Centre for Geo-Information

Project Report GIRS-2004-01

Learning Apart Together
a case study course of the Euroleague initiave

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Acknowledgments

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Abstract

This report gives an overview of the Euroleague project " Learning Apart Together ".

Besides the revised project proposal, the results of the student project, the first learning apart together case, and some remarks and lessons learned about the use of Video Conferencing and Webcams are offered by this report.

The student project focuses on a development of a landscape classification based on geometrical parameters like size, length and shape of landscape objects and open spaces. The results have been compared for the Dutch Topographical 1: 10000 datasets (TOP10 VEC) and the German topographical datasets 1:25000 (ATKIS).

However the results of the students project are really of interest in this abstract some concluding remarks about the use of webcams and Video Conferencing tools concerning the didactic interest.

The students came up with the following evaluation. They did meet difficulties to start up the project due to technical problems. For this reason the students did not reach a sufficient level of contact during the first one and half weeks. During this period, contacts were mainly made through emails, and then followed by a phone call.

The first online discussion was made through audio and webcam in the second week. Since then, the cooperation has become more efficient. There had been 3 to 5 regular contacts each week. Other than emails, other communication techniques were also applied, i.e. quickplace (project site for publishing discussions, results, plans etc.), net meeting (white board, share of software programs), MSN (webcam, voice chat). Exchange of ideas became much easier through these different contact means.

The best cooperation was realized during the discussion of the definition of *space-forming objects*. Due to different levels of GIS knowledge and software condition, there were some difficulties in applying the methodology, but both teams cooperated well in reaching a common agreement. During the data processing session, there were not only cooperation between the teams, but also between the supervisors and students. In time of need, the technical staff did good cooperation in solving the technical problems.

The students summarize that the overall cooperation was at a good level.

Keywords: video conferencing, on-line collaboration, web based communication, application sharing, didactics, landscape analysis, GIS.

Table of Contents

This report offers the collection of different papers and reports that have been written to realize the Euroleague **Learning Apart Together** project.

1 Project Proposal

PROJECT INFORMATION		Euro league 2003
Project title	**Learning Apart Together - LAT** *Version: 3.1*	
Sub Project of	*Euro League Seminar*	
Project coordinator	Ron van Lammeren	
Participants	**Hohenheim, WUR**	
Problem holder	BOKU, KVL, WUR, Hohenheim, Uppsala, Aberdeen	
Goal	Joint Euro League Seminar Program based on small and large scale communication technologies	

DESCRIPTION

Context: Six European universities cooperate in developing new ways of communicating between students and lecturers. These new ways have to support distance based educational initiatives between these partners. Such kind of initiatives could be dedicated to theoretical, methodological and practical items based on (joint) courses.

Objective: Run an intra-universities' students project by which geo-information science knowledge and skills have to be applied in a small project setting. Communication between the students of the different institutes will be based on the project site which will be supported by webcam based netmeeting and video-conferencing.

Boundaries: a limited number of students (2 of each institute) will participate in a specific project case. The GIS applications will be based on local GIS-software. Netmeeting will be the tool to discuss and present the preliminary results on line. Video Conferencing will be used to a more general and plenary sessions.

Planning: October - November 2003

Knowledge + Tools: Students will have a basic understanding of GIS and GIS-tools like Arcview plus extensions

Didactical interest: To understand the way that students interact and communicate with these ICT-tools

RESULTS

Product: Educational project description; Methodological project description; Student results; Evaluation of the use of ICT tools; Evaluation of the benefit of these tools; Technical definition of the systems set up.

Dissemination: the results will be presented to the CEO's of the participating institutes; the results of the project have to be communicated inside each of the organisations; a (scientific) paper will present the results.

SCHEDULE

1. Selection of participating institutes. With at least 2 partner institutes, agreements are made about the organisation and execution of the course work.
   Time investment staff: educational definition/ technical definition/ evaluation definition: 48 working hours (6 days).
2. Students work individually or in pairs on the education material.
3. Students communicate with external professors through Webcam /quickplace.
   Time investment staff: discussing content/ advise – technical issues: 36 working hours (6 hours per week).
4. Project results will be presented through a Video Conference session to the other participants and evaluated. Time investment staff: plenary session/ evaluation and reporting: 48 working hours (6 days).

Start   October 2003, based on 6 weeks project activities

Finish   November 2003

Total Budget   EURO 10,000 (requested) and pro memori staff time

LAT: GEO-DATA based LANDSCAPE DESCRIPTION (4 stp)

Support:
Contacts: Ir. Menno Ribbens
Supervisors: dr.ir. Ron van Lammeren, dr. Klaus Schmieder, a.o.

Project setup:
At least 2 student teams (each 2 studnets) do work at several places but as one projectteam. Their communication and exchange of materials are based on quickplace and the use of netmeeting including webcam

Project objective:
Geo-data offers good facilities to describe by a number of attributes the spatial structure of landscapes in more detail. For example by the geometrics of the geo-data the size and shape of objects can be given. Knowing these shapes and sizes the contramal (the space) can be defined too.
However a landscape exists of a spatial configuration of objects (houses, forests, plantation) that forms spaces and these spaces are the places that people and animals move thru. Given topographic data a classification can be made (according to Kevin Lynch) to find out the landmarks, etc. (the mental landscape map). Another classification can be made to describe or typify the landscape (the landscape structure eg. described by Wim Wassink). These landscape structure is based on the elevation model, the network superposed on the elevation model and the type of objects (their topological relations) and spaces (and their topological relations).

Project objective:
- Development of a methodology to classify landscapes by the relations of objects and spaces
- Application of the methodology for landscapes of interest
- Comparison of the classified landscapes
- Evaluation of the methodology and results of comparison

Project stages
1 project description (objectives, project plan, sources, etc.)
2 development of methodology
3 data preparation
4 data processing
5 comparison of results
6 presentation of project (by Video Conferencing)
7 report
8 evaluation of co-operation

Learning objectives

- To co-operate in an educational project via a digital project-environment including Video Conferencing tools (webcam and VC)
- To structure, analyse and present interpreted and generated data in such a way that it can serve landscape planning and landscape architecture purposes
- To communicate by synchronous (chat, vc) and a synchronous (email, projectsite) with co-students, experts and supervisors
- To understand and exchange data-processing tools to support landscape classification
- To present and discuss the results by Video Conferencing

Student activities

- structured analysis of the landscape analysis approaches by geo-information tools
- working with computers using tools like ArcInfo/ Arview
- exchange information and results with project members by a project site (including asynchronous and synchronous communication)
- reporting by the projectsites, powerpoint, html and pdf
- communicate and discuss of results
- evaluate the value of these learning supporting tools

Sources (october 2003):
http://www.undpquakerehab.org/gis.htm
http://www.csiss.org/classics/content/62
http://www.angelfire.com/ar/corei/hbe1/lynch1.htm
http://www.waikato.ac.nz/wfass/subjects/geography/staff/lars/landscape/nz.html
http://rcswww.urz.tu-dresden.de/~obastian/lsurb00/lsurb20.htm
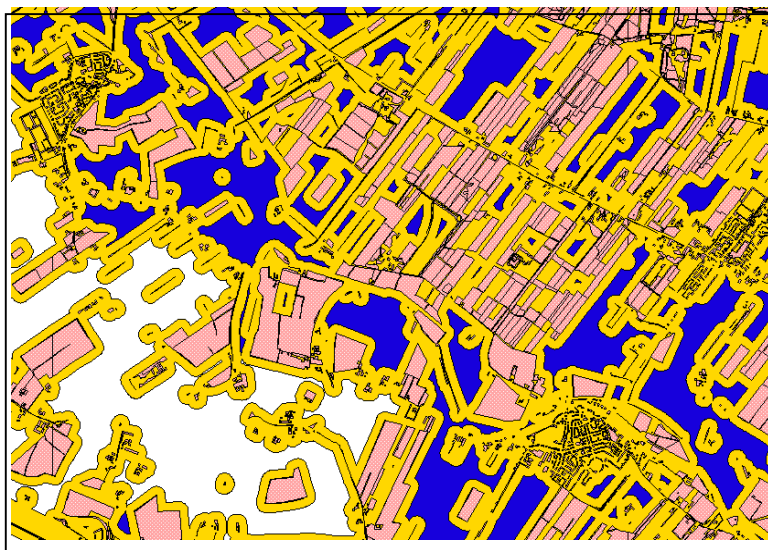
Time Schedule:
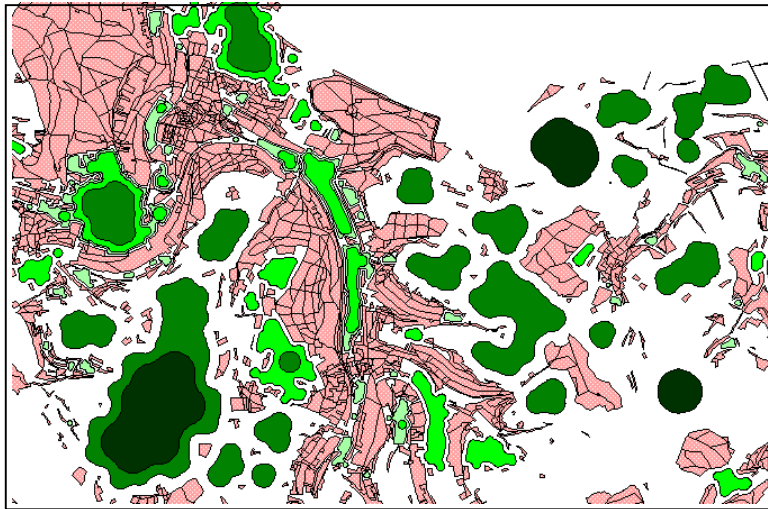Start: 3rd of november
VC-presentation: 11th of December: viewed by other partners
Finish: 12th of december

The detailed planning has to be made by the students group.

2. Students Report

Geo-data based
Landscape Classification

*An **Euroleague LAT** project*

Euroleague LAT project
(Learning Apart Together)

Geo-data based landscape classification

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Thomas de Jong
Danny de Roo
Jingshu Wang

Supervisors: Klaus Schmieder
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Stuttgart/Wageningen November/December 2003

1 Introduction

1.1 Project description

Geo-data offers good facilities to describe the spatial structure of landscapes in more details by using a number of attributes. For example, by the geometrics of the geo-data the size and shape of objects can be given. Knowing these shapes and sizes the contramal (the space) can be defined, too.

However, a landscape consists of a spatial configuration of objects (e.g., houses, forests, plantation, etc.) that forms spaces and these spaces are the places that people and animals move through. Given topographic data, a classification can be made (according to Kevin Lynch) to find out the landmarks, etc. (the mental landscape map). Another classification can be made to describe or typify the landscape (the landscape structure, e.g., described by Wim Wassink). This landscape structure is based on the elevation model, the network superimposed on the elevation model and the type of objects (their topological relations) and spaces (and their topological relations).

1.2 Project objectives

The objectives were:

- Development of a methodology to classify landscapes by the relations of objects and spaces
- Application of the methodology for landscapes of interest
- Comparison of the classified landscapes between the two countries i.e. Germany and the Netherlands
- Comparison of results and evaluation of the methodology

1.3 Project Plan

These project objectives are realized during 8 project stages:

1.3.1 Week 1-Project description

Crisp formulation of the research objectives and project planning with the whole team. Goals and task setting. Preparation and online discussion.

1.3.2 Weeks 1 and 2-Development of methodology

Literature study on existing landscape classification methodologies and choosing of methodologies the project team used. Definition of related terms and clearly defining of the borders of the used theory. Making sure everybody talks about the terms and theory in the same way through online publication (quickplace) and discussion.

Choice of landscapes of interest in both countries comprised of a rural area, so in total the developed landscape classification methodology was applied to two different landscapes. This would make comparison and evaluation of the used methodology possible and would contribute to future landscape classification. Where necessary, agreements on data characteristics, software, hardware etc. were made to make comparison possible during further stages of the project.
Developed a concept on how landscape classification is applied through GIS on the chosen landscapes.

1.3.3 Week 3-Data preparation

Acquired needed datasets of the chosen areas and prepared these datasets according to the agreements that were set in the methodology development stage. German members took care of the areas in their country and the Dutch members of the Dutch areas. This continued in the next stage - data processing.

1.3.4 Weeks 3 and 4-Data processing

Applying the developed landscape classification concept to the chosen areas. During this stage it was important that contact was regularly made, so occurring problems could be solved and discussed together. This made central feedback possible which was needed to come to comparable results.

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1.3.5 Week 5-Comparison of results

Comparison was made on criteria, which were defined in the methodology. Also a description of the found differences are given. This comparison stage consists of providing both local teams with the data processing results, to prepare for online discussion sessions. When necessary, adjustments were made based on the feedback received during the online discussion sessions.

1.3.6 Week 6-Presentation, Report and Evaluation of co-operation of the Project

On the 11th of December the results of the project will be presented and evaluated by a Video Conferencing session together with other Euro League members.

Evaluation of the process and communication during the project. Focus will be on the co-operation between the local teams. This evaluation will be performed by everyone involved and interested in the project.

1.3.7 Report of the project

Based on the findings during the project a report will be written as a whole project team assignment.

1.3.8 Evaluation of co-operation

Evaluation of the process and communication during the project would be made. Focus will be on the co-operation between the local teams. This evaluation will be performed by everyone involved and interested in the project.

2 Methodology

2.1 development of methodology

2.1.1 wassink

The methodology is based on the landscapemorfological model of Wassink (Wassink, W. Th., 1999). In this model the landscape is constructed out of three layers: terrain (basal area, *terreinvormen*), raster (networks, *netwerken*) and volumes (objects, *volumes*). These three layers define the shape of the landscape (spatial structure of the landscape, *de vorm van het landschap*). (Fig. 2.1: The dutch words, which are in italic, correspond to the text in the figure).
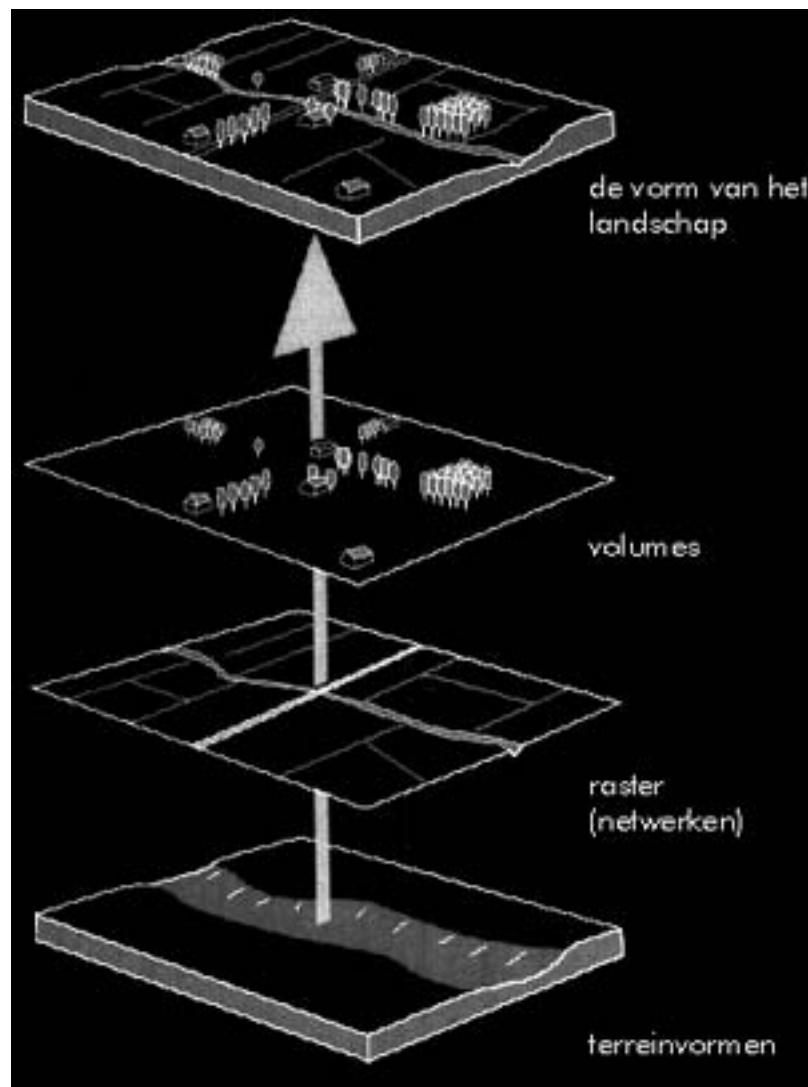

Fig. 2.1 Landscapemorfological model of Wassink

To classify the landscapes by the relations of objects and spaces the third layer, the volumes, is most important. In this layer all objects with a third dimension are included. For the relation

of objects and spaces only the three dimensional objects that form spaces are interesting. These objects are described by thematics (what it is) and geometrics (surface, contour, etc.). Considering the geometrics, the size and shape of the objects can be given. Knowing these shapes and sizes the contramal (the space) can be defined too. This contramal is the opposite of the space-forming objects.

2.1.2 Space-forming objects

Not all objects contribute to the spaces that are formed. Space forming objects are elements which form spaces in the landscape due to their presence, characteristics and spatial configuration. To be able to define which objects are space forming and which are not, strict definition of these aspects is necessary.

Definition:

Space forming objects are objects which are at least 1.5 meter in height and exist 1 year or longer successively in space. Space forming objects have geometric characteristics.

The definition makes it possible to distinguish the following classes:

(Definitely) Space forming objects

Questionable space forming objects

Non-space forming objects

Based on these different classes, variable mass maps can be produced. One including only the (definitely) space forming objects and one including also the objects which are questionable space forming. This will make further analyses possible in different variants. This is necessary, because in some cases the (geo-) data does not offer enough information to determine whether an element is space forming or non-space forming according to the definition. Actually, fieldwork is required to make the determination. This will not be done in this project, so working with variants is the solution to handle this uncertainty.

To make spaces visible in a GIS, some adjustments have to be made to the space-forming objects. First, the objects have to be buffered, so that objects that are close to each other become one object.
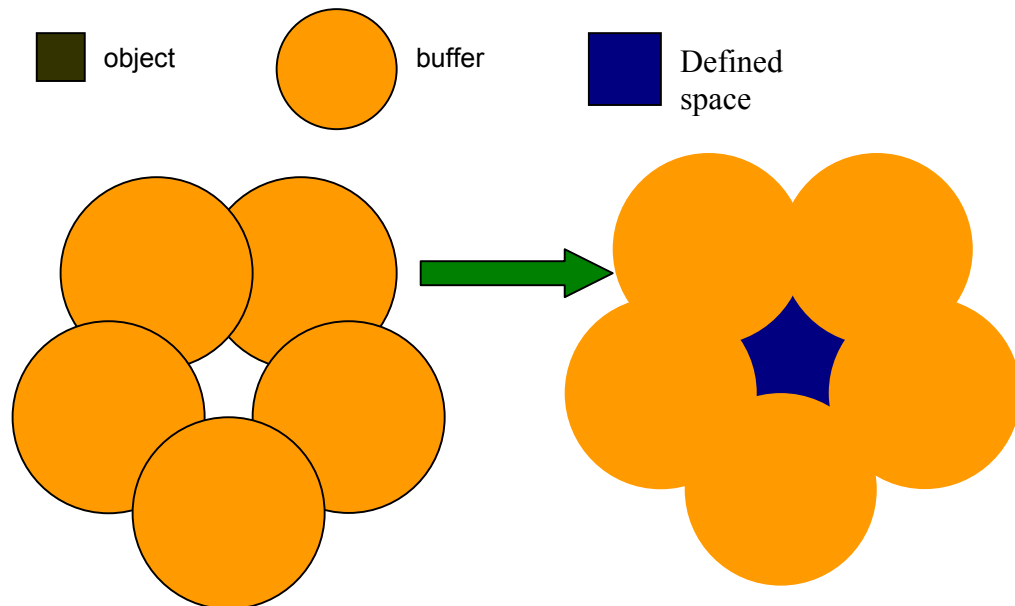

Fig. 2.2 buffering objects and creating space objects

In this way, when the buffers enclose a space, the space that is formed becomes an object itself [1] (fig. 2.2). This is necessary, because the spaces are the points of interest. Using this approach, several classes can be made of the spaces by using different buffer distances. The result is that the spaces will be classified by size. For instance: when a space is present with a 25 meter buffer, but not with a 50 meter buffer, the buffer overlap is totally, the conclusion that can be made is that this space will fall into the 25 meter class. Using this method spaces are defined by there shortest side. If there is a rectangular space with a length of 150 meter and a width of 60 meter, the space will be defined in the 25 meter buffer distance category, because then there will be a space left between the buffers (60 – (25 on both sides) = 10 meter wide), and with a higher space class (larger buffer), this space will be gone due to total buffer overlap (fig. 2.3).
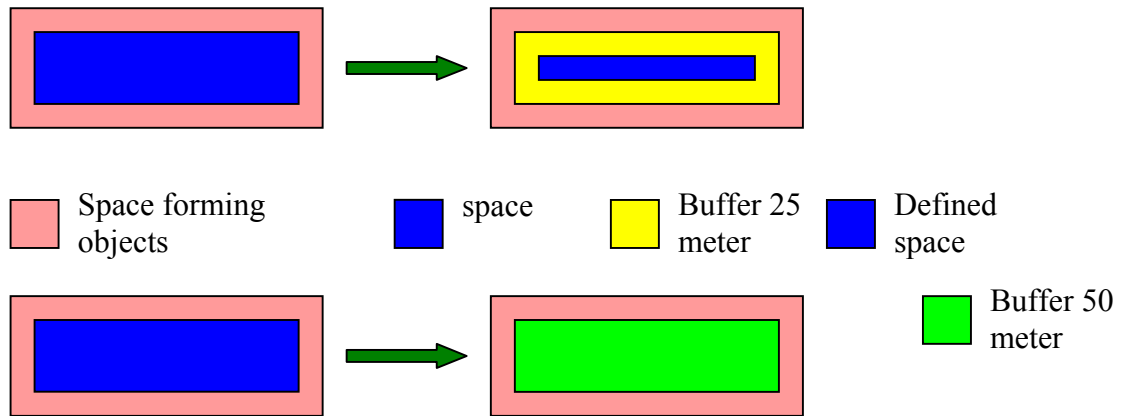
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[1] When using Arc Info

Fig. 2.3 defining space classes

In other occasions it is possible that with a lower buffer distance, for instance 50 meter, the space forming objects are too far apart for the buffers to enclose a space. This space then will only be defined with a larger buffer distance, like 100 meter, and therefore will be assigned to the 100 meter class. With this classification method, 4 space classes can distinguished by size, depending on the input data (amount of objects, level of detail of the data, etc.), varying from a low space class (i.e. 25 meter buffer) to a high space class (i.e. 100 meter)

The space-objects that are found this way, are smaller then the actual spaces, because of the buffer. To compensate for the buffer, the space-objects are buffered also, with 50 % of the original buffer distance [2].

Spaces can also be distinguished by shape, and therefore a sub classification will be made of the spaces by shape. To sub classify spaces by shape a space-index is used to quantify the shape. The Sf-index is considered as the most appropriate space-index in this case. This index uses the following formula (1) to determine the value of a shape for a specific space:

(1) $S_f = P_c/P$

In this formula Pc is the perimeter of a circle with the same area as the space of which the shape needs to be quantified and P is the perimeter of the space itself. As only the area and the perimeter of the space itself are available in the generated data, Pc needs to be calculated for determination of the space-index. Therefore the formulas of the perimeter of a circle (2) and the area of a circle (3) can be used:

(2) $P_c = 2.\pi.r$

(3) $A_c = \pi.r^2$

Because the area is supposed the be exactly the same, the radius r can be calculated with formula (3). When the radius is known P_c can be calculated. When P_c is known S_f can be calculated. This can be summarized by the following formula (4), which is derived out of the first three formulas:

(4) $S_f = (2.\pi.\sqrt{(A/\pi)}) / P$

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[2] see par. 2 buffering back 1

Calculation of S_f results in a space-index between 0 and 1 for each object. Based on this space-index three classes can be defined:

Subclass 1:   0 < Sf < 1/3

Subclass 2:   1/3 < Sf < 2/3

Subclass 3:   2/3 < Sf < 1

With subclass 1 containing the most irregular shapes and subclass 3 the most regular shapes.

Besides this, the analysis of the volumes-layer can be compared with the other two layers of the landscapemorfological model of Wassink, network and terrain. In this way, relations between the dispersal, direction and dimensions of objects and spaces on the one hand and networks and the terrain on the other hand, become visible if they exist.

2.2 data preparation

The main objective of the data preparation stage is to create the necessary input data for the data processing stage. This means that for every area two different input files need to be created. One including all objects which are definitely space forming (DSO) and one including all objects which are definitely and questionable space forming (QSO). Production of those files is done by extracting the wanted objects out of the original dataset. This means that the objects, which are considered as non-space forming by the definition, are excluded.

2.3 data processing

During the data processing fase the construction of the model takes place, using Arc Info in combination with Arisflow (fig. 2.4). For visualization Arc View is used.

 The first step in the process is the conversion of the provided data to workable data. The data that was provided was in Arc View format (shape) and we had to convert it to Arc Info (coverage's). A couple problems arose during this process, like precision settings that also had to be converted and some default values which where corrupt. After making sure that all defaults where set right, the real processing could take place. A couple of times we had to use a so called "clip" which means that a smaller piece of the total area is used for testing. This was necessary, because some actions would have taken to much time, when done on the entire area.

The second part is the buffering actions. Depending on the area and the dataset used, four buffer distance categories can be assigned. For the Dutch dataset, these are 25, 50, 75 and 100 meter. For the German area, due to a lower level of detail of the dataset, the buffer distances are 50, 100, 250, 500 meter. When the buffers are created and space-objects are defined, these space-objects where buffered to resemble the spaces as close as possible. The buffer distance for this action was 50 % of the original buffer distance [3].

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[3] see par. 7.4 buffering back 1

The last part of the model is on the sub classification of the space classes using the shapes of the space-objects and a calculated space index.
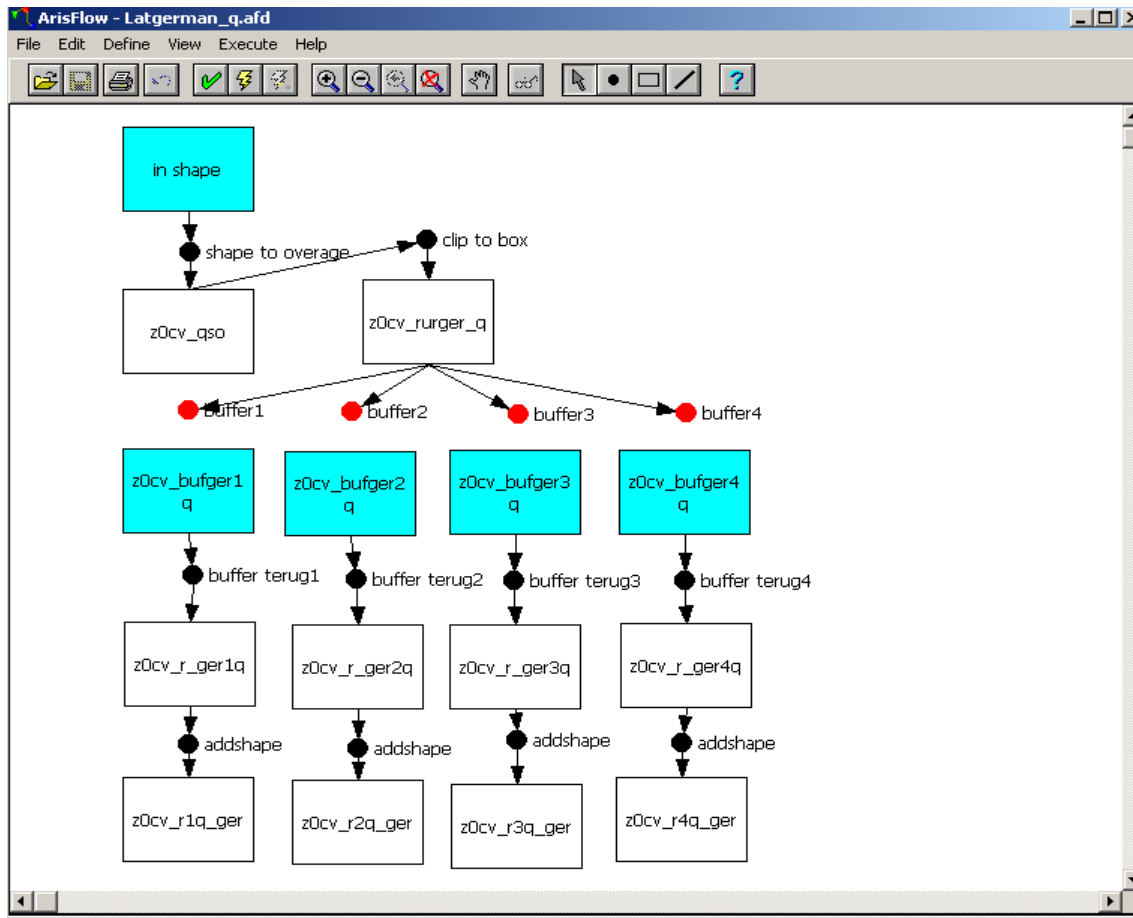

Fig. 2.4 Arisflow model

3 results

(Fig. 3.1)   classification in four different space classes based on size (width) for the Dutch area using only the objects which are definitely space forming considering the definition. Darker shades of green represent spaces in a higher space class.
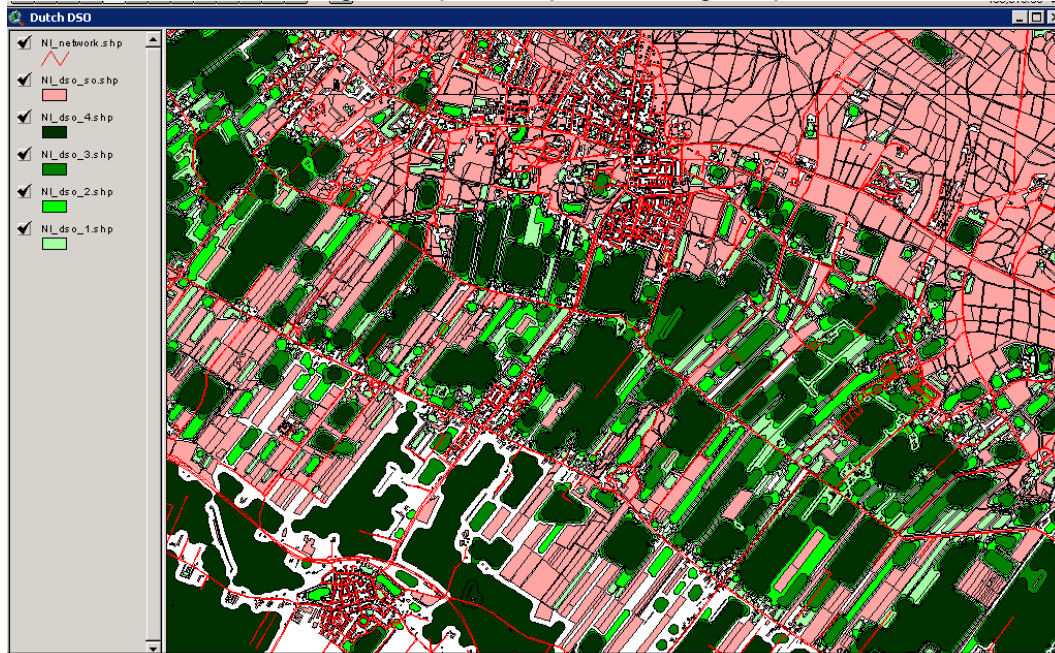

Fig. 3.1

(Fig. 3.2)   Classification in four different space classes based on size (width) for the Dutch area using the objects which are definitely and questionable space forming considering the definition.

Fig. 3.2

(Fig. 3.3) Classification in four different space classes, based on size (width) for the German area using only the objects which are definitely space forming considering the definition.
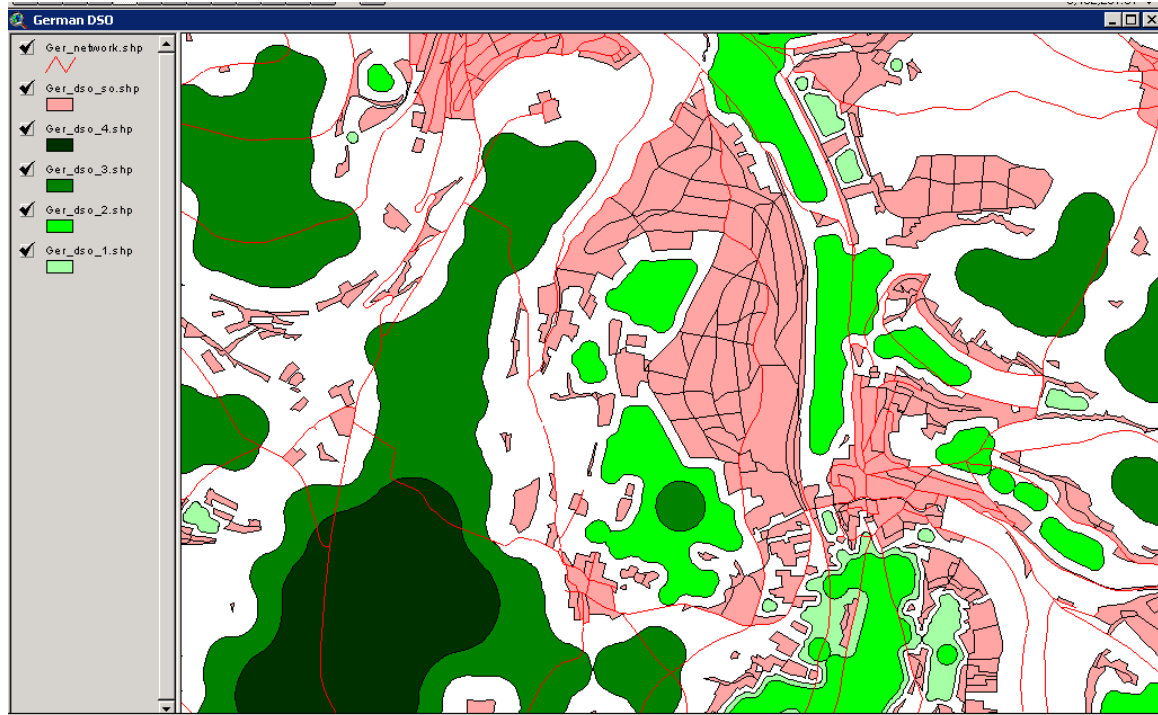

Fig. 3.3

(Fig. 3.4) Classification in four different space classes, based on size (width) for the German area using the objects which are definitely and questionable space forming considering the definition.

fig. 3.4

(Fig. 3.5)   Sub classification of space class 2 in three different subclasses based on shape with the use of a shape-index for the Dutch area using only the objects which are definitely space forming considering the definition.
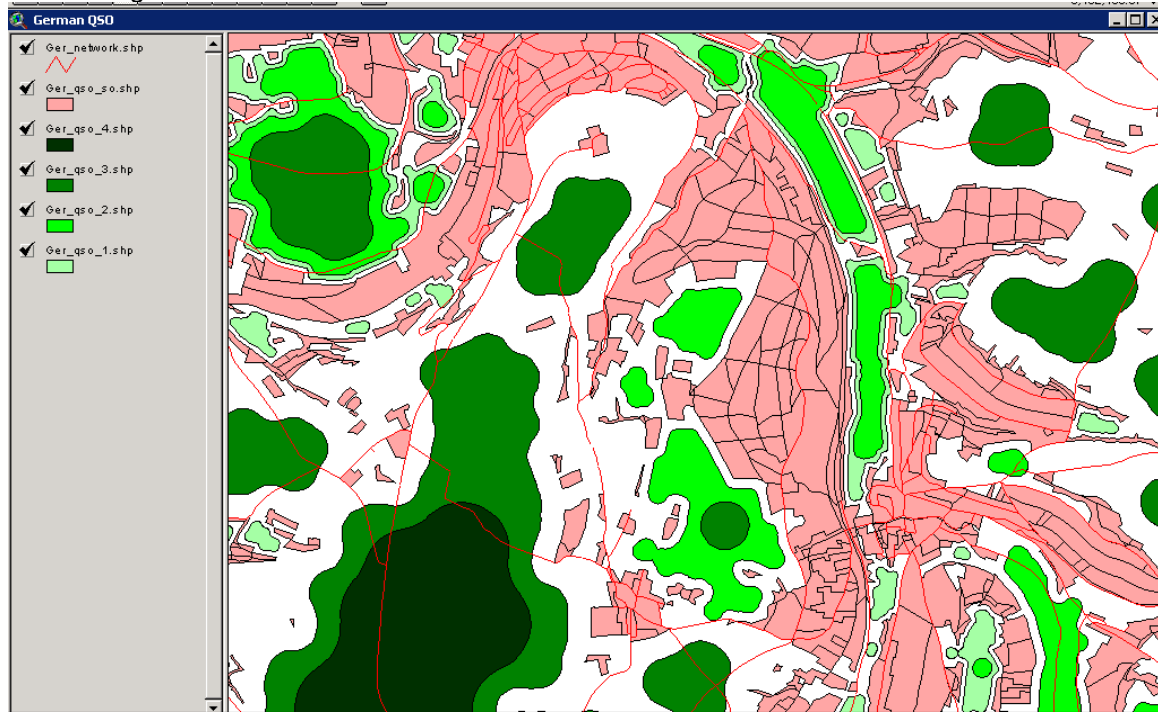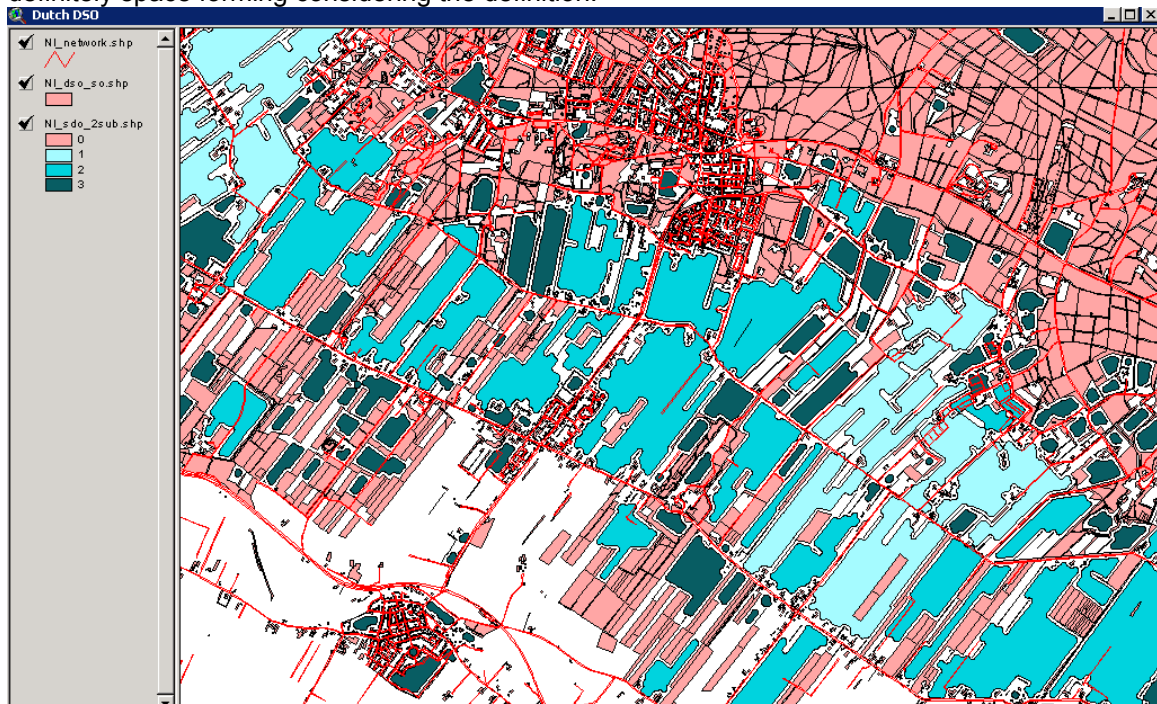

Fig. 3.5

(Fig. 3.6)   Sub classification of space class 2 in three different subclasses based on shape with the use of a shape-index for the German area using the objects which are definitely and questionable space forming considering the definition.
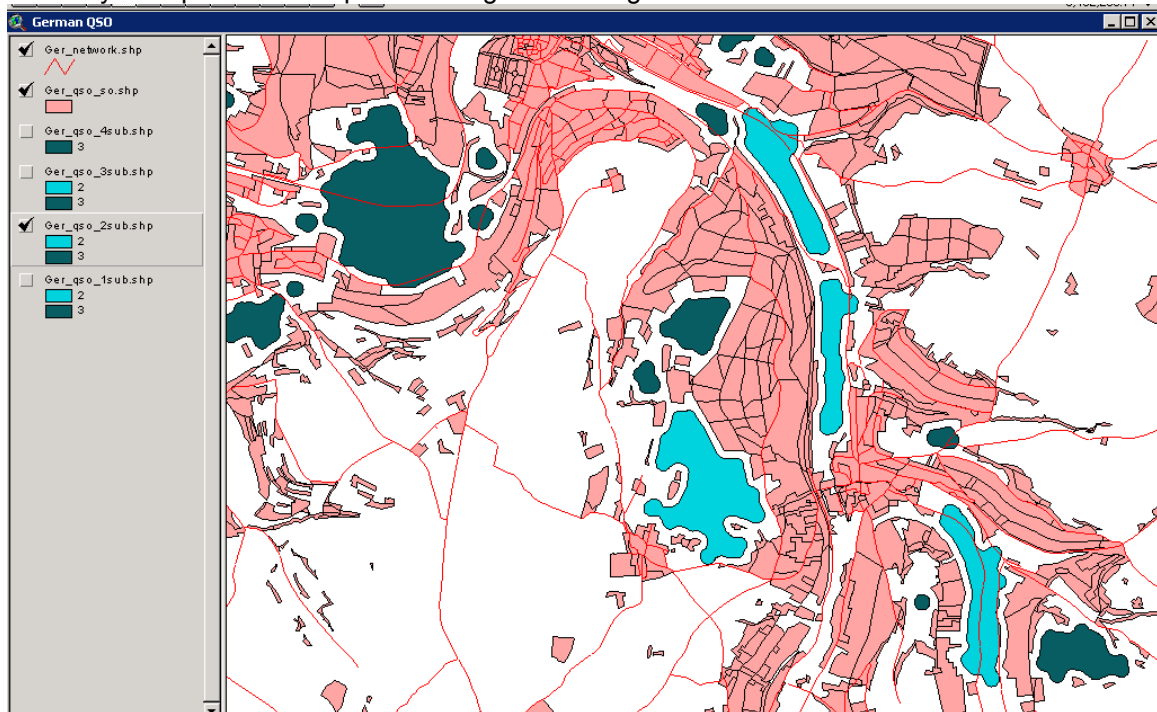

Fig. 3.6

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All results are online available in a digital format:
http://quickplace.wau.nl/regionalseminar
> Entry: the LAT project:
> Results
>Results: Geo-data

To view the data please follow the instructions. For explanation see appendix 1

4 Comparison of the results

German results	Dutch results
Less details in dataset, resulting in less space-forming objects	More details in dataset, resulting in more space- forming objects
Questionable space-forming objects	
The network is radiated	The network is rectangular or blocked
Spaces are circular, bigger and sparsely distributed without a distinct direction	Spaces are rectangular, smaller and denser in the middle, with South West – North East orientation
The network layer and space layer are random	The network layer and space layer are related and similar
Distances of buffer are bigger i.e. 50m, 100m, 250m, 500m, due to less space forming objects	Distances of buffer are smaller i.e. 25m, 50m, 75m, and 100m, due to more space forming objects.
Definitely space-forming objects	
Distances of buffer are bigger i.e. 50m, 100m, 250m, 500m	Distances of buffer are smaller i.e. 25m, 50m, 75m, 100m
Reduced number of spaces	
Have similar properties as in Questionable space-forming objects	
Sub-classification	
2 sub-classifications i.e. 2 and 3	4 sub-classifications i.e. from 0 to 3

5 Evaluation of Cooperation

There were some difficulties at the early stage of the project due to technical problems. The student groups did not reach good level of contact during the first one and half weeks. During this period, contacts were mainly made through emails, and then followed by a telephone call. The first online discussion was made through audio and webcam in the second week. Since then, the cooperation has become more efficient. There had been 3 to 5 regular contacts each week. Other than emails, other communication techniques were also applied, i.e. quickplace (project site for publishing discussions, results, plans etc.), net meeting (white board, share of software programs), MSN (webcam, voice chat). Exchange of ideas became much easier through these different contact means.

The best cooperation was realized during the discussion of the definition of space-forming objects. Due to different levels of GIS knowledge and software condition, there were some difficulties in applying the methodology, but both teams cooperated well in reaching a common agreement. During the data processing session, there were not only cooperation between the teams, but also between the supervisors and students. In time of need, the technical staff did good cooperation in solving the technical problems.

In the last 2 weeks, there was a change in schedule because the German team had to attend lectures in the afternoons. The Dutch team cooperated very well to this change by forgoing some of their morning lectures.

Thus we could summarize that our overall cooperation was at a good level.

6 Conclusion

The main objective of this project was to develop and apply a methodology for classifying landscapes by the relationship between spaces and objects. The developed methodology is successfully applied on the chosen areas in Germany and the Netherlands. As written before in the comparison of results the outcome is different, the main source of these differences is the kind of data sets used. They are different, as you can expect from two countries. The developed methodology is not a classifying methodology for landscapes. It is a methodology for identifying (sub) classes in spaces. To distinguish different kind of landscapes is a step too far for this project.

Time is a limiting factor and even more important, it is not possible with the available tools and technologies to classify. The spaces that are formed are classified only on their size (width) and shape. To make it a landscape classification, also the direction of the spaces needs to be measured. In this way the relationship of the spaces within the landscape can form some sort of classes that then can be named as a certain landscape type. The comparison with the other Wassink layers is not completed due to a lack of time. For landscape classification using the landscape Morphological model of Wassink, the relation of the volume layer with the networks and the terrain requires elaboration.

Concerning the cooperation, it could be said that a lot has been learned. The communication via a digital project-environment by synchronous (chat, vc) and a-synchronous (email, project site) went quite well, but there's still a lot that can be improved. Better preparation and pre-testing of all technology will make a quick start possible, so that the first part of the project is not spent on making contact and solving technological problems. An early introduction (also visual) of every involved person will benefit the cooperation as a result of a better team spirit.

Another aspect that will improve cooperation is agenda synchronisation. Every local team should have the same time available at the same moments. Also important is that, the level and intensity of assistance is equal, so that all parties participate to the same extent. Related to this is the level of knowledge, experience and competences on the subject(s). Similarity will improve the results of the cooperation, stimulate the project team and make it possible to focus on the goal of the project.

7 Discussion

Flaws in the results

7.1 Object orientation

Besides thematics and geometrics, objects have a direction. Every individual object has a direction, which is clearer for rectangles then for squares. But there's also a direction of the objects in relation to other objects. This direction is not always the same as the direction of the individual objects. (Fig. 7.1).
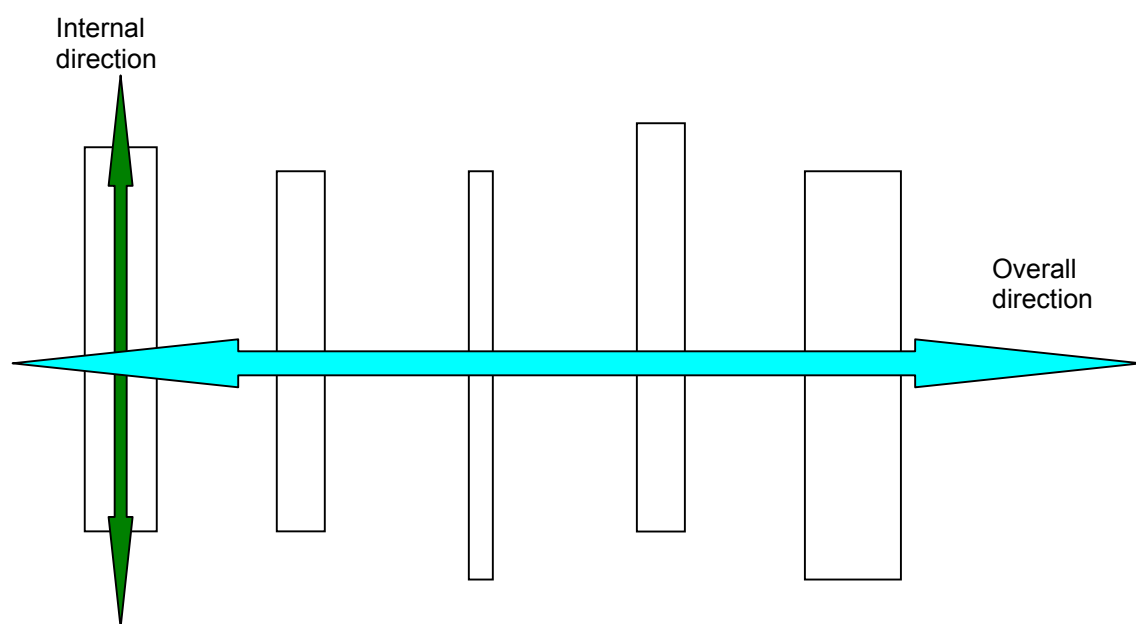
Fig. 7.1 different directions

7.2 Buffer in a direction

A better way of buffering then what is used in our model, is to determine the overall direction first, and then create a buffer in this specific direction. Then you don't have the problem that the buffers get to big and objects will be assimilated that aren't in the overall direction (fig. 7.2). This way, the spaces that are created by the objects, are made visible in the best way.
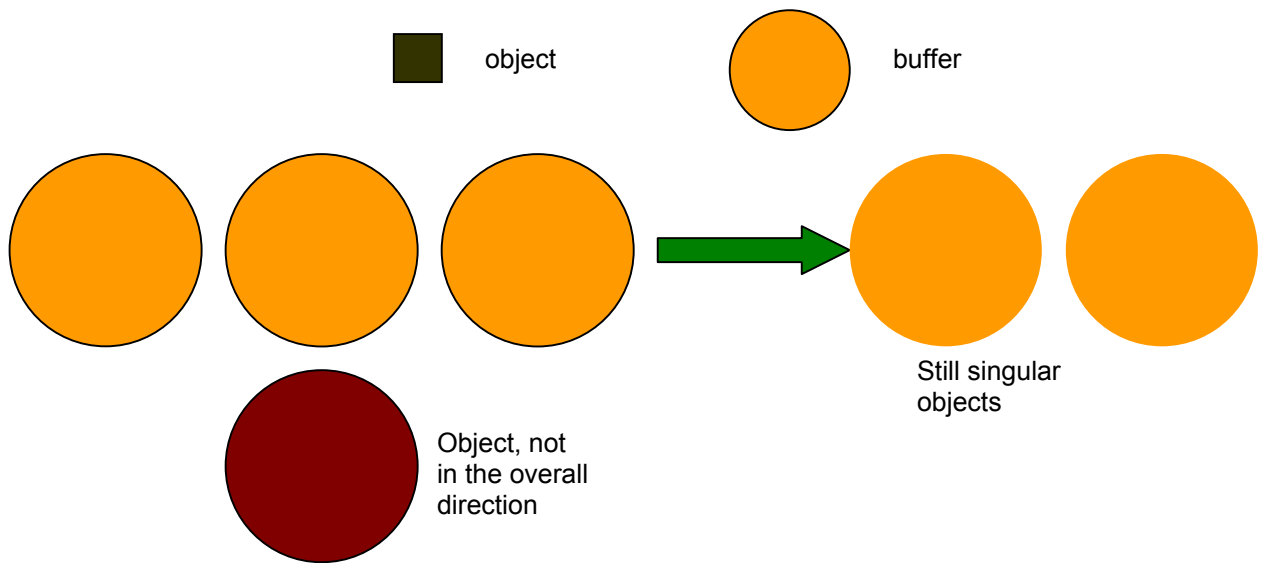
Fig. 7.2 original buffer method

In this picture, the buffer distance has to be increased to make them overlap. The problem here, is that the object in the bottom isn't part of the overall direction, but would be included if the buffer size increases. This is solved by first determining the direction of the objects, and then make the buffers bigger in the overall direction (fig. 7.3).
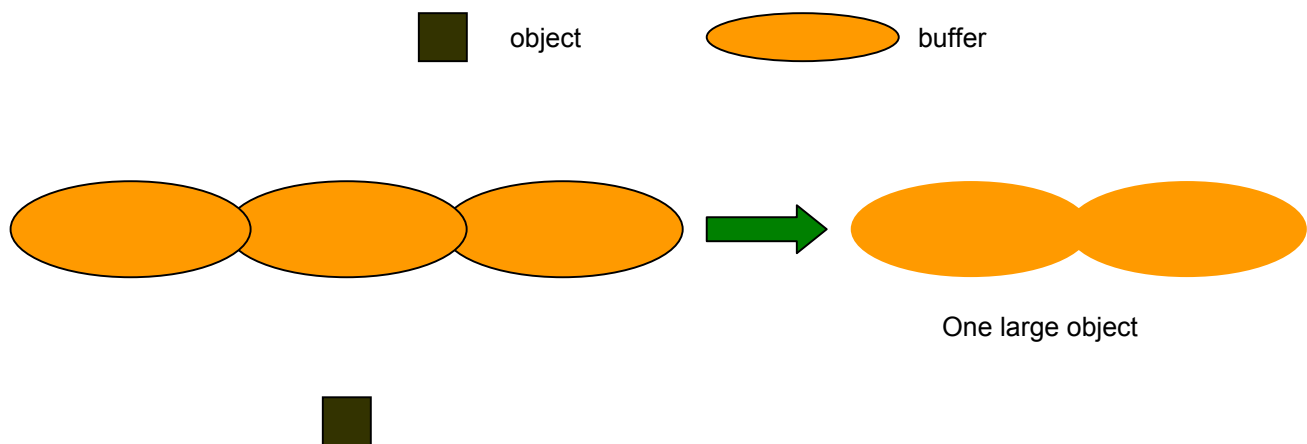

Fig. 7.3 buffering in a direction

If buffering of the objects takes places in this way, the relation between objects and spaces is emphasized.
This was part of our methodology, but it was too complicated considering the amount of time and available tools and technology.

7.3 Buffering back 1

To compensate for the buffer, the space-objects are buffered also with, for instance, 50 % of the original buffer distance. This fraction is necessary, due to the fact that when objects are buffered and enclose a space, and the formed space-object is buffered back again with a larger buffer distance, the enclosed space is no longer enclosed anymore and becomes a part of a bigger space (fig. 7.4).
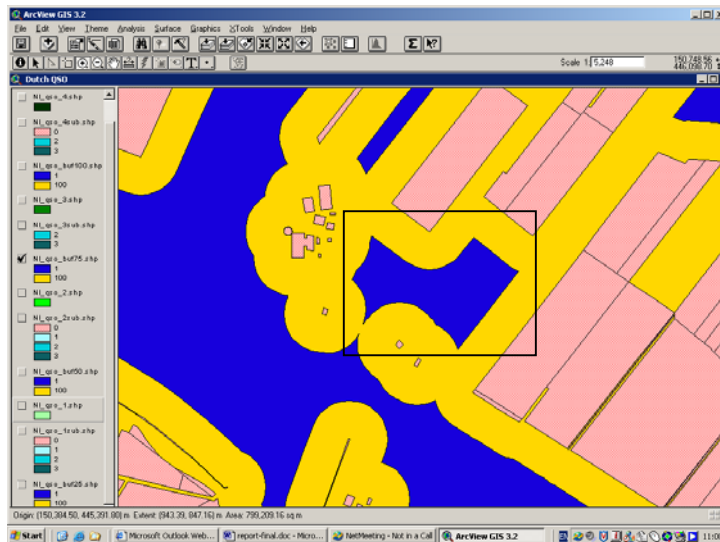
Fig 7.4 enclosed space

In pink are the space forming objects, yellow is the buffer around the space forming objects and blue are the defined spaces. As can be seen in the picture, marked by the black box, there is a defined space, totally secluded by the buffer. When this space-object is buffered back, the space-object becomes a part of another space (fig. 7.5). Light blue are the space objects.
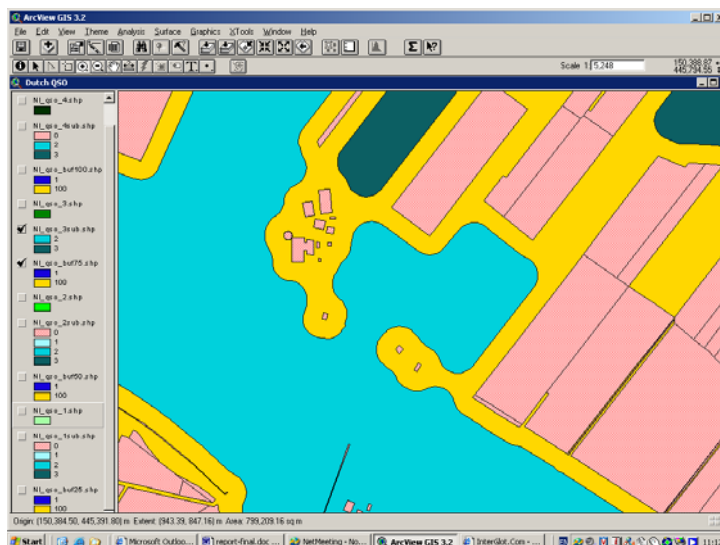
Fig. 7.5 no longer an enclosed space

This phenomenon occurs more often with a relatively high buffer distance for the spaces, that is why the 50 % buffer distance. This space will be enclosed at a higher space class

Another problem is when a space forming object is buffered and forms an "island" in the (blue) space (fig. 7.6).
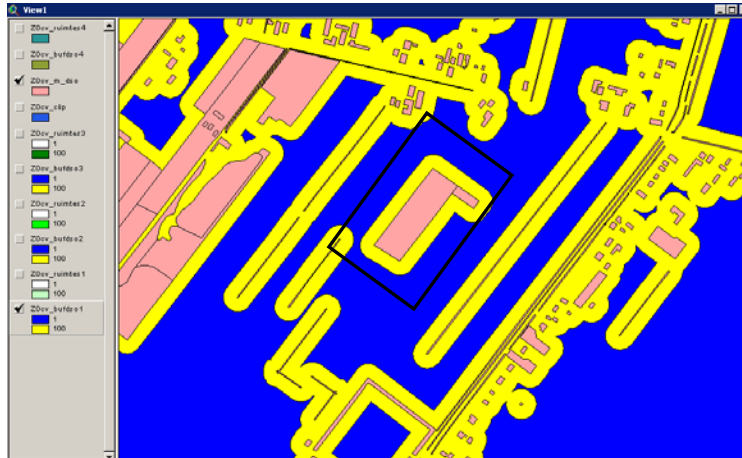
Fig. 7.6 island polygons

When the space-objects are buffered back, the space forming objects will disappear and will be seen as spaces, because the software will "dissolve" these island polygons (fig. 7.7).
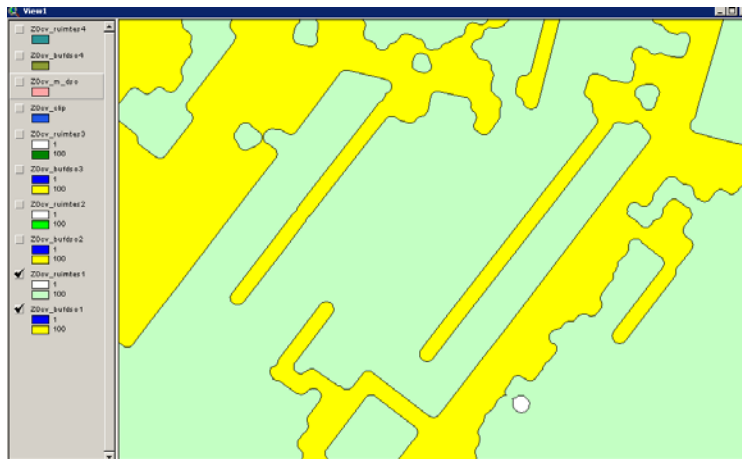
Fig. 7.7 removal of space forming objects by dissolving of island polygons

These objects will be visible again on a higher space class, because the buffer size will increase and the buffers will overlap, so that no islands are formed anymore (see fig 7.8 & 7.9).

Fig. 7.8 No longer island polygons
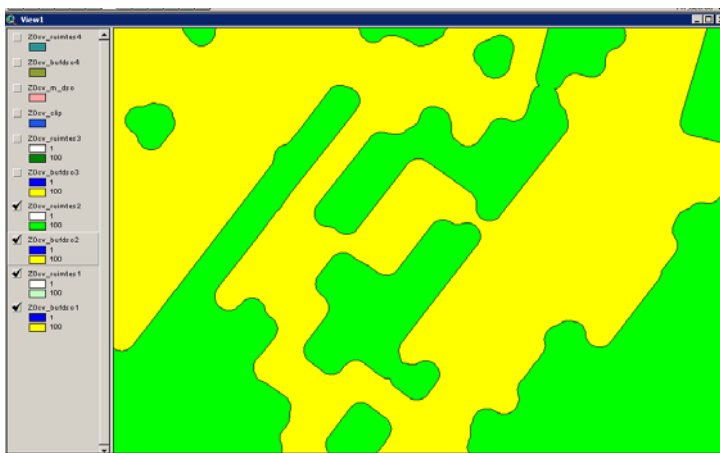
Fig. 7.9 no deletion of space forming objects

The problem with this is that the phenomenon is now solved for this area, but in other areas the same problem can occur. Going to a higher space class can solve this problem again, but in the end, you still have the same problem in the highest space class.

7.4 Buffering back 2

A same kind of problem like the one described above, is that when the space forming objects are buffered and form an overlapping polygon, but when the space objects are buffered back, a part of the buffer becomes an island (fig 7.10 & 7.11).
This island should have had no space value, but because this is not possible within Arc, this polygon gets a space value[4].

---

[4] it is an inside polygon, so value is 1

29
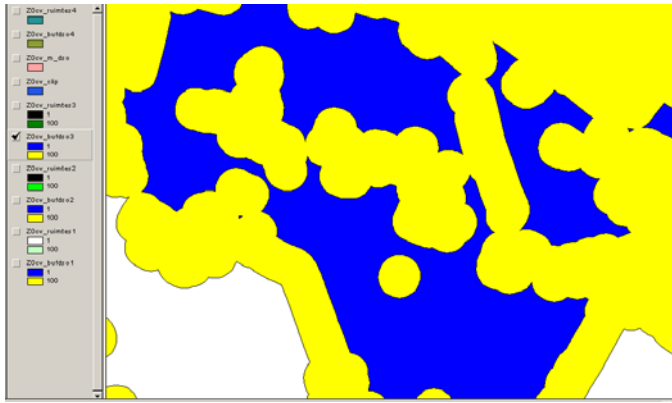
Fig. 7.10 connected buffers
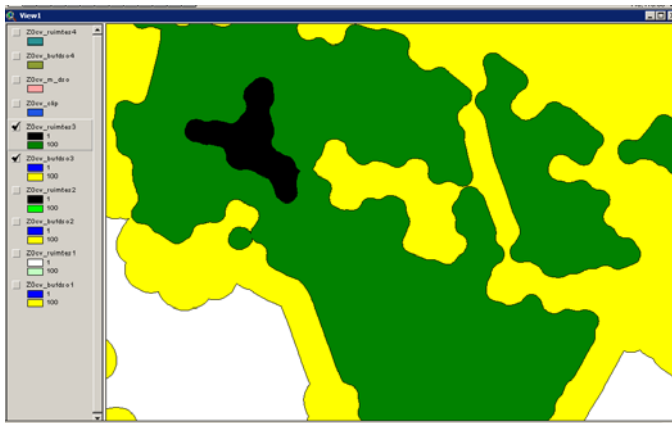
Fig. 7.11 disconnection of buffer, creating inside polygon

This problem also had an influence on the *shape* classification, because these space forming objects where classified as space-objects. This was solved by making a fourth shape class, sub0, which only occurs in the Dutch data set, and visualize sub0 in the same manner as the space forming objects (fig. 7.12)
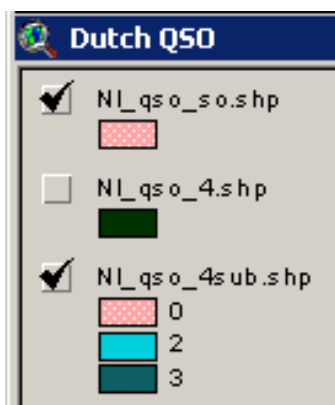
Dutch space forming objects

Shape subclasses

Fig. 7.12 visualization

7.5 space classification

Another problem we encountered was when a very large space was already enclosed in a low space class. The problem is that in a higher space class, this space is subdivided into smaller patches of space, but the narrower parts aren't classified in this higher space class. This means that these narrower spaces are in the lower space class, but we were not able to define them as such in our model, because we encountered problems on how to "disconnect" these spaces. The problem also includes the edges of the spaces. (Fig. 7.13 – 7.16).
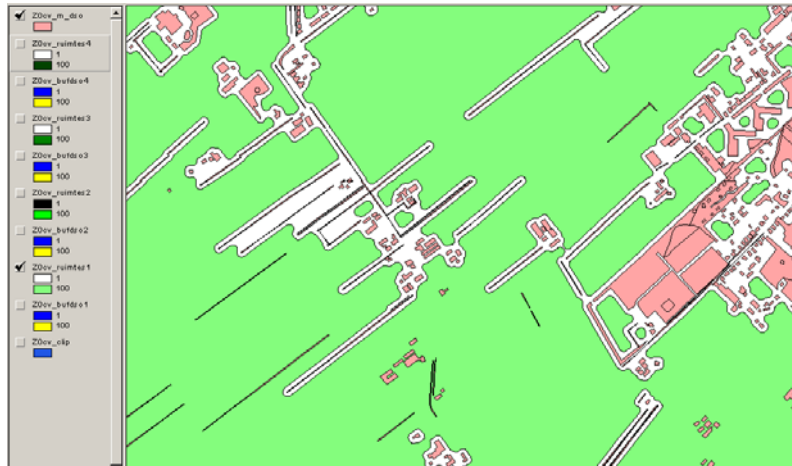
Fig. 7.13 defined space in the lowest class (25 meter)
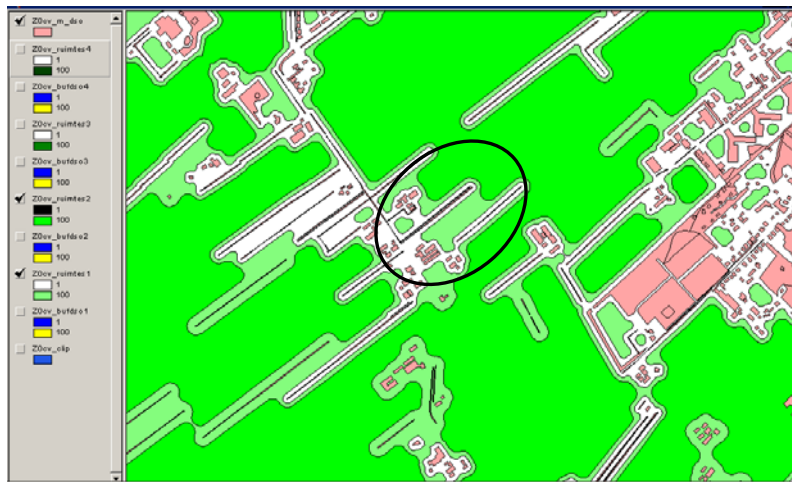
Fig. 7.14 defined spaces in the second class (50 meter). Encircled a space in the lowest class, but not defined as such.
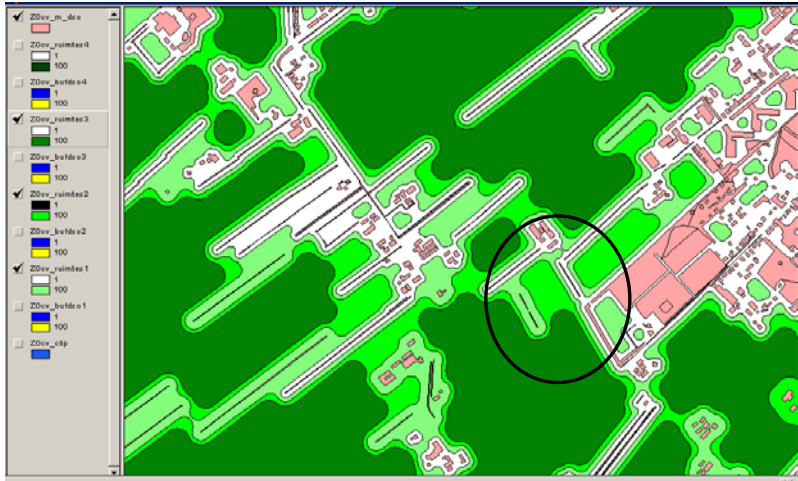
Fig. 7.15 defined spaces in the third class (75 meter).
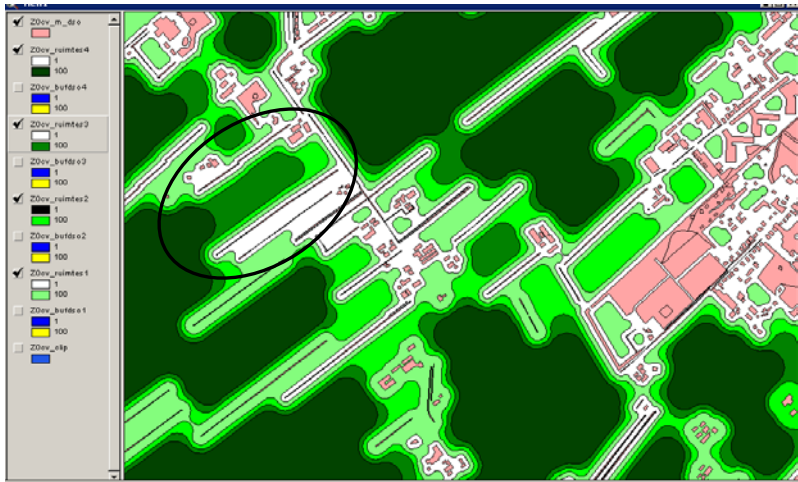
Fig. 7.16 defined spaces in the last class (100 meter).

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Lundberg, C. 1999, *landscape analysis – the concept*

Pouwels, R. 2000, *LARCH: een toolbox voor ruimtelijke analyses van een landschap*, alterra

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landschapsarchitectuur

Links

http://www.csiss.org/classics/content/62

http://www.angelfire.com/ar/corei/hbel/lynchl.htm

http://www.waikato.ac.nz/wfass/subjects/geography/staff/lars/landscape/nz.html

http://rcswww.urz.tu-dresden.de/~obastian/lsurb00/lsurb20.htm

http://www.info.gov.hk/planning/p_study/prog_s/landscape/landscape_tech2/e_index.htm

http://www.arc.govt.nz/arc/library/w10500_2.pdf

http://www.mluri.sari.ac.uk/ccw/task-two/evaluate.html

http://gis.esri.com/library/userconf/proc00/professional/papers/PAP185/p185.htm

appendix

Dutch DSO = *Results of the classification for the Dutch area using only the objects which are definitely space forming considering the definition.*

NI_network.shp	*Network in Dutch area*	-
NI_dso__so.shp	*Definitely spaceforming objects in Dutch area*	-
NI_dso_4.shp	*Spaceclass 4, based on size (width >200 m), in Dutch area with definitely space forming objects*	-
NI_dso_4sub.shp	*Space subclass, based on shape (shape-index between 1 and 0)*	0: Subclass 0 (no space, object within buffer) 1: Subclass 1 (0<Si<1/3) 2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
NI_dso_buf100.shp	*Buffer and enclosed spaces in Dutch area with definitely space forming objects and bufferdistance of 100 m.*	1: Enclosed spaces 100: Buffer of 100 m
NI_dso_3.shp	*Spaceclass 3, based on size (width >150 m), in Dutch area with definitely space forming objects*	-
NI_dso_3sub.shp	*Space subclassification of spaceclass 3, based on shape (shape-index between 1 and 0), in Dutch area with definitely space forming objects*	0: Subclass 0 (no space, object within buffer) 1: Subclass 1 (0<Si<1/3) 2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
NI_dso_buf75.shp	*Buffer and enclosed spaces in Dutch area with definitely space forming objects and bufferdistance of 75 m.*	1: Enclosed spaces 100: Buffer of 75 m
NI_dso_2.shp	*Spaceclass 2, based on size (width >100 m), in Dutch area with definitely space forming objects*	-
NI_dso_2sub.shp	*Space subclassification of spaceclass 2, based on shape (shape-index between 1 and 0), in Dutch area with definitely space forming objects*	0: Subclass 0 (no space, object within buffer) 1: Subclass 1 (0<Si<1/3) 2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
NI_dso_buf50.shp	*Buffer and enclosed spaces in Dutch area with definitely space forming objects and bufferdistance of 50 m.*	1: Enclosed spaces 100: Buffer of 50 m
NI_dso_1.shp	*Spaceclass 1, based on size (width >50 m), in Dutch area with definitely space forming objects*	-
NI_dso_1sub.shp	*Space subclassification of spaceclass 1, based on shape (shape-index between 1 and 0), in Dutch area with definitely space forming objects*	0: Subclass 0 (no space, object within buffer) 1: Subclass 1 (0<Si<1/3) 2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
NI_dso_buf25.shp	*Buffer and enclosed spaces in Dutch area with definitely space forming objects and bufferdistance of 25 m.*	1: Enclosed spaces 100: Buffer of 25 m

Dutch QSO = *Results of the classification for the Dutch area using the objects which are definitely and questionable spaceforming considering the definition.*

Nl_network.shp	*Network in Dutch area*	-
Nl_qso__so.shp	*Definitely and questionable spaceforming objects in Dutch area*	-
Nl_qso_4.shp	*Spaceclass 4, based on size (width >200 m), in Dutch area with definitely and questionable space forming objects*	-
Nl_qso_4sub.shp	*Space subclassification of spaceclass 4, based on shape (shape-index between 1 and 0), in Dutch area with definitely and questionable space forming objects*	0: Subclass 0 (no space, object within buffer) 2: Subclass 2 $(1/3<Si<2/3)$ 3: Subclass 3 $(2/3<Si<1)$
Nl_qso_buf100.shp	*Buffer and enclosed spaces in Dutch area with definitely and questionable space forming objects and bufferdistance of 100 m.*	1: Enclosed spaces 100: Buffer of 100 m
Nl_qso_3.shp	*Spaceclass 3, based on size (width >150 m), in Dutch area with definitely and questionable space forming objects*	-
Nl_qso_3sub.shp	*Space subclassification of spaceclass 3, based on shape (shape-index between 1 and 0), in Dutch area with definitely and questionable space forming objects*	2: Subclass 2 $(1/3<Si<2/3)$ 3: Subclass 3 $(2/3<Si<1)$
Nl_qso_buf75.shp	*Buffer and enclosed spaces in Dutch area with definitely and questionable space forming objects and bufferdistance of 75 m.*	1: Enclosed spaces 100: Buffer of 75 m
Nl_qso_2.shp	*Spaceclass 2, based on size (width >100 m), in Dutch area with definitely and questionable space forming objects*	-
Nl_qso_2sub.shp	*Space subclassification of spaceclass 2, based on shape (shape-index between 1 and 0), in Dutch area with definitely and questionable space forming objects*	0: Subclass 0 (no space, object within buffer) 1: Subclass 1 $(0<Si<1/3)$ 2: Subclass 2 $(1/3<Si<2/3)$ 3: Subclass 3 $(2/3<Si<1)$
Nl_qso_buf50.shp	*Buffer and enclosed spaces in Dutch area with definitely and questionable space forming objects and bufferdistance of 50 m.*	1: Enclosed spaces 100: Buffer of 50 m
Nl_qso_1.shp	*Spaceclass 1, based on size (width >50 m), in Dutch area with definitely and questionable space forming objects*	-
Nl_qso_1sub.shp	*Space subclassification of spaceclass 1, based on shape (shape-index between 1 and 0), in Dutch area with definitely and questionable space forming objects*	0: Subclass 0 (no space, object within buffer) 1: Subclass 1 $(0<Si<1/3)$ 2: Subclass 2 $(1/3<Si<2/3)$ 3: Subclass 3 $(2/3<Si<1)$
Nl_qso_buf25.shp	*Buffer and enclosed spaces in Dutch area with definitely and questionable space forming objects and bufferdistance of 25 m.*	1: Enclosed spaces 100: Buffer of 25 m

German DSO = *Results of the classification for the German area using only the objects which are definitely spaceforming considering the definition.*

Ger_network.shp	*Network in German area*	-
Ger_dso__so.shp	*Definitely spaceforming objects in German area*	-
Ger_dso_4.shp	*Spaceclass 4, based on size (width >1000 m), in German area with definitely space forming objects*	-
Ger_dso_4sub.shp	*Space subclassification of spaceclass 4, based on shape (shape-index between 1 and 0), in German area with definitely space forming objects*	3: Subclass 3 (2/3<Si<1)
Ger _dso_buf500.shp	*Buffer and enclosed spaces in German area with definitely space forming objects and bufferdistance of 500 m.*	1: Enclosed spaces 100: Buffer of 500 m
Ger _dso_3.shp	*Spaceclass 3, based on size (width >500 m), in German area with definitely space forming objects*	-
Ger _dso_3sub.shp	*Space subclassification of spaceclass 3, based on shape (shape-index between 1 and 0), in German area with definitely space forming objects*	2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
Ger _dso_buf250.shp	*Buffer and enclosed spaces in German area with definitely space forming objects and bufferdistance of 250 m.*	1: Enclosed spaces 100: Buffer of 250 m
Ger _dso_2.shp	*Spaceclass 2, based on size (width >200 m), in German area with definitely space forming objects*	-
Ger _dso_2sub.shp	*Space subclassification of spaceclass 2, based on shape (shape-index between 1 and 0), in German area with definitely space forming objects*	2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
Ger _dso_buf100.shp	*Buffer and enclosed spaces in German area with definitely space forming objects and bufferdistance of 100 m.*	1: Enclosed spaces 100: Buffer of 100 m
Ger _dso_1.shp	*Spaceclass 1, based on size (width >100 m), in German area with definitely space forming objects*	-
Ger _dso_1sub.shp	*Space subclassification of spaceclass 1, based on shape (shape-index between 1 and 0), in German area with definitely space forming objects*	2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
Ger _dso_buf50.shp	*Buffer and enclosed spaces in German area with definitely space forming objects and bufferdistance of 50 m.*	1: Enclosed spaces 100: Buffer of 50 m

German QSO = *Results of the classification for the German area using the objects which are definitely and questionable spaceforming considering the definition.*

Ger_network.shp	*Network in German area*	-
Ger_qso__so.shp	*Definitely and questionable spaceforming objects in German area*	-
Ger_qso_4.shp	*Spaceclass 4, based on size (width >1000 m), in German area with definitely and questionable space forming objects*	-
Ger_qso_4sub.shp	*Space subclassification of spaceclass 4, based on shape (shape-index between 1 and 0), in German area with definitely and questionable space forming objects*	3: Subclass 3 (2/3<Si<1)
Ger _qso_buf500.shp	*Buffer and enclosed spaces in German area with definitely and questionable space forming objects and bufferdistance of 500 m.*	1: Enclosed spaces 100: Buffer of 500 m
Ger _qso_3.shp	*Spaceclass 3, based on size (width >500 m), in German area with definitely space forming objects*	-
Ger _qso_3sub.shp	*Space subclassification of spaceclass 3, based on shape (shape-index between 1 and 0), in German area with definitely and questionable space forming objects*	2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
Ger _qso_buf250.shp	*Buffer and enclosed spaces in German area with definitely and questionable space forming objects and bufferdistance of 250 m.*	1: Enclosed spaces 100: Buffer of 250 m
Ger _qso_2.shp	*Spaceclass 2, based on size (width >200 m), in German area with definitely space forming objects*	-
Ger _qso_2sub.shp	*Space subclassification of spaceclass 2, based on shape (shape-index between 1 and 0), in German area with definitely and questionable space forming objects*	2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
Ger _qso_buf100.shp	*Buffer and enclosed spaces in German area with definitely and questionable space forming objects and bufferdistance of 100 m.*	1: Enclosed spaces 100: Buffer of 100 m
Ger _qso_1.shp	*Spaceclass 1, based on size (width >100 m), in German area with definitely space forming objects*	-
Ger _qso_1sub.shp	*Space subclassification of spaceclass 1, based on shape (shape-index between 1 and 0), in German area with definitely and questionable space forming objects*	2: Subclass 2 (1/3<Si<2/3) 3: Subclass 3 (2/3<Si<1)
Ger _qso_buf50.shp	*Buffer and enclosed spaces in German area with definitely and questionable space forming objects and bufferdistance of 50 m.*	1: Enclosed spaces 100: Buffer of 50 m

All results are online available in a digital format:
http://quickplace.wau.nl/regionalseminar
> Entry: the LAT project:
> Results
>Results: Geo-data

To view the data please follow the instructions.

3. Notes on Video Conferencing

1 OUTLINE

In the period September 1st – October 17th, IGI (Introduction to Geo-Information) course lectures have been captured on video by means of a mobile video conferencing (VC) unit and transmitted live to a student class in Tashkent, Uzbekistan. The intention has been to include foreign students interactively in Wageningen UR lecture sessions, allowing them to observe the lecture proceedings, listen in to didactive conversation and pose questions when needed. Being a first-time venture, this type of project requires some improvement if it is to be successfully repeated.

2 PROBLEMS

During VC sessions, the following problems occurred:

- The computer connection was repeatedly lost or the quality of the transmission diminished. At times a connection could not be established, thus not allowing Tashkent students to listen in to lectures.

- Sound was not transmitted adequately. At times the voice of the lecturer was hardly audible in Tashkent. Questions posed by Dutch students could not be heard at all in Tashkent, making the lecturer's response incoherent.

- Words written on the whiteboard were not readable in Tashkent when writing was small or certain marker colours were used.

- At times, the quality of a powerpoint presentation was insufficient on Tashkent's side.

- At times, an overview of a powerpoint slide was lost because the camera had to zoom in on small text or complex diagrams.

3 SOLUTIONS

- Any possible *firewall block* of outgoing and incoming signals should be cleared by technical assistance well in advance of a session. Moreover, the connection should be *tested* before each single VC session. The risk of losing transmission quality is diminished when sufficient *bandwidth* is reserved in advance at the host server. Sudden loss of the computer connection is related to the network of servers between the VC transmittor and VC receiver. A solution to this problem has not been found.

- For every group of students, a *microphone* must be available to the student share in any student-teacher dialogue. The microphone should be *muted* when not in use (students should be made aware on how to do so). The teacher must wear a clip-on microphone rather than speak in the vicinity of a directional microphone. If not, his words are not recorded when he is speaking in a direction that faces away from the **microphone (e.g.** when he turns his head towards a student to answer a question). When a lesson is given at one location, the microphones at the other location should be muted to avoid the emmittance of disturbing background noise through the VC speakers.

- Writing on the whiteboard should be in black or a *thick, dark-colored marker*. Write *in big letters* and *avoid scribbling* words in too small spaces.

- Make sure that the *room is dark* when the camera records a powerpoint presentation directly from a presentation screen. Place *one camera close to the screen, face-on and at sufficient height* so that the image does not seem too distorted or blurry at the other side of the VC connection. Put several camera positions in the memory of the VC equipment (one zoomed in on the presentation screen, another on the lecturer's favorite position, another on a part of the class, etc..) to make switching between camera positions quick and easy to do. Of course, the beamer must beam the presentation with *sufficient brightness* (expressed in Lumen) on the screen.

- When preparing powerpoint presentations, use a *light background* and *dark letters of large size* to optimize the readability of the image in the other classroom. Start being creative with the idea in mind that a camera should <u>not have to zoom in</u> on any images, texts or diagrams for the slide to be understood and readable at the receiving end of the VC line. This may well require re-creating existing powerpoint presentations.

4   REMARKS

- An *assistant* must always be present in the classroom for operating the equipment and a *technical assistant* must be at hand to instantly solve technical problems during lecturing.

- Regarding the technical requirements, a fixed setting of equipment is to be preferred over mobile equipment. This means that for <u>serious</u> VC teaching, a classroom should be specifically designed, equipped and managed. The question remains whether teaching to two audiences (1. the physical classroom; 2. the virtual classroom; rather than one audience being taught to and the other listening in) is feasible at all. There is a tendency to answer this question with a resounding "no", unless "broadcast quality equipment" is available.

- It is worthwhile to investigate whether powerpoints can be transmitted via a separate channel to the PC/beamer at the receiver classroom.

4. Notes on the use of WebCam

1   OUTLINE

In the period November 3rd – December 12th, two groups of three students each have worked as one project team on a classification method for landscapes. One group operated from the University of Hohenheim whilst the second operated from Wageningen UR. Communication between the two parties was supported by webcam equipment, whilst a virtual working environment was available on the web (Quickplace) for students to share documents and files, set objectives and allocate tasks. The results, procedures and communicative experiences of the LAT project have been presented by means of video conferencing equipment on December 11th.

2   PROBLEMS ENCOUNTERED

- <u>Communication between the two teams was hindered by technical difficulties</u> in the first one-and-a-half week. MSN Messenger was installed but did not seem to work on the student PC's. Both PC's had been assigned a static IP in the order of 137.224.* to allow video and audio bytes to bypass the university's firewall. Once one PC was re-assigned a dynamic IP, webcam communication became possible.

  Although application sharing is a feature of MSN Messenger, this function did not work. Netmeeting was installed to counteract this problem. However, Netmeeting did not run on PC's with a dynamic IP, but a PC with a static IP in the aforementioned range. Hence, one PC was equipped with MSN for webcam communication and the other with Netmeeting for application sharing specifically.

  Netmeeting could have been used instead of MSN as it also allows the user to set up a streaming video and direct audio line, had its functionality not been too limited. MSN allows the user to see whether partners are online, and since both teams had need for ad-hoc discussion outside planned sessions, this functionality was indispensable.

- <u>The GIS competence of the German party was inadequate</u>. The data processing phase was entirely performed by the Dutch team. The German team tried to keep up, but failure to do so was disheartening to the team spirit.

- The intensity of supervision was less in Germany than in Holland, where the Dutch team had instant supervision and technical support at their disposal.

- <u>Multipoint webcam sessions could not be set up</u>. Both MSN and Netmeeting allow point2point communication only. Euroleague partner Uppsala could have hosted multipoint sessions on their Click2Meet server, but repeated requests did not yield response. As such, supervisors could not join online student discussions, nor explain a particular (GIS) practice to both teams simultaneously.

- As regards the VC session: the image froze repeatedly on the Dutch display unit. The session had to be paused while a connection was re-established. Also, the available bandwidth does not allow streaming video to be shared.

3 SOLUTIONS

To allow <u>smooth communication</u>:

- Any possible *firewall block* of outgoing and incoming signals should be cleared and the connection should be *tested* by technical assistance well in advance.

- A choice of software should be made in advance, installed and all required functionality tested well before the project is due to start, so that alternative software can be acquired and tested if need be. It should be possible to run all software for communication purposes on one and the same PC.

- The audio and video settings of webcam software should be calibrated and a webcam session started to test these settings.

- Back-up communication facilities such as a telephone should be available.

- Technical assistance should be available on the spot, having administrative privileges on the student PC's.

To allow <u>equal input of students</u>:

- Students should only be allowed to join the project if they have a minimal level of expertise and competence.

- Supervisors should repeatedly contact students, on a regular basis. To ensure frequent *supervisors-student interaction*:

- Contact with students should be proactively made.

- Contact with students should not only take place face-to-face but also online: (1) by acquiring multipoint VC software or by arranging server time on, for instance, the Click2Meet server, and (2) planning online supervisor-student sessions in advance, thereby specifying the topic of discussion and the persons to join in.

To allow <u>smooth VC-sessions</u>:

- Test the hardware set-up and connection well in advance, thereby taking in consideration any possible firewall block. Arrange maximum bandwidth. Share IP addresses. Place multiple microphones across the room.

- Transmit PowerPoint presentations along a separate PC –to-PC connection. Do not include video files.

- It is absolutely advisable to plan the session in as much detail as possible, rather like one plans a television show. Assign a host to introduce the attendants, direct the session and lead any discussion. A VC session plan may include:

- The full names of those attending.

- The order in which topics are to be discussed/presented, and by whom.

- The time allowed for each discussion/presentation point.

- The host's lines of text.

4   ADDITIONAL REMARK

- Kick-off the project with an introductory VC session.