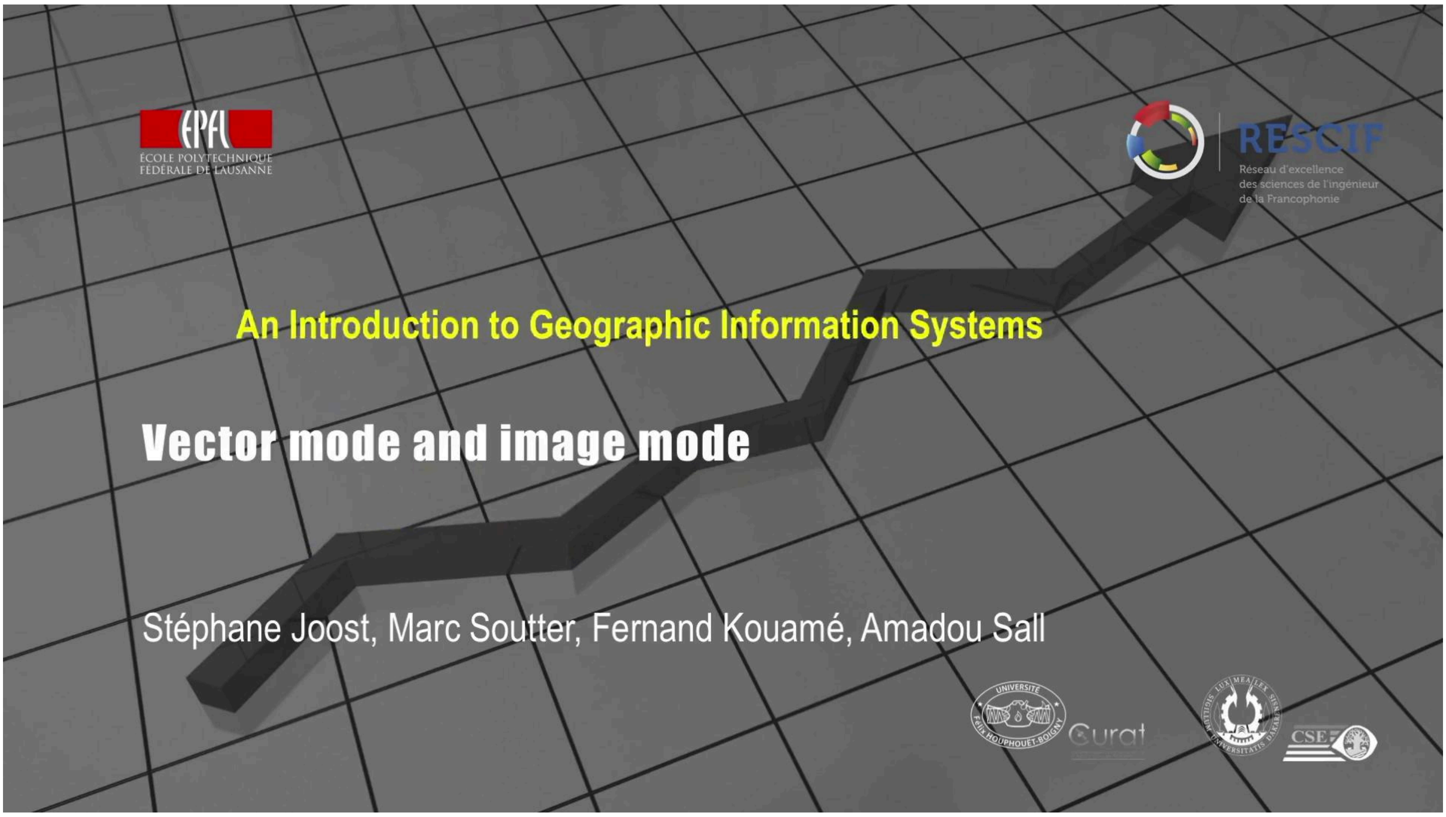

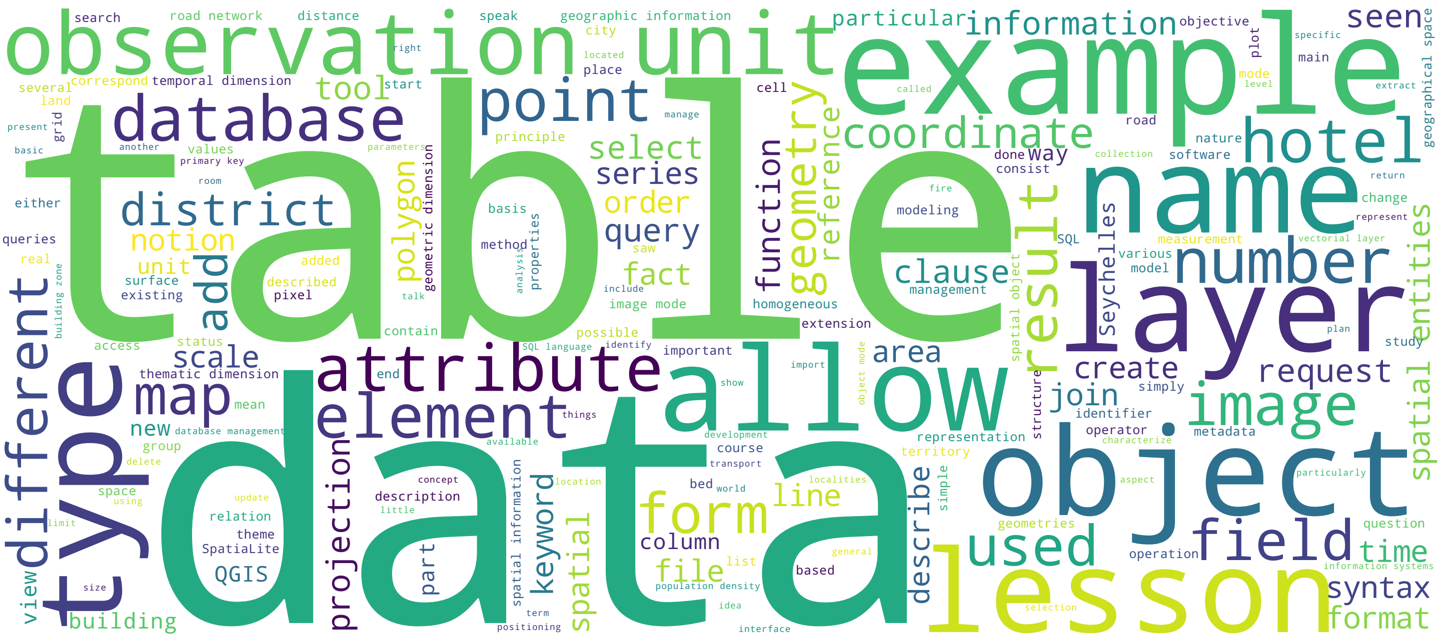

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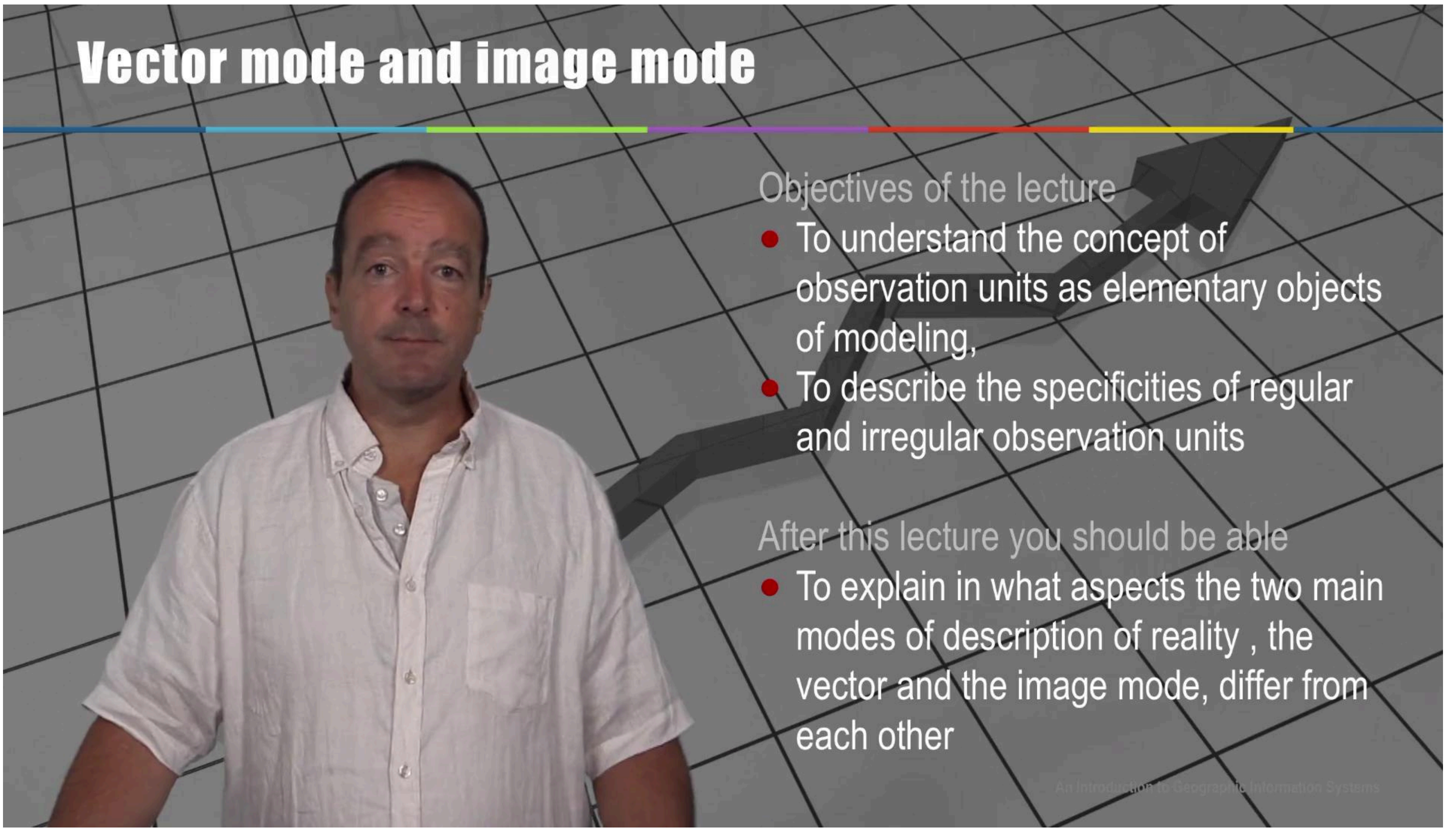
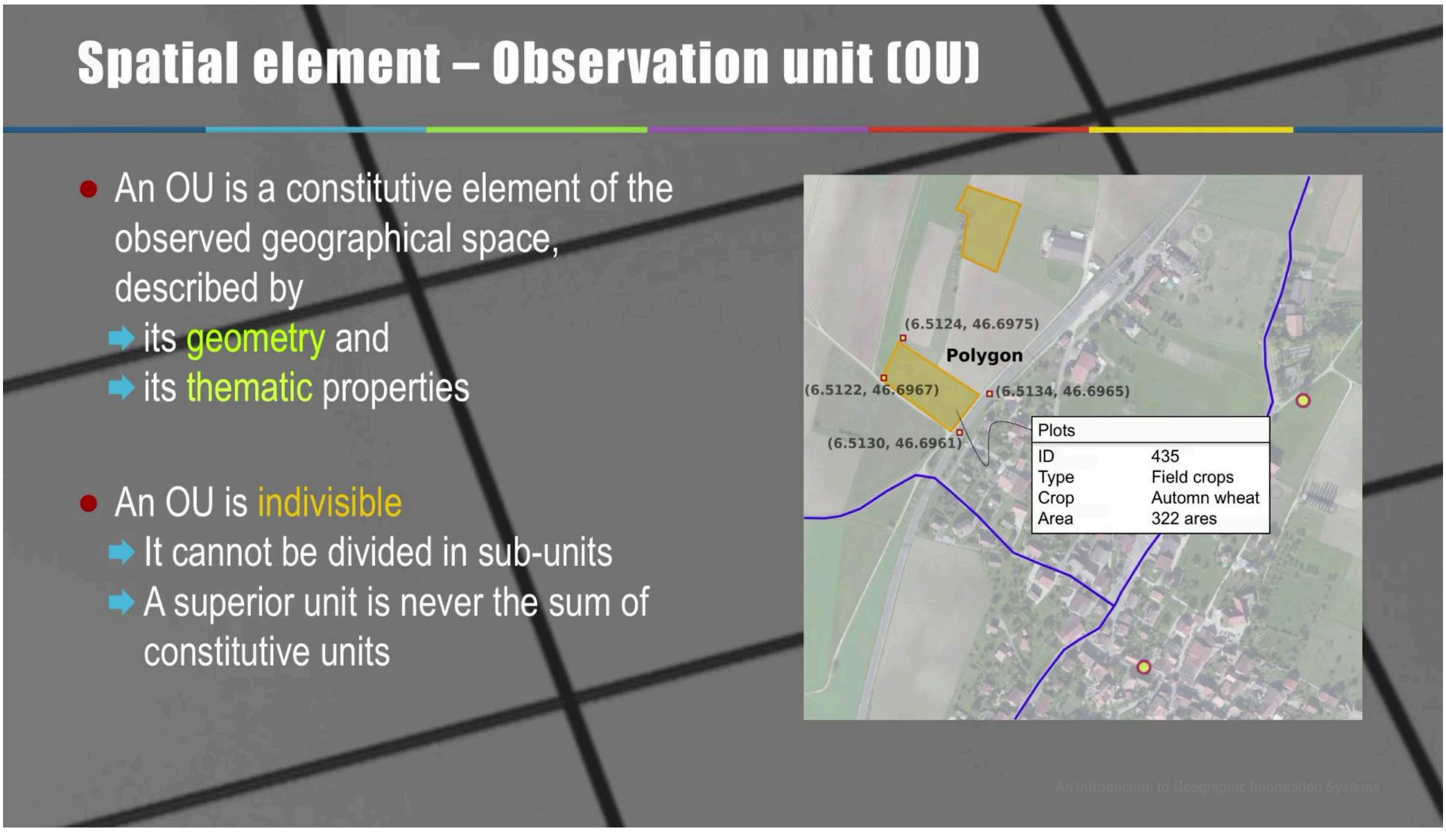


M1W1L4_enWelcome to this course dedicated to the vector mode and the raster mode which are the two major families of the geographic reality representation. In the first lesson of this course, dedicated to general principles of the modeling of the territory, we had seen that geographical space can be perceived in the form of discrete phenomena described by spatial objects or in the form of continuous phenomena described by an image or by a grid. After a little detour in the last two lessons, to positioning and topology elements, we will return in this present lesson to these two modes of description of geographical reality : the vector mode and image or raster mode. The objective of this lesson is to deal with the question of geographical space or territory decomposition in elementary objects called "observation units" which can be of irregular or regular nature. This lesson has to allow us to characterize the vector and image modes which are the two major modes of description of the real and to explain in what they differentiate themselves.

Notes

Summary

0m 24s

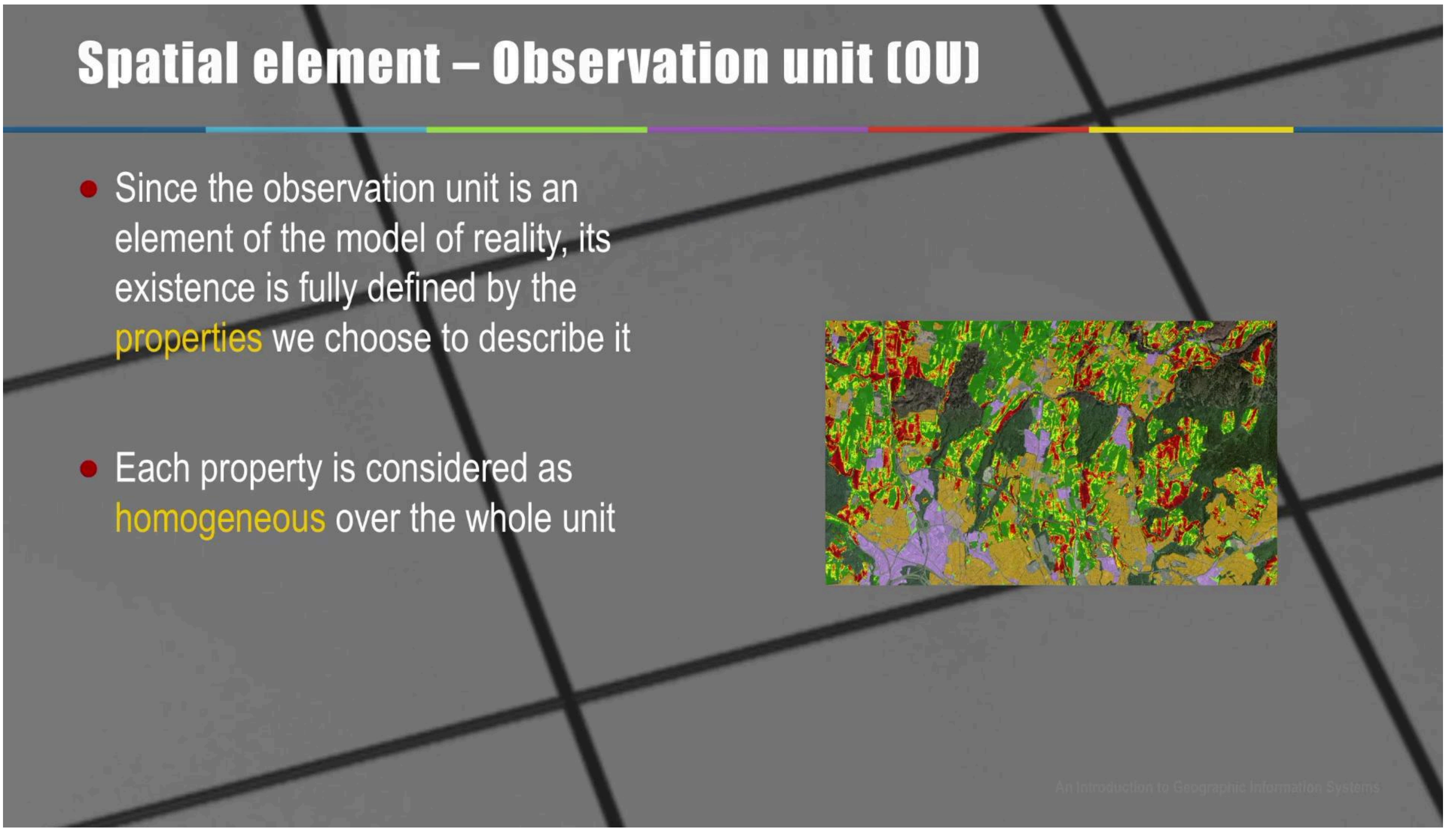


In this lesson, we will successively discuss the spatial entities theme or units of observation, the way these entities are used in an object approach then in an image approach. We will then discuss about the different dimensions of the spatial entities before moving to spatial information. The observation unit is the elementary geometric support of the geographic information or the portion of the observed geographic space. This observation unit is described by its geometry, for example, in the case of a polygon by the coordinates of its vertices, and by one or more thematic properties. The observation unit has as its major property to be indivisible, which means that it cannot decompose into subunits, any more than one large unit could be the sum of units that would compose it.

Notes

Summary

1m 40s

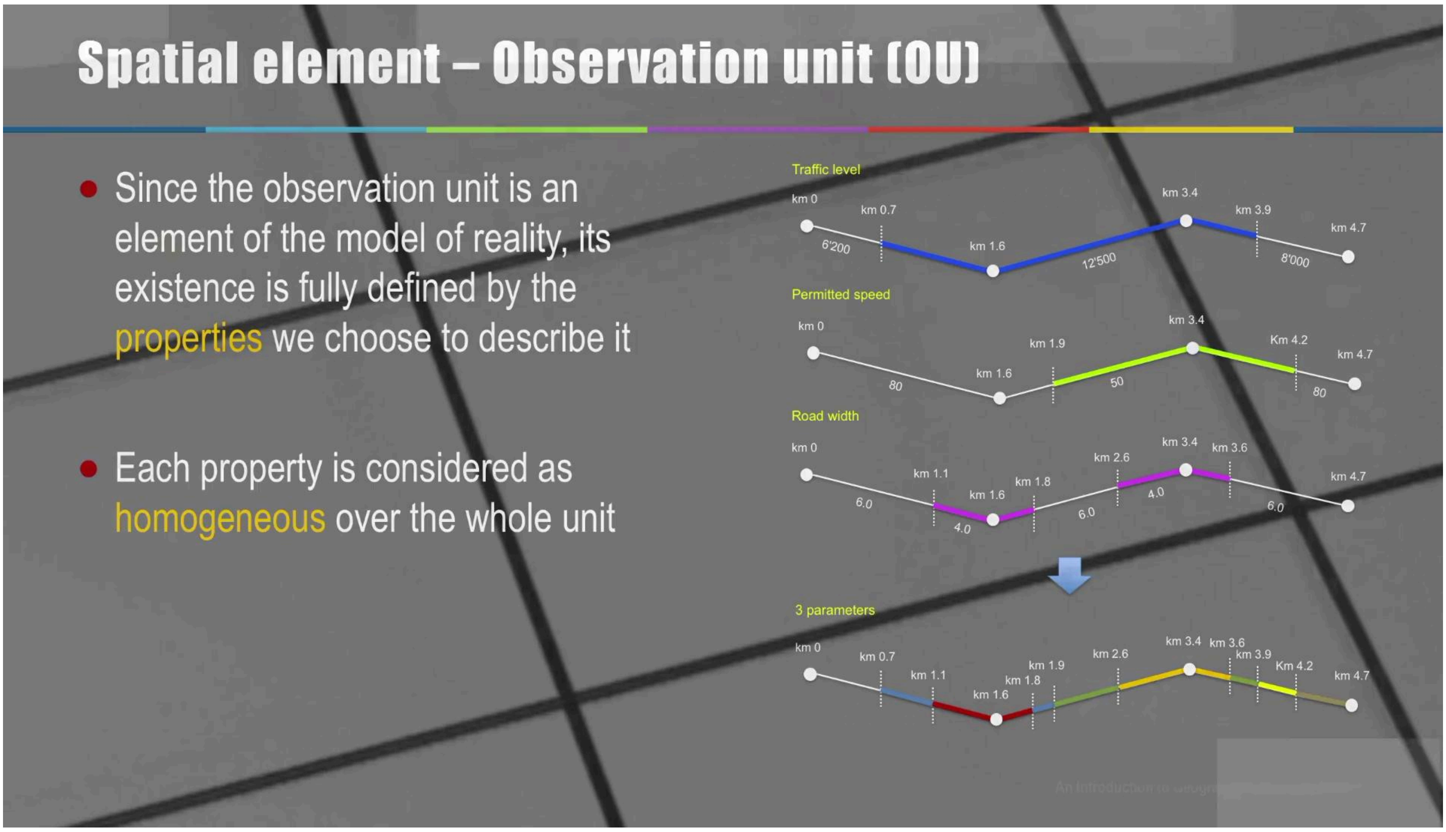


Since the unit of observation is an element of the model of reality, its existence is totally defined by the properties we have chosen to describe it, by which we mean that it is the choice of a thematic property, for example the type of building zone or the value of the erosion risk, which will define the units of observation with the important consequence of the units of observation being homogeneous throughout the unit and this for all their properties. Indeed, in the case of multiple properties, the superposition of different forms of division of the real, for example here to identify observation units that would be homogeneous both from the typology of the building zones point of view and the risk of erosion, leads to search for the lowest common denominator and to multiply the number of observation units.

Notes

Summary

2m 40s

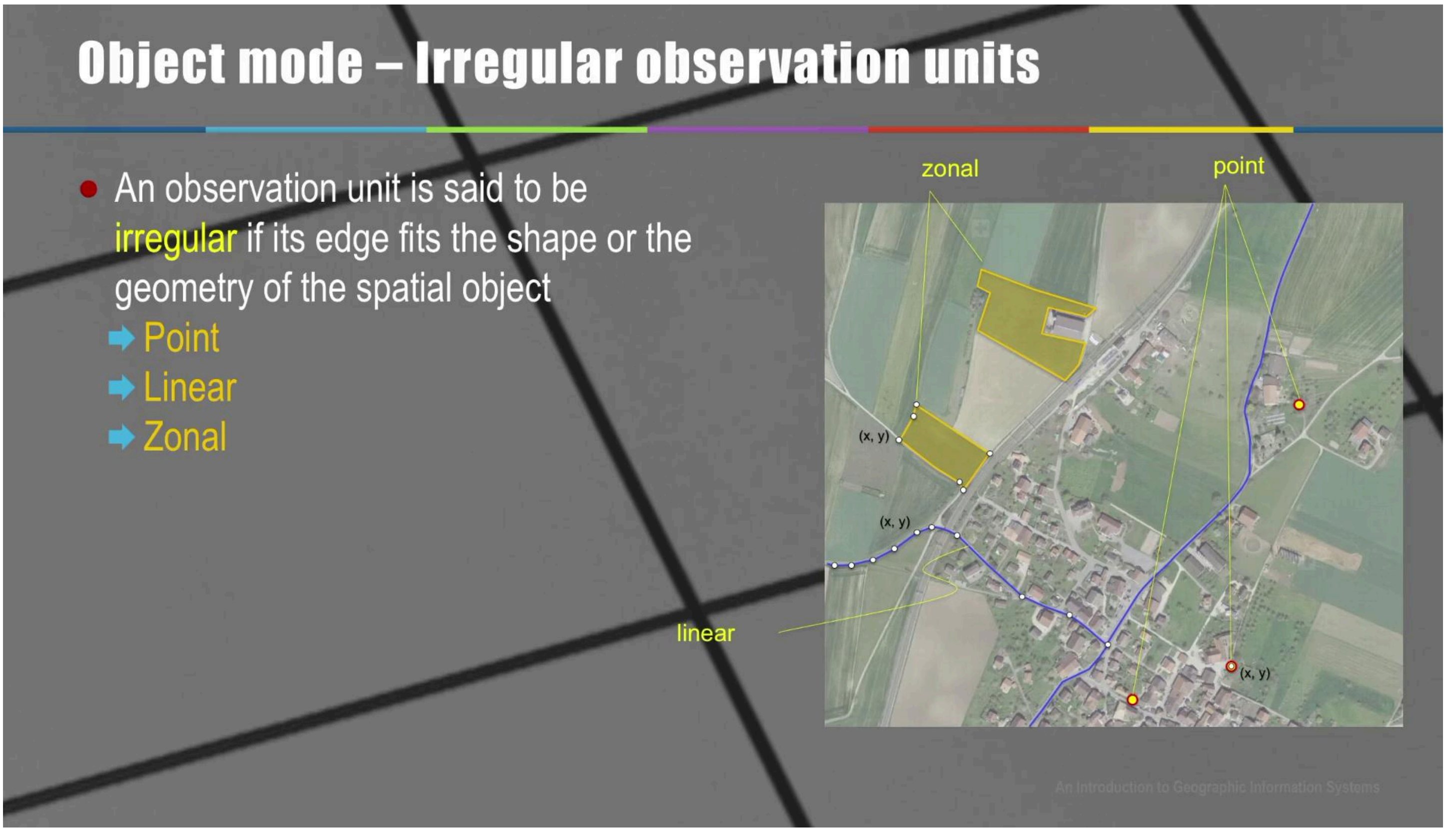


These notions of common denominator and division are particularly highlighted by the example of a road network whose sections can be described on the basis of the volume of traffic, of the authorized speed, or the width of the tracks, with each case having a different division. The definition of the observation units simultaneously for these three themes leads, for each unit of observation or element to be homogeneous in all its properties, to decompose the road network by creating a new observation unit with each change of one of these thematic parameters.

Notes

Summary

3m 29s

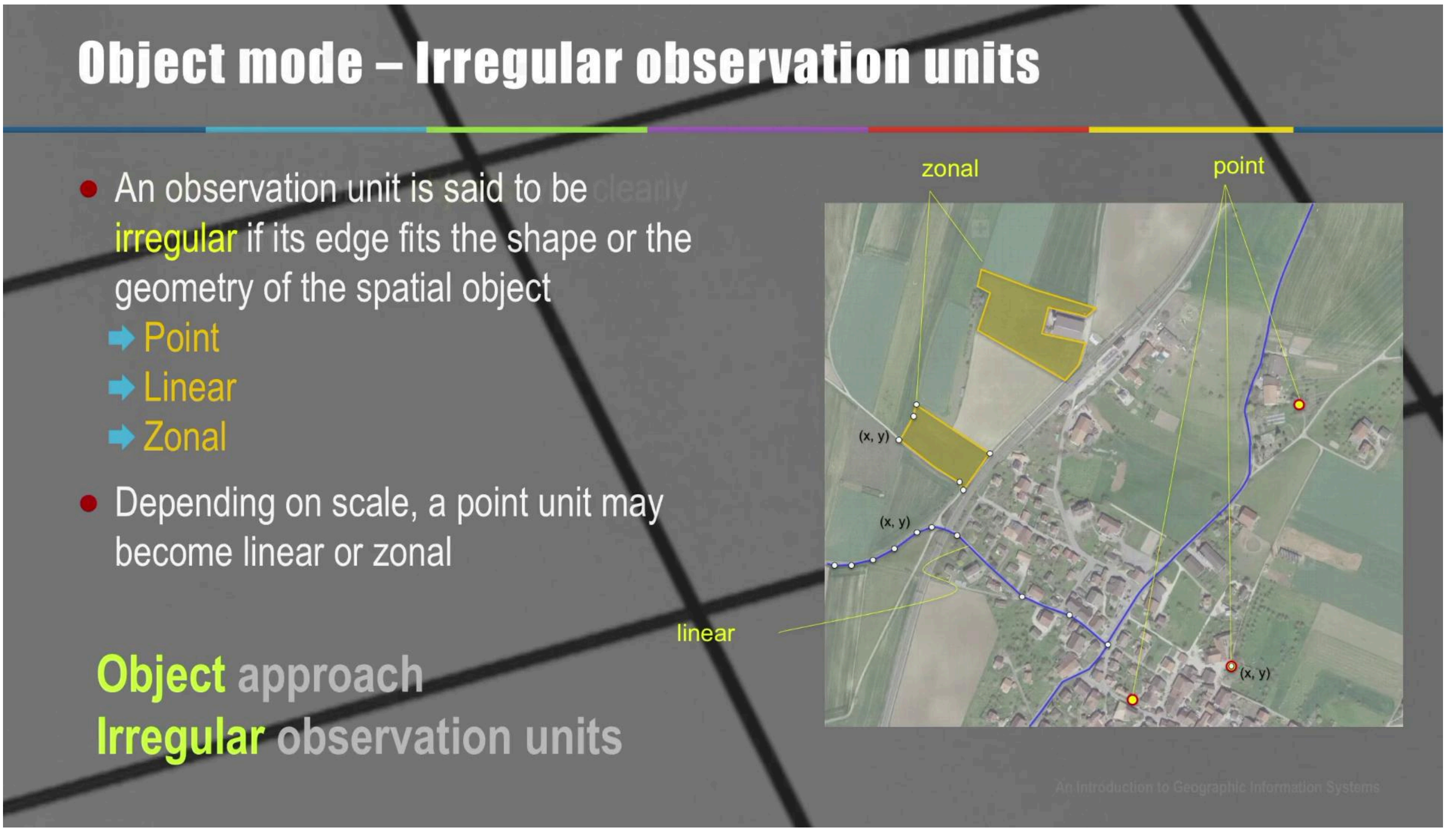


It is natural to modelize in the first place and spontaneously the shape of a spatial object by a geometric representation in general simple of the punctual, linear or zonal type. These geometries are described by the coordinates of their vertices in a reference system.

Notes

Summary

4m 14s

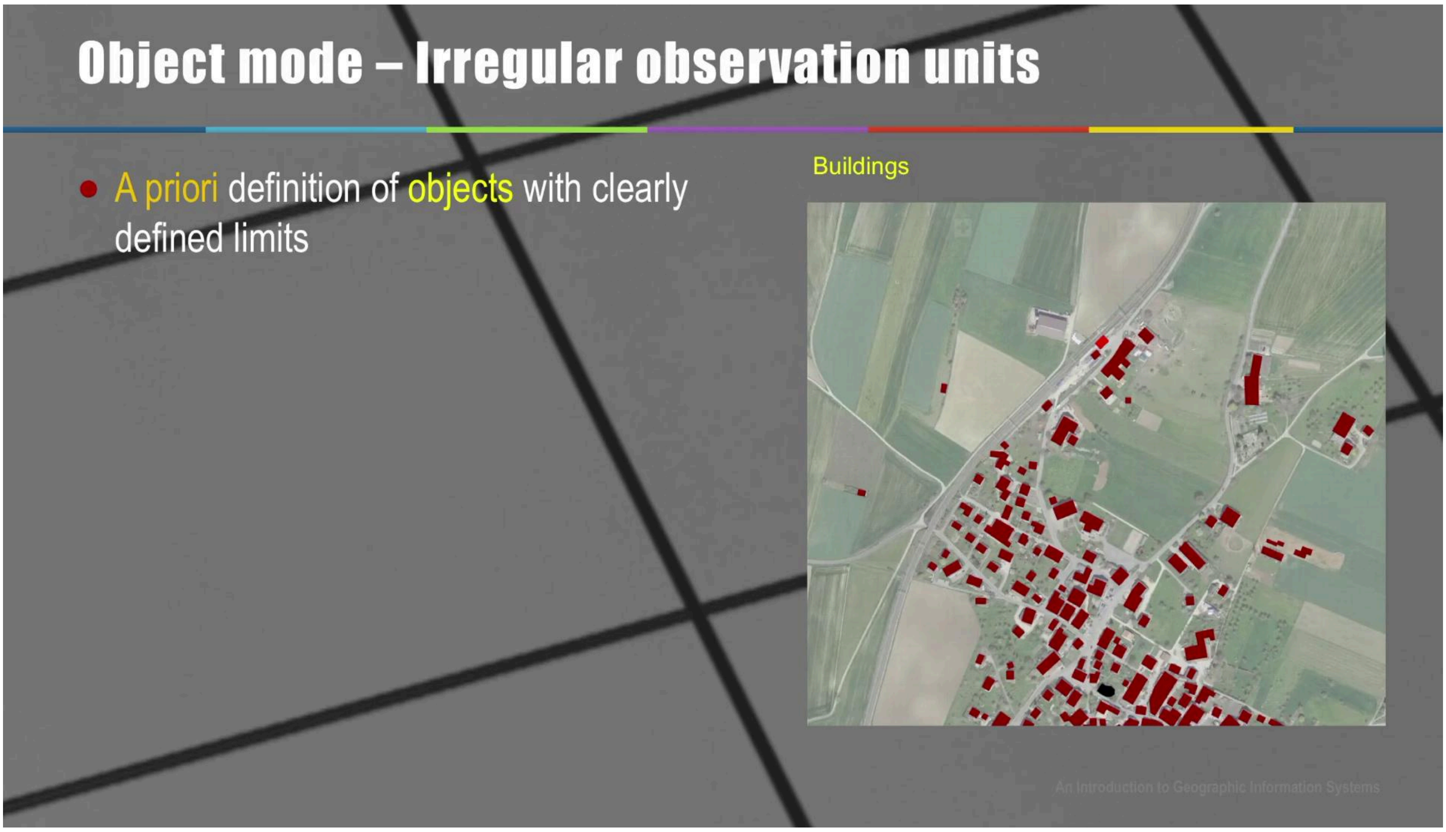


Of course, depending on the scale of representation, the shades of forms can lose their meaning, so much so that a linear or zonal object can be reduced to a point and vice-versa when the scale increases again. This type of description of spatial entities corresponds to an object approach and we talk about irregular observation units because they all take different forms.

Notes

Summary

4m 31s

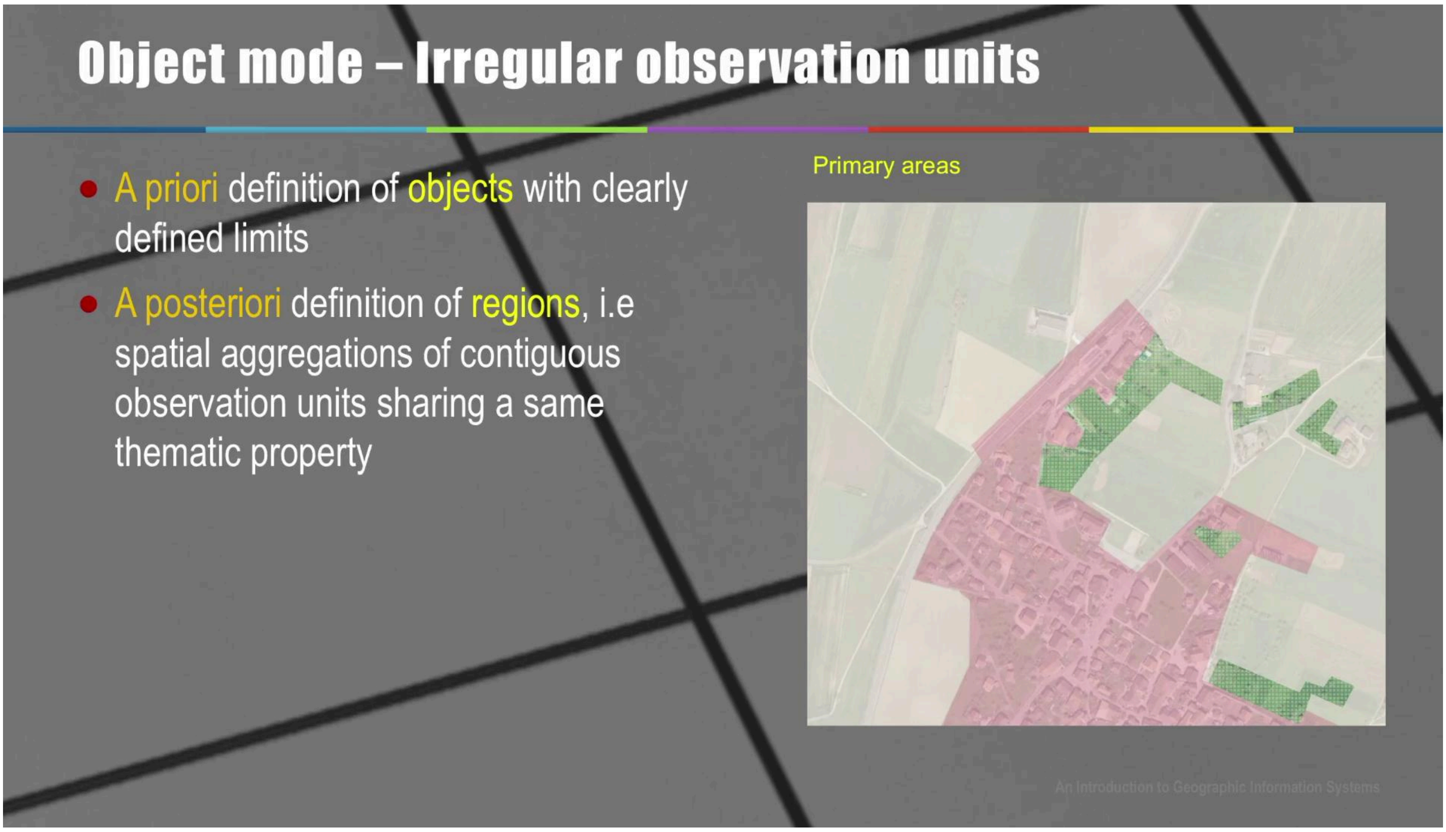


The object mode includes implicitly an a priori definition of spatial entities whose boundaries or contours have a physical reality, such as buildings, a railway line, the road network or building areas.

Notes

Summary

4m 53s

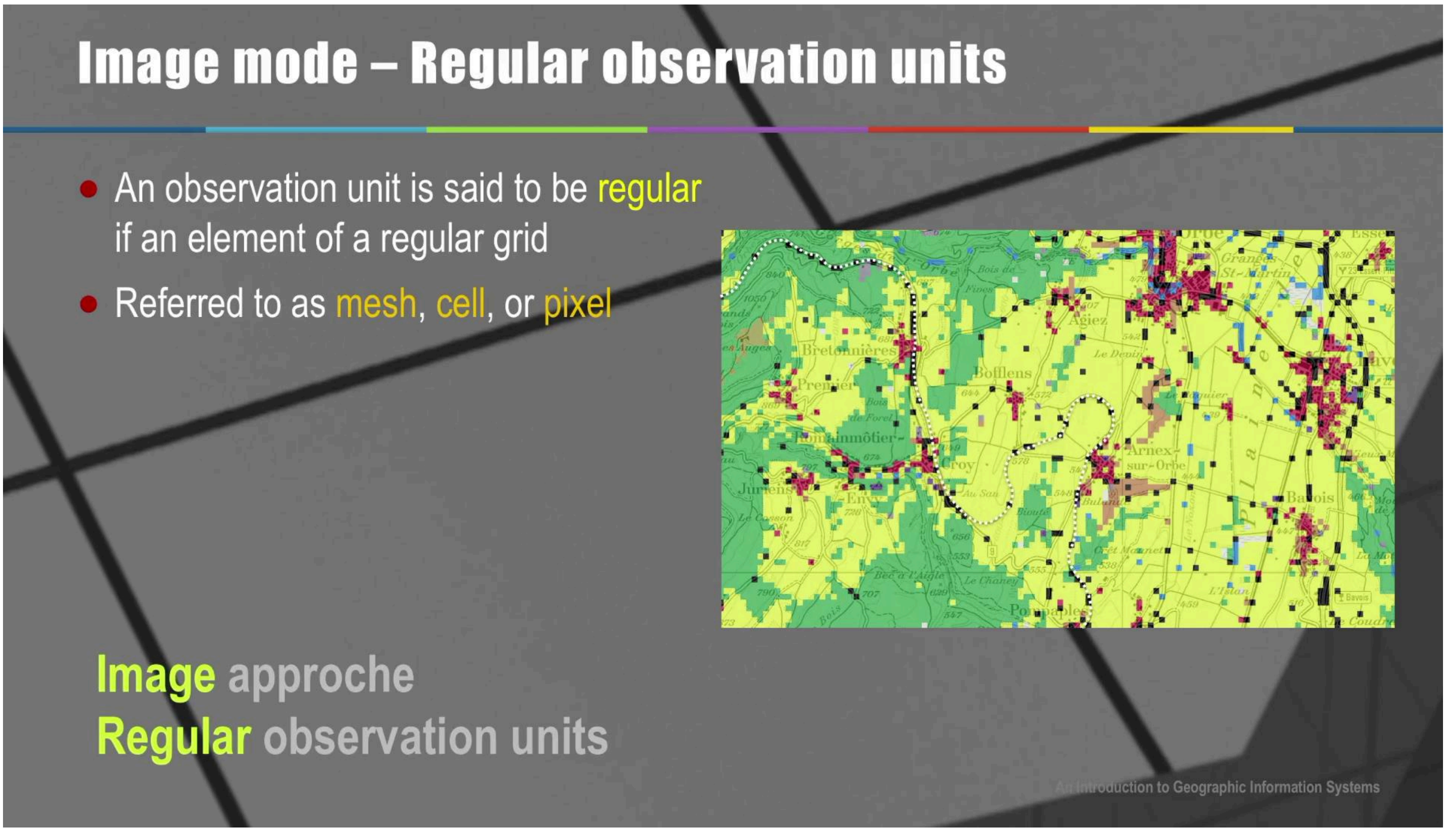


Spatial aggregation of observation units of the same nature, like here the aggregation of building zones to describe the land use, corresponds to a post facto definition of regions possessing the same thematic property.

Notes

Summary

5m 10s

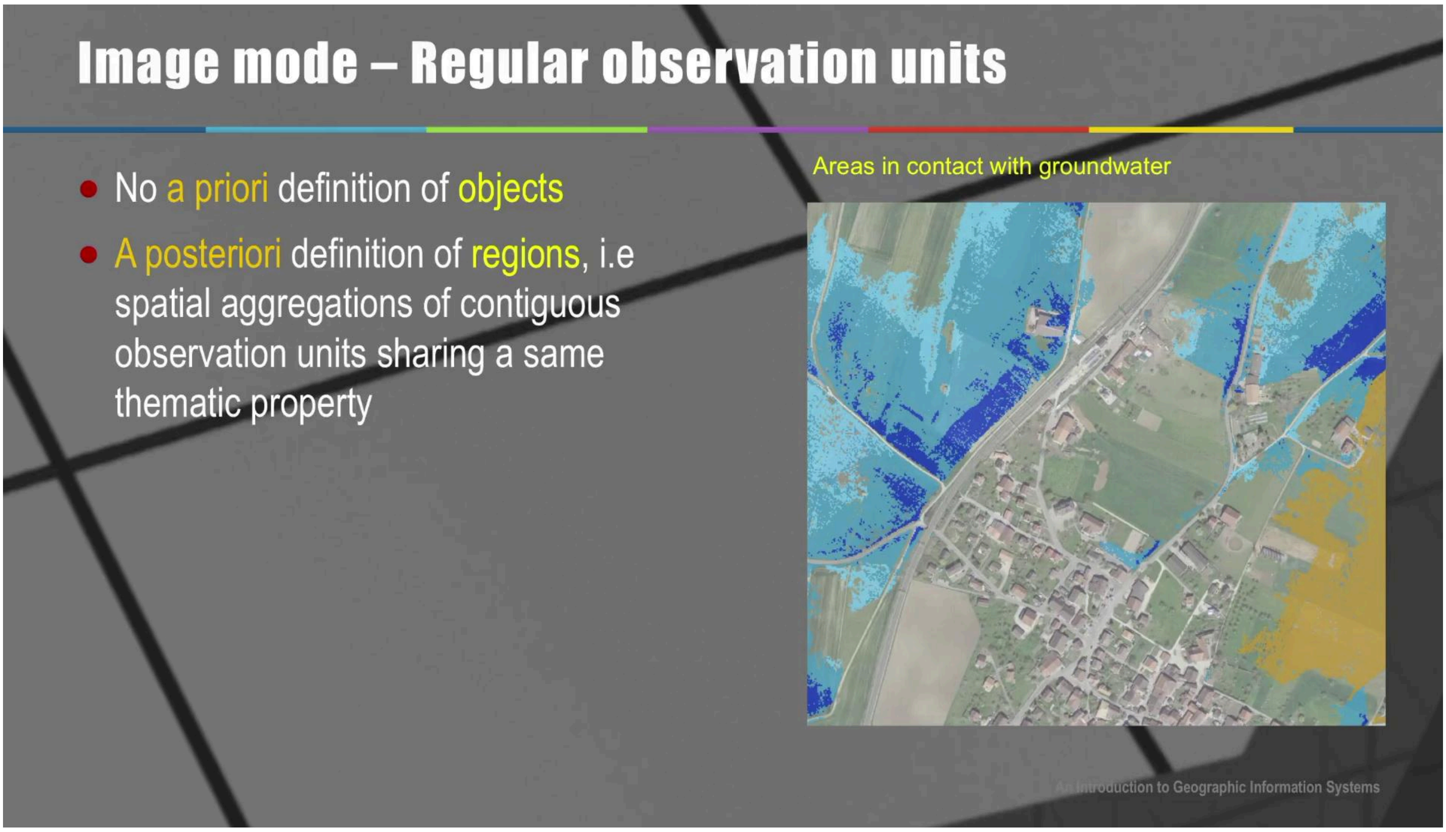


Regular observation units result from the decomposition of the geographical space or the territory according to a regular grid, each item being a mesh or cell or pixel, and then we speak, by analogy with the structure of a digital image, of an image or raster approach. For each theme, we assign a unique attribute to each cell. So there are as many grids to implement than there are themes to describe. Often, the content of a regular observation unit or cell is not really homogeneous, for example, in the case of land use. The value taken by the thematic value corresponds in principle to the dominant value of the pixel, but this is not necessarily the case. We see for example that such an approach would not allow to report the presence of a railway line in the image that is here and we could want to give a greater weight to this form of ground occupation to emphasize that infrastructure even for a relatively coarse grid in view of the phenomenon studied.

Notes

Summary

5m 34s

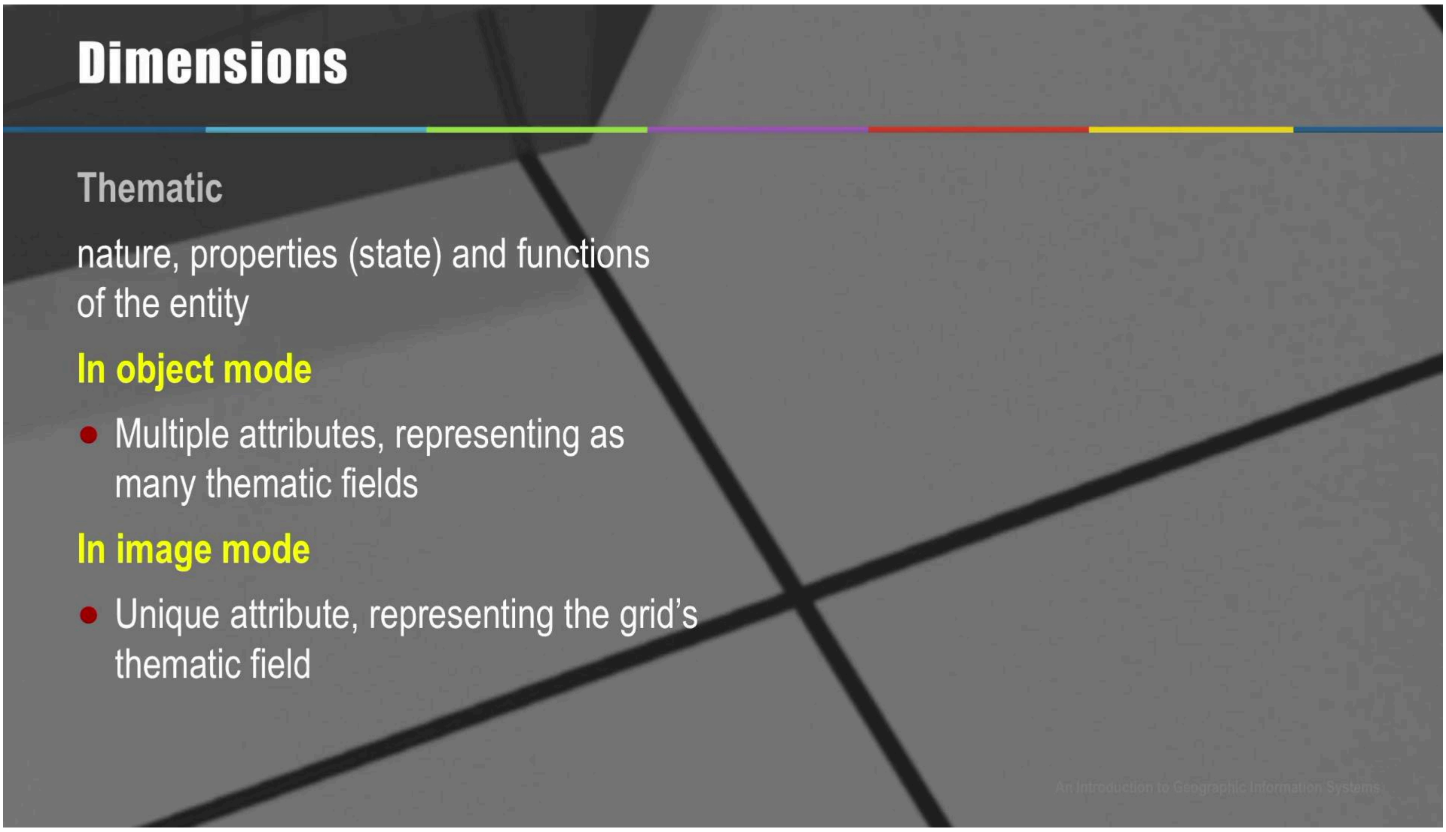


In image mode, obviously no object definition a priori since it would be rather unusual that physical limits of objects aligned up on a regular grid. However, we find the notion of regions defined post facto by the spatial aggregation of observation units of common thematic properties.

Notes

Summary

6m 33s

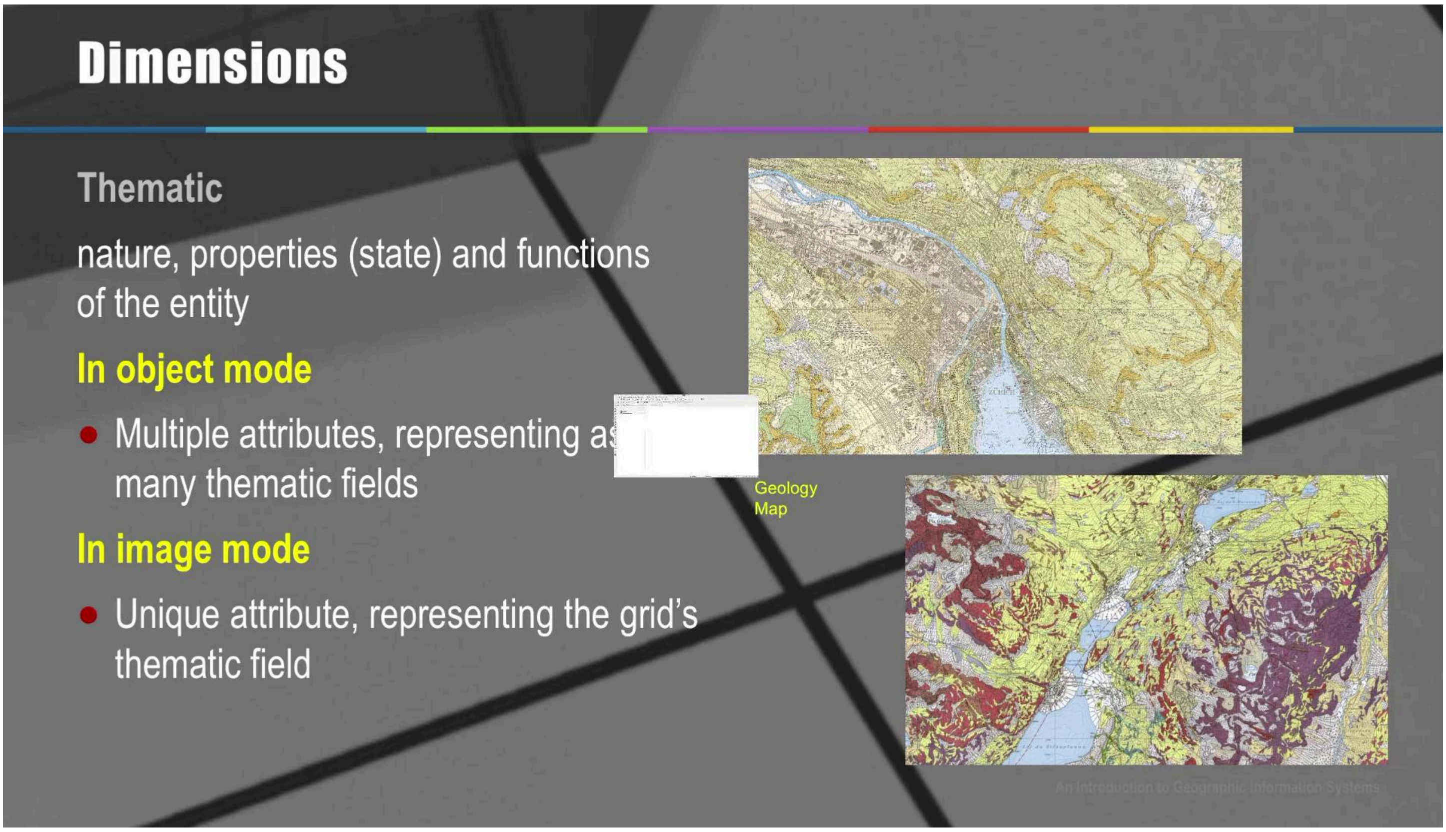


Whatever the mode of discretization of the adopted geographical area, the observation units have three fundamental dimensions which are the geometric dimension, the thematic dimension and the temporal dimension. The geometric dimension covers the position and neighborhood properties of the spatial entities, that is to say the location, the form, the size and the proximity. In object mode, the observation unit is defined and located by the coordinates of the points of its geometric model, the other information are mostly extracted from it. In image mode, the geometric properties are reduced to the resolution of the mesh, the location being deduced from the geo-referencing of the grid. The thematic dimension includes all he information characterizing the nature, the properties or the status and the functions of the spatial entity. In object mode, the attributes can be multiple as for example the construction state of the plots, the nature of the houses roofs, the rate of connection to electricity, the population density, the rate of motorization for motorcycles, for cars, for trailers, or again as here the traffic load plan.

Notes

Summary

7m 01s

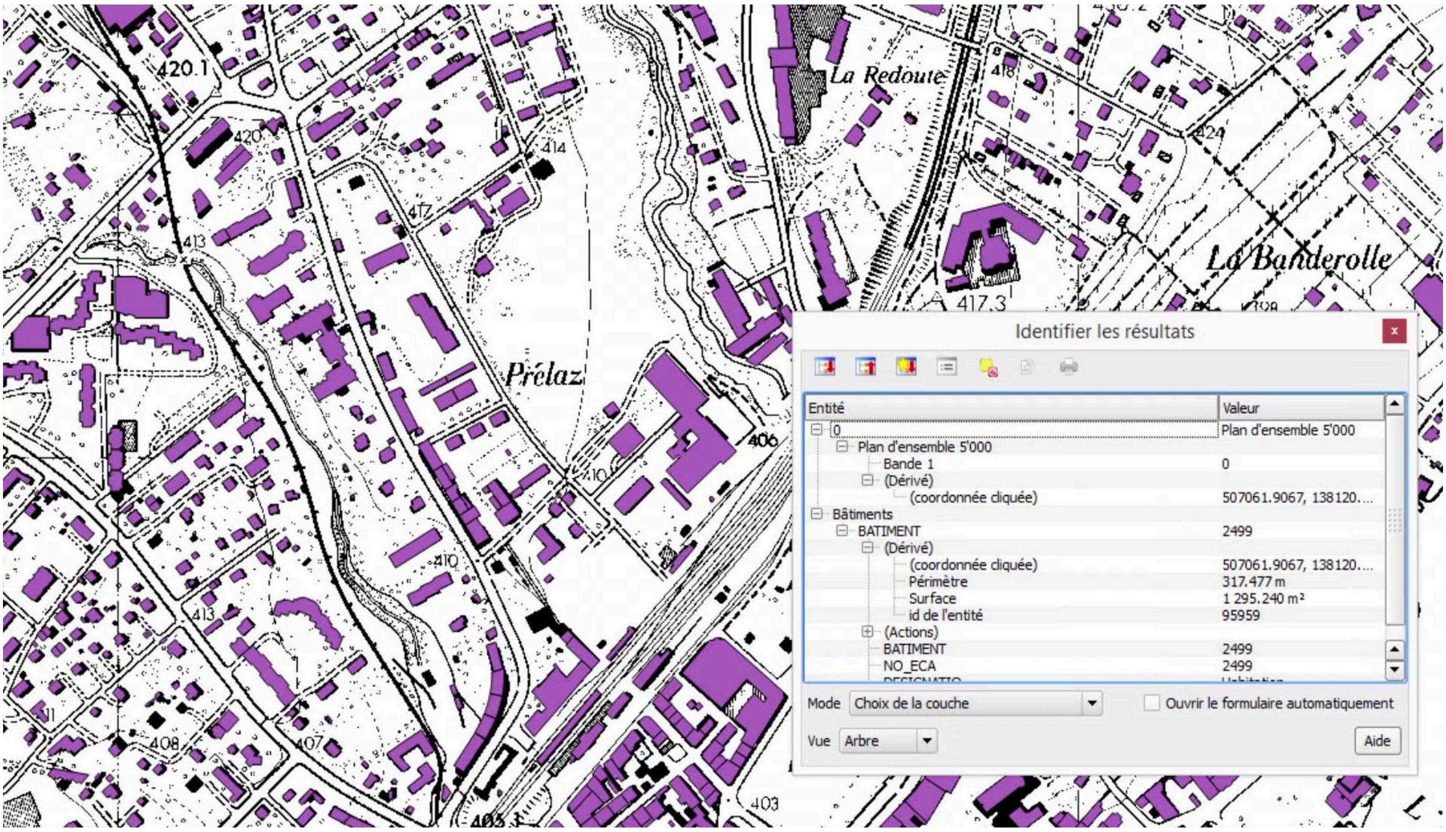


In image mode, the attribute is unique and constitutes the theme of the grid, as for example, the population density, the occupation of the ground, the aerial photography, or the national map or the geology.

Notes

Summary

8m 17s

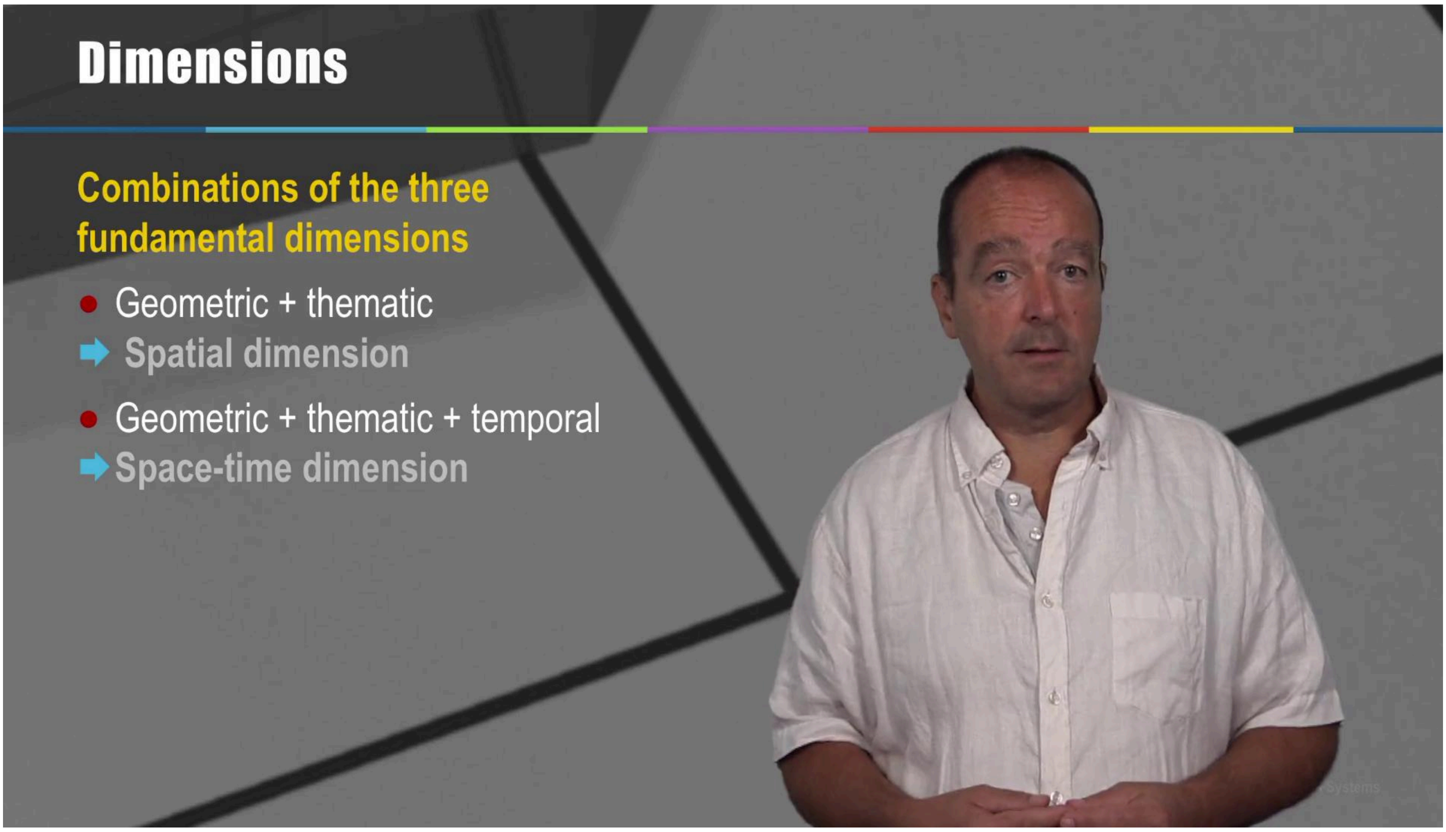


The example here shows an overall plan, so an image at the scale of 5,000 with different buildings, roads, etc. and a vectorial layer of these buildings. The data query tool, when used to click on one of these objects, allows to note that in the case of the overall image plan, the only information that we have, is the coordinates of the clicked point, whereas for the layer of buildings, we have information about the geometry, the perimeter, the surface and the building, the number and the designation, here a covered parking. Another example here of a bar of buildings where similarly, for the image plan, we just have the clicked coordinate whereas for the vectorial layer, we have a much greater wealth of information.

Notes

Summary

8m 30s

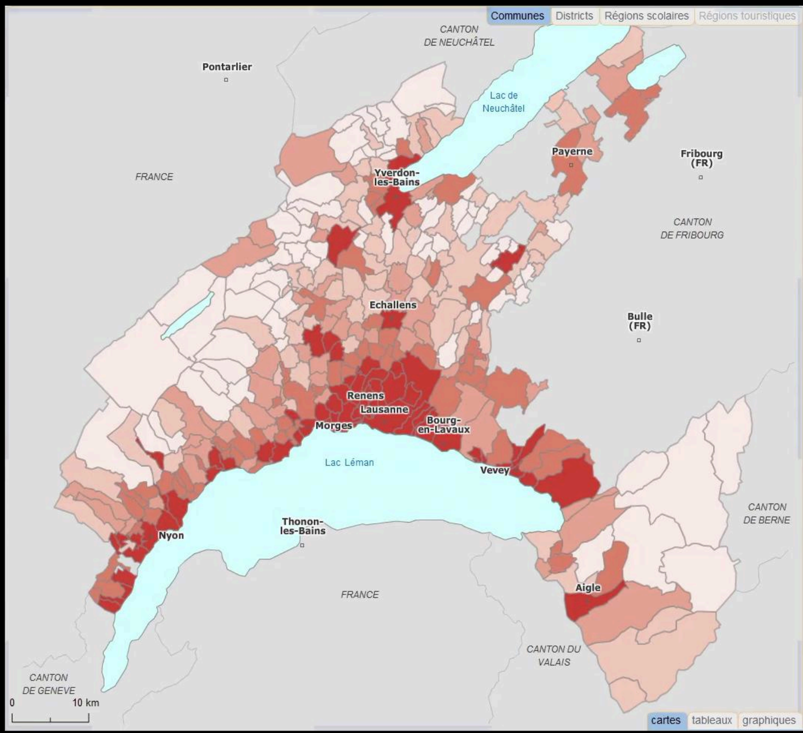


We have successively talked about the three fundamental dimensions characterizing the spatial entities, namely the geometric dimension, the thematic dimension and the temporal dimension. These dimensions can be combined, with each other. When we associate geometric dimension and thematic dimension, we speak of spatial dimension and with the temporal dimension in addition, we will speak of spatio-temporal dimension.

Notes

Summary

9m 23s

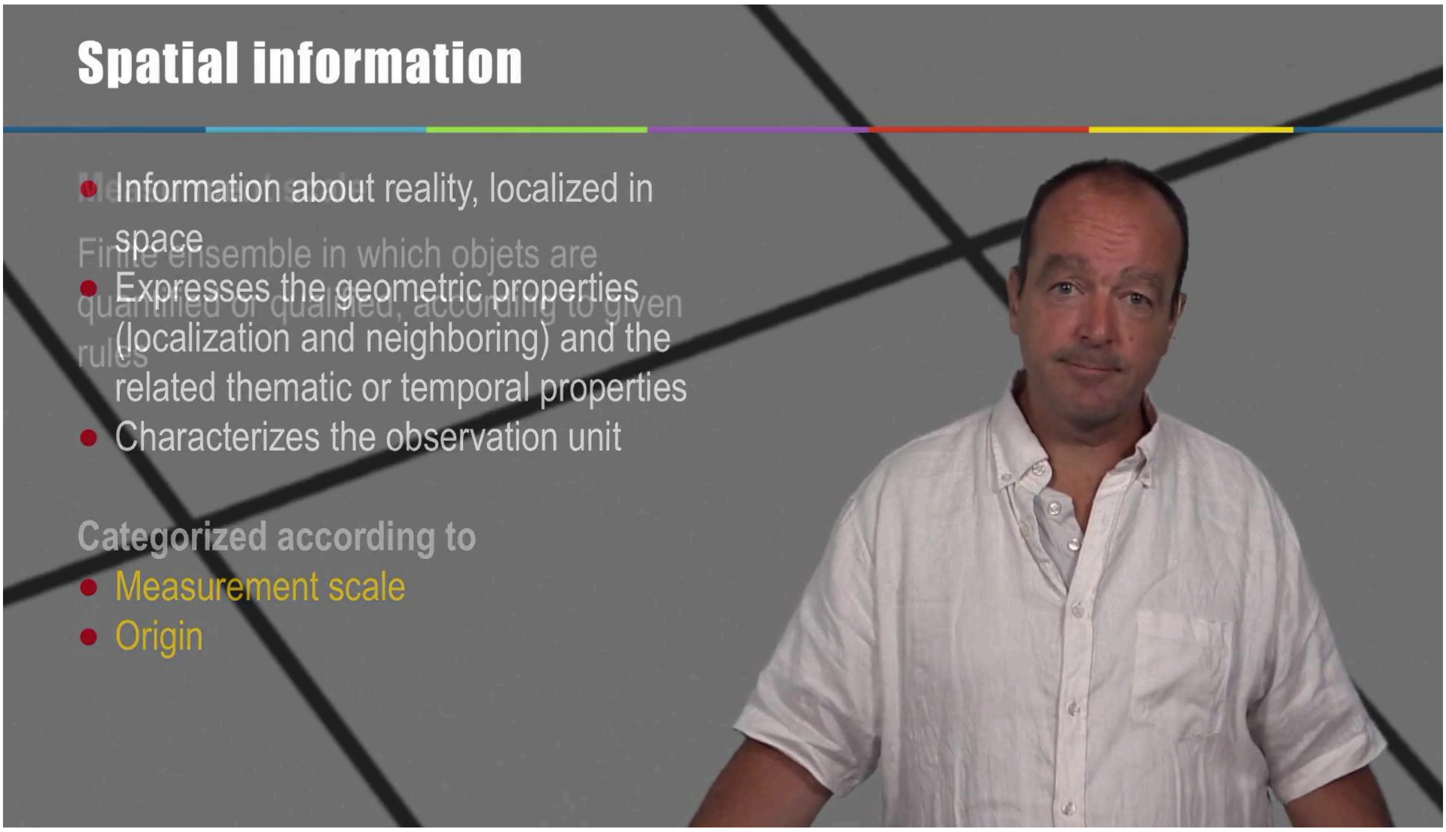


As an example of this spatio-temporal dimension, we have here the evolution of the population density in the different municipalities of the Canton of Vaud in Switzerland over the years.

Notes

Summary

9m 49s

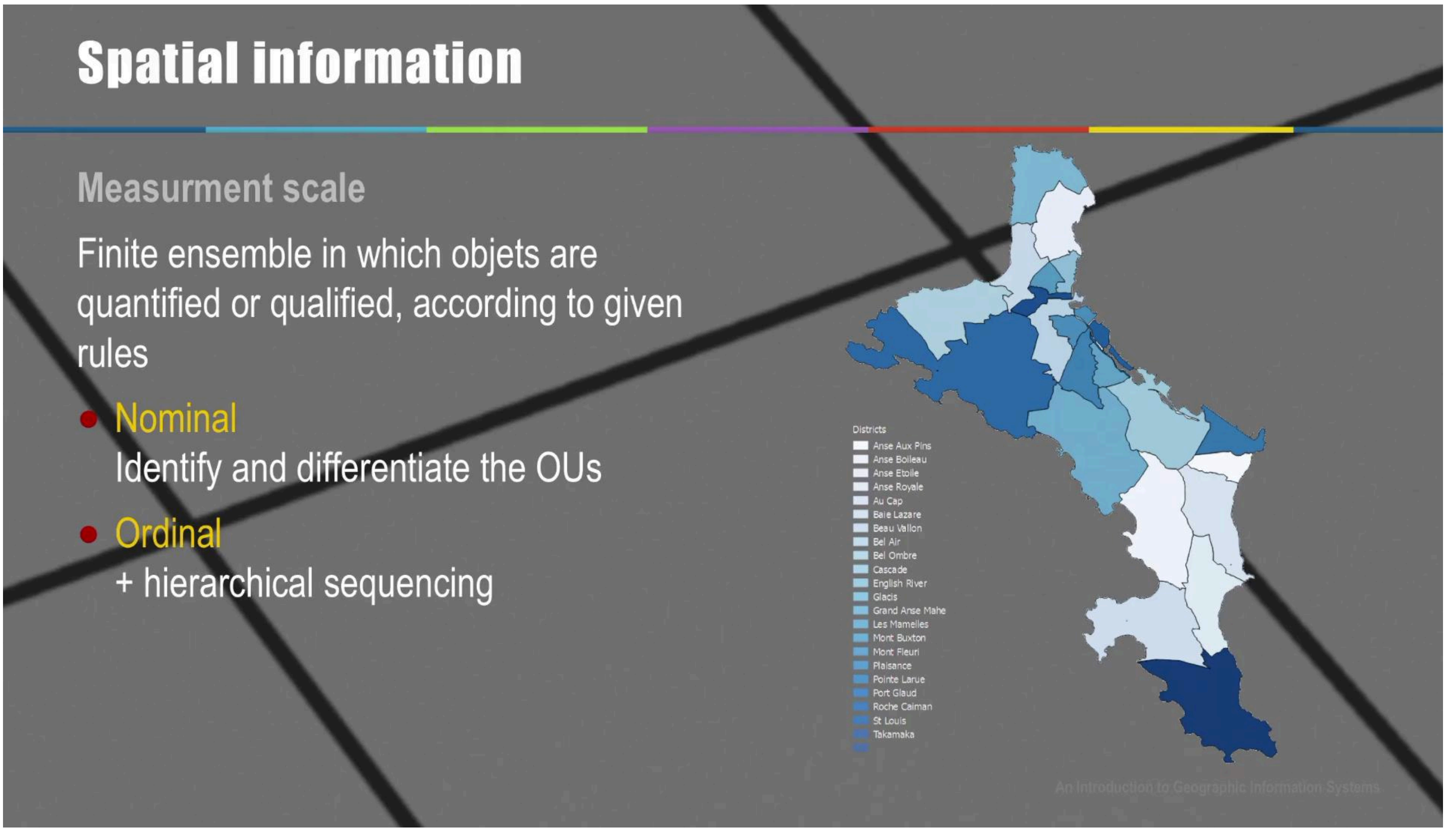


The concept of spatial information can be seen as the constituent element of geographic information systems. Indeed, it describes a reality localized in space, it expresses geometric properties and associated thematic and temporal properties and finallly it characterizes an observation unit. The spatial information can be categorized according to the measuring scale and according to its origin.

Notes

Summary

10m 04s

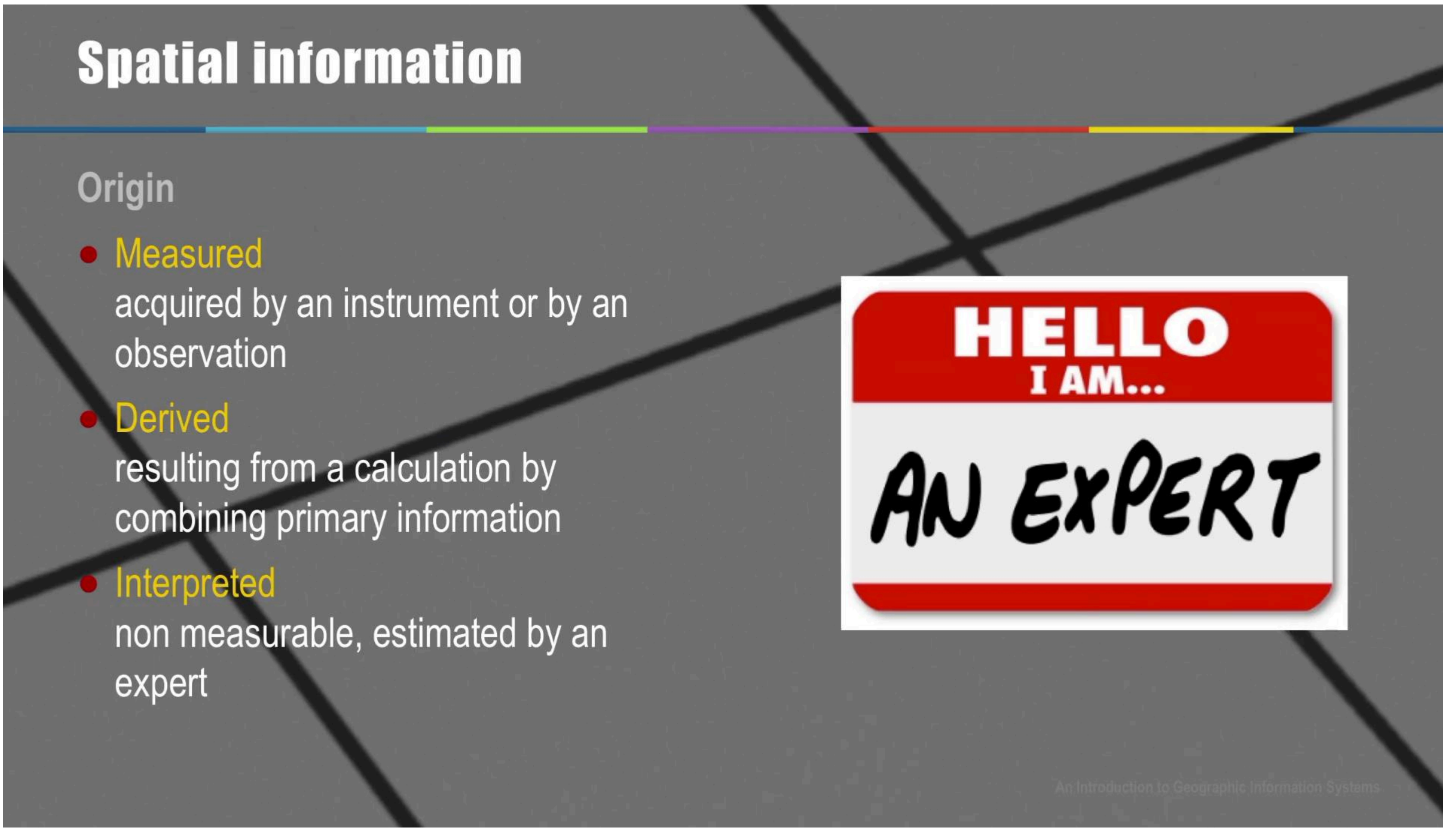


It can be nominal, which allows to identify and differentiate the observation units, like here differentiating the various districts of the Seychelles on the basis of their names, it can be ordinal, so allowing a hierarchical ordering, like here the series of Seychelles districts arranged alphabetically and finally, it can be cardinal, so have an associated metric, like here the districts filed in order of increasing area.

Notes

Summary

10m 43s



On the origin plan, the spatial information can either be measured, so acquired by an instrument or by observation, it can be derived so resulting from a calculation by combination of primary information, or interpreted, in the case of unmeasurable information estimated by an expert.

Notes

Summary

11m 14s