Introduction to GIS Modelling

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Modeling

Definitions

- The model : A **simplified** representation of system or phenomena.
- Modelling is describing (**mathematically**) a situation in reality for the purpose of solving a problem or question in that situation.
- The computer modeling in general is merely (mathematical) but supported by computational methods (Numerical).

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Modeling

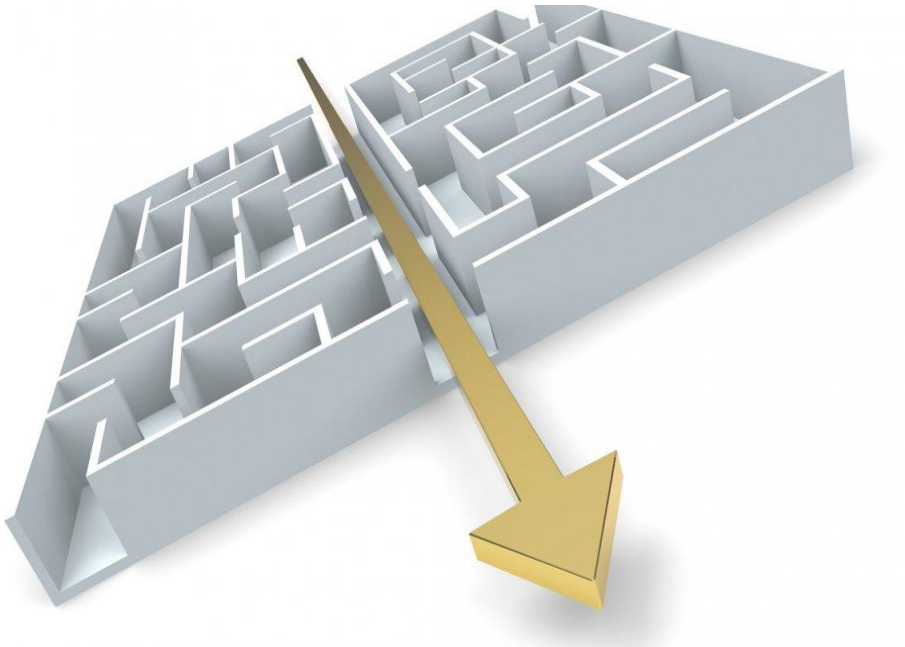
Mathematical Modeling

- "The simplest solution is almost always the best" Occam's razor.
- The simplest model in math is the linear equation.

$$Y_i = \beta_0 + \beta_1 X_{1i} + \varepsilon_i$$

or

$$\mu_{Y|X} = \beta_0 + \beta_1 X_1$$



Source:
https://www.theanalysisfactor.com/generalized-linear-models-no-error-term/

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Modeling

Classification of Models

- Descriptive vs. Prescriptive
- Deterministic vs. Stochastic
- Dynamic vs. Static
- Deductive vs. Inductive

- The deprivation model which is studying in IDeaMap is descriptive, stochastic, static and inductive model.

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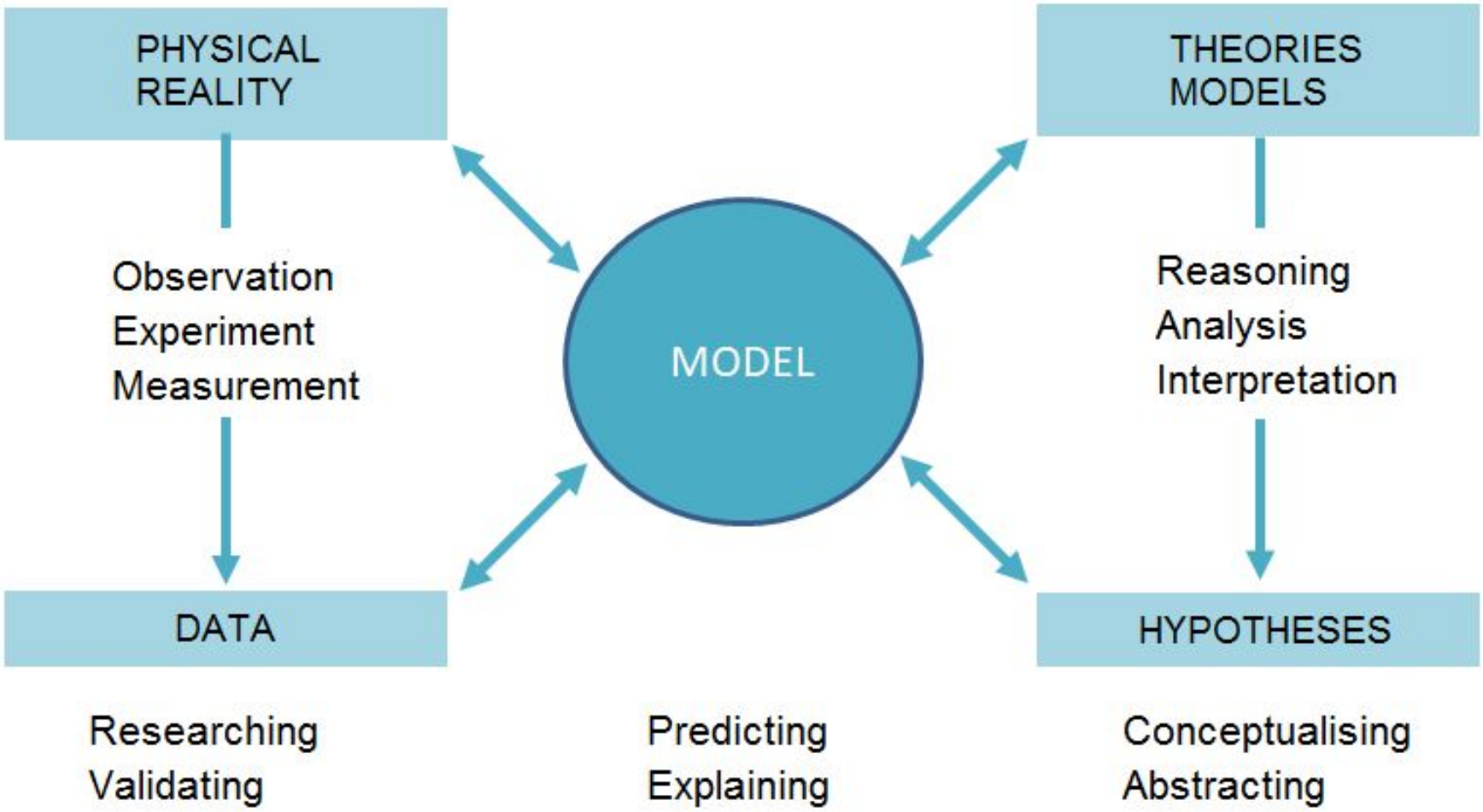
Modeling

Modeling Process



Source: https://staff.fnwi.uva.nl/a.j.p.heck/Guide_on_modelling/Text/watismodelleren.html#:~:text=In general%2C modelling is describing,and a way of thinking.

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GIS Modeling

Definition

- The GIS Modeling : A set of rules and procedures for representing a geographic phenomenon or predicting an outcome.

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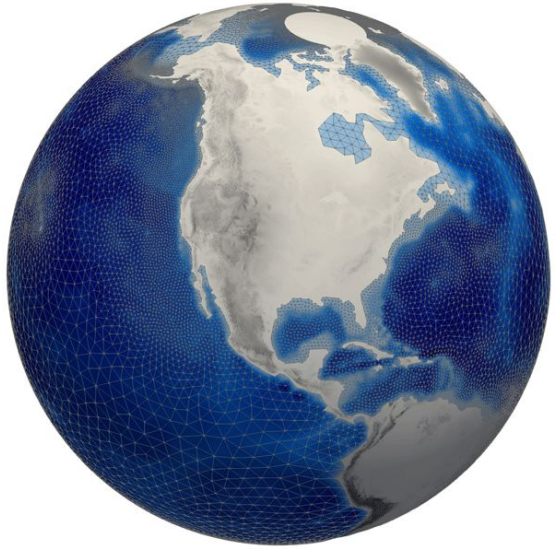
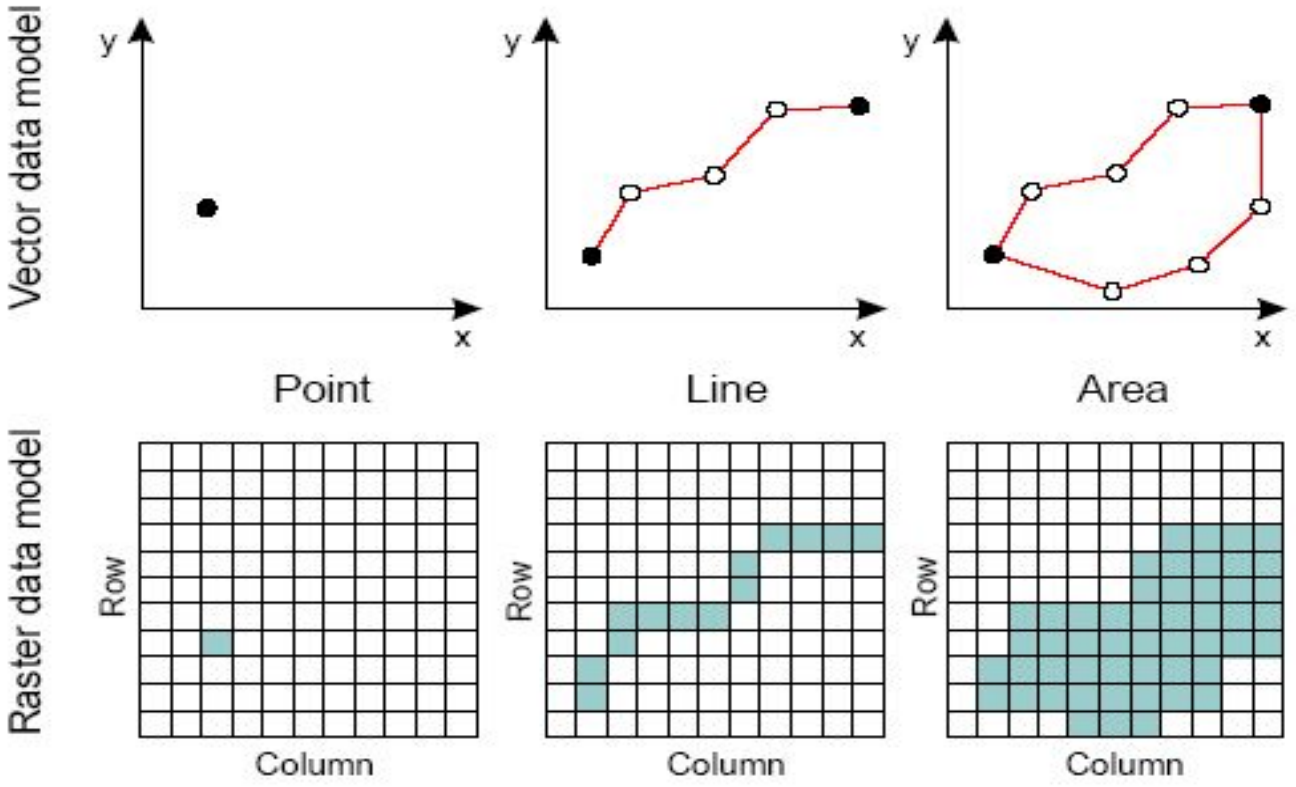
GIS Modeling

Vector VS. Raster

- The classification of geospatial data into vector and raster is basically descripting the way we represent the geographical phenomena in computer or the structure we model it by.





GIS Models

Binary Model

- A **binary model** uses logical expressions to select target areas from a composite feature layer or multiple rasters.
- Image classification is an example of binary model.

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

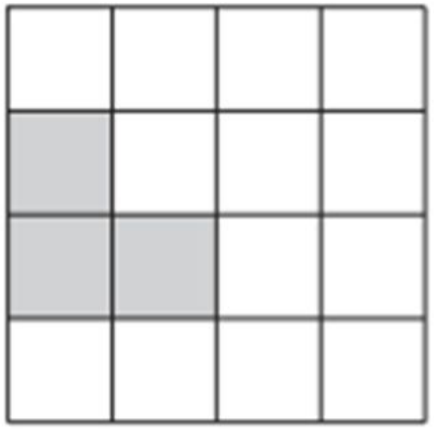
Raster 1

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

Raster 2

([Raster 1] = 3)
AND
([Raster 2] = 3)

=



GIS Models

Index Model

- An **index model** calculates the index value for each unit area and produces a ranked map based on the index values.
- The IDeaMap Deprivation model.