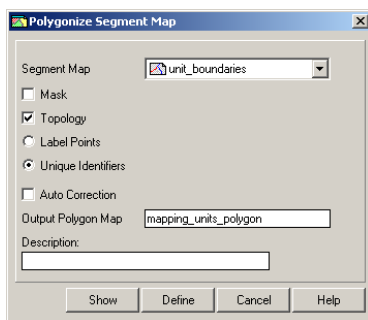# Exercise 4a: Generating a database of elements at risk from scratch

For experienced ILWIS users:

We consider first the case when you do not have a point map with the id of every polygon.

**Generate the polygons from the digitized segments.**

☞

- After checked the errors and repaired it, go to operations, *vectorize, segment to polygon.* Select the map **Unit_boundaries** and fleg **Unique Identifiers**. You use this option if you do not have a point map. Call the output **mapping_units_polygon**. Click on *Show.* See the image left.

- Open the **mapping_units_polygon** and check the results.

Now we are going to consider the case when you have a point map. It is important that every polygon had a point as identifier.

It is suggested to insert a point identifier after the digitalization of every polygon. In this exercise is also available a point map Mapping_units_points. It is possible that you have to modify (delete or add) some points in the area where you have digitized the new segments. Take in your mind that every polygon need only one point, and in every polygon must be a point with a unique identifier.

You can consult the ILWIS guide for further explanation about the polygonization.

☞
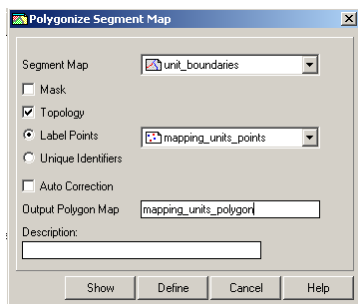
- Check the errors of the segments and repair them.

- After you are sure that every polygon has his Point identifier, go to *operations, vectorize, segment to polygon* and select the **Unit_boundaries** segment map and the **mapping_units_points**. Select **label points**, and call the output map **mapping_units_point.** See the image left.

- Open the polygon map **mapping_units_points** and compare with the **mapping_units_polygon**.

4a.1.2 Estimating urban land use from image interpretation

| LANDUSE NAME	IMPORTANT BECOUSE:
Com_business	During the day are presumed to be occupied by employed. This is important for the daytime distribution of the population and for the subsequent evaluation of the vulnerability.
Com_hotel	Give an additional contribution to the population that came from census data. It is presumed that the hotel have high value in terms of money and costs. This will be important for the evaluation of the amount.
Com_shop	Elevated number of people during the day.
Ind_hazardous	It could be cause of industrial risk (ex: explosion).
Ind_industries	High number of worker. High value in terms of money. Very important also for the indirect economic losses.
Ind_warehouse	Low number of people during the day, and void during the night.
Ins_fire	It is very important know where are situated the essential facilities, for the evaluation of the risk and for the reduction losses.
Ins_office	High number of population during the day. Empty during the night.
Ins_police	It includes part of the worker, and is also an essential facility.
Ins_school	High density of young population. Possible space where arrange people affected from the disaster.
Pub_cemetery	Possible presence of people during the day and in particular during the weekend. Potential indirect losses.
Pub_cultural	High density of people in particular period of time.
Pub_electricity	Are lifeline facilities and its important to know where are situated in order to protect them.
Pub_religious	High number of people during particular period time of the day. High value in terms of money and cultural. High value of potential indirect losses.
Rec_flat_area	Wide open space. Potential area for the arrangement of the evacuated population. Potential presence of young people during the day.
Rec_park	Wide open space. Potential area for the arrangement of the evacuated population. Presence of people.
Rec_stadium	High number of people during the particular period of the day. Potential area for the arrangement of the evacuated population.
Res_large	Give an idea about how many people live in this kind of buildings. It is important also for the evaluation of the vulnerability, (you can suppose that these buildings are more stable).
Res_mod_single	Give an idea about how many people live in this kind of buildings. You can suppose that these buildings are less stable then the Res large).
Res_multi	Give an idea about how many people live in this kind of buildings. The Buildings type are also important for the evaluation of the amount.
Res_small_single	Give an idea about how many people live in this kind of buildings.
Res_squatter	Give an idea about how many people live in this kind of buildings. These are buildings with the higher density of people, and lowest quality of construction.
River	It is important for the evaluation of some hazard maps (floods, landslides).
unknown	
Vac_car	Wide area. Possible temporary arrangement of the population.
Vac_construction	Give an idea on the area to consider populated in the next years.
vac_damaged	It is a good indicator for mapping the extent of the disaster.
Vac_shrubs	Wide empty areas. Very low vulnerability.

Answer:

Land use type	Image characteristics that you used to classify the urban land use class
Church	Dome, bell tower.
Vac_shrubs	Presence of green area, vegetation and trees, without buildings.
Res_squatter	Small houses, usually in cluster, and not even in the city center. Sometimes the streets between these houses are not paved.
Res_Large	Big buildings, usually with 2 or more floors. Often these building have a garden.
Vac_car	Flat area paved, with regular shape, and probably with cars parked.
Ins_school	Generally are big buildings, with a parking car in front of it. Sometimes these are difficult to distinguish from other landuse type (Ex: Ins_police, Ins_fire).
Ind_industries	Often are big rectangular buildings, present in cluster. They have a parking area. Usually they are not in the city center. The roof of these buildings, in true color visualization, appears white a cause of the high reflectance of the material used for this kind of construction.
Rec_flat_area	Wide open space, often green. You can see the facilities used, depending to the sport practiced (goal, basket, etc).

Below are shown some example of landuse type.

Church
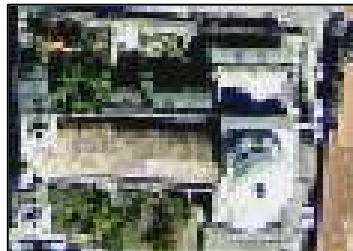
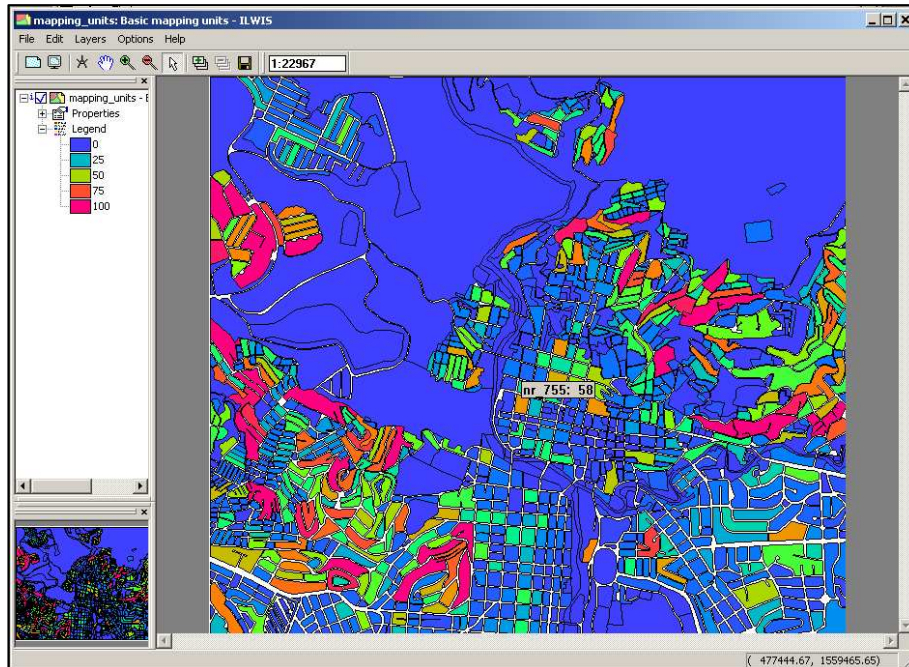Church

Cemetery

Residential squatter

Residential large

Park

4a.1.3 Estimating the number of buildings

Mapping units linked to the table "**Mapping_units**", showing the attribute "**Nr_buildings**"

4a.1.4 Estimation of population distribution

Land use class	Our estimation			You estimation		
	People per building	Daytime	Nighttime	People per building	Daytime	Nighttime
Com_business	20	1	0	15	1	0
Com_hotel	100	0.1	1	120	0.2	0.9
Com_market	1000	1	0	800	1	0
Com_shop	10	1	0	20	1	0
Ind_hazardous	10	1	0	30	0.8	0.1
Ind_industries	25	1	0	50	0.8	0.1
Ind_warehouse	20	1	0	10	0.8	0
Ins_fire	25	1	1	35	0.9	0.4
Ins_hospital	800	1	1	1000	1	0.8
Ins_office	100	1	0	60	1	0
Ins_police	50	1	1	60	1	0.2
Ins_school	300	1	0	300	1	0
Pub_cemetery	0	0	0	20	1	0
Pub_cultural	200	0	1	150	0.5	1
Pub_electricity	0	0	0	0	0	0
Pub_religious	500	1	0	400	1	0

Rec_flat_area	0	0	0	20	1	0.1
Rec_park	0	0	0	15	1	0.1
Rec_stadium	20000	0	0	15.000	1	0
Res_large	5	0.2	1	4	0.1	1
Res_mod_single	6	0.2	1	5	0.2	1
Res_multi	20	0.2	1	20	0.1	1
Res_small_single	6	0.2	1	5	0.2	1
Res_squatter	7	0.3	1	8	0.4	1
River	0	0	0	0	0	0
unknown	0	0	0	0	0	0
Vac_car	0	0	0	10	1	0.1
Vac_construction	0	0	0	5	1	0
vac_damaged	0	0	0	0	0	0
Vac_shrubs	0	0	0	2	1	0

Answer:

Period	Total population
Daytime	143363
Nighttime	183779
Difference	40400

This is not an accurate division of population and the results are depending to the estimation of the population made per landuse classes. This can be improved modifying this estimation (for example in the same way as shown in the previous table). The best way to improve the population distribution is to know real data, for example from census data.