

# Geoinformatika

- \* Vymezení oboru
  - \* geoinformatika a kartografie
- \* Prostorová data
  - \* modely
  - \* topologie
- \* Geografické Informační Systémy (GIS)
  - \* komponenty
  - \* funkce
  - \* software pro tvorbu GIS

# Literatura

- \* Michael N. DeMers : Fundamentals of Geographic Information Systems (Willey 1997,2002,2008)
- \* Wolfgang Kainz : Geographic Information Science (GIS) ([mailbox.univie.ac.at/~kainzw5/Lehrveranstaltungen/ GIS/GIS\\_Skriptum.pdf](mailto:mailbox.univie.ac.at/~kainzw5/Lehrveranstaltungen/GIS/GIS_Skriptum.pdf))

# Geoinformatika

- \* Teorie zpracování geografické informace
- \* Geografické Informační Systémy - speciální informační systémy pro zpracování geografické informace
- \* Software pro tvorbu GIS
- \* Geoinformační studie - Socio-kulturní kontext (legální, ekonomický), infrastruktura

# Geoinformační vědy

- \* Kartografie
- \* DPZ (RS)
  - \* Zpracování obrazu (IP)
  - \* Fotogrametrie
- \* Geodézie
  - \* GPS

# Pomocné vědy

- \* Informatika
  - \* Teorie databázových systémů
  - \* Výpočetní geometrie
  - \* Umělá inteligence
- \* Matematika
  - \* Geostatistika
- \* Geografie
- \* Kognitivní vědy, psychologie, lingvistika

# GI a kartografie

- \* kartografie

- \* datový model

- \* reprezentace

- \* analýza

- \* geoinformatika

- \* technologie

- \* archivace

- \* analýza

# Geografická informace

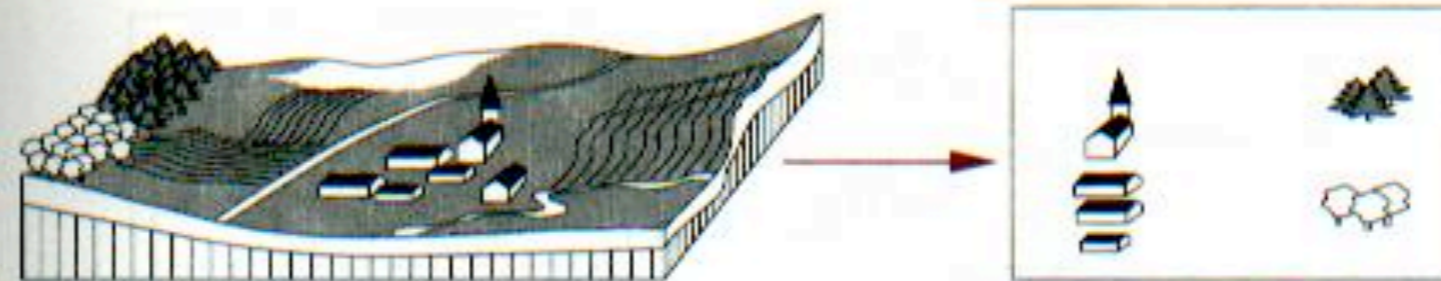
- \* Informace o jevech reálného světa obsahující prostorovou složku
- \* Data = záznam informace
- \* Geodata = záznam geografické informace
- \* Prostorová data = obecnější termín pro geodata



# Geodata

- \* Geometrie + atributy
- \* Geometrie se skládá z
  - \* Lokace
  - \* Tvar
  - \* Topologie

# geodatové modelování



THE REAL WORLD

REAL-WORLD MODEL

Buildings	
- probable categories:	house, outbuilding, industrial building
- situated at:	property no./lot no.
- represented by:	single point
- geometric accuracy:	± 10 m

Vegetation	
- probable categories:	spruce, oak
- coverage/area:	hectares
- represented by:	area (polygon)
- geometric accuracy:	± 2.0 m

DATA MODEL

ID	Type	Property No.	X	Y	Accuracy
1	House	44 113	350	575	± 10.0
2	Outbuilding	45 6	375	600	± 10.0
3	Industrial	45 11	345	630	± 10.0

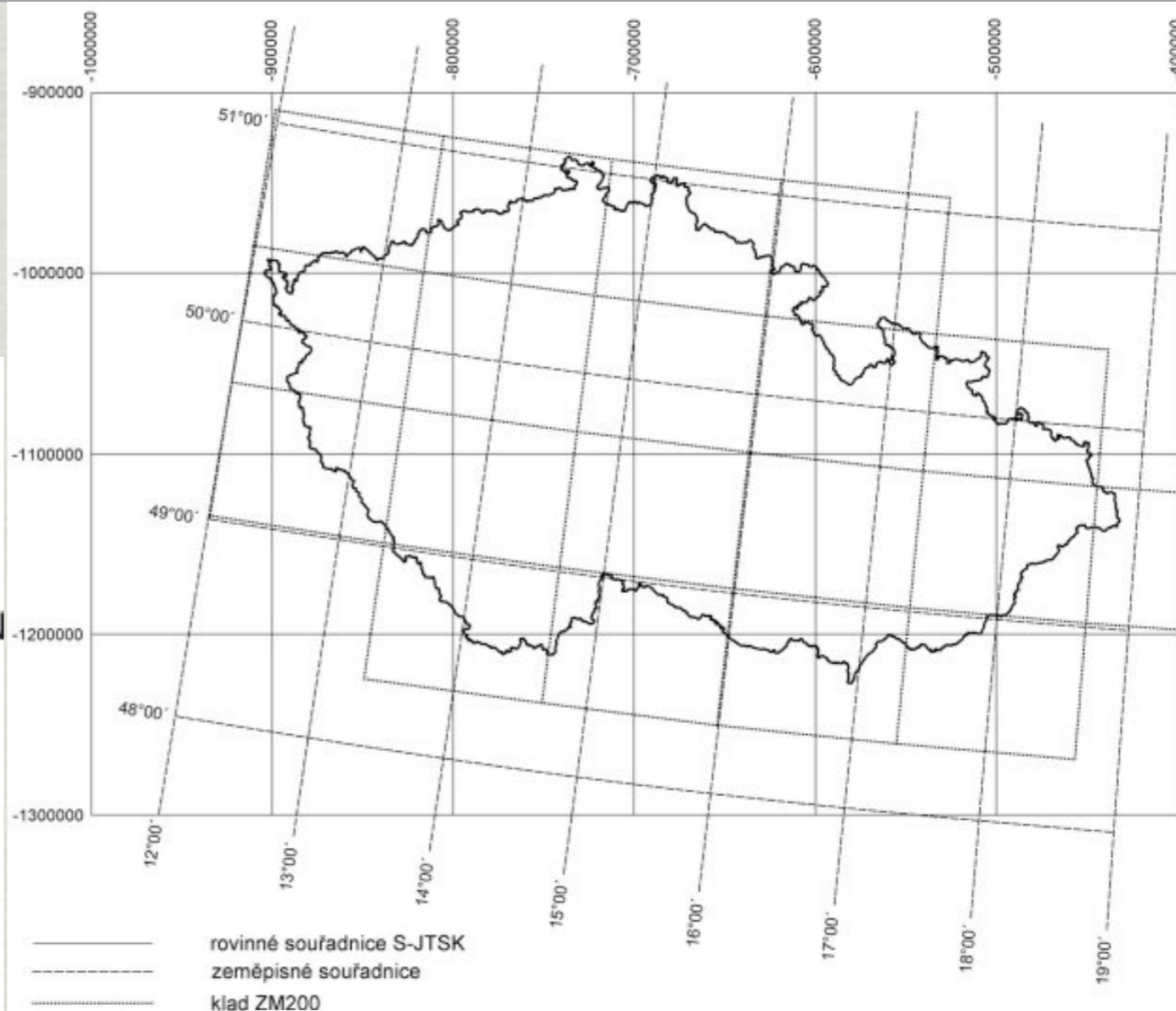
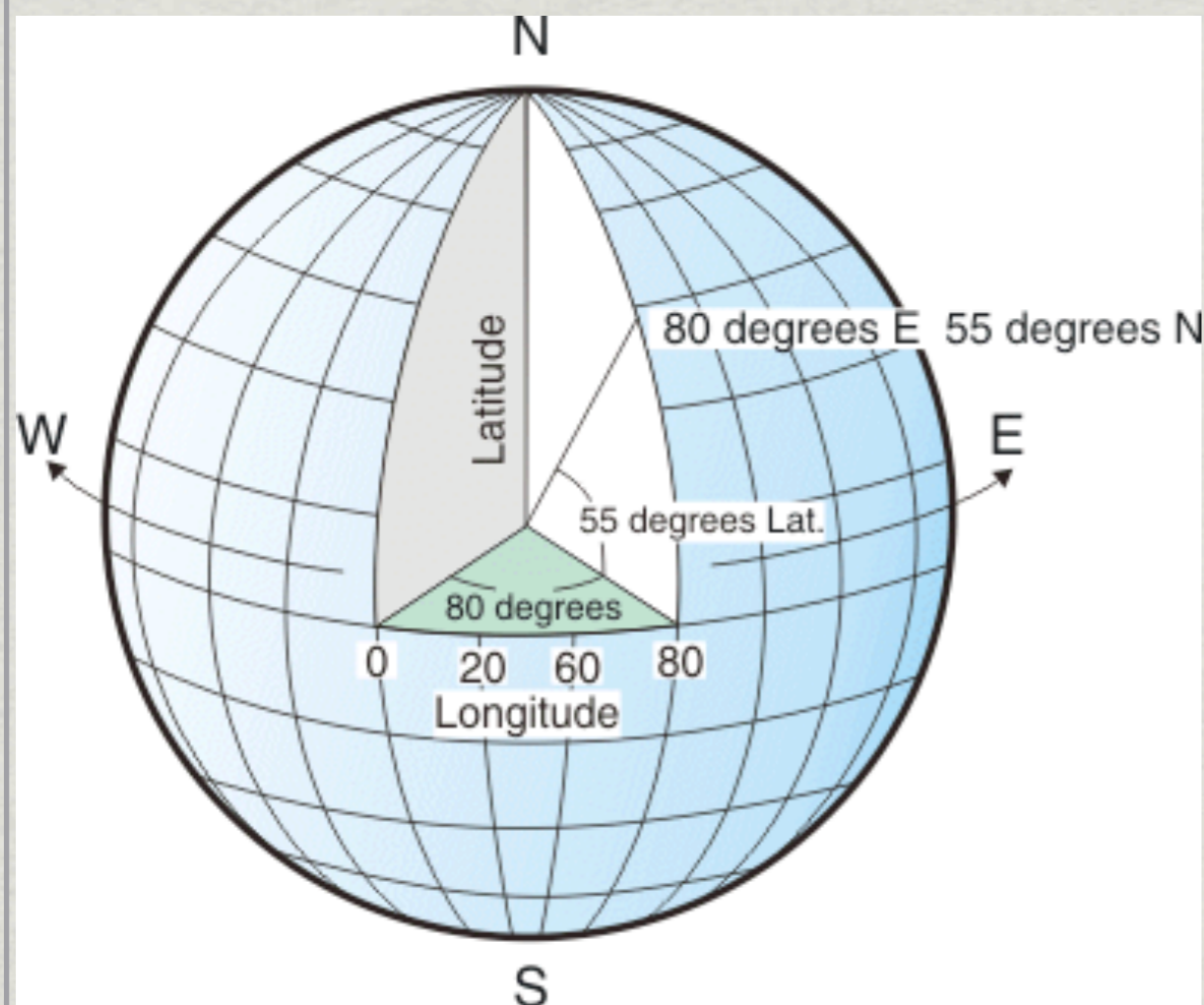
ID	Type	Area	Coordinates				Accuracy	
10	Spruce	100	250,420	250,455	370,475	360,420	250,420	± 2.0
20	Oak	50	360,420	370,475	425,395	425,420	360,420	± 2.0

DATA BASE

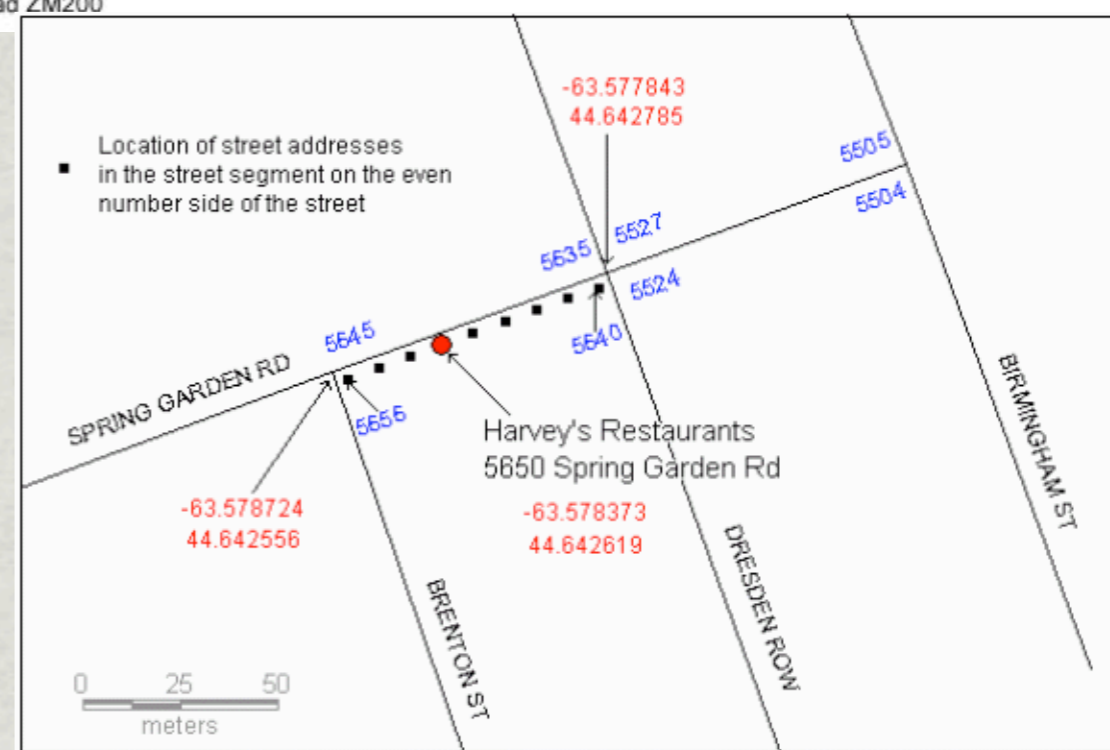


MAP WITH SYMBOLS

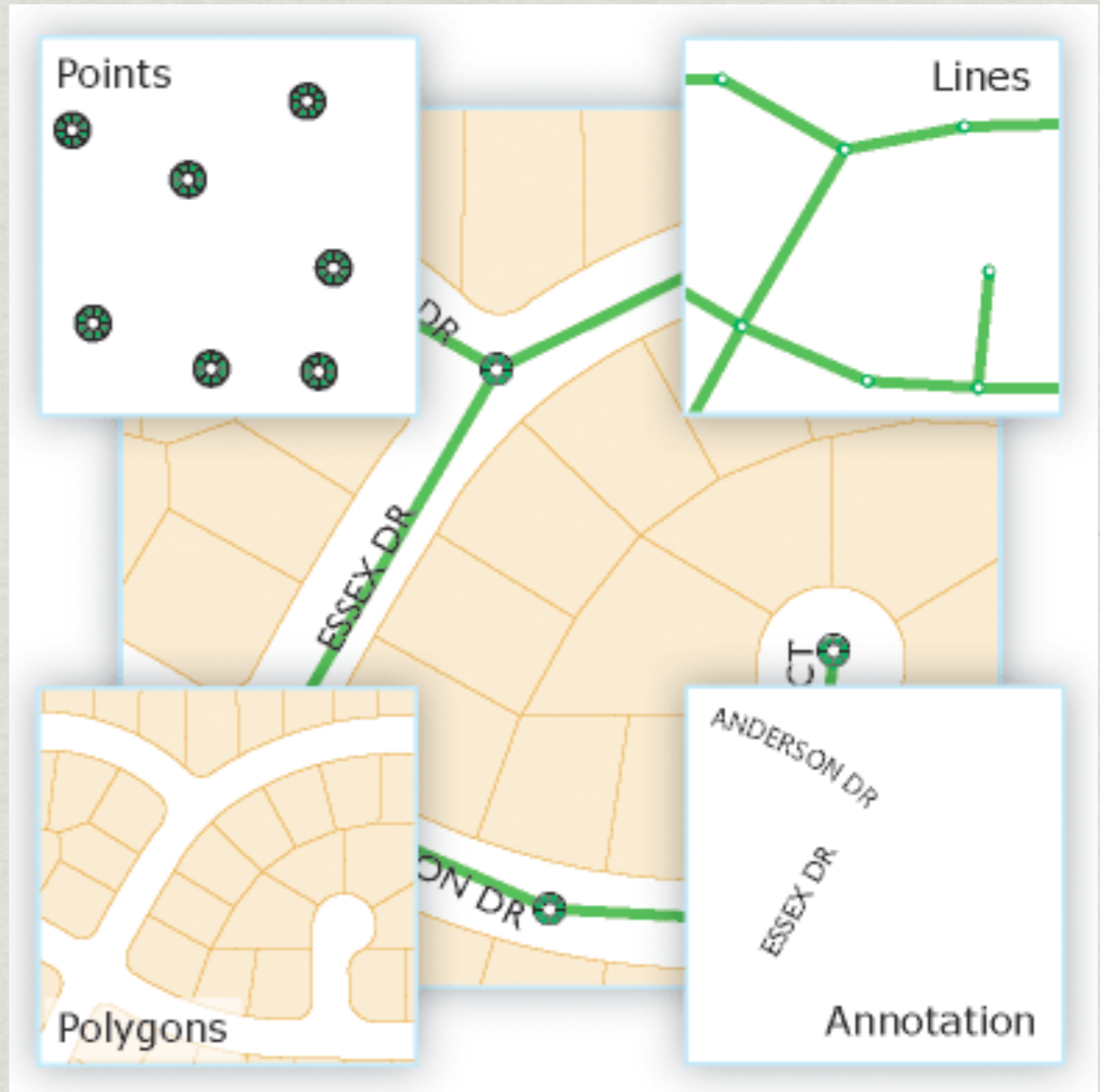
# Lokace



## GEOREFERENCOVÁNÍ GEOKÓDOVÁNÍ



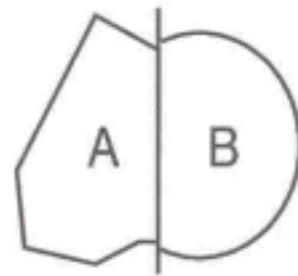
# Tvar



# *TOPOLOGY*

## SPATIAL RELATIONSHIPS

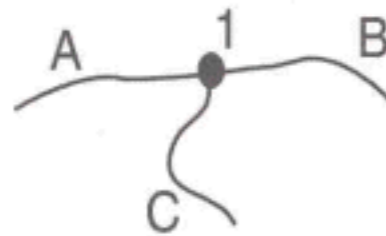
CHAIN 1



LEFT POLY = A

RIGHT POLY = B

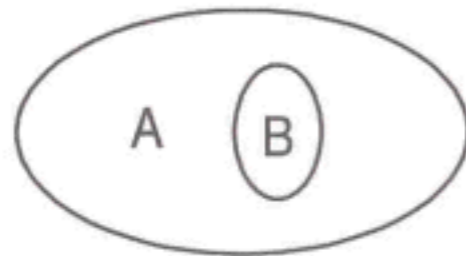
**ADJACENCY**



NODE 1 = CHAINS A, B, C

CHAIN A IS CONNECTED  
TO CHAINS B and C

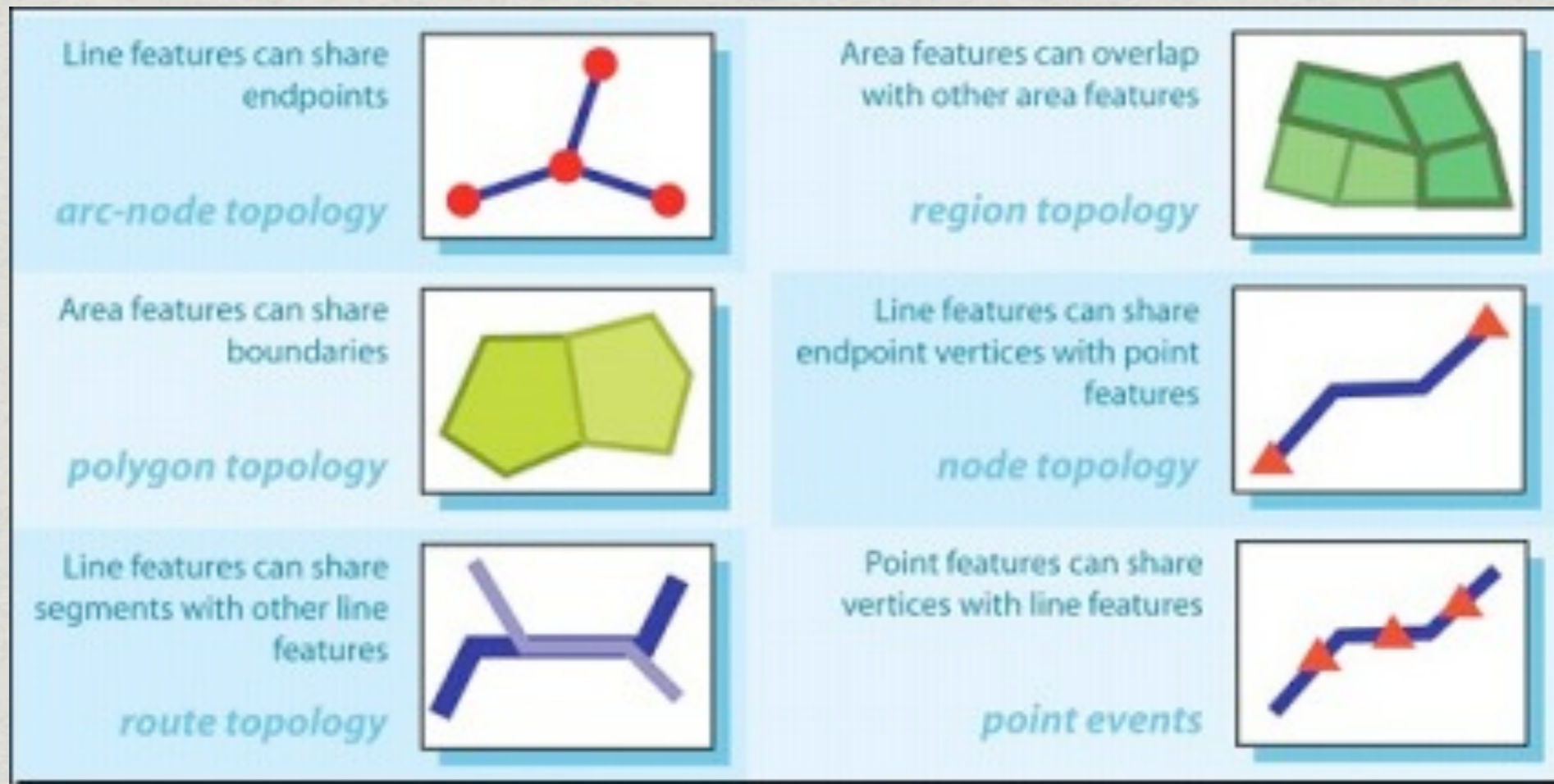
**CONNECTIVITY**



POLY B CONTAINED  
WITHIN POLY A

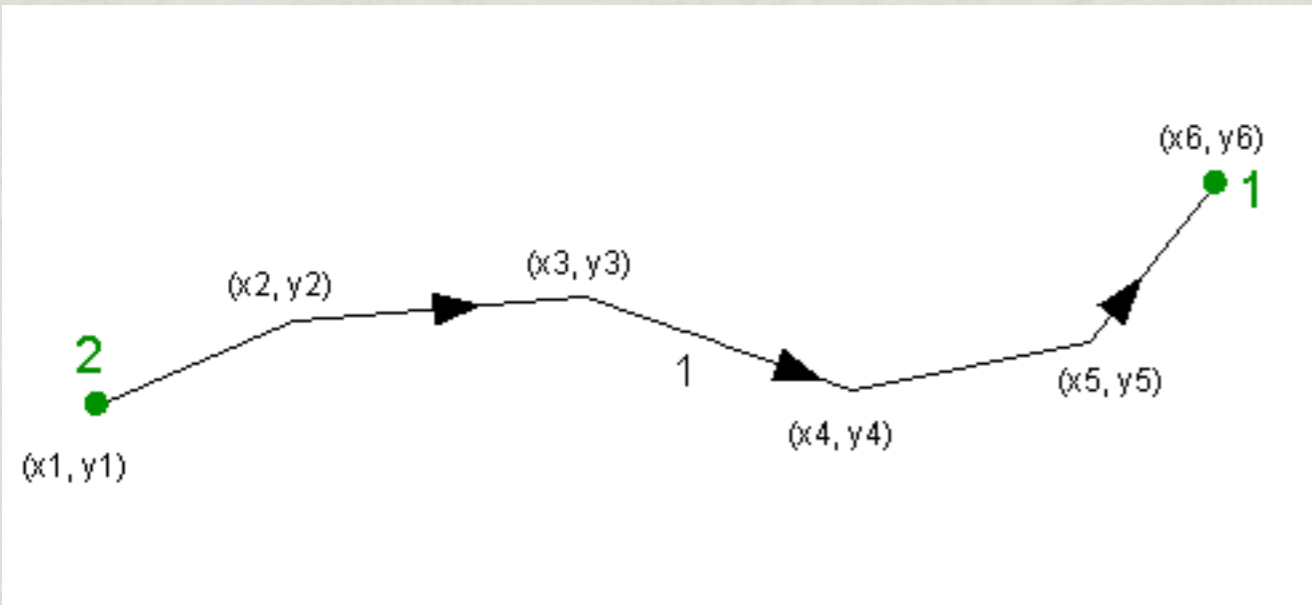
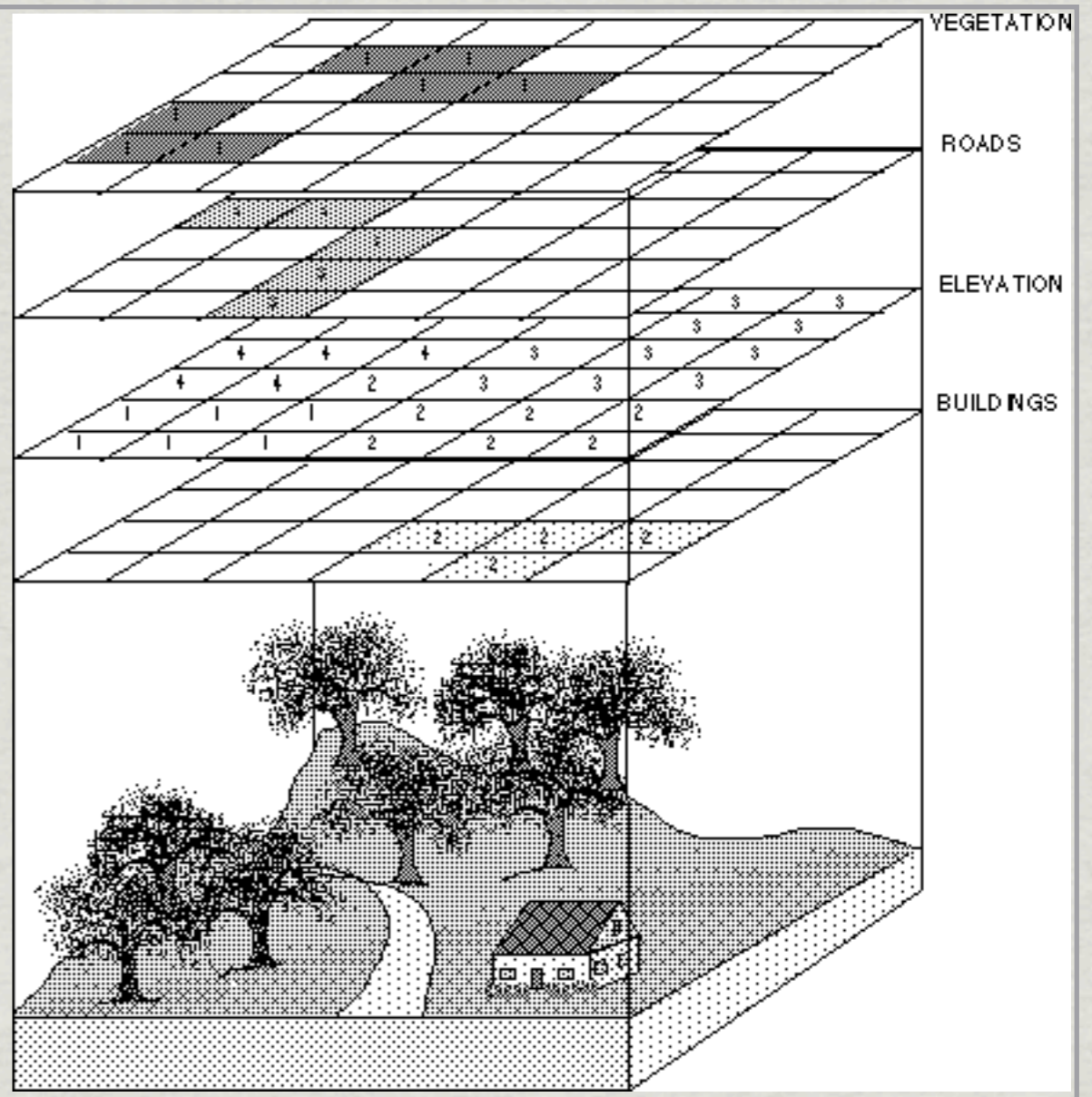
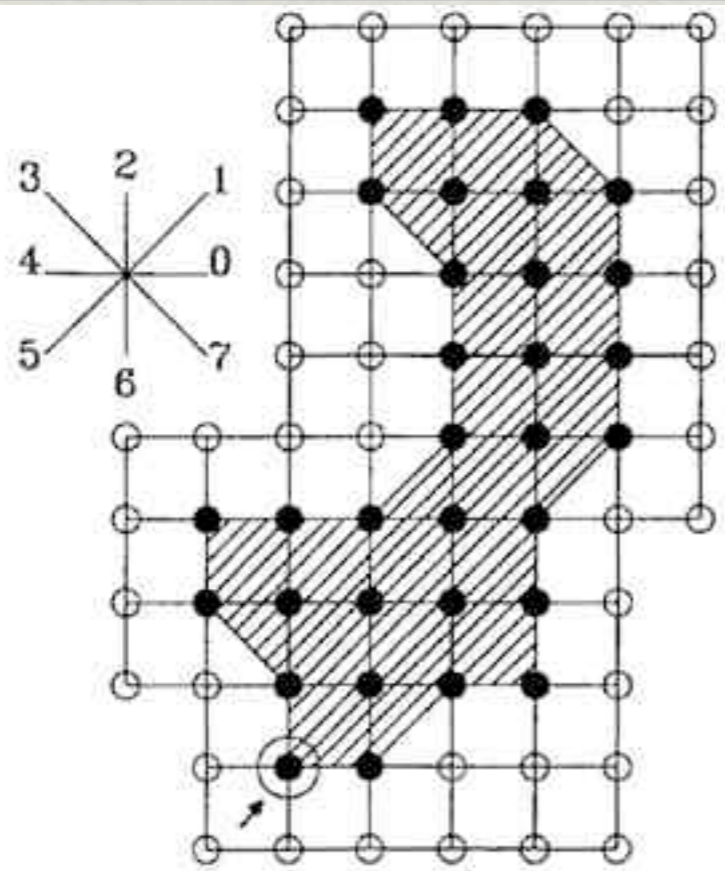
**CONTAINMENT**

# Topologie

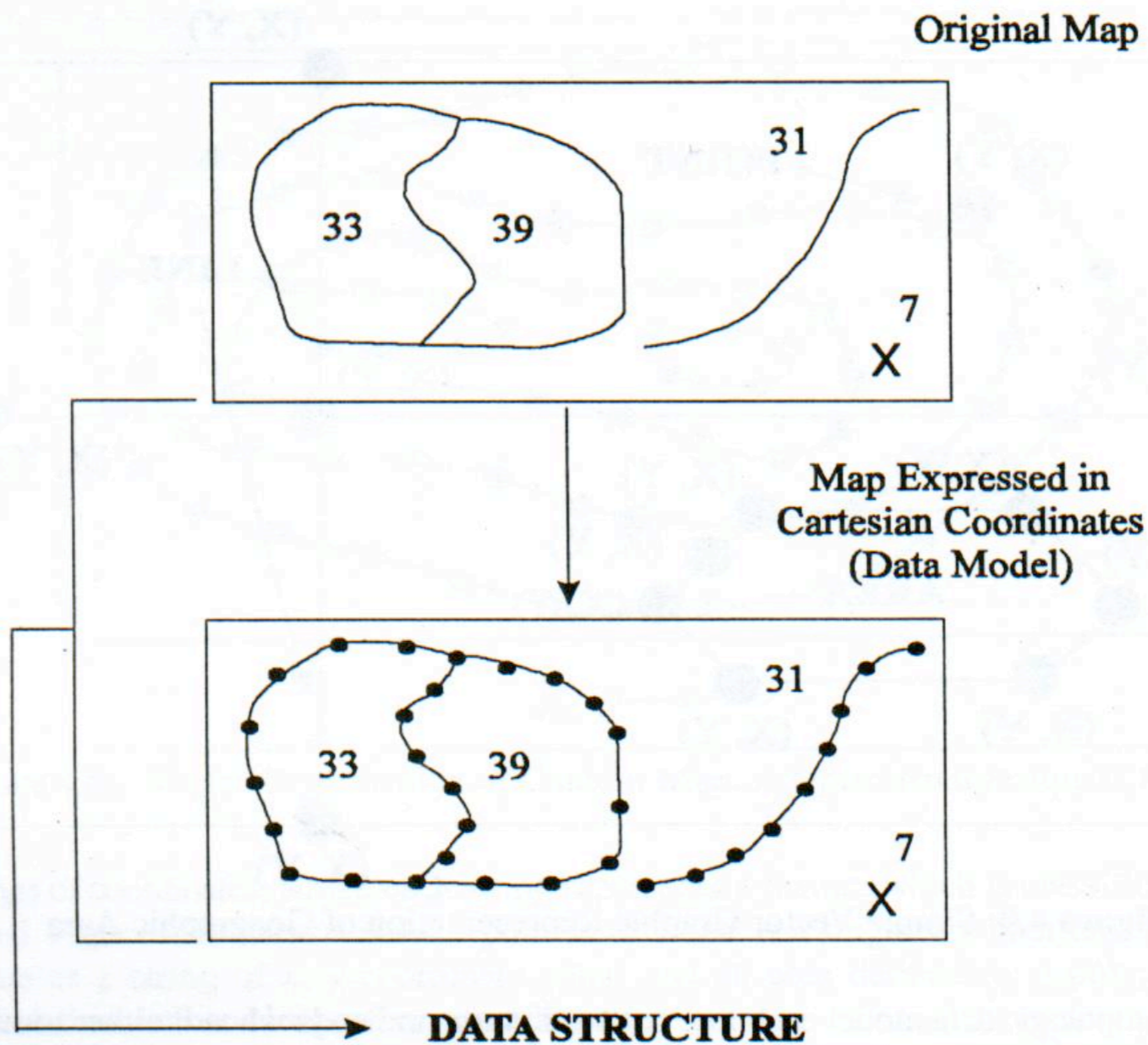


# Modely Geometrie

- \* Vymezení x Pole
- \* Vektorový záznam x Grid
- \* Základní modely
  - \* Spaghetti, TVM (Pizza, dynamicky segmentovaný)
  - \* Grid, TIN

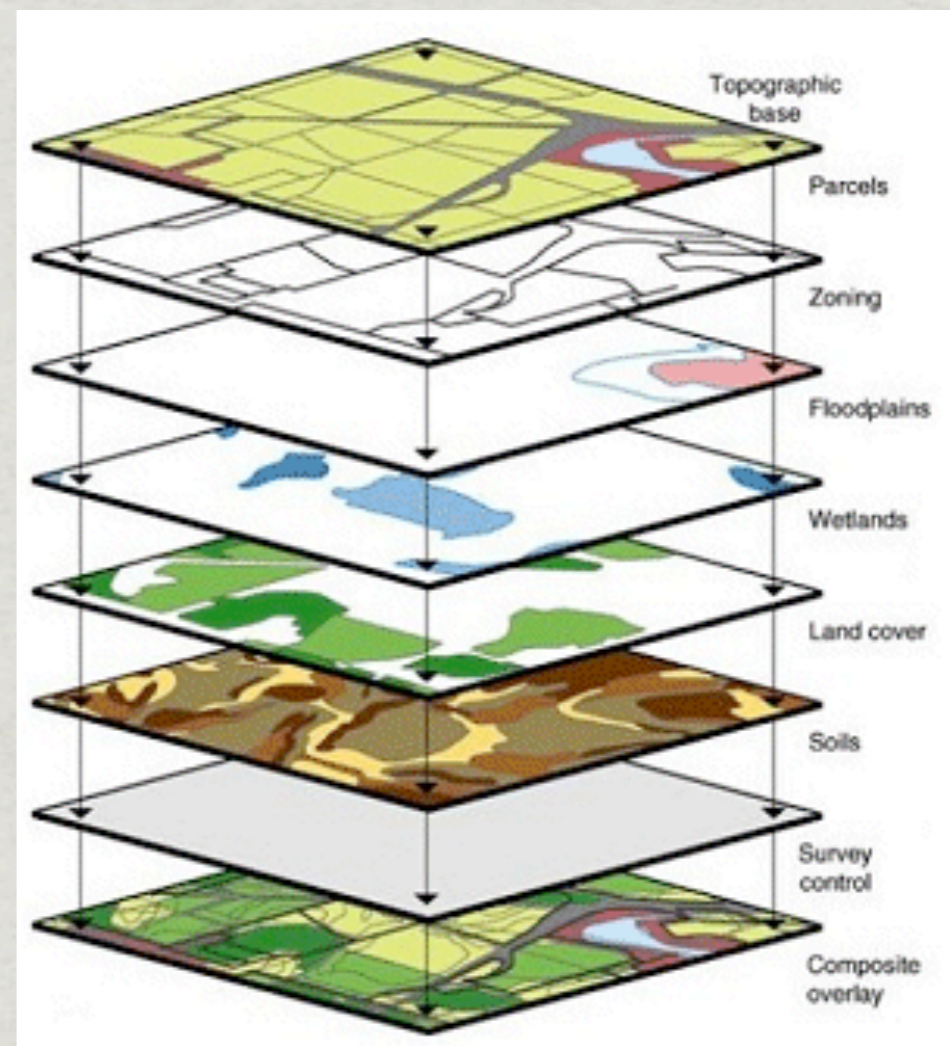
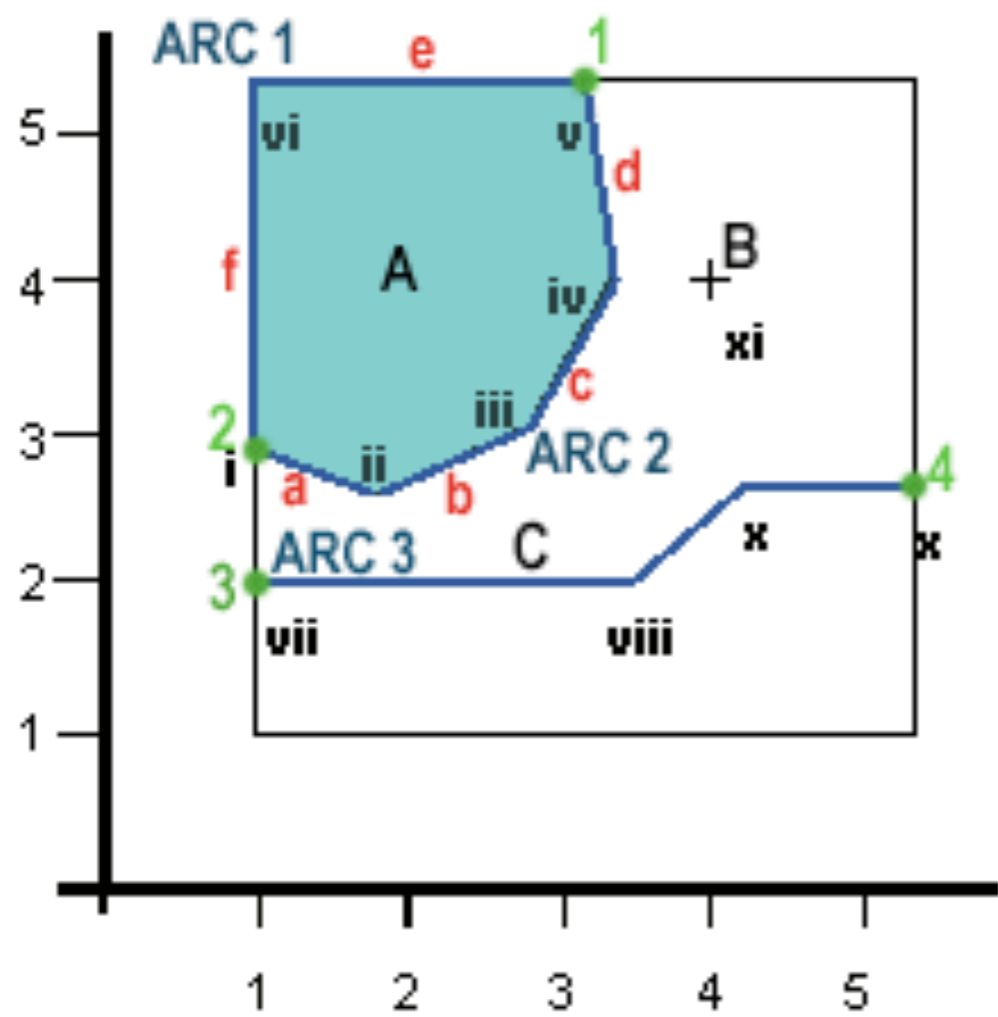


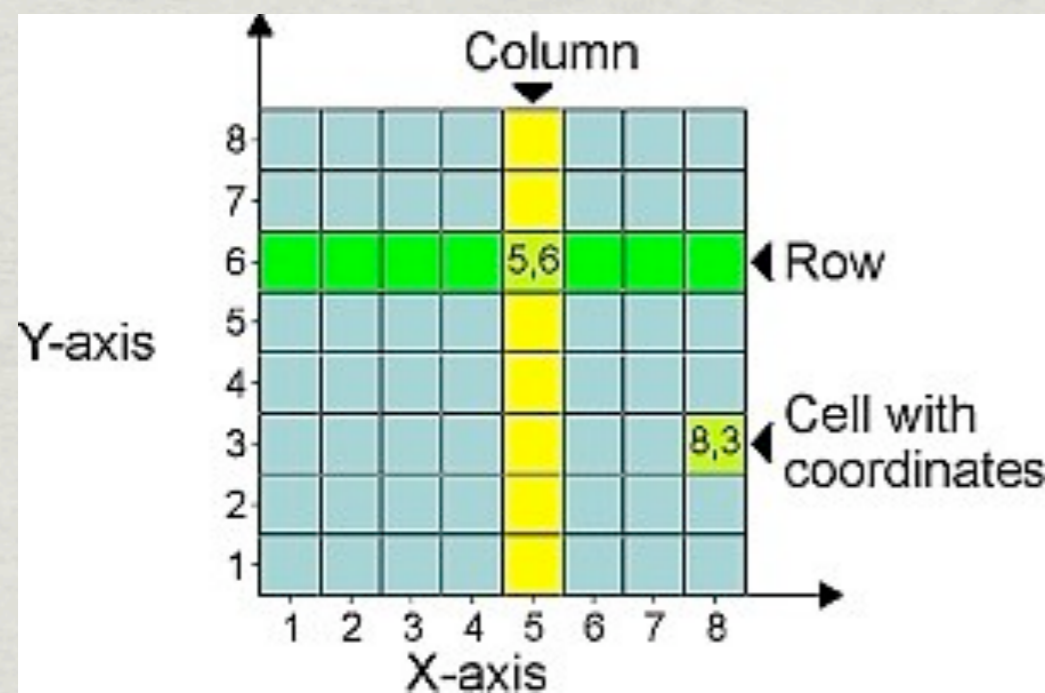




FEATURE	NUMBER	LOCATION
POINT	7	X Y (SINGLE POINT)
LINE	31	$X_1Y_1 X_2Y_2 \dots X_NY_N$ (STRING)
POLYGON	33	$X_1Y_1 X_2Y_2 \dots X_NY_N$ (CLOSED LOOP)
	39	$X_1Y_1 X_2Y_2 \dots X_NY_N$ (CLOSED LOOP)

**Figure 4.10:** The “Spaghetti” Data Model. Source: Adapted from drawing presented by Dangermond (1983).





Continuous grid

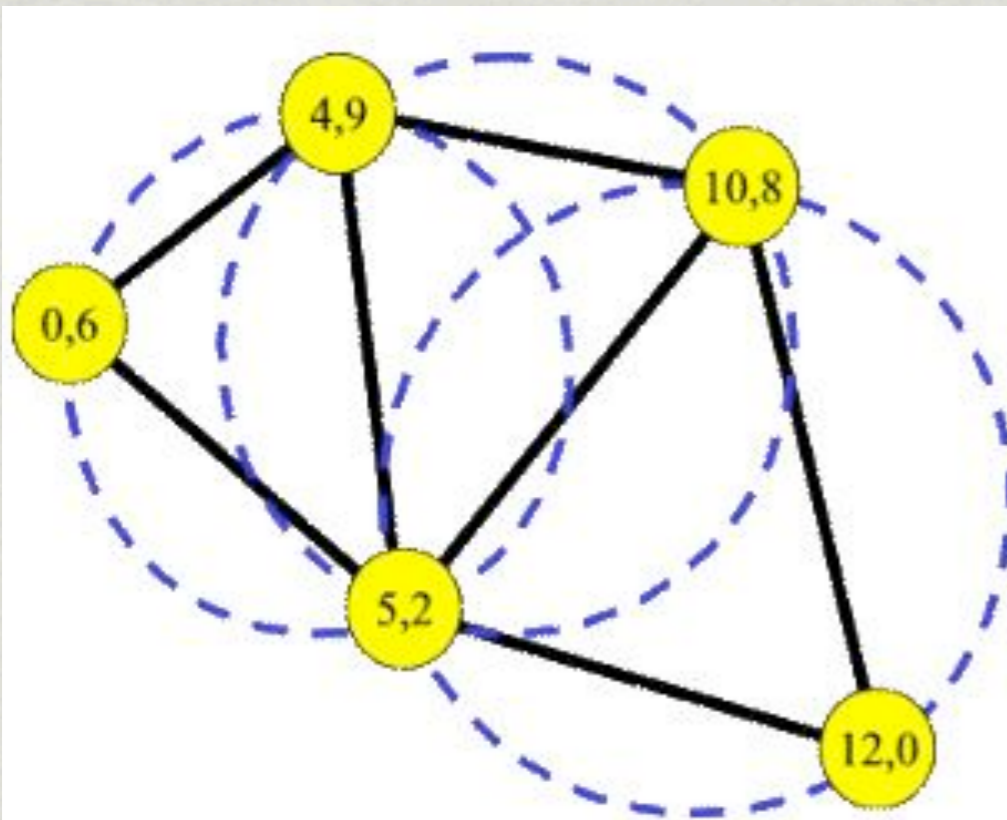
0	0	0	99	278	488	753	989
0	0	0	75	369	464	861	1075
0	0	55	255	498	752	932	1235
0	102	267	478	664	849	1307	1897
67	119	324	572	893	1483	1987	2335
291	425	766	954	1257	1537	1979	2476
392	482	877	1115	1692	2010	2639	3010
499	604	849	1045	1943	2338	2591	3301

Each cell is stored with its unique value e.g. bathymetric depth

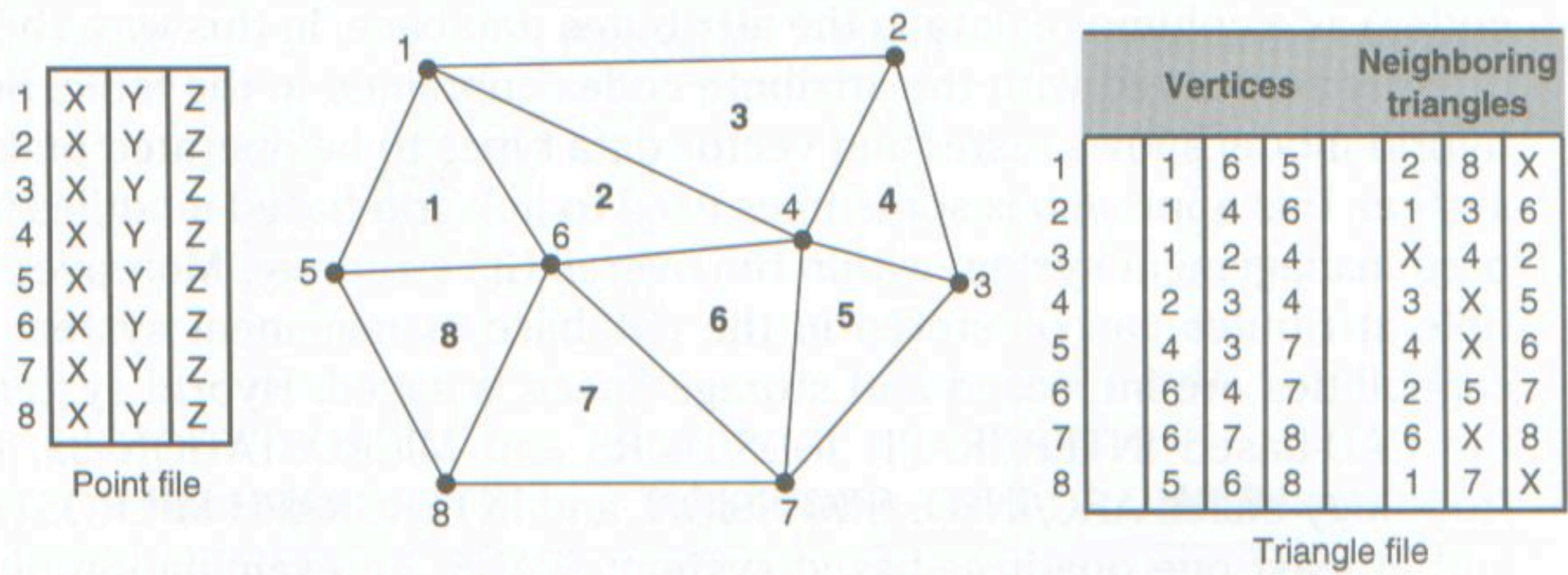
Categorical grid

1	1	1	2	2	2	3	4
1	1	1	2	2	2	3	4
1	1	2	2	2	3	3	4
1	2	2	2	3	3	4	4
2	2	2	3	3	4	4	4
2	2	3	3	4	4	4	4
2	2	3	4	4	4	4	4
2	3	3	4	4	4	4	4

Zonal value	Count of cells	Category
1	9	Land
2	20	Shelf
3	13	Slope
4	22	Deep sea



**Figure 1.3.** Delaunay triangulation.



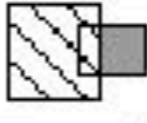






**Figure 4.19 TIN model.** In a vector system surfaces are represented by connecting points of known elevation into triangulated flat surfaces. The model is called a triangulated irregular network (TIN) model, a specific form of tessellation.

# GIS otázky

- \* Co je v místě XY poloha
- \* Kde se XY nalézá? výskyt
- \* Co se změnilo od doby XY? trend
- \* Jaký prostorový vzor lze pozorovat? analýza
- \* Co se stane když ... ? modelování

# Topologické relace

	$\delta\delta$	$\circ\circ$	$\delta\circ$	$\circ\delta$	Relation
<i>disjoint</i>	$\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$	
<i>meet</i>	$\neg\emptyset$	$\emptyset$	$\emptyset$	$\emptyset$	
<i>overlap</i>	$\neg\emptyset$	$\neg\emptyset$	$\neg\emptyset$	$\neg\emptyset$	
<i>cover</i>	$\neg\emptyset$	$\neg\emptyset$	$\neg\emptyset$	$\emptyset$	
<i>covered_by</i>	$\neg\emptyset$	$\neg\emptyset$	$\emptyset$	$\neg\emptyset$	
<i>contain</i>	$\emptyset$	$\neg\emptyset$	$\neg\emptyset$	$\emptyset$	
<i>inside</i>	$\emptyset$	$\neg\emptyset$	$\emptyset$	$\neg\emptyset$	
<i>equal</i>	$\neg\emptyset$	$\neg\emptyset$	$\emptyset$	$\emptyset$	