Report on course evaluation by pilot students (March to September 2020)

Summary of results for Course 1: SDI-T for Collaborative Environmental Management

Introduction

This report summarizes the evaluation of the four pilot students that have enrolled in the course 1 (Spatial Data Infrastructures and Technologies for Collaborative Environmental Management) of the Environmental Management in the Middle East: Spatial Approaches project (EMME, 598189-EPP-1-2018-1-SE-EPPKA2-CBHE-JP, co-funded by the Erasmus+ Programme of the European Union). This course was designed by project partners, namely the Instituto Superior Técnico – University of Lisbon (UL, Portugal), the University of Tehran (UT, Iran), the École Nationale des Sciences Géographiques (ENSG, France), the National Technical Univ. of Athens (NTUA, Greece), the Vilnius Gediminas Technical University (VGTU, Lithuania) and the University of Lund (LU, Sweden). Other partners within the same project were the Imam Khomeini International University (IKIU, Iran), the Bu-Ali Sina University (BASU, Iran), the Sana'a University (SU, Yemen), and the Taiz University (TU, Yemen).

The course aims at providing an overview of the organizational and technical components of Spatial Data Infrastructures and Technologies (SDI-T). The course covers the theoretical and practical concepts of SDI-T, which are important for environmental management. It includes an introduction to Geographical Information Systems and Remote Sensing to harmonize the terminology and concepts related to spatial data, its analysis and modelling, and spatial databases. Other topics cover the concept of SDI-T, data issues, web services, and SDI business analysis and management.

After the development of the course and its deployment in early 2020, four students from Iran and Yemen completed it and filled an evaluation form, which is a questionnaire with 13 questions, and open for comments and suggestions.

In the next sections, the structure of the course and the results of pilot student evaluation are presented.

Structure of the course

The course "SDI-T for Collaborative Environmental Management" was divided into seven parts, each corresponding to a working week. The first two parts or weeks are common to the other two courses developed in the project.

Various material types and formats were used to deliver the courses and uploaded into the project's Moodle platform: video-lectures in streaming format, support documentation and recommended reading materials in PDF files, open-source software tutorials, and data for exercises, as well as assignments and a final project. The course materials were uploaded by February 2020.

The course structure is as follows:

1. GIS & Geovisualization (Week 1)
   1.1 Introduction to GIS and Geovisualization
   1.2 Models and Structures
   1.3 Precision and Quality of Data
   1.4 Spatial Analysis Operations
   1.5 Geovisualization
2. Remote Sensing (Week 2)
   2.1 Electromagnetic Radiation
   2.2 Platforms and Sensors characteristics
   2.3 Remote Sensing: Data Acquisition
   2.4 Remote Sensing: Multi-spectral Signatures and Classification Algorithms
3. Spatial Data Infrastructures (Week 3)
   3.1 Introduction to SDI
   3.2 Organizational Dimension of SDI
   3.3 Public data
   3.4 Spatial Data Issues in the Middle East
4. Data for SDI (Week 4)
   4.1 Data Feeding for SDI for Environmental Management
   4.2 Centralizing Real-Time Data
5. Web Services (Week 5)
   5.1 Web Services Standards and Protocols
   5.2 Geoportals, Geovisualization and Dashboards
   5.3 Web Service Composition and Service-Oriented Architectures
6. SDI Business Analysis and Management (Week 6)
   6.1 SDI Business Analysis
   6.2 SDI Management
7. Project (Week 7)

The course included a series of assignments that the students had to complete and submit via the course submission platform. The structure of assignments is as follows:

1. GIS & Geovisualization (Week 1)
   1.2 Data acquisition with a smartphone using GNSS
   1.2 Digitization (raster to vector)
   1.3 Computing procedures of Coordinate Reference Systems
   1.4 Spatial datasets - SQL queries
   1.5 Spatial analysis operations
2. Remote Sensing (Week 2)
   2.1 Copernicus data access online
   2.2 Work with ESA SNAP Toolbox: Flood plain mapping
   2.3 Mapping desertification using TIRS Data
   2.4 Test
3. Spatial Data Infrastructures (Week 3)
   3.1 Introduction to SDI (assignment)
   3.2 Public data (assignment)
4. Data for SDI (Week 4)
   4.1 Data feeding- Data quality
   4.2 Data feeding – DEM

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Evaluation by pilot students

Four students from Iran and Yemen started the course by March 2020 and completed the course by September 2020. After the completion, they were required to fill an evaluation form, and all students delivered the form between July 24th and September 14th, 2020.

Questions

There was a questionnaire with 13 questions and open for comments and suggestions relative to the overall materials, methods, and evaluation aspects of the course. The questions were as follows:

Question 1. Do you think that the aim, as described above, has been reached well in this course? (1: Not at all, 5: Yes, completely)

Question 2. How was the workload of the course? (1: low, 3: fair, 5: high)

Question 3. How do you grade the course as a whole? (1: very weak, 3: fair, 5: very good)

Question 4. Mark the strongest weeks of the course

Question 5. Why these weeks are strongest?

Question 6. Mark the weakest weeks of the course:

Question 7. Why are these weeks the weakest?

Question 8. Which parts of the course do you recommend to omit?

Question 9. Why do you recommend omitting these parts?

Question 10. What parts do you recommend to add to the course?

Question 11. How was your background knowledge to this course? Was the course too easy or too complicated for your knowledge?

Question 12. Grade the quality of contacts with lectures: (1: very weak, 3: fair, 5: very good)

Question 13. How do you evaluate the course?

All questions except 4 and 6 enabled the insertion of comments. Pilot students critically evaluated the course, giving suggestions for improvement.

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Evaluation by pilot students

Question 1. Do you think that the aim, as described above, has been reached well in this course?

Pilot students have positively evaluated the course. One student referred to it as a good and useful introduction to SDIs, although not enough.
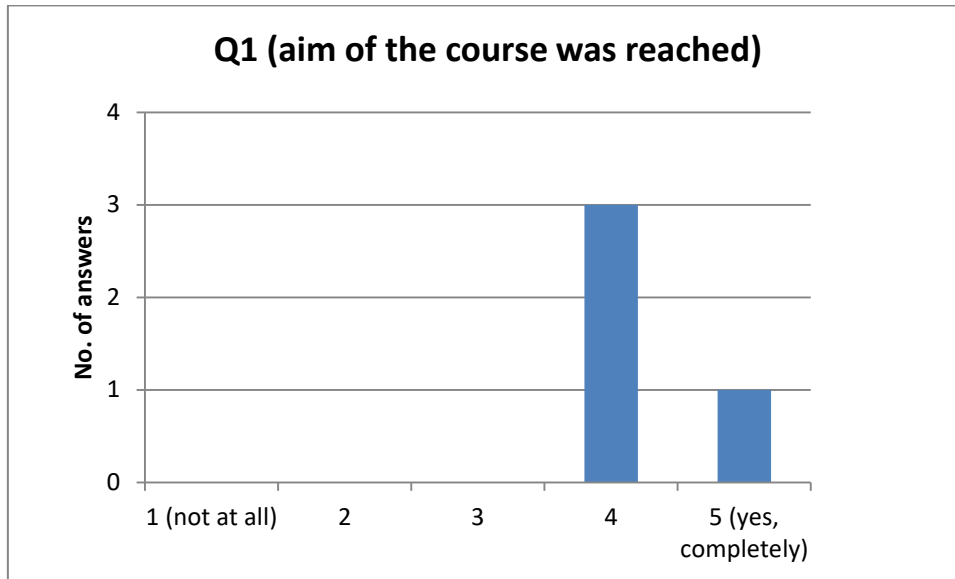

Question 2. How was the workload of the course?

Pilot students were divided as of evaluating the workload. Two answered as "fair" and two as "high". In comments, one said the workload was hard. One other referred that workload was high in some exercises, but fair in general.
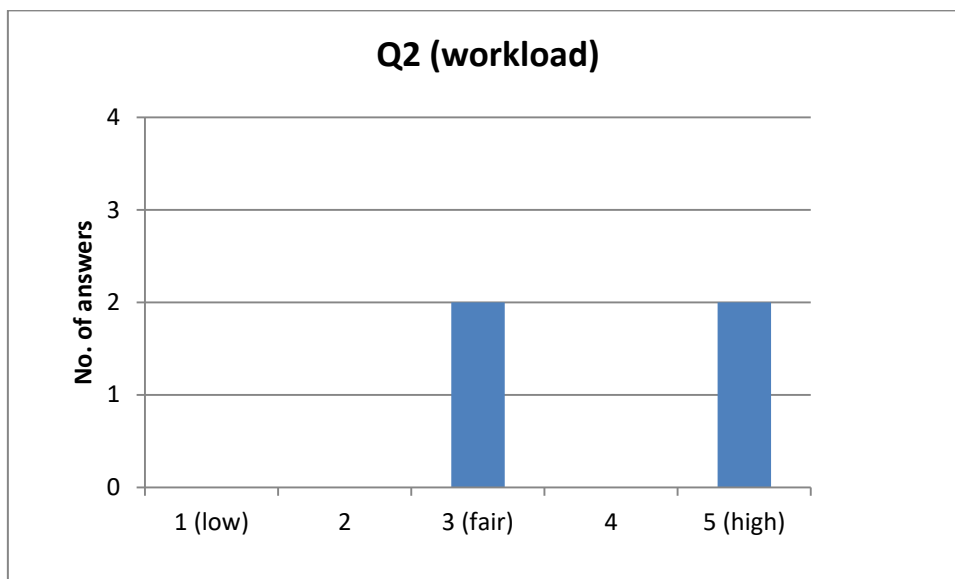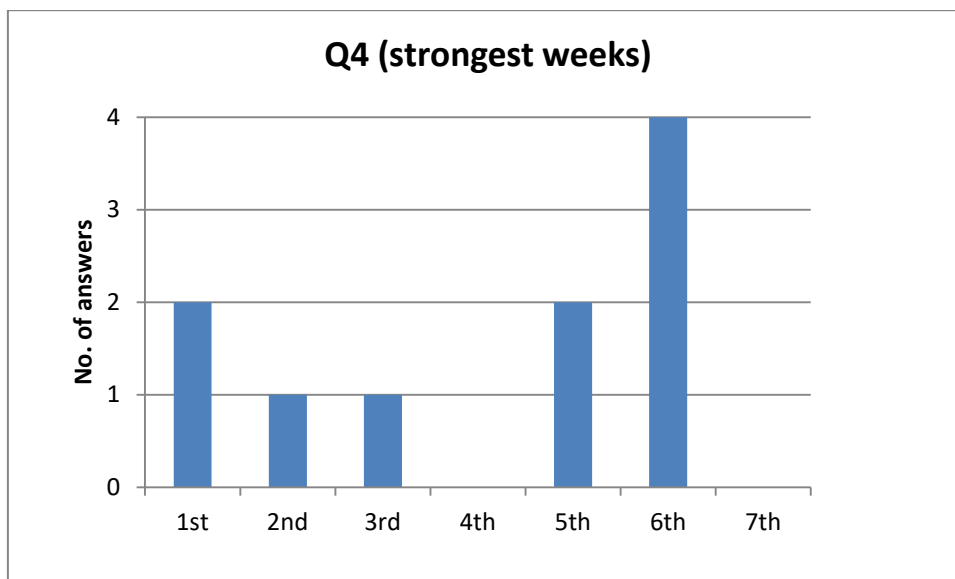
Question 3. How do you grade the course as a whole?

Pilot students gave a good grade to the course as a whole. However, they pointed out that the course needs to be further developed and simplified, as some of the assignments need to be clearer, as well as some of the lectures, e.g. by providing some examples.

Q3 (course as a whole)
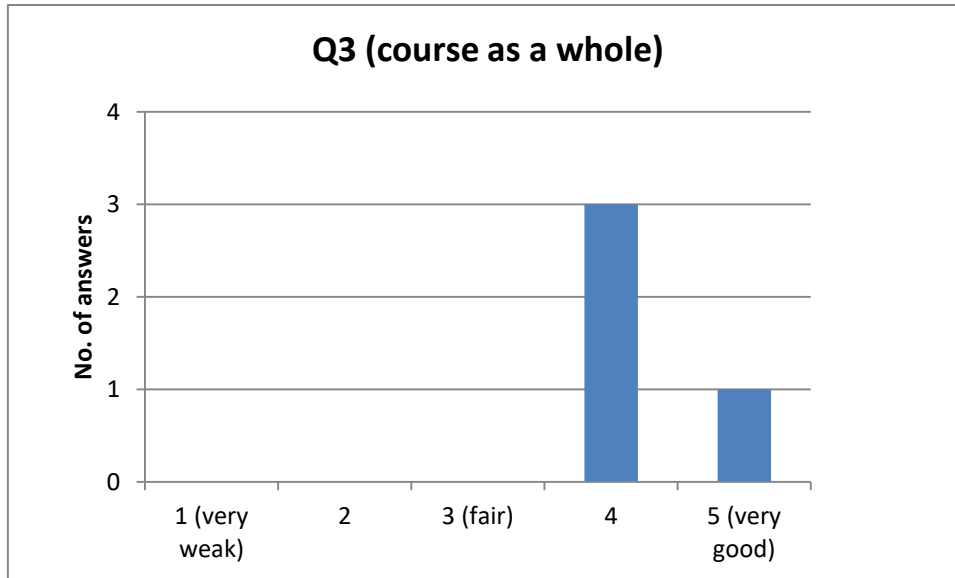
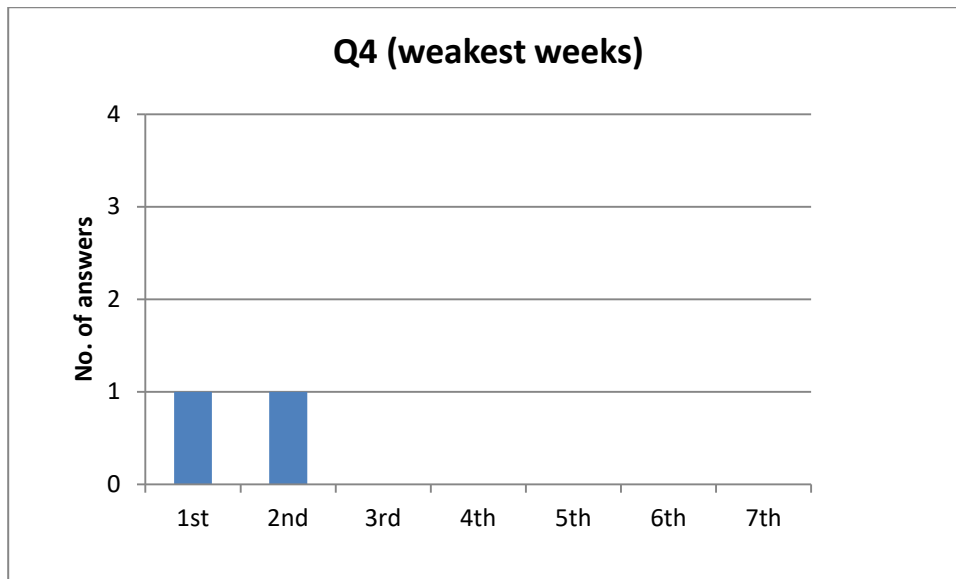*Questions 4. Mark the strongest weeks of the course* and *5. Why these weeks are strongest?*

Pilot students were asked to select the strongest weeks of the course and could provide any number of weeks). The figure below shows the accumulated number of answers per week. All students selected the 6th week for the innovative contents. Overall, they valued the course contents, with references to the learning of new topics and the acquaintance with useful tools. The project was not considered as one of the strongest contents of the course, as clearly students preferred the more guided lecture and assignment schema.

Q4 (strongest weeks)

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Questions 6. Mark the weakest weeks of the course** and **7. Why these weeks are weakest?

Pilot students were asked to select the weakest weeks of the course and could provide any number of weeks). The figure below shows the accumulated number of answers per week. Only two students answered, one listing Week 1 and one other referring Week 2. Both weeks were in the general introduction and were shared with other courses of the EMME project. As such, a specific discussion with course developers concerning the core weeks should be on the agenda for the upcoming stage of the project.

Q4 (weakest weeks)

No. of answers (y-axis: 0 to 4)
(x-axis: 1st, 2nd, 3rd, 4th, 5th, 6th, 7th)
Bars: 1st = 1, 2nd = 1

Questions 8. Which parts of the course do you recommend to omit?** and **9. Why do you recommend omitting these parts?

Two of the pilot students referred to one specific exercise each, and one suggested that instead of removing part of the content, a reorganization would be preferable. One referred that some parts take a long time to learn but one other asked for more advanced materials.

Question 10. What parts do you recommend to add to the course?

There was a mixture of suggestions to add other materials and re-organize the current structure. One student suggested that a specific SDI could be analysed in more detail, while one other suggested that some components of the SDI framework could be addressed in separate sections. One other opinion was that geoportal familiarity was an important goal for students taking the course.

Question 11. How was your background knowledge to this course? Was the course too easy or too complicated for your knowledge?

Three of the pilot students mentioned the course as useful and had some background on geographic information systems or remote sensing. All have declared that the course has improved their knowledge, regardless of background. No one referred to course to be too easy or too hard.

Question 12. Grade the quality of contacts with lectures

Pilot students were asked to classify the contact with the lectures. Positive opinions were given, despite a reference to audio/video problems or the late upload of some materials. It is our opinion that the used platforms for content deployment and assignment communication are efficient and easy to use, as no one reported difficulties.

Q12 (contacts with lectures)
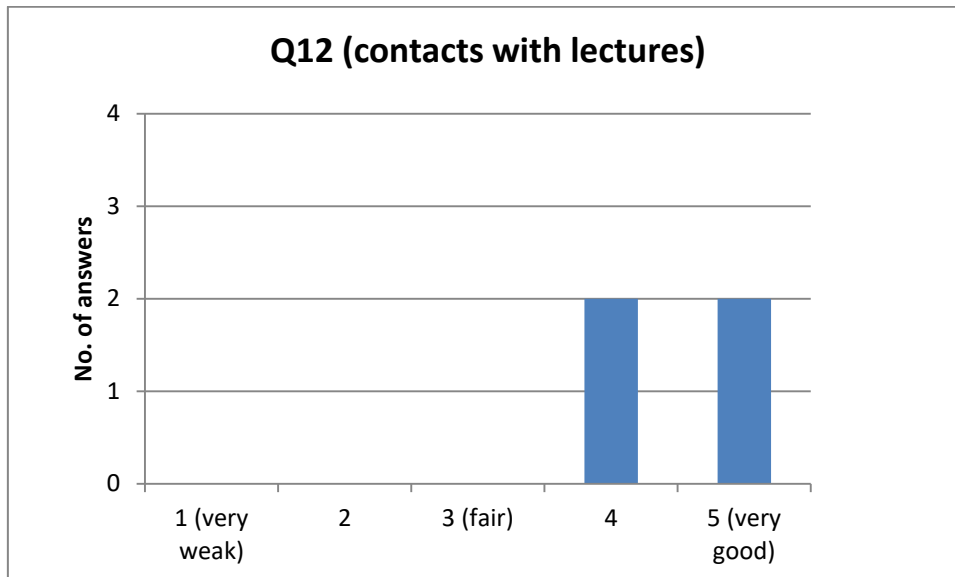
Question 13. How do you evaluate the course?

An analysis of the very heterogeneous set of answers to this open question in the form leads to the conclusion that the overall appreciation of the course was very positive, describing it as informative and well organized. Students referred that new knowledge was acquired, regardless of the background on the course topics. A non-exhaustive list of examples taken from the reports includes the need for a better description of the project tasks, the improvement of the sound/video quality of some materials, and a more balanced workload between exercises.

Final remarks and upcoming developments

The pilot students of the SDI-T for Collaborative Environmental Management course have evaluated the course after completing the lectures and assignments during an approximate period of 6 months. The feedback is generally positive and useful suggestions to improve the course were pointed out. The feedback is very useful for course developers and will help in the changes to the course structure or contents that will be decided according to the project's schedule. The general and the specific suggestions related to the course structure or exercises were collected and will be presented to the course developers with the ultimate goal of improving the quality of the course.

Relative to week 1 and 2 (core module) a general discussion with the other course coordinators such be performed, as they are shared with the other courses.

Concerning the weeks between 3 and 7, we propose to lead a distance meeting (we will suggest a Zoom videoconference) in November 2020, with all those involved in the preparation of the contents (a Doodle form will be sent to check individual availability). This meeting's tentative program is:

- Presentation and discussion of the student´s evaluations;
- Identification of alternatives and discussion of solutions to mitigate the weaknesses identified by the students.

November 18th, 2020

The course coordinators,

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Environmental Management in the Middle East (EMME):
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Course evaluation report by pilot students
Course: SDI-T for Collaborative Environmental Management

Aim: This course aims at providing an overview of the organizational and technical components of Spatial Data Infrastructures and Technologies (SDI-T). Students will explore the theoretical and practical concepts of SDI-T, which are important for environmental management. It includes an introduction to Geographical Information Systems and Remote Sensing to harmonize the terminology and concepts related to spatial data, its analysis and modelling, and spatial databases. Learners will be presented the concept of SDI-T, data issues, web services, and SDI business analysis and management.

Name and family name of the student:

Email:

1. Do you think that the aim, as described above, has been reached well in this course?

(1: Not at all, 5: Yes, completely)

☐	☐	☐	☒	☐
1	2	3	4	5

Comments:

2. How was the workload of the course? (1: low, 3: fair, 5: high)

☐	☐	☒	☐	☐
1	2	3	4	5

Comments:

It was mostly fair, but in some exercises it was really high.

3. How do you grade the course as a whole? (1: very weak, 3: fair, 5: very good)

☐	☐	☐	☒	☐
1	2	3	4	5

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Comments:

The SDI part was great. Although I prefer it to be more informative in some parts. But some non-SDI parts need some modifications.

4. Mark the strongest weeks of the course

☐   ☐   ☐   ☐   ☒

1   2   3   4   5

☒   ☐

6   7

5. Why these weeks are strongest?

Comments:

The contents were very informative and really interesting to me. They gave me many information about SDI. There were a lot to learn and they were very well organized.

6. Mark the weakest weeks of the course:

☒   ☐   ☐   ☐   ☐

1   2   3   4   5

☐   ☐

6   7

7. Why are these weeks the weakest?

Comments:

This week is not the weakest due to its content, but the way and the time of presenting the data was not good. We received some of these courses such as 1.3 and 1.4 very late. While we were in the middle of learning about SDI, we encountered these courses with

huge amount of information and very time consuming exercises. Specially for the spatial dataset –SQL exercise which was not well organised.

8. Which parts of the course do you recommend to omit?
I do not like any part to be omitted, but as I will explain in the last part, I prefer some parts to be reorganized.

9. Why do you recommend omitting these parts?
Due to my answer to the previous question, I do not like to omit any part.

10. What parts do you recommend to add to the course?
Comments:
I think as basic components of SDI, it is required to have a special interest on " Policies " and " metadata " and also the appropriate architecture for the SDI based on the applications. It is preferred to have them as separate sections and providing more information for them.

11. How was your background knowledge to this course? Was the course too easy or too complicated for your knowledge?
I have studied about SDI before but not in such organized way and not with so much details. It was very useful to me. The course was neither too easy nor complicated to me. I think I could fulfil the expectations and came to good knowledge about SDI.

12. Grade the quality of contacts with lectures: (1: very weak, 3: fair, 5: very good)

☐	☐	☐	☐	☒
1	2	3	4	5

Comments:

Except for some courses which were uploaded late and in the non-appropriate time, it was very good.

13. How do you evaluate the course?
(Write a summary of the course, what you have learnt, the quality of lectures, the quality of exercises, etc. at least, 3 pages' report is expected)

The course was focused on Geographic Information Systems Introduction to SDI for environmental impact assessment. In fact, the course was informative and useful for me. As a PHD student in RS&GIS, I have a good background in GIS, but SDI was very new to me. I learnt the basic structure of SDI, it's components (data and data feeding, policies, standards, technologies and web services) and also how to manage and evaluate an SDI.

To be more specific I like to discuss each course with details, what I learnt and their strength and limitations.

Start from GNSS, although it was not new to me to work with GPS for data collection, this course was very informative. I learnt how to evaluate the accuracy of collected data. The provided website was new and interesting to me and Arunas answered my questions and helped me with the upcoming challenges with details and kind consideration. I really appreciate it.

About digitizing, although I have enough skill and information in this subject, the course was really interesting. It was very well designed and I enjoyed working with QGIS, as I mostly work in ArcGIS.

Part 1.3 "geodetic coordinate reference systems and cartographic projections" was very well organized, both the concepts and the software and its implementation was great. Although geodesy is not my favourite subject, I found it very interesting and applicable in this course procedure.

Spatial dataset-sql queries part: despite of being familiar with programming before, this course was the most challenging one to me. Maybe for the one who is new with Postgresql, more information was needed both descriptive and operational. I prefer this course to be reorganised.

Spatial analysis operations were not new to me, I applied these tools a lot before, but it was well organized for the beginners. It was brief but very useful.

Week 2 was very well organised. The courses were very useful and describe each subject with detail and in very efficient way. I just like to mention that more websites and applicable tools could be introduced in this part. Earth explorer could be a good example beside Copernicus for image acquisition for the exercises. Moreover, as Landsat data are available from 1972, they have been used in numerous projects and various applications. So, they are available in many datasets around the world. Beside Landsat, other satellites with different spatial, spectral and temporal resolutions could be used in combination with the mentioned Sentinel images for implementing such applications for these exercises.

Week 3, interaction to SDI was very useful, we came to the fact that how SDI could be useful and valuable. The course was very well designed.

Public data, was really useful to me. It gave me the opportunity to evaluate the public data sources like OSM very precisely. It gave me more insights regarding different websites using OSM, which I have never used before, and I could observe their strength and weaknesses in using OSM for their own application. The exercise was very fruitful and I really enjoyed doing it.

Week 4, data feeding: in fact, I like this week to rename to metadata. In fact, except for the population exercise, this part is mostly focused on metadata. As metadata has significant importance in creating SDI, this part could be presented with the same structure but with more details about metadata. And data feeding could be revised and reorganized.

Population exercise was very interesting as it is the pre-requisite for every country to do the same. It gave me a very good insight.

Web services was one of the best among these courses. The provided information very well organized, the course presentation procedure was very well. It was really informative; each subject was described in a very appropriate way with good examples. The exercise was also very helpful.

SDI business analysis, was also very well organised but the provided document was somehow ambiguous and there was not enough explanation for the provided documents. Giving some examples while presenting this document could make the course more fruitful. In fact, this course was mostly dedicated to review the topics and did not go deep to the subjects. But the exercise was very helpful. It made us to investigate more about this course.

SDI management, was very informative specially with good examples and also its very efficient exercise. It was a very good experience for me to work with the software and evaluate an SDI. It helped me to know and deal with the concepts in a practical way.

Beside these, as I mentioned before, policies and metadata could also be presented as a distinctive course as they are very important in creating SDI. They have been introduced briefly in SDI courses, but having more details and examples about them would be very helpful.

Moreover, SDI architecture beside its components could be a valuable course.

I also think that it would be great if a valid well-designed SDI could be presented as an example (its architecture, its whole components; the applied data, standards, policies, the technology, web services and the whole strength and weakness of the geoportal). This would give a very good insight to the students for sure.

To conclude, this course was very useful and informative to me and would be more fruitful with some modifications.

Best regards,

Maryam

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Course evaluation report by pilot students

Course: SDI-T for Collaborative Environmental Management

Aim: This course aims at providing an overview of the organizational and technical components of Spatial Data Infrastructures and Technologies (SDI-T). Students will explore the theoretical and practical concepts of SDI-T, which are important for environmental management. It includes an introduction to Geographical Information Systems and Remote Sensing to harmonize the terminology and concepts related to spatial data, its analysis and modelling, and spatial databases. Learners will be presented the concept of SDI-T, data issues, web services, and SDI business analysis and management.

Name and family name of the student: Mehrdad Jeihouni

Email: jeihouni92@ut.ac.ir

1. Do you think that the aim, as described above, has been reached well in this course?

(1: Not at all, 5: Yes, completely)

☐ 1   ☐ 2   ☐ 3   ☒ 4   ☐ 5

Comments:

2. How was the workload of the course? (1: low, 3: fair, 5: high)

☐ 1   ☐ 2   ☒ 3   ☐ 4   ☐ 5

Comments:

3. How do you grade the course as a whole? (1: very weak, 3: fair, 5: very good)

☐ 1   ☐ 2   ☐ 3   ☒ 4   ☐ 5

Comments:

The course had high quality. All weeks were informative to me and some of them were really interesting. However, there are still rooms for improvement.

4. Mark the strongest weeks of the course

☒ 1   ☒ 2   ☒ 3   ☐ 4   ☒ 5

☒ 6   ☐ 7

5. Why these weeks are strongest?

Comments:

I learned new stuffs these weeks and they were interesting.

6. Mark the weakest weeks of the course:

☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5

☐ 6   ☐ 7

7. Why are these weeks the weakest?

Comments:

There was not any weak week. But there is an important point, which is lack of planning for presenting the week materials and data in its appropriate time. As an example we received the first week's 1.1, 1.3, 1.4 and 1.5 courses and exercise very late. Moreover, spatial dataset SQL course was not arranged well and need modifications and should be reorganized.

8. Which parts of the course do you recommend to omit?

In general, all parts are well arranged and are needed to students.

9. Why do you recommend omitting these parts?

I don't recommend omitting any part.

10. What parts do you recommend to add to the course?

Comments:

I recommend adding a part to the course. In this part one well known and operational global / national SDI should be analysis comprehensively with all its components such as data sources, web services, web server, its limitation and etc. This gives a deep view about an SDI and its functionality to students.

11. How was your background knowledge to this course? Was the course too easy or too complicated for your knowledge?

As a Ph.D student in RS & GIS I had background knowledge about some parts. But in general the course was good and honestly increased my knowledge in some areas. It was very useful to me.

The course parts are suitable for students without any background knowledge about RS, GIS and SDI.

12. Grade the quality of contacts with lectures: (1: very weak, 3: fair, 5: very good)

☐ 1   ☐ 2   ☐ 3   ☒ 4   ☐ 5

Comments:

13. How do you evaluate the course?

General comments:

As all students of these courses will be from non English language countries, it is highly suggested to the lecturers to speak in Standard English without any accent. Moreover, some of the course's lecture videos had low quality and there were sound noises on the videos.

Summary of the course:

This course contained seven parts that each part was a one week plan. The parts are: 1) an introduction to Geographical Information Systems geovisualization, 2) Remote Sensing, 3) spatial data infrastructures, 4) data for SDI, 5) web services and 6) SDI business analysis and management. Finally the 7th part was belonged to a project. In the following a summary about each part is presented:

1) An introduction to Geographical Information Systems geovisualization:

In this part we learned how to:

- Acquire data with a Smartphone using GNSS

  This part was very interesting for me as it present Mobile APP for data collection, Website for GPS data visualization and conversion. Moreover, the course presented how we can assess the accuracy of the GPS collected data. This was great.

- Digitize raster data models to vector

  As a Ph.D student in RS & GIS, I am familiar with digitizing raster data. I always used ArcGIS as GIS software. But in this course I asked to use QGIS and I found it capable in doing some tasks.

- Compute procedures of Coordinate References

  This was a great course on converting CRS. I thank Dr. Eimuntas Parseliunas for this well organized and interesting course.

- Get queries in PostgreSQL

  Unfortunately, in the exercise, there was not any video or lessons for us to get some knowledge about fundamentals of SQL and query coding. I highly suggest this part to be re-organized and presented in more details.

- Operations of Spatial analysis

  This part was useful for me as it presented spatial analysis in QGIS.

2) Remote Sensing

In this part we learned how to:

- Access Copernicus data

- Work with ESA SNAP Toolbox for Flood plain mapping

  Working with free available Sentinel Radar data was very interesting for me. This course was very well organized with details.

- Desertification mapping using TIRS Data

  I had worked with Landsat-8 data, but the course presented in much details which is suitable for all students.

3) Spatial data infrastructures (SDI)

This part was great and well organized. In this part, as a first main SDI section, the SDI was introduced in the best way possible.

In this part we learned about:

- What is an SDI?

- Organizational dimension of SDI

- Public data

  This part was really informative and interesting. It introduced OSM and wikimapia and how to download data from them. This was really nice and useful. I taught how to find free available vector layer data all over the world.

- Spatial data issues in the Middle East Assignment

4) Data for SDI

Generally, the course was helpful and data quality and population exercise was really informative. But it is highly recommended to present more information about database structure.

In this part we learned about:

- Data feeding for SDI

  I suggest renaming this part to "Meta data".

- Centralizing real time data

5) Web Services

Web service course was great and well organized. This course was very interesting and informative for me.

In this part we learned about:

- Web services standards / protocols
- Geoportals, geovisualization, dashboards
- Web service composition, service oriented architectures Assignment

6) SDI business analysis and management

In this part we learned about:

- All aspects of business analysis

  This part was informative for me. The exercises made me do more research on this topic, and it was really interesting.

- SDI management

  This part presented a new vision to SDI; which is how to manage it. The course introduced BSC Designer software with a detail and practical example. This manner in presenting a subject and its related software is great. I really enjoyed this course.

7) Project

This part didn't have any lessons but students should answer some question to evaluate their knowledge about SDI. This part had its own challenges and made me more search about them.

The quality of lectures:

As the all students of these courses will be from non English language countries, it is highly suggested to the lecturers to speak in Standard English without any accent. Moreover, some of the courses lectures videos had low quality and there were sound noises on the videos.

The quality of exercises

All the parts of the course designed on the fact that students may be un-familiar with the lessons and exercises. Therefore, generally most of the exercises started with step by step screenshots. This strategy is good and helpful.

Unfortunately, in the exercise of "Spatial datasets - SQL queries" there was not any videos or lessons for us to get some knowledge about fundamentals of SQL and query coding. I highly suggest this part should present in more details. And one video should be uploaded to show how to code queries, what are functions, what is sub query, and what is a conditional query?, and etc.

I suggest this part of course should be start from the beginning of SQL query coding and present more examples.

Additionally, as mentioned in the SQL introduction exercise there was a plan to data integration, in connection with PostGIS and QGIS. It will be interesting to illustrate how to connect the PostGIS and QGIS in next courses.

Recommendation:

I recommend adding a part to the course. In this part one well known and operational global / national SDI should be analysis comprehensively with all its components such as its architecture, standards, policies, data sources, web services, web server, its limitation and etc. This gives a deep view about an SDI and its functionality to students.

As conclusion, the "SDI-T for Collaborative Environmental Management" course was very useful and informative. The course parts are suitable for students without any background knowledge about RS, GIS and SDI. However, there are still rooms for improvement by adding and reorganizing some parts.

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Name and family name of the student: Morteza Omidipoor

Email:Omidipoor@ut.ac.ir

1. Do you think that the aim, as described above, has been reached well in this course?

(1: Not at all, 5: Yes, completely)

☐ 1   ☐ 2   ☐ 3   ☐ 4   ■ 5

Comments:

2. How was the workload of the course? (1: low, 3: fair, 5: high)

☐ 1   ☐ 2   ☐ 3   ☐ 4   ■ 5

Comments:

3. How do you grade the course as a whole? (1: very weak, 3: fair, 5: very good)

☐ 1   ☐ 2   ☐ 3   ☐ 4   ■ 5

Comments:

4. Mark the strongest weeks of the course

☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5

■ 6   ☐ 7

5. Why these weeks are strongest?

Comments:

Fully matched the title of the course

6. Mark the weakest weeks of the course:

☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5

☐ 6   ☐ 7

7. Why are these weeks the weakest?

Comments:

I think there is no such case.

8. Which parts of the course do you recommend to omit?

1.2 Digitization (raster to vector)

9. Why do you recommend omitting these parts?

It seems that the students of the course have the least knowledge in this field and need newer and more advanced topics.

10. What parts do you recommend to add to the course?

Developing a geoportal (a prototype)

Comments:

Spatial data infrastructure output is provided on geoportals, and students are expected to become familiar with the technical aspects of it.

11. How was your background knowledge to this course? Was the course too easy or too complicated for your knowledge?

Based on my previous lessons and activities, the content was not difficult for me, however, the it was useful for and could not be done easily. In addition to reviewing basic concpt, I also learned a lot of new concepts.

12. Grade the quality of contacts with lectures: (1: very weak, 3: fair, 5: very good)

☐ 1   ☐ 2   ☐ 3   ■ 4   ☐ 5

Comments:

In some cases, the audio and video quality was not very satisfactory

13. How do you evaluate the course?

(Write a summary of the course, what you have learnt, the quality of lectures, the quality of exercises, etc. at least, 3 pages report is expected)

First of all, I have to thanks for offering useful materials in the course. The following is a summary of the activities performed for each lesson:

**GIS & Geovisualization (Week 1)**

1.1 Data acquisition with a smartphone using GNSS

The Easy GPS logger app developed by Leafdigital downloaded from play store and then GPX data related to a village near Yasuj city, Iran collected by a smartphone. Accuracy of collected data estimated too. Then the GPX data was imported into the QGIS software. A plugin named "GPX Segment Importer" was used for importing GPX file.
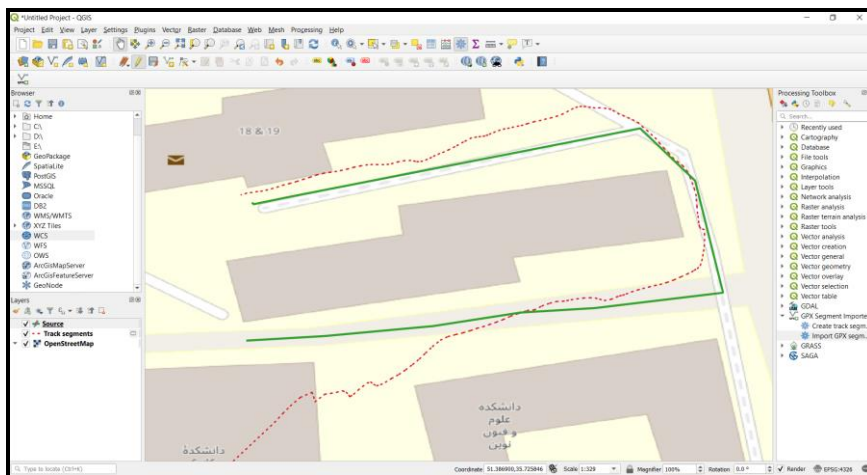

Display collected Data in the QGIS

To evaluate geometric accuracy the Buffer-Overlay-Statistics (BOS) method was used (International Journal of Geographical Information Science, 13, pp. 27-47. URL: https://doi.org/10.1080/136588199241445).
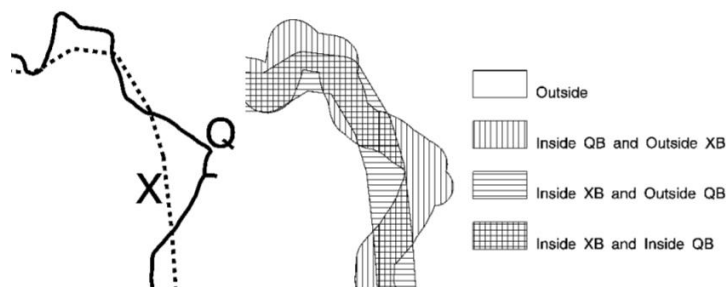
The BOS method works on line data sets and produces graphs that indicate spatial accuracy, bias, completeness and miscodings for a line data set of unknown quality with respect to a data set of better quality. The core of the method is buffering around the lines of the two data sets using a number of buffer sizes, and combining the resulting buffer data sets (XB and QB) and the two input line data sets (X and Q) in various ways to produce statistics that can be plotted to reveal the characteristics of the input line data set, X, with respect to the reference data set, Q. The results of BOS method are illustrated below:

.
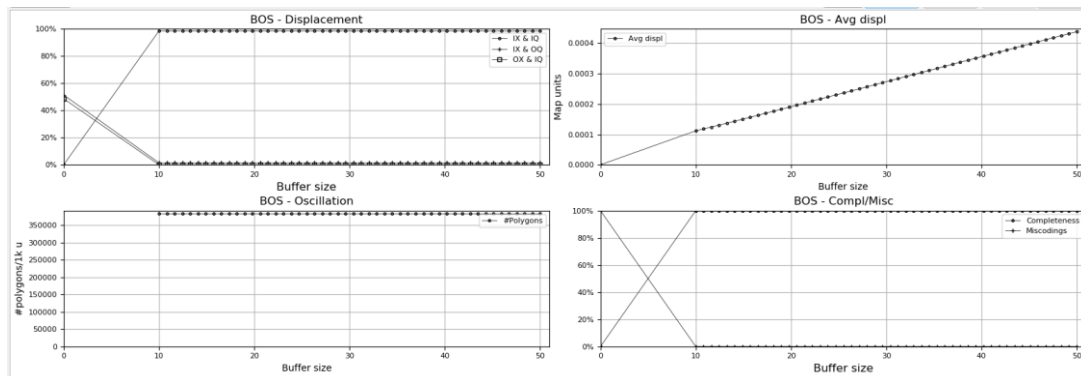
The results of BOS method to evaluate colected data

1.2 Digitization (raster to vector)

In this section we use Google Map API as a Base layer for drawing or digitize some features.

The steps I took to digitize are:

- Define a Layer
- Define the Spatial Reference System (SRS): Google Mercator.
- Define Required fields (Fields)
- Draw features geometry
- Joining descriptive information to the Fields

1.3 Computing procedures of Coordinate Reference

In this cource using Python programming language an attempt was made to develop a graphical software to support coordinate reference systems (CRS) calculations.
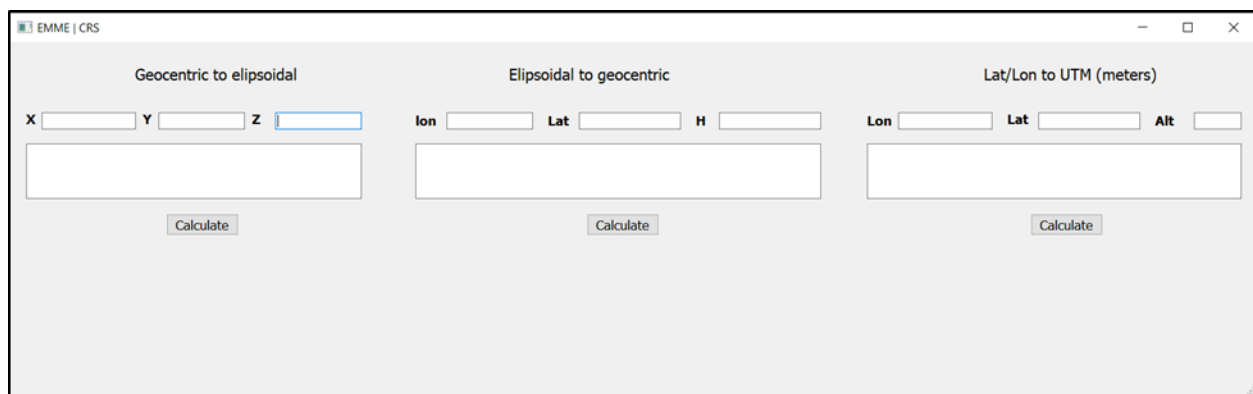
GUI of windows application developed for coordinate reference systems (CRS) calculations

1.4 Spatial datasets - SQL queries

In this lesson, the following items were reviewed in relation to the database and tested in practice:

- PostGIS installation
- SQL code for table creation
- Home-made data insertion
- SELECT queries (Filter, Join, Alias, Aggregation)

- UPDATE and join

- Subqueries

- Data integration

- Views

1.5 Spatial analysis operations

Basic spatial analyzes were reviewed and then several examples were implemented in practice.

Remote Sensing (Week 2)

2.1 Copernicus data access online

Working with radar images is one of the most important things that I learned in the course. Review of electromagnetic radiation, polarization concepts, radar images, visiting ESA SciHUB and work with ESA SNAP software were attractive for me.

Copernicus open access hub provides an API hub that we can search and download products based on many options. This was interesting for me because we can use programming languages for real-time storing and processing of products. Using python I checking API and it worked for me. (https://scihub.copernicus.eu/twiki/do/view/SciHubUserGuide/BatchScripting?redirectedfrom=SciHubUserGuide.8BatchScripting).

2.2 Work with ESA SNAP Toolbox: Flood plain mappin

In this lesson we use SAR satellite imagery for flood mapping. First radiometric correction based on VV polarization done. Speckle reduction have used to moderate speckle effects, so we use speckle filtering tool in snap software. We use fixed windows (7 * 7) for this. In order to separate water bodies from other phenomena, spectral histogram of processed product evaluated and then using Boolean operator we define an expression. The output band included areas that were smaller than defined threshold (< -15).

2.3 Mapping desertification using TIRS Data

In this lessson Normalized Difference Vegetation Index (NDVI), Land Surface Emissivity (LSE) and Land surface temperature (LST) calculated in ESA Snap software.
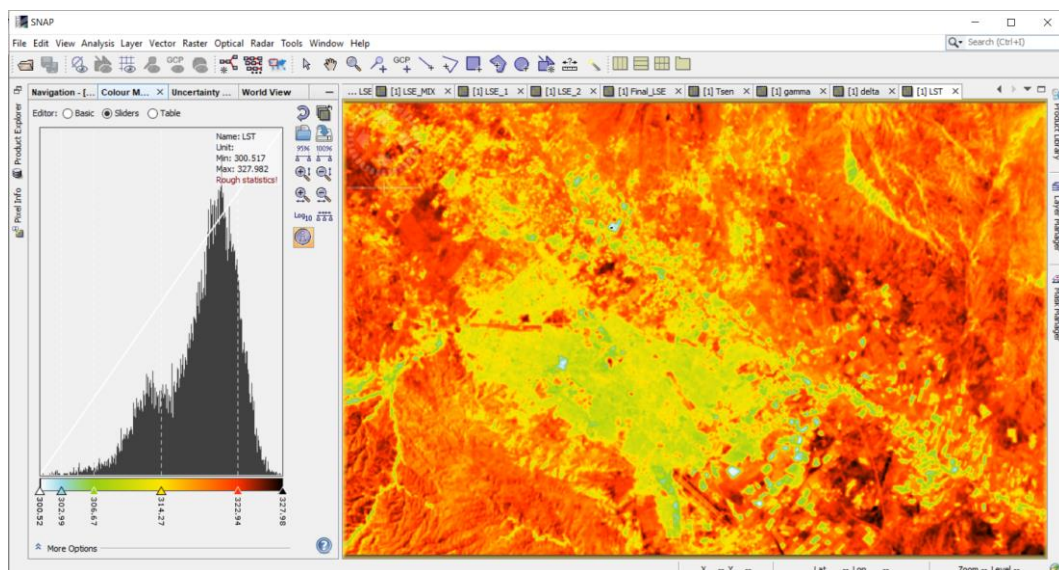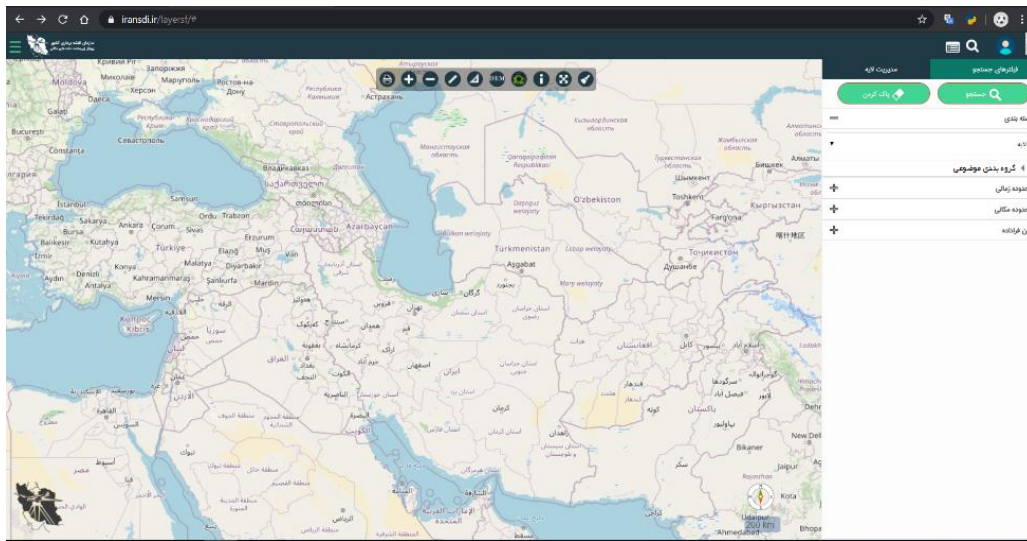

Land surface temperature (LST) calculated in ESA Snap software

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Spatial Data Infrastructures (Week 3)

3.1 Introduction to SDI

In this lesson, first the basic concepts of spatial data infrastructure were reviewed and then an existing SDI selected as case study and its components were reviewed.

Iran national SDI - Geoportal

Data for SDI (Week 4)

In this lesson, we reviewed and summarized some useful articles related to SDI data sources.

Web Services (Week 5)

The following geospatial web services standards were reviewed:

- Web Map Service (WMS)

The WMS is used in NSDI geoportal to display georeferenced map images over a network. These images are typically published by a map server from data delivered by a GIS server (i.e. Geoserver). A WMS service usually attends the map in image (bitmap) format, however, vector graphics can be published in SVG or WebCGM.

- Web Feature Service (WFS)

The WFS is used in NSDI to define interfaces for describing data manipulation operations of geographic features. These operations include the ability to create, delete, or update a feature instance as well as get or query features based on spatial and non-spatial constraints. Usually, data interaction between server and client is encoded with Geography Markup Language (GML), an XML-based encoding which can be used to model geographic features.

- Catalogue Service for the Web (CSW)

To discover, browse, and query metadata about data, services, and other potential resources published by different organization, the NSDI uses the CSW. S Reference System, Title, Format, Type, BBOX , and etc. are the most important fields published in the CSW. This service plays a key role in the NSDI.

- Web Coverage Service (WCS)

The WCS used to representing or publishing continues phenomena that relate a spatio-temporal domain to a (multidimensional) range of properties. For example, daily, monthly and annual temperature or precipitation provided to others by using this service.

- Web Processing Service (WPS)

The NSDI provides operations for data processing and geospatial analysis by using the WPS service. To discovery and execution of geospatial analysis, the service defines three operations including GetCapabilities, DescribeProcess, and Execute.

SDI business analysis and management (Week 6)

6.1 Business analysis

First, the concepts related to strategic planning were reviewed. Then the following tools were used to evaluate the spatial data infrastructure.

- The PESTEL method
- SWOT analysis

Internal	
Strengths	Weaknesses
1. Extensive experience in spatial data management 2. Existence of specialized and educated personnel in GIS field 3. Existence of some country side data repositories 4. Serious emphasis of managers for development of NSDI 5. Budget allocation for NSDI	1. Lack of proper knowledge of available data 2. Mismatch of users' needs with existing data 3. Lack of up-to-date and efficient access to spatial data in many organizations 4. Improper server performance and service downtime 5. Inadequate coordination for data sharing
External	
Opportunities	Threats
1. Development of open source tools and technologies 2. Emphasis of superior institutions on NSDI implementation 3. Government emphasis on the need for e-government 4. Increasing the number of organizations and companies that need spatial data	1. Advances in technology may change the market beyond our ability to adapt 2. Overlap of tasks with other organizations 3. Changing the needs of SDI users 4. Costs increase over time 5. Legal and security issues in data sharing

Resault of SWOT analysis for evalate Iran NSDI

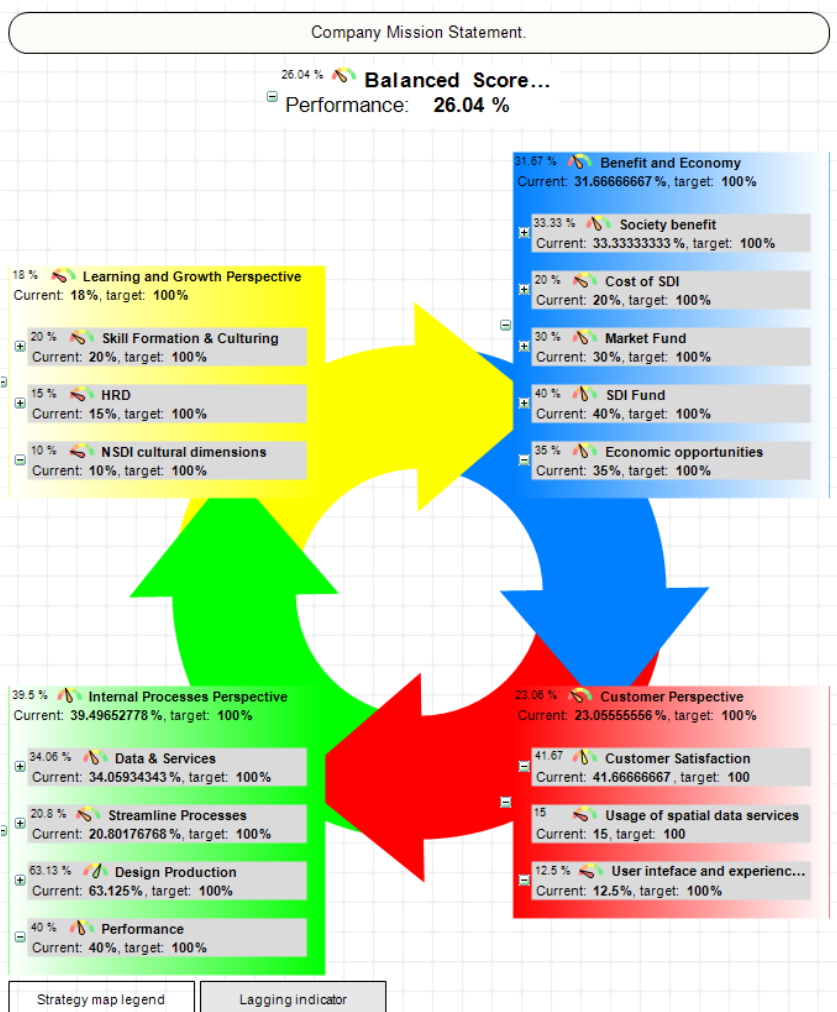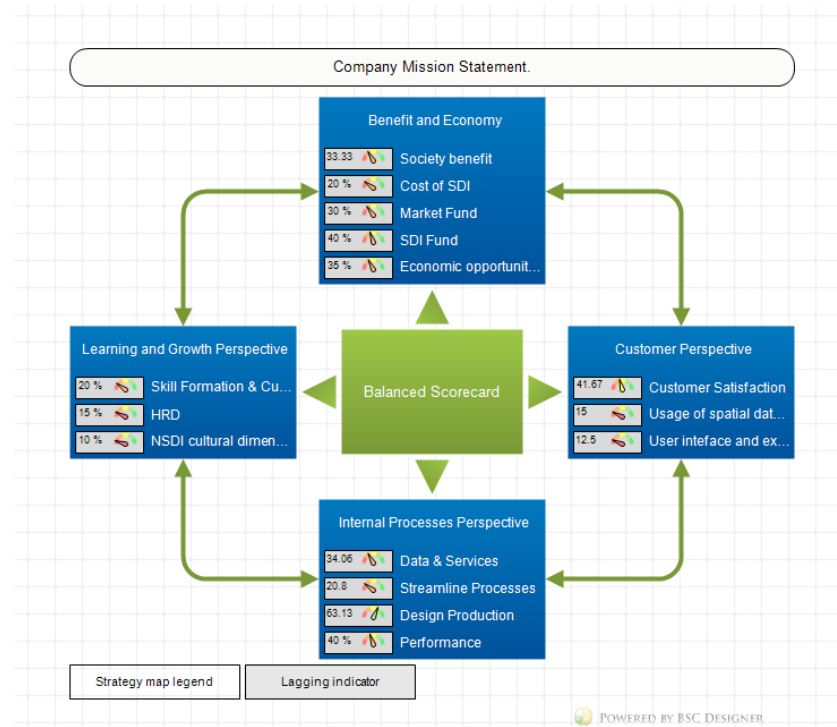### 6.2 SDI management

In this lesson, we evaluate the Iran NSDI based on Balanced Scorecard (BSC). BSC aims to present management with a concise summary of the measured values of a business, and to facilitate alignment of business operations with the overall strategy.

After define and entering the KPIs for evaluation perspectives strategic maps created as follows.

Project (Week 7)

In this section we study the process of developing a SDI include:

Preparation and Planning

- Defining objective
- Business analysis and strategic
- Resource availability
- Cost-related issues
- Timeframes
- Develop an action plan

Analysis

- Feasibility analysis
- Review of successful experiences
- Requirements specifications
- Preparation of conceptual model
- Software architecture
- Identify stakeholders (Actors)
- Workflows and standards
- Choice of technologies
- Prototype and mockups

Design and Development

- Desin proper schema for spatial dataset
- Developing backend geospatial services (WMS, WFC, WCS and ....)
- Developing user interfaces include Geoportal
- Developing required APIs

Integration and testing

- Quality Assesment of data
- Test and debugging services
- Evaluation of usability
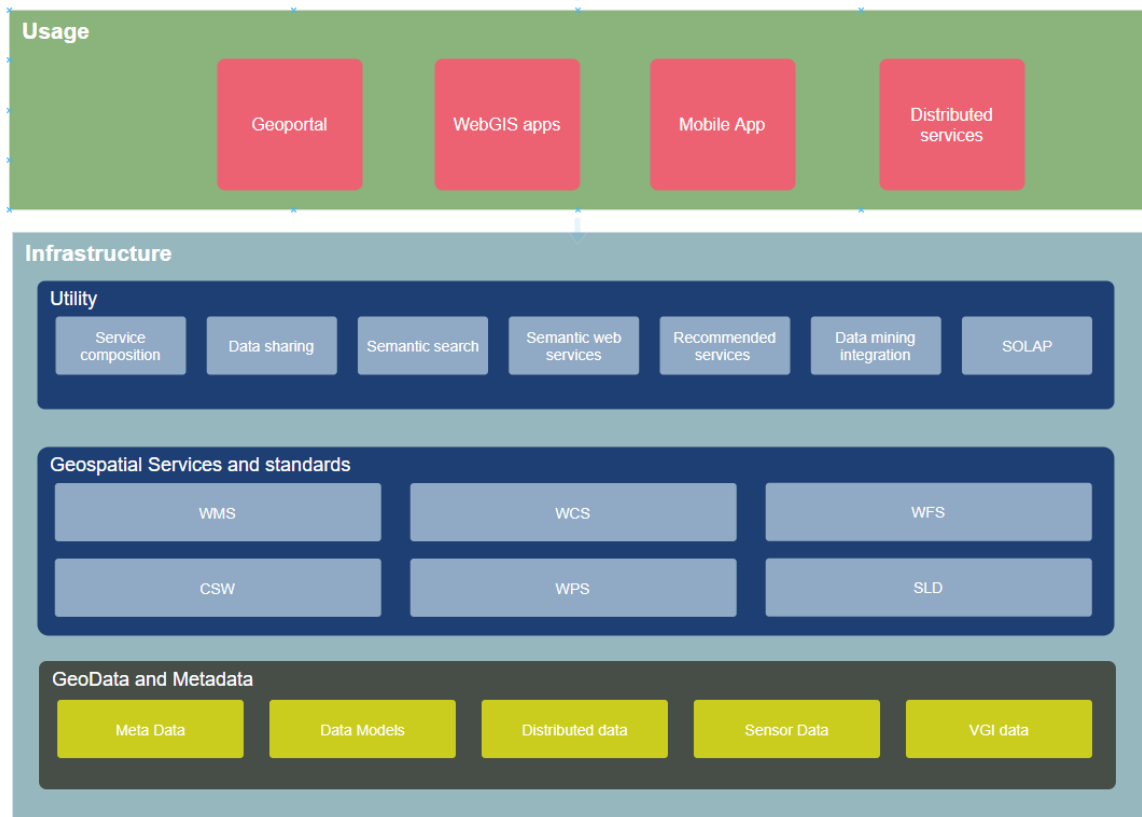- Evaluation of performance

Maintenance

- Maintenance
- Regular updates
- Upgrade services
- Meet additional user requirements

Also Actors necessary to create an SDI reviewd.

This diagram provides the actors needed to create an SDI.

The actors needed to create an SDI

<div align="center">

Course evaluation report by pilot students

</div>

Course: SDI-T for Collaborative Environmental Management

Aim: This course aims at providing an overview of the organizational and technical components of Spatial Data Infrastructures and Technologies (SDI-T). Students will explore the theoretical and practical concepts of SDI-T, which are important for environmental management. It includes an introduction to Geographical Information Systems and Remote Sensing to harmonize the terminology and concepts related to spatial data, its analysis and modelling, and spatial databases. Learners will be presented the concept of SDI-T, data issues, web services, and SDI business analysis and management.

Name and family name of the student: Samah Alsururi

Email: alsururi2016@gmail.com

1. Do you think that the aim, as described above, has been reached well in this course?

(1: Not at all, 5: Yes, completely)

☐ 1 ☐ 2 ☐ 3 ☑ 4 ☐ 5

Comments:

Yes, it was a good and useful introduction to SDIs. But it was not enough.

2. How was the workload of the course? (1: low, 3: fair, 5: high)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☑ 5

Comments:

Well, I need to spend several days even more to solve one exercise. Since, I had to read and search so much to understand the topics. Workload is hard.

3. How do you grade the course as a whole? (1: very weak, 3: fair, 5: very good)

☐ 1 ☐ 2 ☐ 3 ☑ 4 ☐ 5

Comments:

The course gives a good introduction to SDIs , however I think the course needs to be further developed and simplified . Some of the assignments were unclear and incomprehensible, some of the lectures need more clarification with some examples. In addition, some of the sits (URL) do not work

4. Mark the strongest weeks of the course

☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5

☐ 6   ☐ 7

5. Why these weeks are strongest?

Comments:

For the first week , there were a lot of basic assignments in which I used many programs (such as conversion , QGIS and postgreSQL programs). For the sixth week, I learned the basics of business administration and how to do an analysis strategy. Also I learned to use the BSC designer program

6. Mark the weakest weeks of the course:

☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5

☐ 6   ☐ 7

7. Why are these weeks the weakest?

Comments:

This week, the student needs more theoretical explanation in processing of the satellite images.

8. Which parts of the course do you recommend to omit?

- Spatial dataset SQL queries

9. Why do you recommend omitting these parts?

Because students take a long time to understand, and the allowed time is not enough.

10. What parts do you recommend to add to the course?

Comments: I think the course should be developed only

11. How was your background knowledge to this course? Was the course too easy or too complicated for your knowledge?

I had no knowledge of the course, except for some topics of the first and second week.

12. Grade the quality of contacts with lectures: (1: very weak, 3: fair, 5: very good)

☐ 1   ☐ 2   ☐ 3   ☐ 4   ☐ 5

Comments:

The teachers are very helpful.

13. How do you evaluate the course?

(Write a summary of the course, what you have learnt, the quality of lectures, the quality of exercises, etc. at least, 3 pages report is expected)

Week 1 : GIS & Geovisualisation:

I learnt an introduction to GIS, object-based model, raster and vector formats, data collection methods and sources, lectures and practical materials related to coordinating and reference systems, Global Navigation Satellite Systems (GNSS) and Spatial Analysis Operations.

My knowledge has been increased by these lectures.

Exercises:

- Data acquisition with a smartphone using GNSS technology and estimation of data accuracy: I used GPS logger ,it was easy to use

- Digitization (raster, vector) : This exercise was easy and interesting because I used to work this .

- Computing Procedure of Coordinate Reference System (CRS) and map projections: understand how coordinate reference systems and map projections.

- Spatial Database Exercise: I learnt some concepts about queries, although I have taken a long time to learn them.

- Spatial Analysis operation Exercise: I learned different spatial analysis operations that are available in GIS.

Week 2: Remote sensing.

The lecture introduction to remote sensing is very interesting. But, there is not any vidoes, I had to read more data. Maybe it was good. But, it takes too much time to understand the theory.

Exercise :

- I learned what are Copernicus Open Access Hub, Sentinel-2, and SNAP. Downloading data, analyzing them is good, but required a very good internet connection.

- Two exercises are also good. I used flood mapping by SNAP and understood water collection, I worked with sentinel1 data

- Rapid map exercise gave me information about land surface temperature and vegetation cover. I worked with Landsat data.

Week 3 : Spatial Data Infrastructures

After completing this course, I have learned what components make up an SDI and SDI hierarchy. Also knowing the various issues that concern the infrastructure and how to share in making data through volunteers. It was interesting to learn about the various executions of SDIs in different countries and the two different models used to fund the national SDIs like (Iran and Yemen). The concepts introduced allowed me to gain awareness of the collaborative power and usefulness of SDI implementation. Standardization allows for a collaborative process as the data becomes comparable and consistent.

Exercise:

- Introduction to SDI assignment: Interesting to explore my national SDI but the assignment could be a bit more engaging.

- Public Data assignment: I learnt how the OSM data has been collected and uploaded by users as already mentioned in the literature review. How to downloaded OSM form different sites , and imported to GIS programs.

Week 4: Data for SDI

I enjoyed exploring some geoportals of other countries. I found it helpful because I could gain a basic understanding of how they are constructed, the type of data that they display, the type of policies used to guide them , and Knowing some sites that allow taking data free. Data feeding for SDI for environmental management and Centralizing real time data.

Exercise:

I learnt how to access distinct data from several SDIs. Access to Satellite image and DEM metadata. Through the article Global spatio-temporally harmonized datasets for producing high-resolution gridded population distribution datasets, I learnt how to coordinate and produce population data. Through the article, Metadata-based data quality assessment , I knew how to develop data quality (DQ) assessment model based on content analysis and metadata analysis.

Week 5: Web services

Knowledge of types web services and standards, Symbology Style Layer Description, spatial data clearinghouse (structure and generation), how to improve cartography a in geoportal , (SOA) that that provides its functions as a package of cooperative services that can be used by different systems from multiple service fields ,and web service composition.

Exercise:

I learnt How to use portal and access procedures by knowing one of the web service in the Middle East, Knowing the type of web service, and give some suggestions to improve this service.

Week 6: SDI Business Analysis

I learnt Strategic analysis to evaluate the implementation of an SDI, some tools for strategic analysis , the business model environment, project procurement management, economical evaluation, and traditional and agile project management .

These topics were new to me, but they are very useful to know the foundations of business management.

Exercise:

In this exercise , an organization analysis strategy using the SWOT and PESTEL analysis tools. It was a difficult exercise and I took a long time to complete it.

I learnt how to deal with the evaluation of an SDI according to a number of objectives and goals , and evaluate the SDI in any country based on a number of targets. In this exercise I enjoyed working on a BCS designer program.

Week 7 : project

As for the project of this course, although it included most of the topics of the course, I felt that there were some issues that the program of the course did not explain them , which forced me to search more and more.