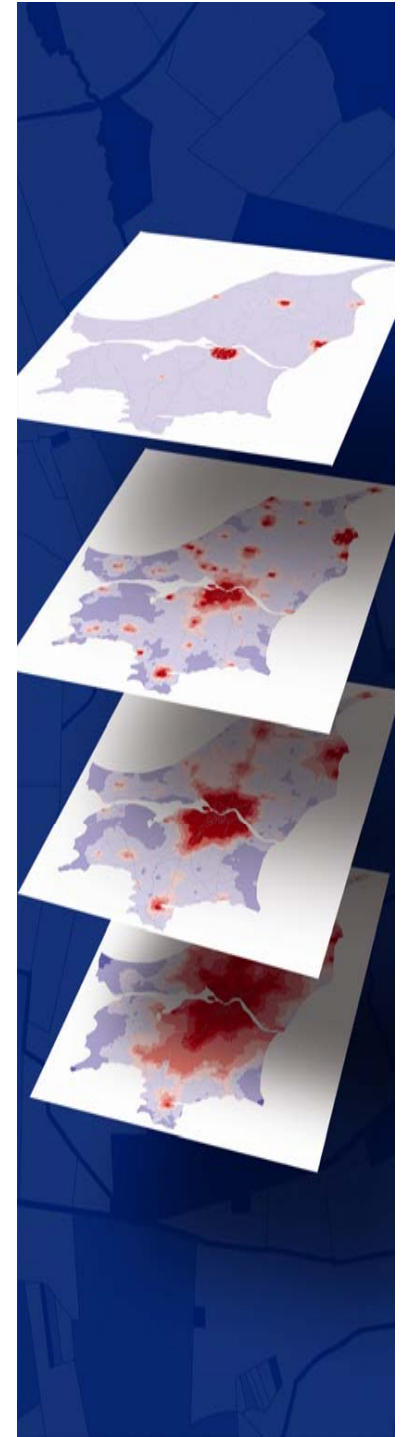


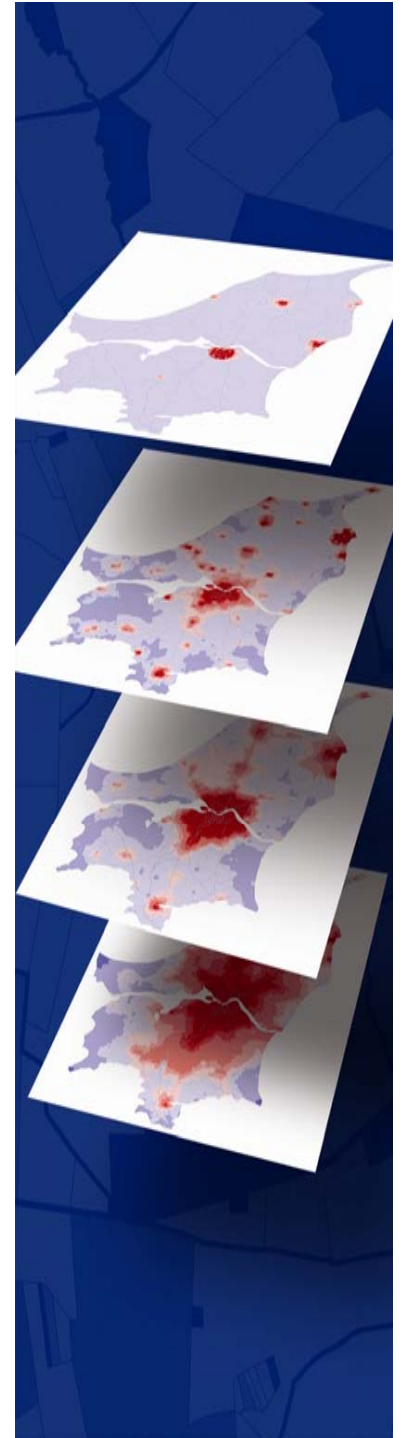
Applying Problem Based Learning to teaching GIS in Higher Education

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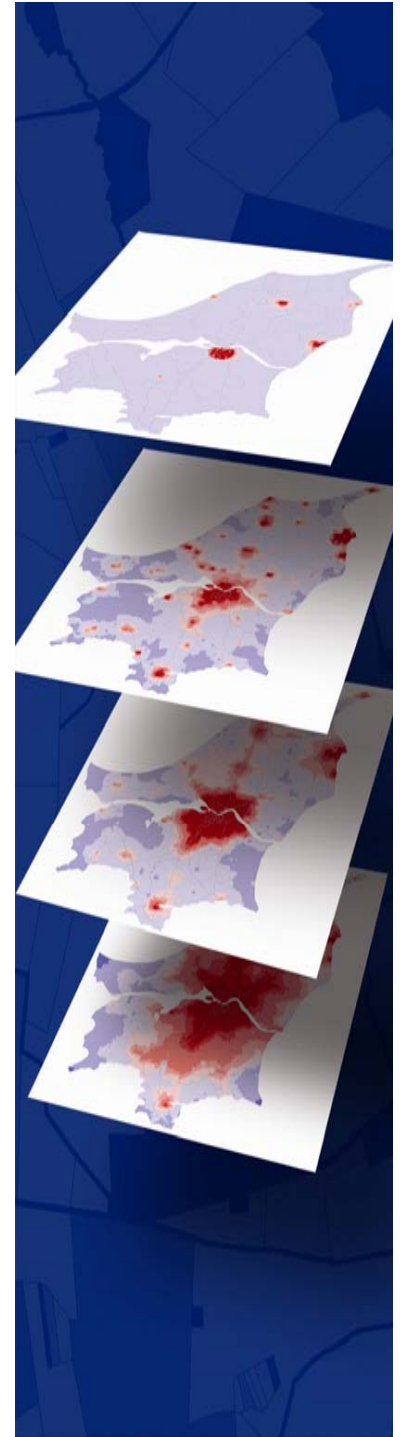
Objectives

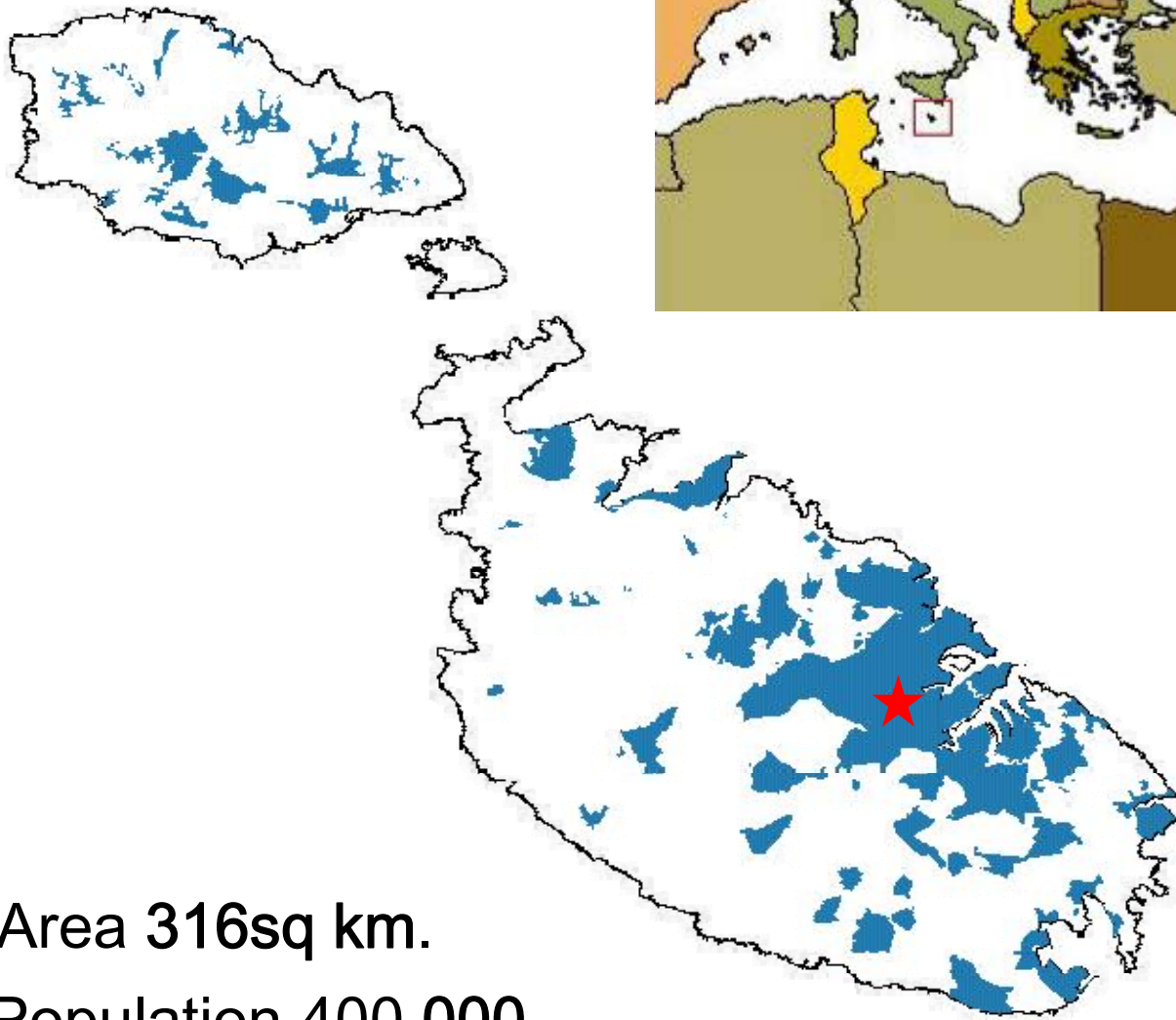
- Identify key elements of an introductory GIS module
- Identify the problems of teaching GIS at undergraduate levels to various disciplines
- Discussing the importance of student self-learning by applying PBL techniques in the application of GIS



GIS Lab, University of Malta

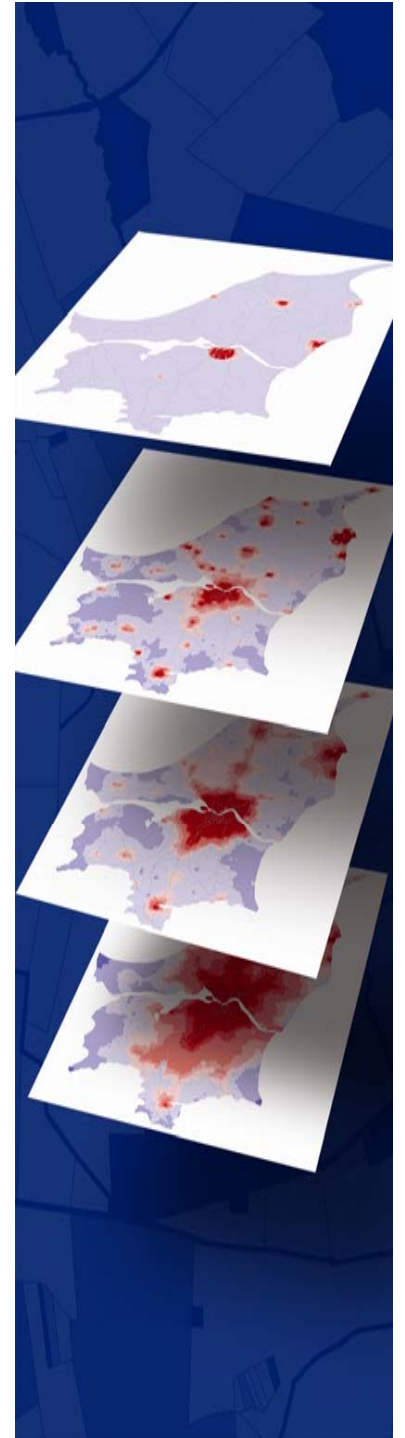
- Oldest and highest educational institution in islands
- 10,000 registered students
- Geography Division, Mediterranean Institute – multidisciplinary institute for social sciences and arts subjects.





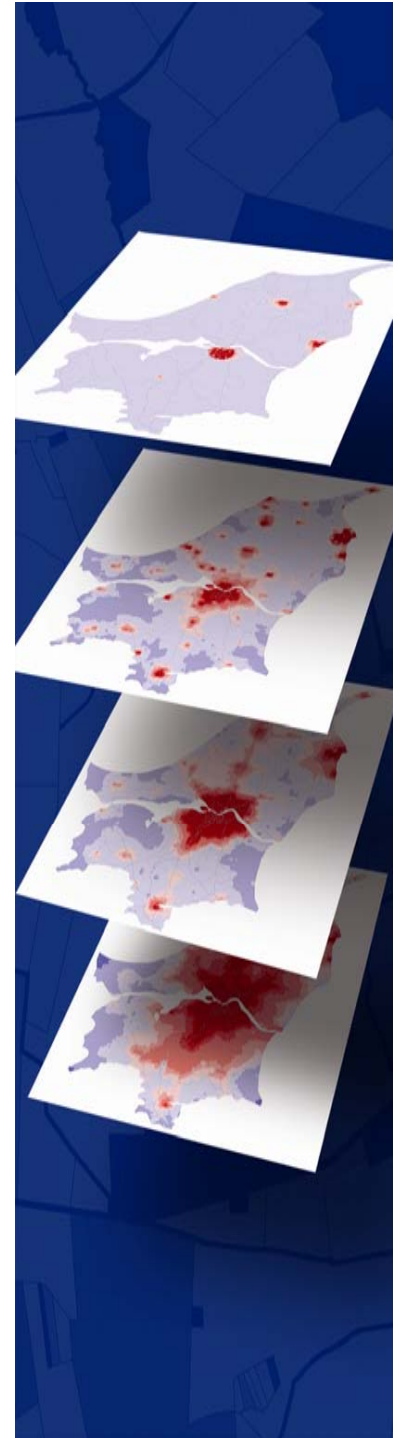
Area 316sq km.

Population 400,000



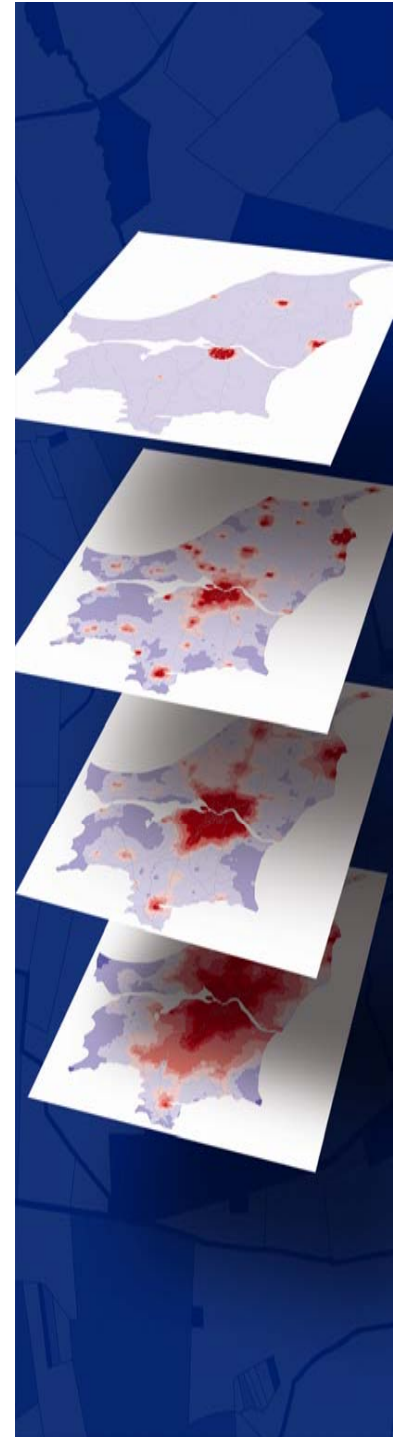
GIS Lab, University of Malta

- GIS Laboratory linked to the Geography Division.
- Set up in 1996 through a donation from ESRI
- Started modules in GIS to Computer Science students, then moved on to teach GIS to Geography, Archaeology, Biology, Engineering, Architecture and Education.



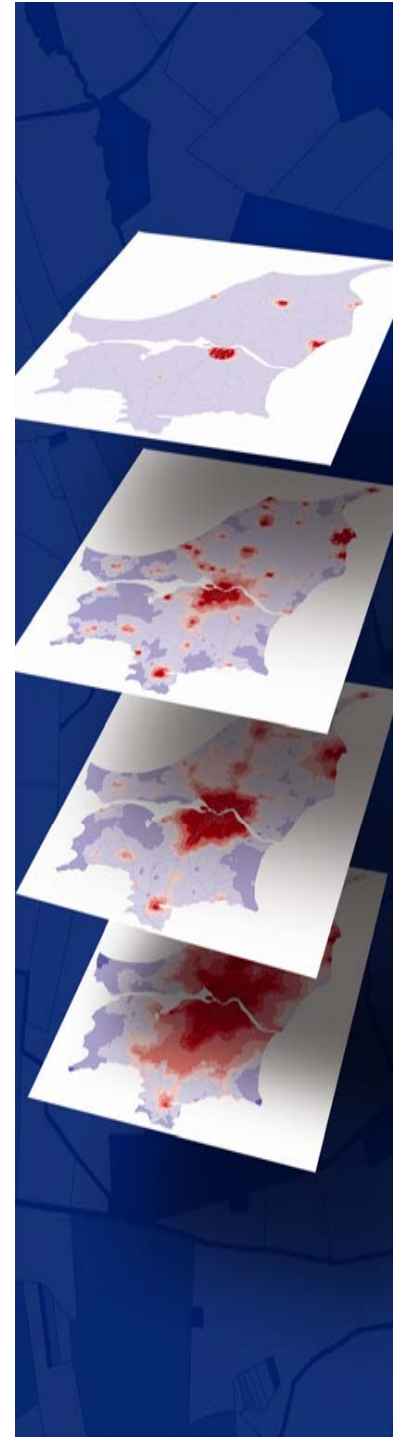
GIS Lab, University of Malta

- Results so far have been encouraging.
- 2004, 20% of the geography programme graduates were directly employed in GIS in the fields of agriculture, transport and mineral resources management.
- GIS has increased the visibility of Geography as a subject in the local job marketplace.



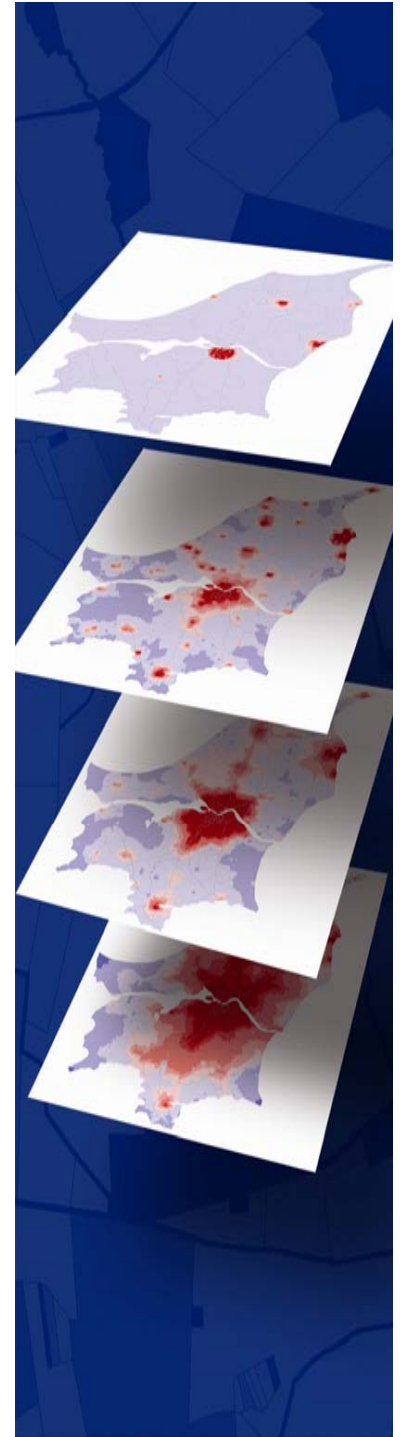
Introductory GIS modules

- Despite many disciplines embracing spatial analysis, geography departments in higher education institutions still play a dominant role in the teaching of GIS
- At undergraduate level, GIS is a crucial subject/skill.
- Learning outcomes currently being discussed at European Level within the HERODOT Network.



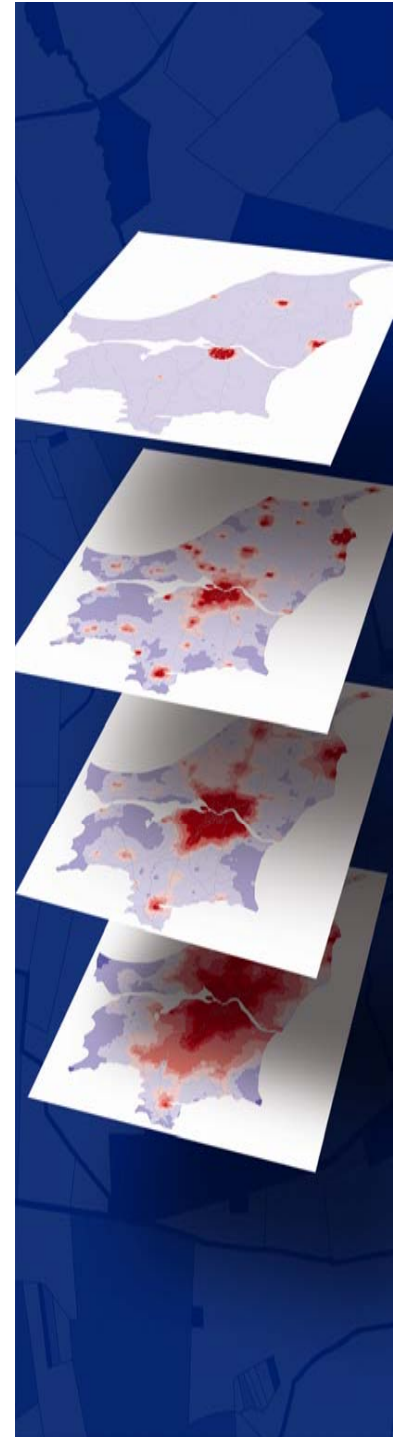
Introductory GIS modules

- Understanding your audience
 - Computer literacy
 - Spatial thinking skills
 - Background subjects
 - Issues of interdisciplinarity



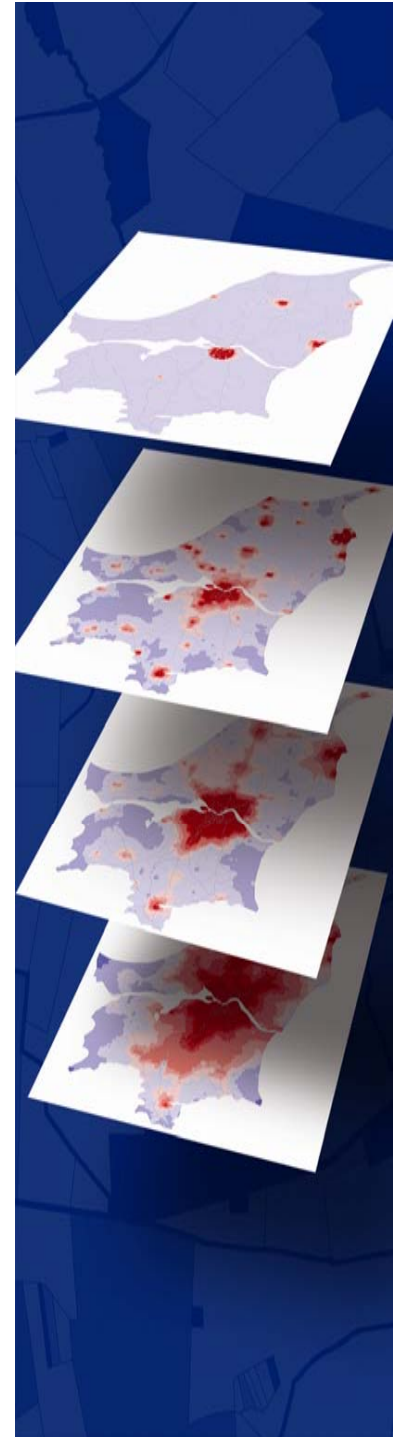
Introductory GIS modules

- Main components of an introductory GIS module
 - One semester duration
 - Theory and Practice
 - definitions;
 - history;
 - spatial data concepts, types, sources and quality;
 - functionality, capture, structure, manipulation, analysis and output; implementation, application



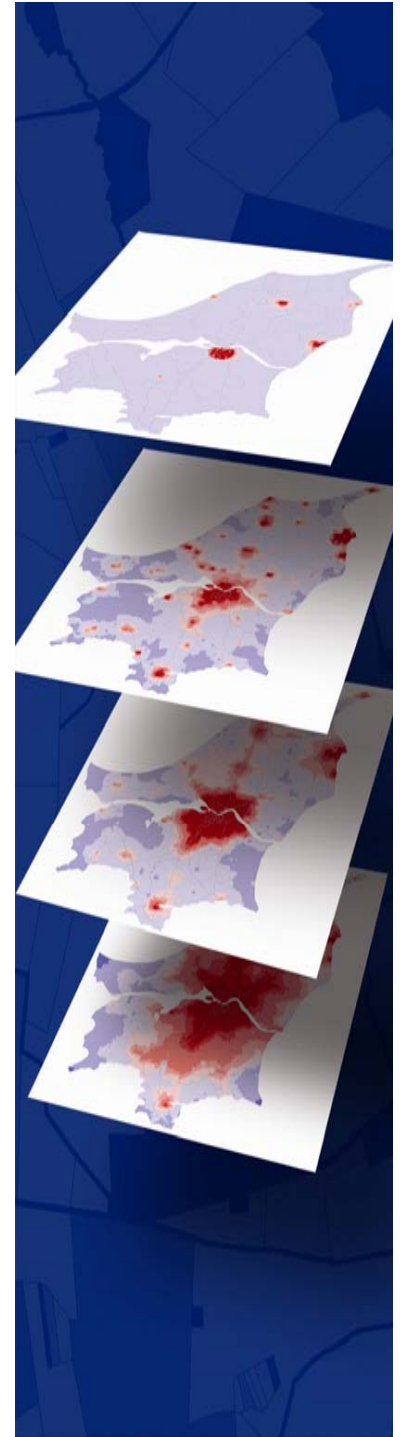
Introductory GIS modules

- Coordination of information and practical sessions
 - Hands on sessions (both fixed and independent study sessions)
 - Identification of a problem to solve
 - 70% of the assessment
 - Presentation in a report which includes introduction, project proposal, methodology, analysis, problems encountered and conclusions and applicability of GIS



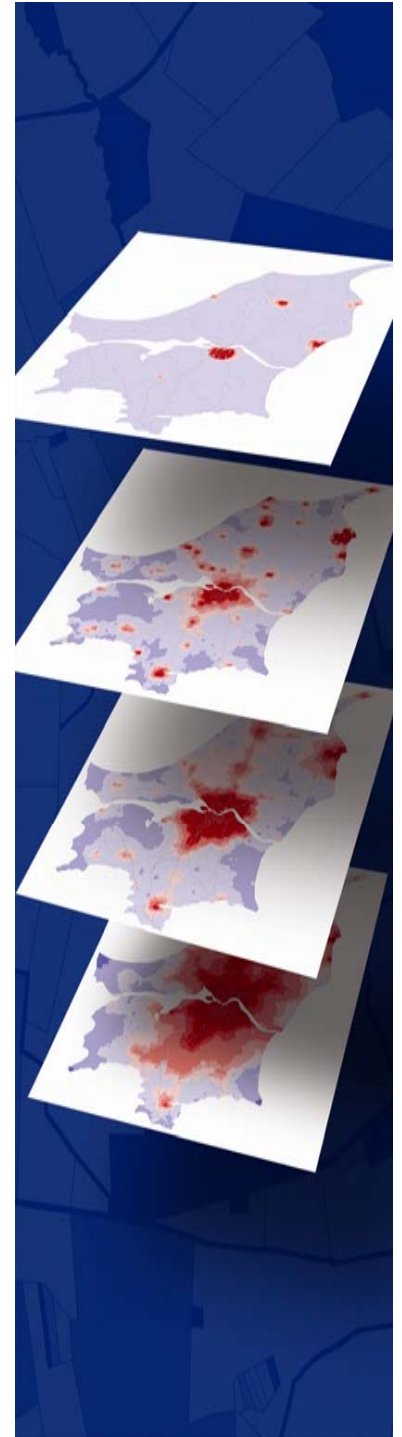
Introductory GIS modules

- Advantages of the practical sessions and project
 - Improved spatial thinking
 - Better adaptability to problem solving
 - Faster learning
 - Longer than expected use of GIS tools in future studies



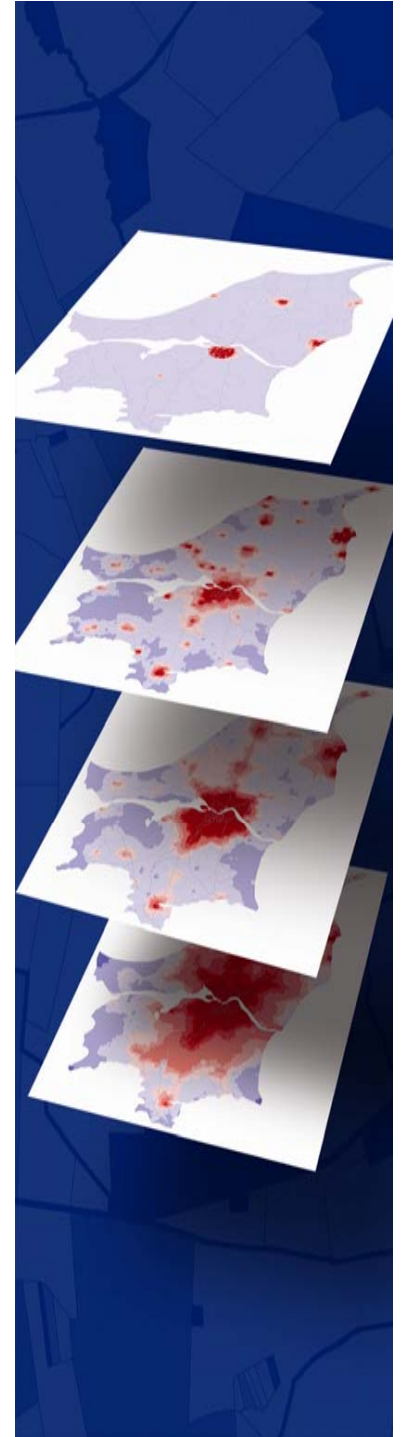
Introductory GIS modules

- Use of teaching aids for teaching GIS in Higher Education
 - GIS a young technology with lots of its developments documented online
 - Books published online
 - Portals such as ESRI Virtual Campus allows students to independently learn how to use GIS
 - Self learning tools with books and software demos, most popular for independent studies (and exploration)



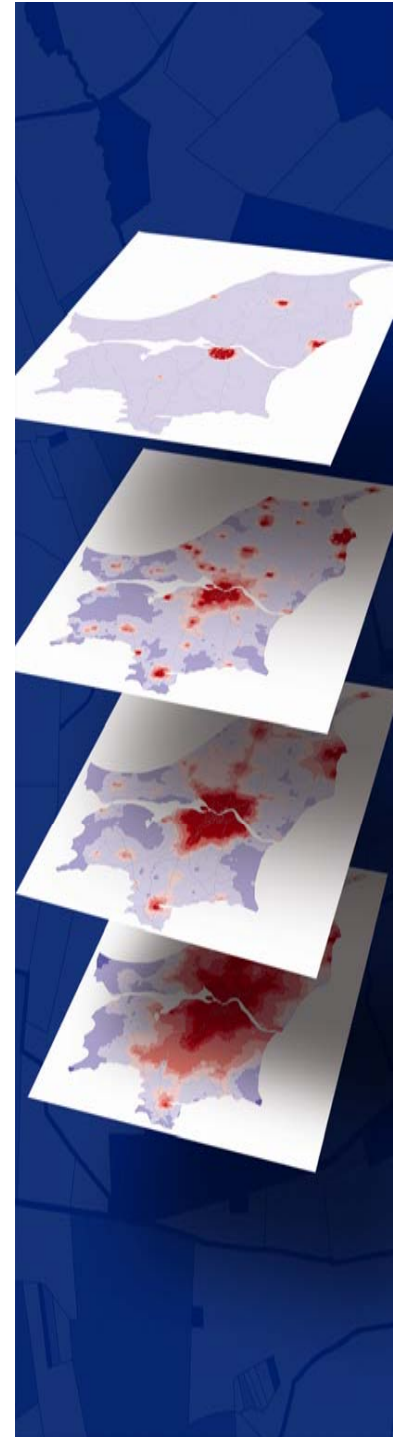
Teaching undergraduate GIS to various disciplines

- GIS Lab a multidisciplinary centre
- Each group taught separately to ensure focus on subject area (application)
- Instructor's disposition to various applications of GIS
- In professional degrees it helps to research the industry expectations
- In many cases today there is supporting literature



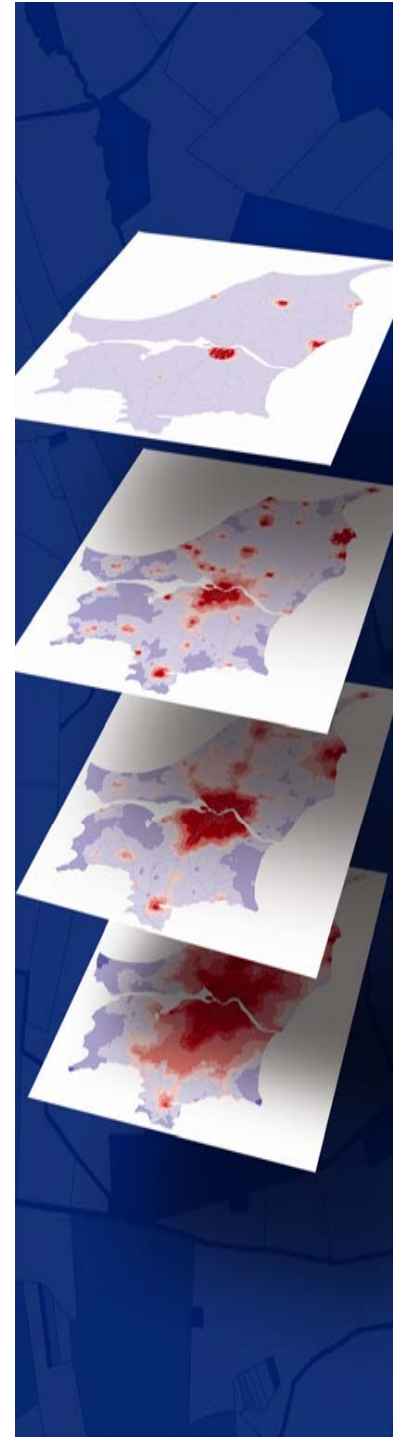
Multi-disciplinary GIS

- Development of a GIS lab or centre should focus on attracting various disciplines.
- A long term plan for the development of GIS training is crucial to ensure both professional and course development is constant.



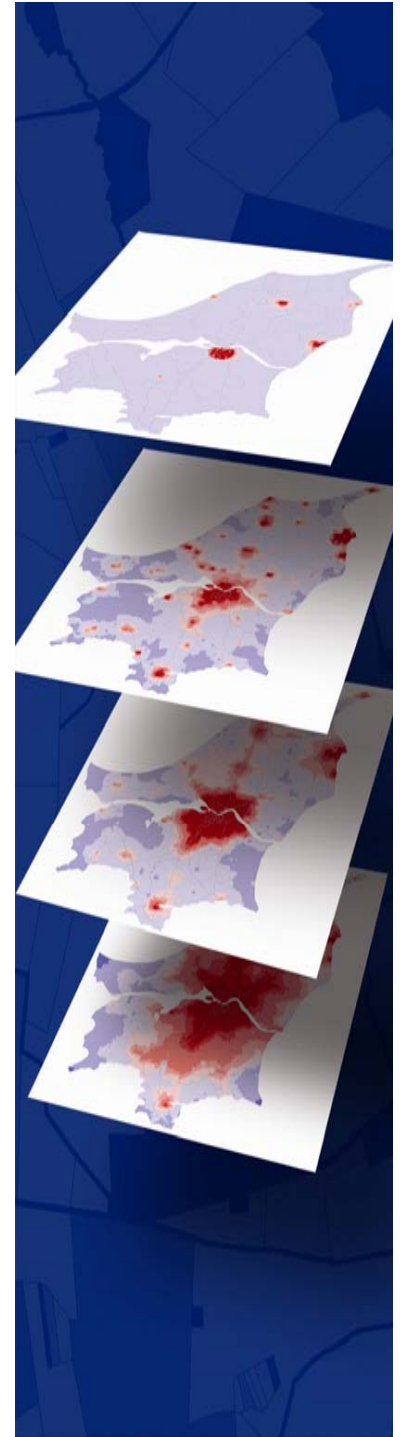
Role of the student

- Student play a very important role.
- Depends on student's adaptability to use computers and practice time dedicated during the semester.
- PBL defined as learning by doing.
- Students are stimulated to formulate their learning goals and reflect on the quality of their learning through a process, as well as the outcomes.



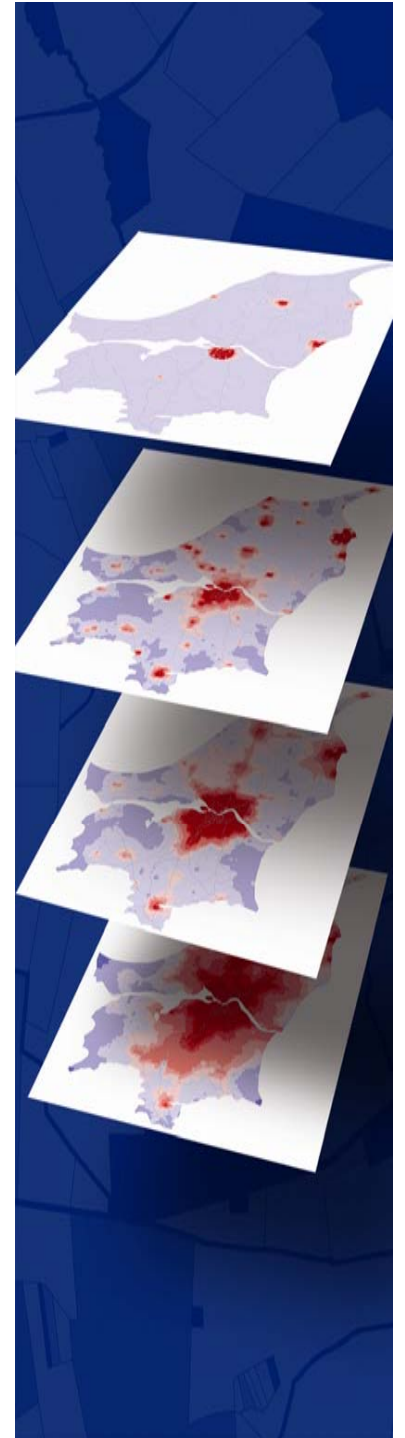
Role of the student

- Team work is critical in the GIS projects.
- Problem solvers are organised and flexible, and are able to better apply knowledge for problem solving.
- Student is therefore encouraged to seek a spatial problem to investigate.
- Students vary when tackling GI Science rather than Systems



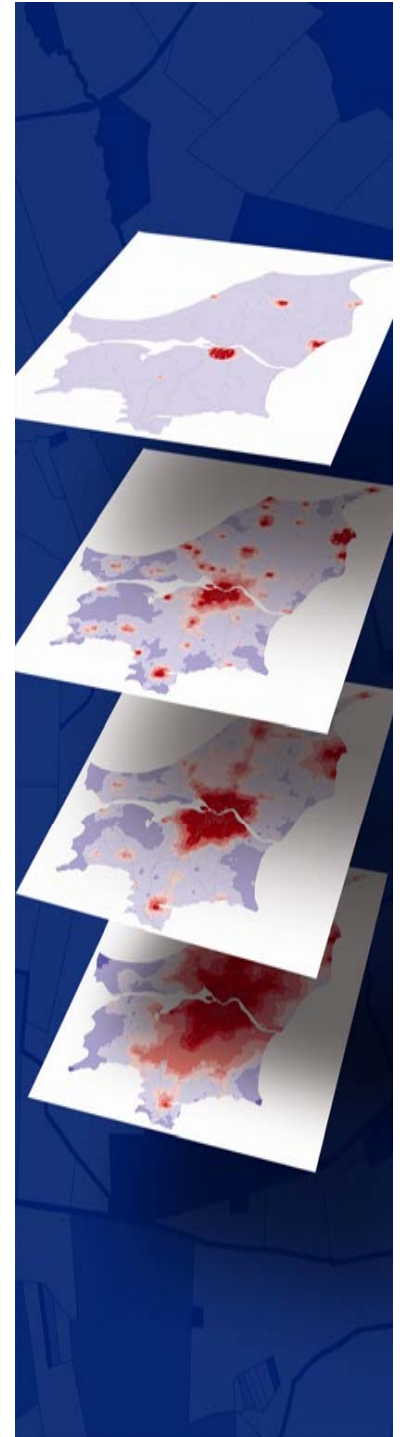
Role of the student

- Students today are generally keen to use software / tools.
- It is however important for the student to understand the processes that are going on in the tool.
- Tendency is for students to go quickly through tutorials but never understand the underlying processes.



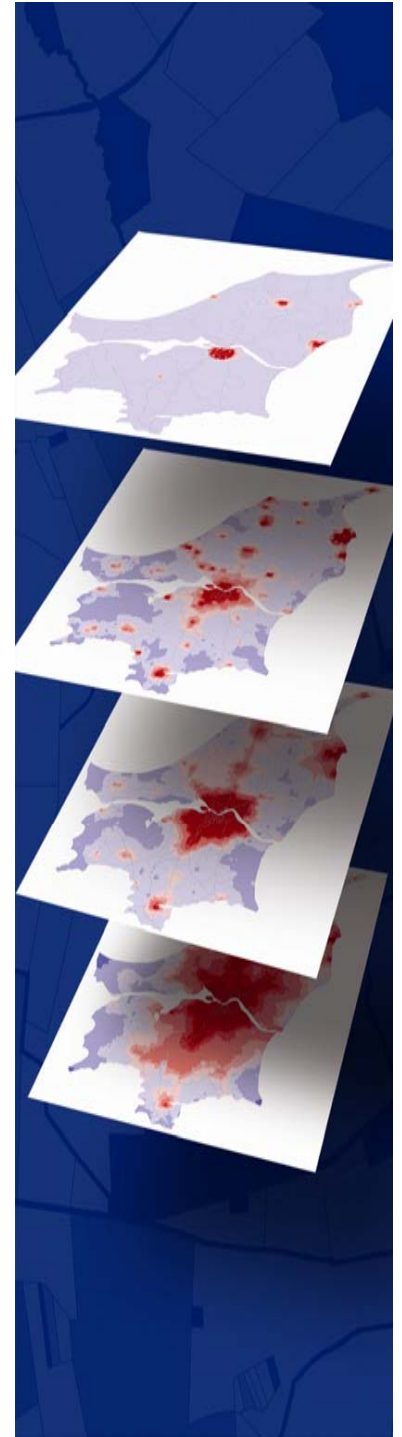
Role of the student

- This jeopardizes the future ability to use and apply GIS successfully.
- Students are guided to understand both how the tool works but also the analysis and processes they are undergoing at each stage.
- Optional site visits are organised to major companies using GIS.
- Student is central to the learning of GIS.



Conclusions

- Teaching has improved the development of undergraduate modules.
- Growing demand for geospatial skills.
- University of Malta increasing its investment (Summer School in July 2008)
- Future initiatives in this field to support the growing sector.



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**THE
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