absorbed concepts and the lack of basic technical skills make the manufacturing process of offering services to external users particularly difficult, time wasting and not effective.

Thus even though there is not an unified effort or set of standards regarding GIS certification and course accreditation, it is largely recognised that at the level of public administration and enterprises aiming to the satisfaction of the public needs there is the same need of having core level certified skill in GIS, similarly to what is happened for using the computer in the office work. The trend is demonstrated by the success of ECDL [ECD] in last seven years.

The ECDL has been conceived by the ECDL Foundation with the express purpose of raising IT skills in industry. Its strong social ethos further requires the Foundation to dedicate itself to providing access for all to the Information Society and raising the general level of computer skills in society.

The ECDL-GIS is part of the specialised ECDL programme which at the moment already envisages ECDL Advanced, ECDL for Computer Aided Design (ECDL CAD) and ECDL Certified Training Professional (ECDL CTP).

In order to clarify the exact definition of ECDL-GIS objectives the general functioning of the ECDL programmes has to be shortly explained.

The complete independence of the ECDL Foundation is maintained by not being directly involved in training or testing services for its certifications. On the other hand, delivering at local level the computer skills certification programmes, the ECDL Foundation is in charge of the quality control based on strict sets of standards.

ECDL-F has produced a set of standards and quality guidelines, which govern the procedures for the introduction of the ECDL concept and ensure that the concept is operated in a consistent fashion in all member countries through adherence to these common quality standards.

In addition the ECDL Foundation undertakes a regular rigorous audit process with visits to each country. The audit process includes a thorough examination of the procedures in place and of the approved Test Centres.

The ECDL suite of programmes spans from the ECDL-CORE, well known as ECDL/ICDL (International Computer Driving Licence), which consists of seven modules (1 theoretical and 6 practical skills tests), to ECDL Advanced which is an intensive programme that awards candidates with a higher-level certification in four areas typically oriented to the office work, such as word processing, database, spreadsheet, presentation.

Among the most recent programmes should be considered ECDL for Computer Aided Design . ECDL CAD requires the Candidate to demonstrate competency in using some of the standard available features of a 2D CAD application to create and manipulate objects or elements and to modify objects or elements. On completion of the programme, the Candidate will be able to change object properties, to undertake printing or plotting activity associated with the delivery of outputs. The Candidate will also be able to demonstrate competency in using some of the more advanced features of CAD applications software such as inserting objects from other applications.

The tests performed during the examinations are software independent up to the verification of the skills to use specific commands.

The syllabus of each programme is built in an absolute vendors neutral way and the candidate may choose which platform intends to use in order to check her/his skills. Tests, adequately weighted and generally organised in about one hour session, appear equal or very similar in formulation and the verification is performed on how the answer has been carried out in the specific software environment. The evaluation procedure is aiming to verify the candidate skills to operate on simple commands and procedures that of course have to be equally present on all the software used to perform the tests. According to the neutrality which drives the syllabus on the certificate issued by the ECDL Foundation, no mention about the specific platform used during the examination is mentioned.

A complete blind evaluation is performed both through an automatic system and/or manually through some ad hoc trained evaluators, and the complete process in terms of transparency, quality and performance has the supervision of inspectors.

## **EUROPEAN DIMENSION AND OPPORTUNITIES OF ECDL-GIS**

Behind the effort and the generally recognised need for certification in the ICT field, in the specific field of GI and GIS the present situation has peculiarity and specially in Europe, where a great development at European, National and Local level of the effort to be addressed to the GI is expected within next years driven by the coming Directive INSPIRE [INS].

Considering even the possibility that a large use of the Galileo [GAL] project generated location data will impact the public and private sector, it looks like strategically relevant the fact of insuring an effective understanding, a professional usage and complete correct technical treatment of GI within the public and private bodies. All those needs may not be satisfied by the use of personnel specifically trained in GIS in the middle and high level education systems which also does not insure that such educated persons may be entered in the production system of a public authority or a private firm aiming to satisfy and/or to offer services GI related to the users and citizens.

What is really perceived in the public administration is the fact that the GI will be a substantial component of many services to be offered to the citizens. Since services will be based on multiple information, one component of which will be the GI, at the end of the chain even though the GI will be relevant for a number of services, they will be founded on complex characteristics. Will this address the problem of how to insure that the personnel working on those services may correctly understand the GI, use the necessary tools related to it and profit by the availability of the GI, correctly treating and manipulating geodata?

The metaphor of GI as a language or a vocabulary to be part of the services for the citizens may be applied in order to demonstrate that it is needed to certify people in charge of using that language and vocabulary. The amount of GI in the e-government funded projects in the 5FP programme has been not irrelevant and it has been already revealed increased and relevant in the FP6 funded projects.

## **THE ECDL-GIS PROGRAMME**

In order to offer a programme for professional skills recognition in GI the AICA [AIC] and the University of Rome La Sapienza – LABSITA [LAB] initiated the development of the programme and the syllabus of ECDL-GIS. It intends to be the new independent international standard for certification of core skills in GIS.

According to the previous discussion about the professional recognition and to the specific aspects of the GIS skills it immediately appears that students and professionals seeking an internationally recognised qualification to certify their current core GIS skills should demonstrate a robust knowledge of basic principles governing the GI techniques. This peculiar aspect gives to ECDL-GIS the flavour of a certification aiming to verify the capacity by the student and/or the professional of having the tools for operating on and with the GI and related information.

The basic theoretical knowledge acquisition and certification has also a positive impact on the use of the proprietary software and avoids any conflict with educational and training programmes developed by academicians and vendors finalised to skill users in GI science and techniques and for specific functionalities of proprietary and open source software.

The general structure of the programme has been designed with three major levels: core, advanced and professional. The second and third levels has been planned in order to meet the certification market needs.

The ECDL-GIS Core certification, which is here discussed, can provide the basis towards further studies or professional development in GI&GIS and related fields such as SDI and system design. The aim of the programme is to build a concrete benchmark for GIS user skills based on a vendor neutral certification.

The process of developing such as programme already started with an initial Italian WG formed by experts and professional in GIS and experts in ECDL programmes in order to produce within the first quarterly of 2005 the first draft of the programme with the syllabus and the related documents in order to allow the official launch of the programme at least in Italy within the 2005 first half.

ECDL-GIS will certify that an individual who has successfully completed the qualification has the skills and ability to use and to treat the geographic information and to use a standard software and features of GIS applications.

The certification ECDL-CORE programme is organised in four modules. The four modules cover:

- (1) the basic knowledge of informatics and of some GIS peripherals and techniques. This module is using some of the outcomes of the first and second module of ECDL-CORE certification and is aiming to verify the ability to use files, archives, to recognise different data and their sources. The candidate has to be able to demonstrate the complete understanding of computer components and some of the basic technologies applied by GIS also with reference to input and output peripherals.
- (2) the cartographic representation skills and GI understanding. The second module is based on the basic concepts of geodesy and topography in order to check the candidate's knowledge of the necessary skills about how to use coordinate systems, representation scale, representation of the real world objects and entities, digital and traditional cartography and an appropriate use of the GIS, legend management. Some references to the metadata are part of the module as well. The part of module which contains specific references to national data will be specialised according to the nation where the certification is going to be offered.
- (3) the basic knowledge of the GIS components. The module is aiming to verify the ability of operating on simple data models, topology, spatial analysis, raster and vector data, continuous and discrete reality description and handling.
- (4) the knowledge and the ability to use GIS commands of a commercial GIS software. The module is verifying the ability of using ESRI or Intergraph software in order to perform in both softwares identical GIS operations of light complexity.

Specific issues such as remote sensing, open standards, quality control, system management and other are not addressed, being delayed to the other two levels of the programme. Briefly the ECDL-GIS programme covers the core requirements of usage of GI and GIS using standard software and features found in almost all GIS applications. The four tests are independent and they have not to be taken in any specific order also if a logical *consecutio* is advised.

The candidate will decide on the beginning of the certification programme which software he/she intends to use and the tests of specific software functionalities will be offered in the chosen environment. The formulation of tests will be software independent and aimed to control the ability to "know how to do" by "which specific command" in order to achieve the same results in both the software environment.

All the principles and control techniques already set up by the ECDL Foundation, since almost ten years, will be applied: the four modules are organised in sections, themes and topics have been weighted according to the complexity of the operations to be performed. Tests will be manually and blindly evaluated by ad hoc trained evaluators supervised by inspectors. Tests are of three major types: multiple answers, single answer/result and operations performing. Each test answer, if needed, will have a commands log in order to check the path followed to produce the graphical result of the test. Tests using one of the two specific software, which has to be chosen by the candidate in advance, are set up in order to insure the absolute vendor neutrality through an adequate set up of themes and topics of the syllabus which are present in all the used software. [SW]

**The table represents an excerpt of Italian version of the syllabus module 2.**

SEZIONE	TEMA	RIF.	ARGOMENTO
1.1 Concetti generali	2.1.1. Forma della terra, superficie fisica e superfici di riferimento	2.1.1.1	Sapere quale è la forma della terra e conoscere i suoi parametri dimensionali approssimativi
		2.1.1.2	Sapere cosa si intende

			con superficie terrestre, superficie geoidica, superficie ellissoidica, sfera locale
	2.1.2. Sistemi di riferimento e datum	2.1.2.1	Sapere cosa sono i datum planimetrici e i datum altimetrici
		2.1.2.2	Conoscere gli aspetti fondamentali dei sistemi di riferimento planimetrici (ellissoide di rotazione, punto di emanazione, deviazione dalla verticale)
		2.1.2.3	Conoscere gli aspetti fondamentali dei sistemi di riferimento altimetrici, conoscere il significato di quota ortometrica e quota ellissoidica
	2.1.3. Le coordinate su supporto curvo e piano	2.1.3.1	Conoscere e saper misurare la latitudine, la longitudine e la quota s.l.m..
		2.1.3.2	Conoscere gli aspetti fondamentali e le differenze tra le diverse coordinate su supporto curvo (coordinate sferiche, ellissoidiche, geoidiche, astronomiche, geocentriche)

## PATH AHEAD AND FUTURE DEVELOPMENTS

The programme will span during 2005 in the test-bed phase and final implementation. This will give the opportunity to create the necessary EU dimension and to verify the relationships with some EC initiatives particularly with INSPIRE. Regarding INSPIRE and related actions which will take place at national and EU level it is clear that a relevant effort will need in terms of creating in terms of basic knowledge, vocational training and operational expertise specially in public administration in order too achieve the final tasks of setting up an SDI at EU level and to insure the circulation of data which are rated in the INSPIRE Annexes. It has to be considered that the strength of the ECDL-GIS Core programme and certification is only one of the module in which the ECDL-GIS intends to shape the sustainable future developments of the ECDL-GIS programme which may foresee other certifications finalised to certify specialisations in the GI dominion and in some other application oriented dominions. The path ahead, once the ECDL approach and praxis is accepted, will follow the developments already successfully experimented. One simple and crucial aspect ECDL-GIS wants to address and solve: to avoid that the intelligent and effective use of GI and related systems, specially in

the public administrations, should be inhibited by the absolute lack and/or the imperfect understanding of the basic expertise about data and techniques. Unfortunately how many resources have been wasted for the previously mentioned reasons is largely demonstrated day after day by the analysis conducted on GIS, on GI and e-government applications which find in an insufficient basic expertise of the humans the most relevant gap.

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- [PRE] The AICA and LABSITA group has the following participants: Giulio Occhini, Marina Cabrini, Pasquale Di Donato, Laura Berardi, Mauro Salvemini. A Scientific Committee has been started with representatives of the major Italian Universities such as “Politecnico di Torino” and “Politecnico di Milano”. The vendors from Autodesk, Intergraph and ESRI has already participated to the initiative.

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[SIC ] <http://www.artasicilia.it/web/arta/menu.htm>

[SW] The evaluation part of the programme has started through three software suites by Autodesk, ESRI and Intergraph.

[UNI] <http://www.unigis.org/>