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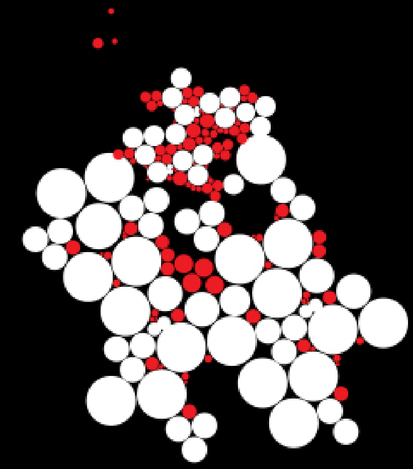
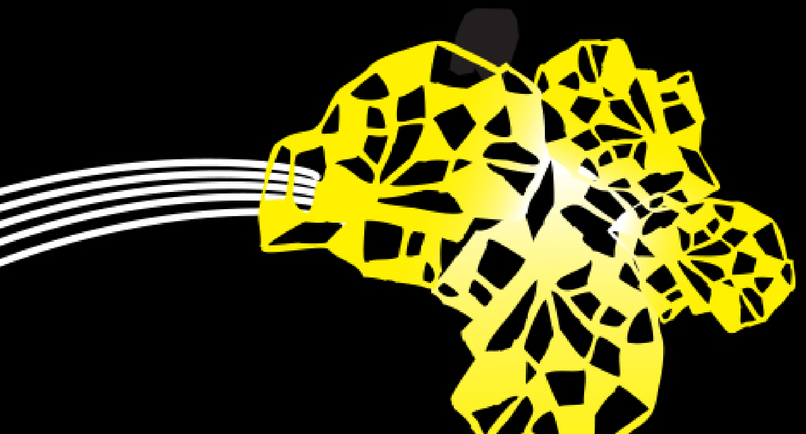
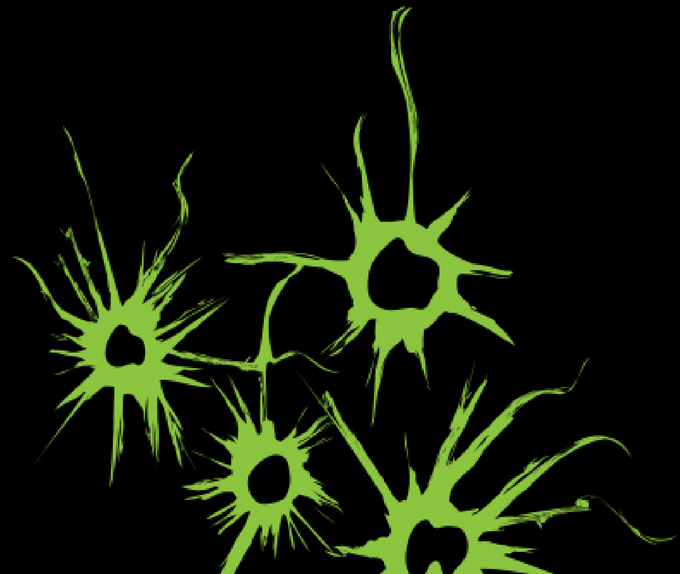


Seeing the Sustainable Development Goals through maps

Menno-Jan Kraak





Seeing the Sustainable Development Goals through maps

- Background
- The book project
- Content
- Examples

ICA’s objective

WE MAPS

INTERNATIONAL MAP YEAR 2015–2016

THE GLOBAL GOALS

For Sustainable Development

ICA’s posters

United Nations - Global Goals

ICACI Posters

MAPPING
FOR A SUSTAINABLE WORLD

1. Introduction

2. Sustainable Development Goals and geospatial temporal data

3. Cartographic Design

4. Maps and Diagrams

5. Use Environments

6. Epilogue

Section 2
Sustainable Development Goals and geospatial temporal data

- SDG
- Geospatial Data
- Location
- Data Characterisitics
- Time
- Indicator Tiers
- Data conversions
- Modifiable area unit problem
- Data classification

Section 3
Cartographic Design

- Planning & Content selection
- Workflow
- Basemaps
- Map projections
- Center map
- Scale
- Dimensionality
- Generalization
- Symbolization
- Color
- Typography
- Toponomy
- Visual Hierarchy
- Art and design
- Uncertainty

Section 4
Maps and Diagrams

- Thematic map types
- Nominal maps
- Choropleth maps
- Proportional point symbol maps
- Dasymetric maps
- Bivariate maps
- Cartogram

- Diagram - single indicator
- Diagram - multiple indicators
- Diagrams - time
- Diagram maps
- Animation
- Dashboards / linked graphics

Section 5
Use Environments

- Audiences
- Usability
- Visually impaired
- Media
- User interfaces
- Interaction
- Responsive design
- Mobile
- Web mappiung
- Standards
- Storytelling
- Exploratoriy visualization
- Atlasses
- Open


13 CLIMATE ACTION
7 AFFORDABLE AND CLEAN ENERGY
4 QUALITY EDUCATION
8 DECENT WORK AND ECONOMIC GROWTH
14 LIFE BELOW WATER
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
6 CLEAN WATER AND SANITATION
5 GENDER EQUALITY
SUSTAINABLE DEVELOPMENT GOALS
3 GOOD HEALTH AND WELL-BEING
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
11 SUSTAINABLE CITIES AND COMMUNITIES
United Nations
Sustainable Development Goals

4.1 Thematic Map Types

Thematic maps depict the variation of one (or sometimes several) geographic phenomenon across the landscape, mapping spatial and attribute information together. Meeting the UN Sustainable Development Goals requires thematic mapping, as the SDG indicators serve as thematic proxies for understanding and addressing our planet's most pressing problems. Thematic maps enable geographic imagination and spatial thinking, and often represent abstract or statistical concepts that cannot be observed directly.

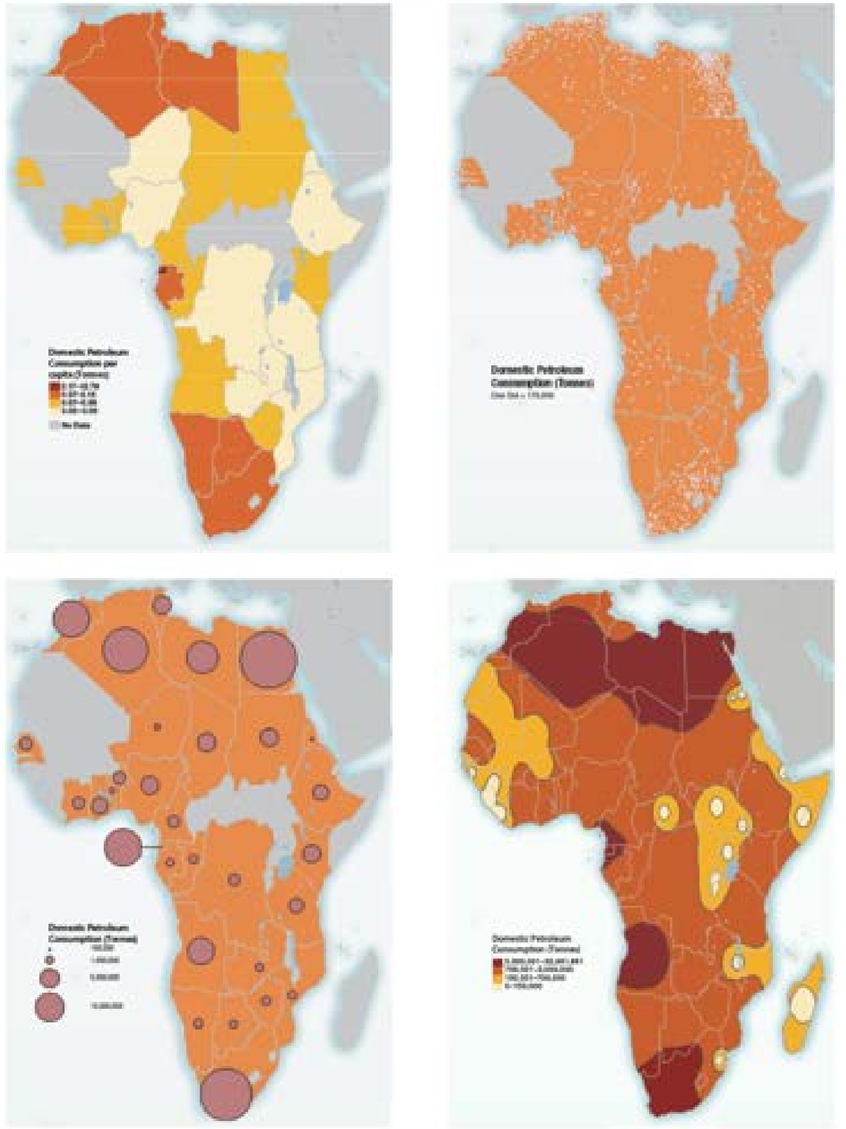
Thematic maps primarily depict information that is enumerated within polygonal units, which includes many of the SDG indicators. Choropleth maps shade enumeration units by their attribute values. Proportional symbol maps scale point symbols placed at the centroids of enumeration units by their attribute values. Dot density maps adjust the density of randomly placed dots within enumeration units by their attribute values. Finally, isoline maps interpolate attribute values from the centroids of enumeration units, producing a new set of geographic linework representing the interpolated gradient. Several thematic map types, like proportional symbol and isoline maps, also are commonly applied to conceptual point data. Additional thematic mapping techniques include cartograms, dasaymetric maps, flow maps, and value-by-alpha maps as well as bivariate and animated variants.

[4 Africas annotated, noting visual variables]

Different thematic map types evoke different visual metaphors about the mapped geographic phenomenon, and thus different thematic maps of the same SDG indicator may lead to different conclusions even though the maps depict the same attribute data. Visual metaphors are particularly pertinent when mapping enumerated data, as information about who the phenomenon exists within space (discrete versus continuous) and varies across space (abruptly vs. smoothly) is lost during the tallying process. Thus, different thematic map types evoke one of four distinct visual metaphors about the mapped phenomenon.

Choropleth maps evoke a metaphor of continuous and abrupt phenomena, and thus congruently match governmental activities and policies that are fixed to political units. Proportional symbol evoke a discrete and abrupt metaphor, and congruently match economic sites of production and distribution, like mines, factories, offices, and stores. Dot density maps evoke a discrete and smooth metaphor, and thus congruently match human and social phenomena in their depiction of individual bodies. Finally, isoline maps evoke a continuous and smooth metaphor, and thus congruently match environmental or geophysical phenomena.

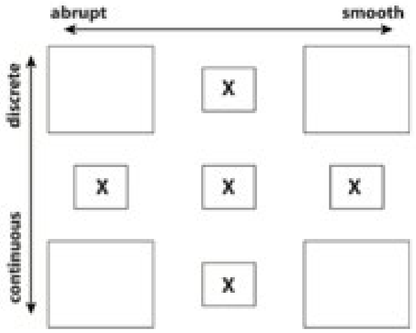
[visual metaphors]

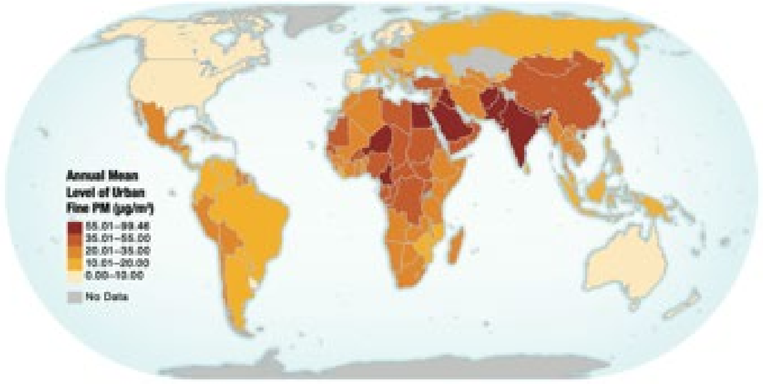


2.10 How to Choose a Classification

Classification describes the process of organizing map features into groups to improve legibility in the display. Classification is one way cartographers generalize thematic maps, reducing visual complexity in the attribute data to clarify map patterns. However, classification also is one way cartographers add uncertainty into thematic maps, as the resulting patterns can be heavily influenced by the placement of class breaks within the scheme.

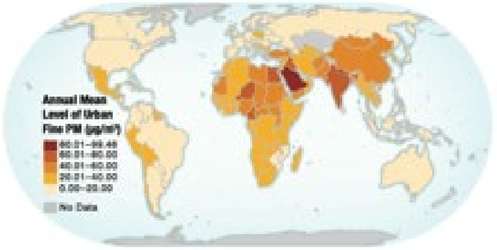
Classification applies to all statistical information, including nominal level data, but grows in difficulty when applied to ordinal and numerical data, such as many of the SDG indicators. As with all cartographic design, a "perfect" classification does not exist, and all classification strategies have trade-offs. Instead, cartographers weigh several considerations to arrive at an "appropriate" classification scheme, including the distribution of the attribute across map features, the portion of the distribution the cartographer wishes to emphasize, the total number of classes (most schemes use 4-7 classes), and critical values that produce rounded or meaningful class breaks.



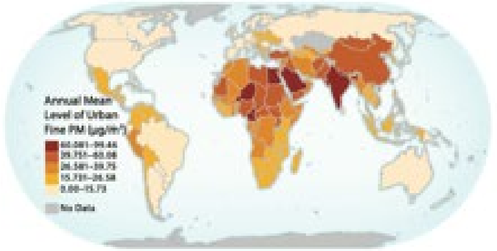


Use an arithmetic scheme for indicators with a skewed distribution. Arithmetic schemes provide more detail for features in the clustered side of the distribution, rather than emphasizing extreme outliers.

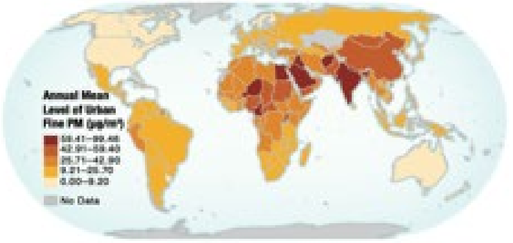
Use equal interval for indicators with a uniform distribution. Equal interval has the added advantage of resulting in simple, easy to understand map legends.



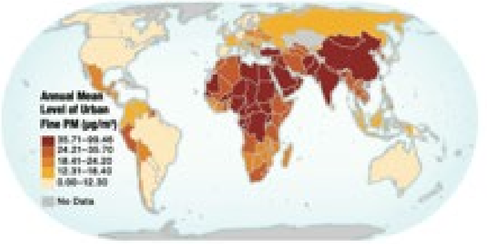
Use natural breaks such as Jenk's method for indicators with multiple clusters in the distribution. Optimal breaks emphasizes extreme outliers, rather than providing detail within the clusters.



Use mean & standard deviation for indicators with a normal distribution. Mean & standard deviation also is good when the mean value is meaningful.



Use quantile for side-by-side or bivariate comparison of multiple indicators, as the scheme reduces numerical attributes to the same ordinal scale. Quantile also is good when the median value is meaningful.



2.4 Attribute Data: SDG Indicator

Attributes describe the what or who of data. Attribute data that is tied to location comes in two forms: individual-level attributes, which describe unique conditions or qualities of a place (e.g.m the tax rate for an entire administrative unit); and enumerated attributes, which aggregate or tally individual data within a predefined space (e.g., the population within a country). Many of the SDG indicators are enumerated, making the M49 polygonal boundary locations–or enumeration units–critical in determining how statistical attributes are aggregated and what the resulting patterns look like in the map.

Attribute data is collected on one of four scales or levels of measurement:

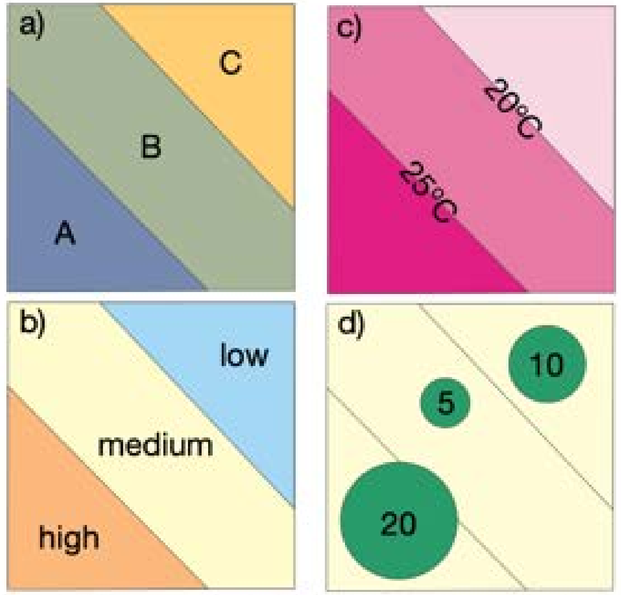


Figure 2.4-1 Measurement levels: a) nominal, b) order, c) interval, d) ratio

- Ratio data is quantitative and the values are counted or calculated from a meaningful zero value. An example is the number of inhabitants for each country (Figure 2.4-1 a). Most enumerated attributes are reported at ratio level, with the fixed zero indicating the baseline count of zero.
- Interval data also is quantitative, but their absolute zero is arbitrary and thus limits its estimation of relative magnitudes. An example is temperature in Celsius: zero represents the point at which water freezes and not the total absence of heat (i.e., absolute zero)(Figure 2.-1 b).

Level of Measurement

- Ordinal data describes non-numerical ranking, such as first-to-last, high-to-low or good-to-bad, or good and bad (Figure 2.4-1 c).
- Finally, nominal data refers to unranked categories, such as the M49 delineation of countries into different geographic regions based on continental zonesn(Figure 2.4-1d).

The SDG indicators have ratio, ordinal or nominal values (Figure 2.4.2). Interval data is not represented in the SDG indicator data because of the focus on enumerated attributes.

Ratio-level SDG indicators include absolute and relative attributes. Absolute attributes are measured or counted and reported without consideration of other attributes. Relative attributes are normalized based on one, two or multiple attributes. Two values belonging to the same attribute result in a proportion (a percentage), two values belonging to two different attributes lead to a rate (e.g., a count of something in the population), and multiple values belonging to multiple attributes result in an index (based on formla).

Many enumerated SDG indicators are reported proportions or rates related to population; however, population rarely is homogeneously distributed. Normalizing ratio-level data by population is useful both to mask privacy of individual-level data and to account for the variable distribution of people within enumeraion units.

Scale type	Absolute / relative	Variables	Data type (name)		Description (X and Y are variables)
ratio	absolute (one value)	one variable	absolute value		count X
	relative (calculated using two or more values)	one variable	proportion	proportion of total population	% of total population
				other proportion	% of X, other than population
		two variables	rate	rate per population unit	count X per capita / population
				change rate (per time unit)	% change or count X per time
				other rate	X per Y, other than population or time
		many variables	index (calculated)		formula
interval			interval value		
ordinal			ordinal value		level or rank
nominal			nominal value		in SDG indicator all: yes/no

Figure 2.4-2 Measurement levels and indicators

ICA’s objective

Offer guidelines and best practices for mapping the UN SDG indicators by…

- Transfer knowledge and expertise via the book ***Mapping for a sustainable world*** and various training related activities

Let’s make the world a better place with maps