From indicators construction to their synthesis

Indicators and complexity

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SEMPLIFICARE È PIÙ DIFFICILE
(Bruno Munari)

Complicare è facile, semplificare è difficile.

Quello che non si può dire in poche parole non si può dirlo neanche in molte.

There are no good or bad things ,,, there things done in a good way and things done in a bad way

Premise

TOPIC

- considered a "niche field" from a scientific point of view
- never missed in any conference, workshop, seminar on measuring socio-economic dimensions during the last decades

Plan

I. sketching out the main methodological steps aimed at **developing indicators**

II. clarifying the different issues to face in **synthesizing indicators**

Plan

1

I

Developing indicators and managing the complexity

1. Developing indicators
2. From basic indicators to systems of indicators
3. Managing indicators: instructions for use

1. Developing indicators

2. From basic indicators to systems of indicators

3. Managing indicators: instructions for use

Developing indicators

(1) a normative exercise

Developing indicators

(1) a normative exercise

Indicators construction

between

data-driven **concept-driven**

approach

Developing indicators

(1) a normative exercise

Indicators construction

data-driven → more objectivity

Developing indicators

(1) a normative exercise

Indicators construction

data-driven → more objectivity

Does respect for data imply intellectual passivity?
*Is that **objectivity**?*

Developing indicators

(1) a normative exercise

Indicators construction

measuring through definition ← **concept-driven**

In order to start any measurement process, a crucial guiding principle should be identified …

Developing indicators

(1) a normative exercise

Why talking about "indicators"?

In order to start any measurement process, a crucial guiding principle is identified …

Developing indicators

(1) a normative exercise

Three approaches to measurement:

- ***fundamental*** *process* → not derived from other measures (length, volume)
- ***derived*** *process* → derived from other measures (density, velocity)
- ***defined*** *process* → achieved as a consequence of a definition (socio-economic status) by developing indicators

Developing indicators

(1) a normative exercise

… but … **what actually is an "indicator"?**

Developing indicators

(1) a normative exercise

In social sciences, where the concept of "indicator" was born, the measuring process requires:

- a robust *conceptual definition*
- a consistent *collection of observations*
- a consequent *analysis of the relationship* between observations and defined concepts.

Developing indicators

(1) a normative exercise

“index”

↓

from Latin

“*any thing useful to indicate*”

Developing indicators

(1) a normative exercise

“indicator”

“index”

from Latin

“who or what indicates”

“any thing useful to indicate”

Developing indicators

(1) a normative exercise

Indicator

↓

what relates
concepts to reality
through observation

Developing indicators

(1) a normative exercise

Indicator

↓

not

a simply crude statistical information

but

a measure organically connected to a conceptual model

Developing indicators

(1) a normative exercise

Indicator

↓

purposeful statistics

(Horn, 1993)

Developing indicators

(1) a normative exercise

index → indicator

when its definition and measurement occur in the ambit of a conceptual model and is connected to a defined aim

Developing indicators

(1) a normative exercise

Indicators should be developed and managed so that they …

… represent different aspects of the reality,

… picture the reality in an interpretable way, and

… allow meaningful stories to be told

Developing indicators

(1) a normative exercise

Developing indicators

(1) a normative exercise

Developing indicators

(1) a normative exercise

RISK

lack of any logical cohesion and consistency

deforming reality through distorted results

(hidden – sometime - by using and applying sophisticated procedures and methods)

Developing indicators

(1) a normative exercise

normative nature of the selection of indicators cannot be denied

the process contains a “subjective” component

Developing indicators

(1) a normative exercise

normative nature of the selection of indicators cannot be denied

the process contains a “subjective” component

GDP is the most important example of failing in using a statistics as an indicator

Developing indicators

(2) between objectivity and subjectivity

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Some clarification
on the use of the term "subjective"

Developing indicators

(2) between objectivity and subjectivity

Some clarification
on the use of the term "subjective"

- are we talking about defining the phenomenon?
- are we talking about components of the phenomenon?
- are we talking about defining the method of measurement and analysis?

Developing indicators

(2) between objectivity and *subjectivity*

"**subjective**"
in defining phenomena

Process of describing the reality (conceptual framework) is always *subjective*

↓

related to the researchers' view of the reality

The conceptual definition represents only a "small window" through which only some facets of the reality can be seen (*reductionism*).

Developing indicators

(2) between objectivity and *subjectivity*

"**subjective**"

as one of the components of the reality

We can distinguish between:

- *objective information*, collected by observing reality
- *subjective information*, collected only from individuals and their assertions

Developing indicators

(2) between objectivity and subjectivity

"**subjective**"

in the measuring process

Developing indicators

(2) between objectivity and subjectivity

"s ve"

in the me g process

Developing indicators

(2) between objectivity and subjectivity

"s ve"

in the me g process

Sometimes in this context the dichotomy "subjective-objective" is considered equivalent to the dichotomy "qualitative-quantitative". However, the two dichotomies should be kept distinct

Developing indicators

(3) the hierarchical design

Developing indicators

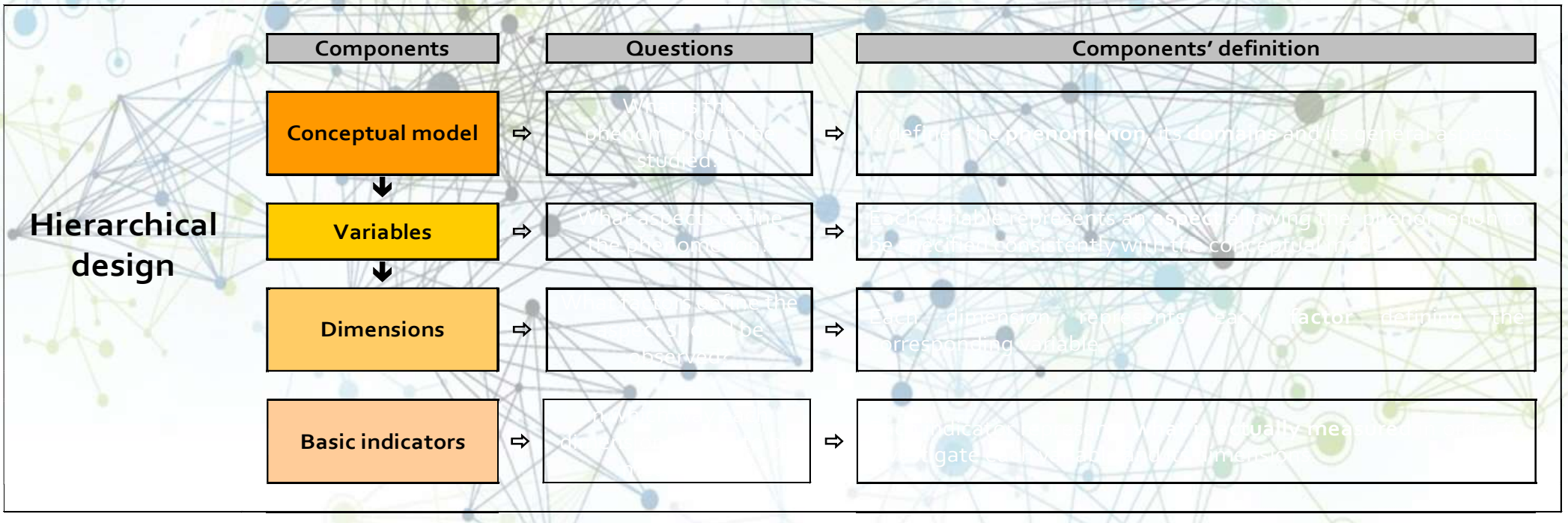
(3) the hierarchical design

Process allowing indicators to be developed

hierarchical design → requires the definition of the different subsequent components

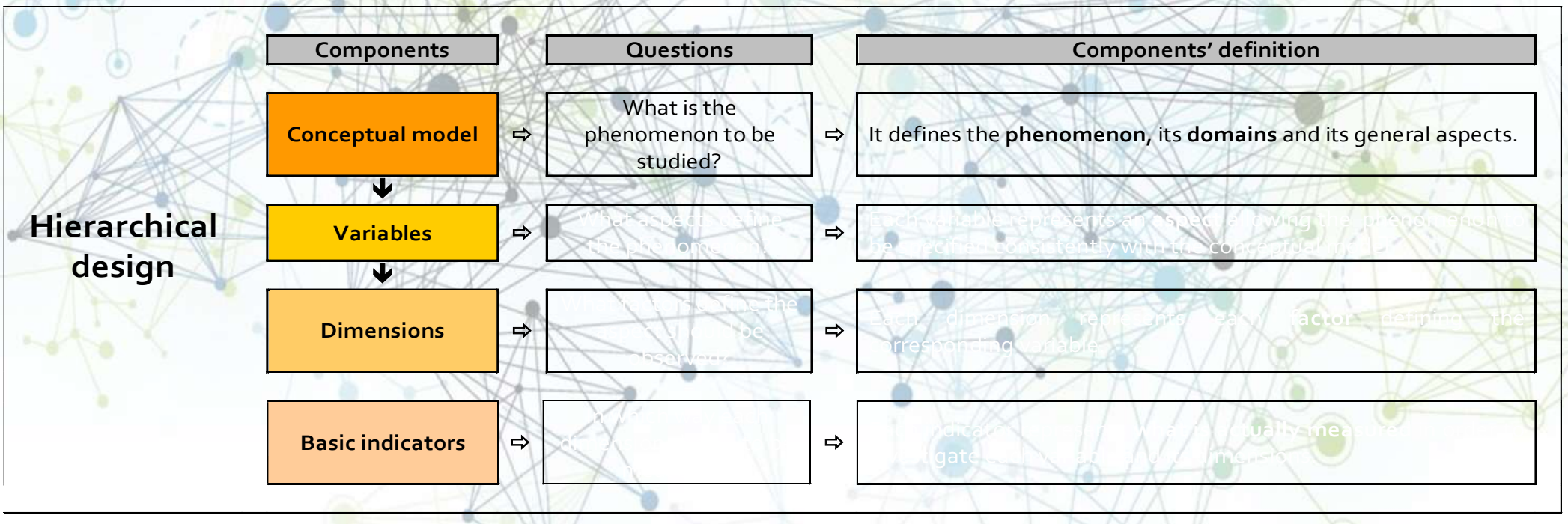
Developing indicators

(3) the hierarchical design



Developing indicators

(3) the hierarchical design



a) the model aimed at data construction,
b) the spatial and temporal ambit of observation,
c) the aggregation levels (among indicators and/or among observation units),
d) the models allowing interpretation and evaluation.

Developing indicators

(3) the hierarchical design

Hierarchical design

Components	Questions	Components' definition
Conceptual model	What is the phenomenon to be studied?	It defines the **phenomenon**, its **domains** and its general aspects.
Variables	What aspects define the phenomenon?	Each variable represents an **aspect** allowing the phenomenon to be specified consistently with the conceptual model
Dimensions	[illegible]	[illegible]
Basic indicators	[illegible]	[illegible]

Developing indicators

(3) the hierarchical design

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Dimensions	What factors define the aspect should be observed?	Each dimension represents each **factor** defining the corresponding variable.
Basic indicators		

"Dimensionality" → theoretical

Two different situations can be observed:

- *uni-dimensional* → variable assumes a unique, fundamental underlying dimension
- *multidimensional* → variable assumes two or more underlying factors

Developing indicators

(3) the hierarchical design

Hierarchical design

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"Dimensionality" → theoretical

The correspondence between the defined dimensionality and the selected indicators has to be demonstrated empirically by testing the selected **model of measurement**.

Developing indicators

(3) the hierarchical design

Hierarchical design

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Dimensions	What factors define the aspect should be observed?	Each dimension represents each **factor** defining the corresponding variable.
Basic indicators	In which way each dimension should to be measured?	Each indicator represents **what is actually measured** in order to investigate each variable and its dimensions.

Each indicator (Land, 1971, 1975)

- represents a component in a model
- can be measured and analysed to compare different situations/groups … to observe evolutions along time)
- can be aggregated with other indicators or disaggregated to specify the model

Developing indicators

(3) the hierarchical design

Hierarchical design

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Observed variables

Some variables can be observed and directly measured. Consequently, they do not need any indicator (age, sex, level of education, and so on).

Developing indicators

(3) the hierarchical design

Indicators describe through different levels of observation …

- ***micro*** → the values refer to individuals or groups
- ***macro*** → the values refer to communities, regions, countries, etc.

Developing indicators

(3) the hierarchical design

Indicators describe concepts observable at individual level at …

- ***external*** level (e.g., objective living conditions)
- ***internal*** level (e.g., subjective evaluations or perceptions)

Developing indicators

(3) the hierarchical design

How many indicators?

1° option

single-indicator approach

each variable measured by one indicator

Developing indicators

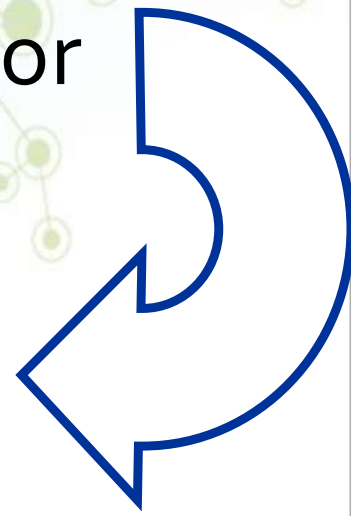
(3) the hierarchical design

How many indicators?

1° option

single-indicator approach

each variable measured by one indicator



weak → low precision and low accuracy

Developing indicators

(3) the hierarchical design

How many indicators?

2° option

multi-indicator approach

each variable measured by more than one indicator

Developing indicators

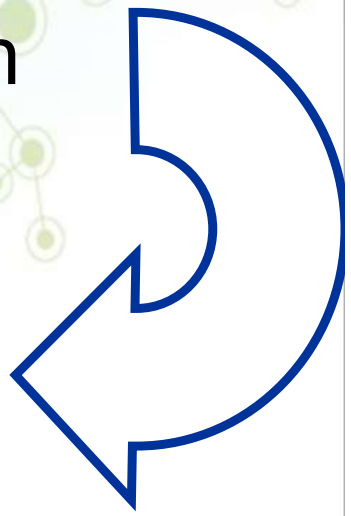
(3) the hierarchical design

How many indicators?

2° option

multi-indicator approach

each variable measured by more than one indicator



necessary with multidimensional variables

Developing indicators

(3) the hierarchical design

Defining domains

- each variable
- each dimension

refers to **domains**

Developing indicators

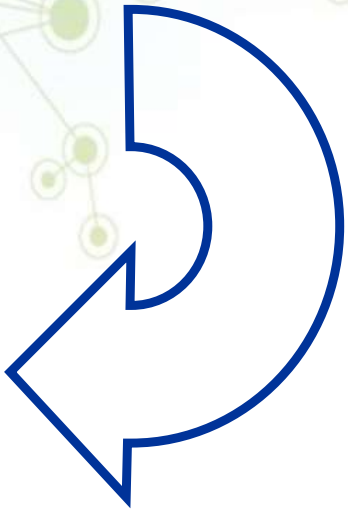
(3) the hierarchical design

Defining domains

- each variable
- each dimension

refers to **domains**

Other indicators are needed!



Developing indicators

(3) the hierarchical design

Defining domains

Segments of the reality in which the relevant concepts and their dimensions have to be observed and assessed

Developing indicators

(3) the hierarchical design

Defining domains

1. Households and families
2. Housing
3. Transport
4. Leisure and culture
5. Participation
6. Education
7. Labour market and working condition
8. Income, standard of living and consumption patterns
9. Health
10. Environment
11. Social security
12. Crime and safety
13. …

Developing indicators

(3) the hierarchical design

Defining domains

Domains in which wellbeing, equity and sustainability are assessed ↓	
1	Environment
2	Health
3	Economic wellbeing
4	Education and culture
5	Work and trade-off with life
6	Social relationships
7	Security
8	Subjective wellbeing
9	Landscape and cultural heritage

Domains promoting wellbeing, equity and sustainability ↓	
10	Scientific research and innovation
11	Quality of services
12	Politics and institutions

BES

Developing indicators

(3) the hierarchical design

The hierarchical design can be drawn also through sub-designs (e.g. each area could require sub-areas).

Its logic can be applied both at micro and macro level.

Developing indicators

(4) the model of measurement

Developing indicators

(4) the model of measurement

relationship between

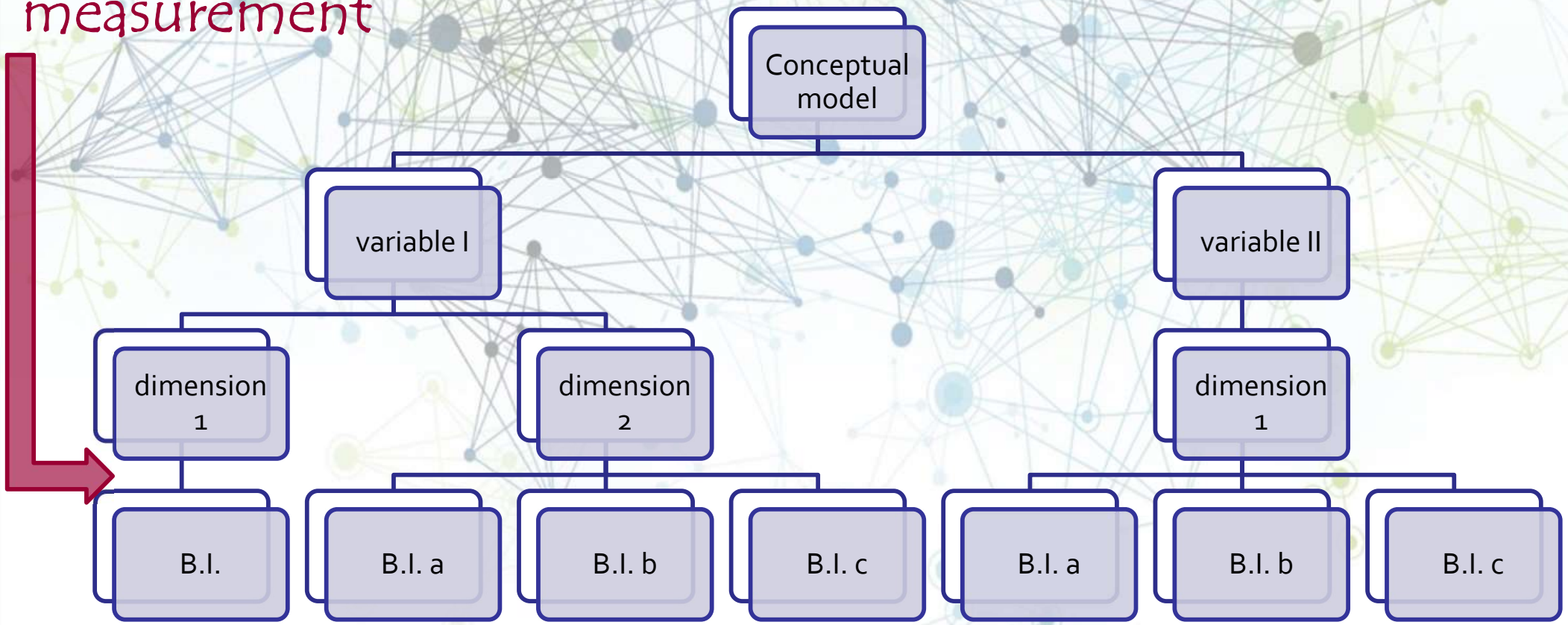
variable and indicators

model of measurement

Developing indicators

(4) the model of measurement

model of measurement



Developing indicators

(4) the model of measurement

Two different models:

reflective **formative**

Developing indicators

(4) the model of measurement

Two different models:

reflective

formative

Developing indicators

(4) the model of measurement

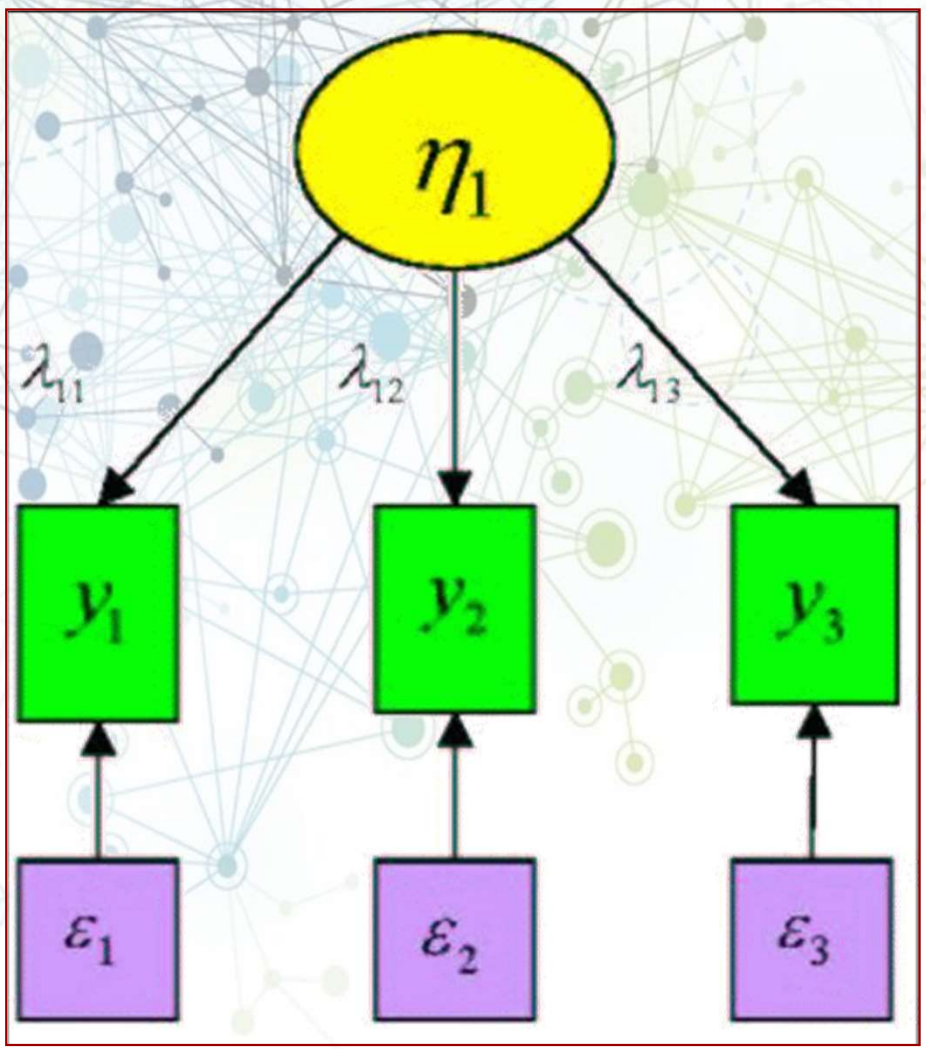
reflective

indicators → *functions of latent variable*

explanatory perspective → *top-down*

⇩

changes in the latent variable are reflected in changes in the observable indicators



Developing indicators

(4) the model of measurement

reflective

Statistical assumptions and properties

- **indicators** are
  - **linearly related**
  - **interchangeable** (the removal of an indicator does not change the essential nature of the underlying construct)
- evidence for assessing the model → **internal consistency:**
  - **correlations** between indicators can be **interpreted** only by the presence of **latent variables**
  - two uncorrelated indicators cannot measure the same construct
  - each indicator has an error term

Developing indicators

(4) the model of measurement

reflective

Statistical assumptions and properties

- **total variance** of each indicator can be expressed as a **function of**
  i. latent variable (→ uni/multi-dimensional → factors → *communality*)
  ii. individual indicator's characteristics (*uniqueness*)
- **errors** and disturbance factors are **not interrelated** and are not correlated with latent variables

Developing indicators

(4) the model of measurement

reflective

Statistical assumptions and properties

Total variance of each indicator → **sum of three components**

1. **common variance**
   - explained by → latent variable (and its dimensionality)
   - measured by → correlation between indicators
2. **specific variance**
   - not correlated with the other indicators
3. **error**, portion of the total variance
   - not correlated with the previous

Developing indicators

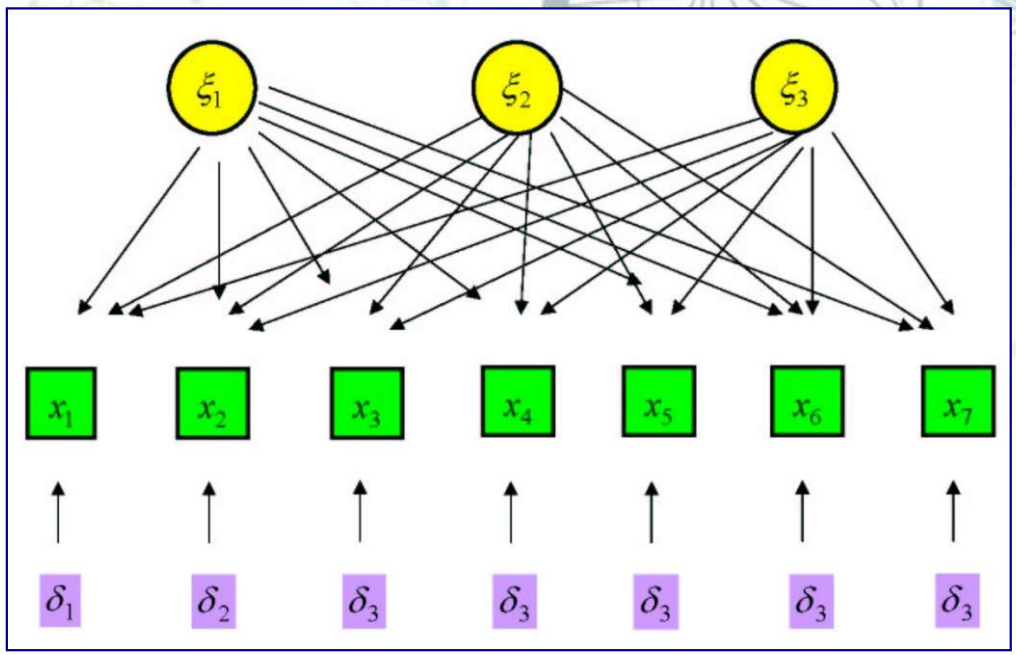
(4) the model of measurement

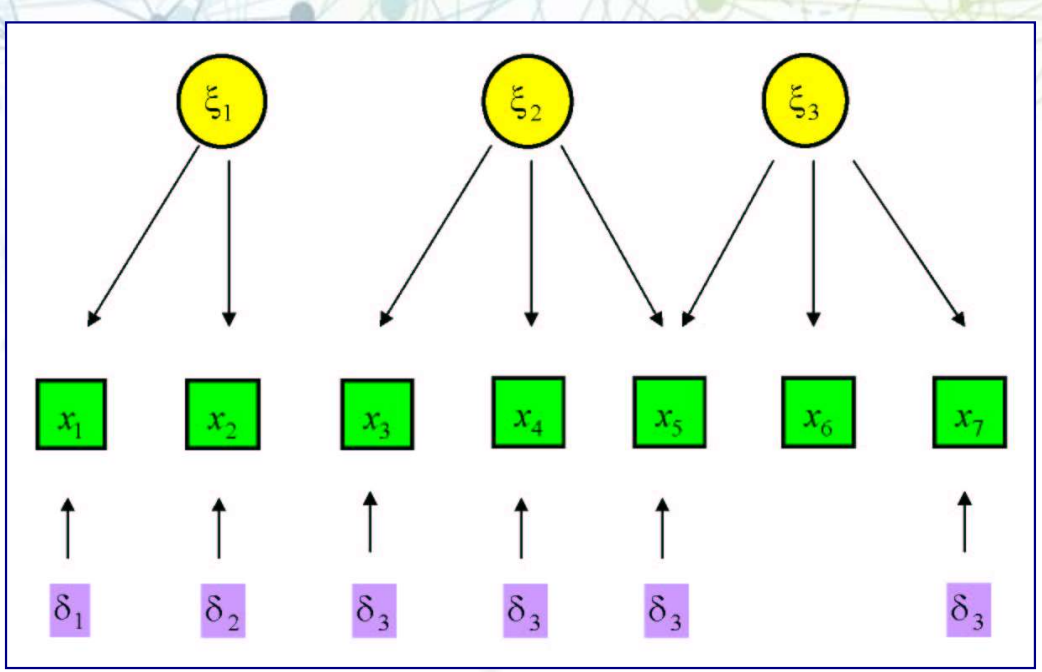
reflective

Statistical assumptions and properties

Multidimensional Latent Variables

explorative **confirmatory**





Developing indicators

(4) the model of measurement

Two different models:

reflective

formative

Developing indicators

(4) the model of measurement

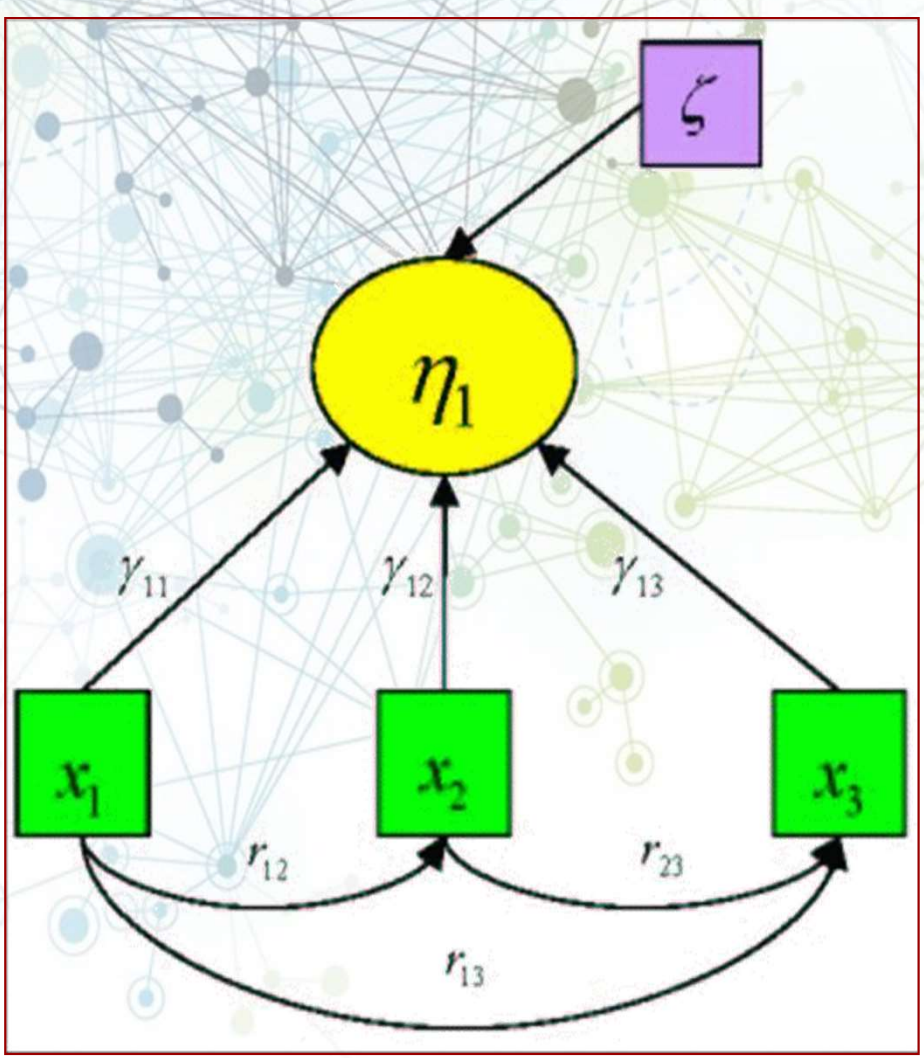
formative

indicators → *causal in nature*

explanatory perspective → *bottom-up*

⇩

changes in the indicators determine changes in the definition / value of the latent variable



Developing indicators

(4) the model of measurement

formative

Statistical assumptions and properties

- **indicators are not interchangeable** (omitting an indicator is omitting part of the construct)
- **two uncorrelated indicators** can serve as meaningful indicators of the **same construct** (internal consistency is not important)
- indicators have **no error term**

1. Developing indicators

2. From basic indicators to systems of indicators

3. Managing indicators: instructions for use

From basic indicators to systems of indicators

From basic indicators to systems of indicators

(1) Systemic approach

Avoiding the point representation produces many indicators

Using them requires a systemic approach

From basic indicators to systems of indicators

(1) Systemic approach

Avoiding the point representation produces many indicators

Using them requires a systemic approach

Indicators → bricks of knowledge

SET →

From basic indicators to systems of indicators

(1) Systemic approach

Avoiding the point representation produces many indicators

Using them requires a systemic approach

Indicators → bricks of knowledge

SYSTEM →

From basic indicators to systems of indicators

(1) Systemic approach

In other words, indicators should be used

not

as separeted and schizofrenic elements

but

as sensors connected to each other

From basic indicators to systems of indicators

(1) Systemic approach

This is

important in the monitoring and reporting exercise

but is

essential in defining sustainability policies

From basic indicators to systems of indicators

(1) Systemic approach

Losing the systemic view

is risky

From basic indicators to systems of indicators

(1) Systemic approach

Losing the systemic view

is risky

Sparrow paradox

From basic indicators to systems of indicators

(1) Systemic approach

Losing the systemic view

is risky

Sparrow paradox

Indicators: sparrows and wheat → highly negatively correlated

↓

Hypothesis: possible hunger for humans

↓

Policy action: Suppression of sparrows

↓

Indicators: sparrow and wheat → highly positively correlated (no sparrow and no crop)

From basic indicators to systems of indicators

(2) System of indicators

Proper and accurate application of the hierarchical design

↓

complex structure

↓

each indicator measures and represents a distinct component of the phenomenon of interest

From basic indicators to systems of indicators

(2) System of indicators

Proper and accurate application of the hierarchical design

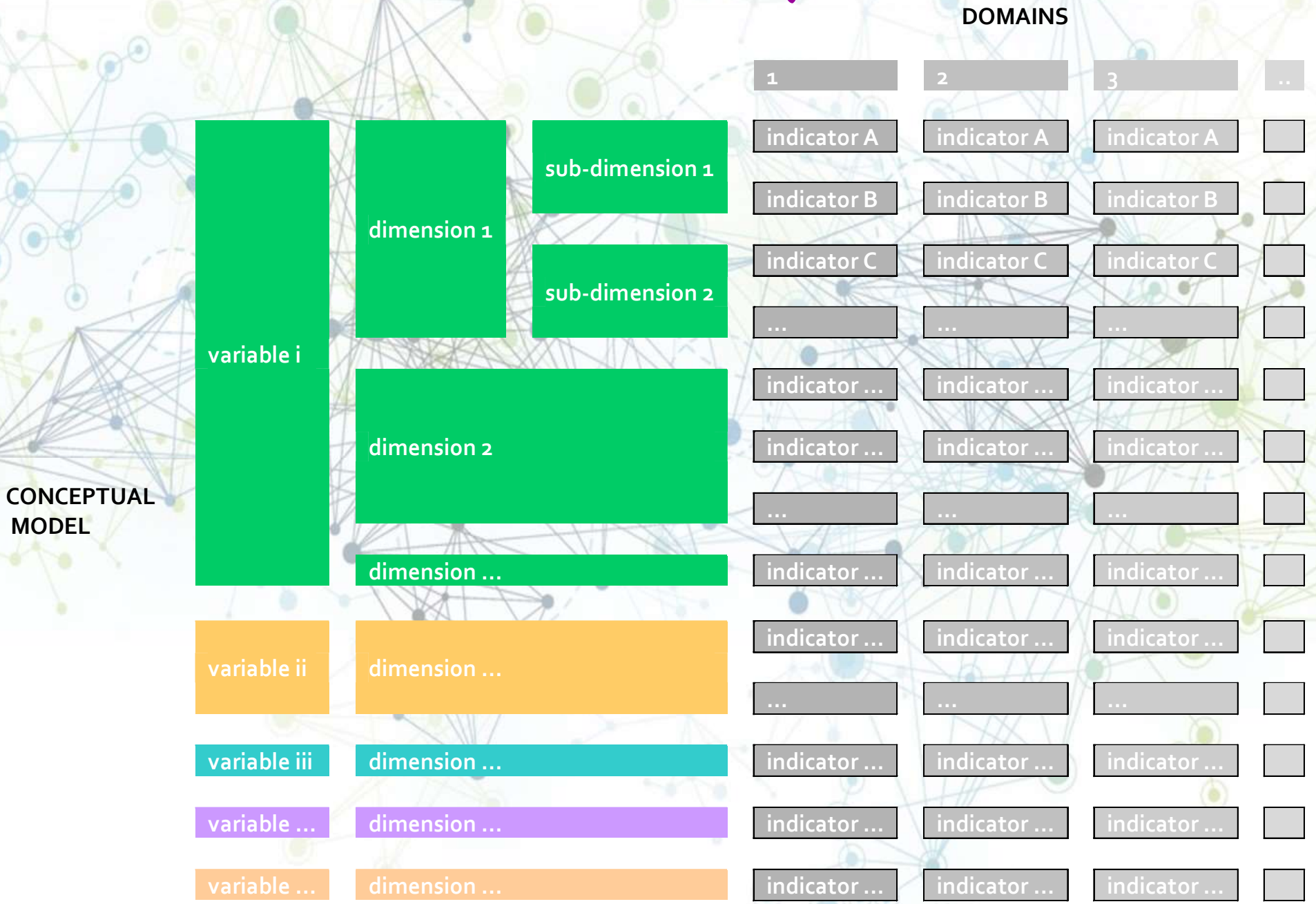
↓

complex structure

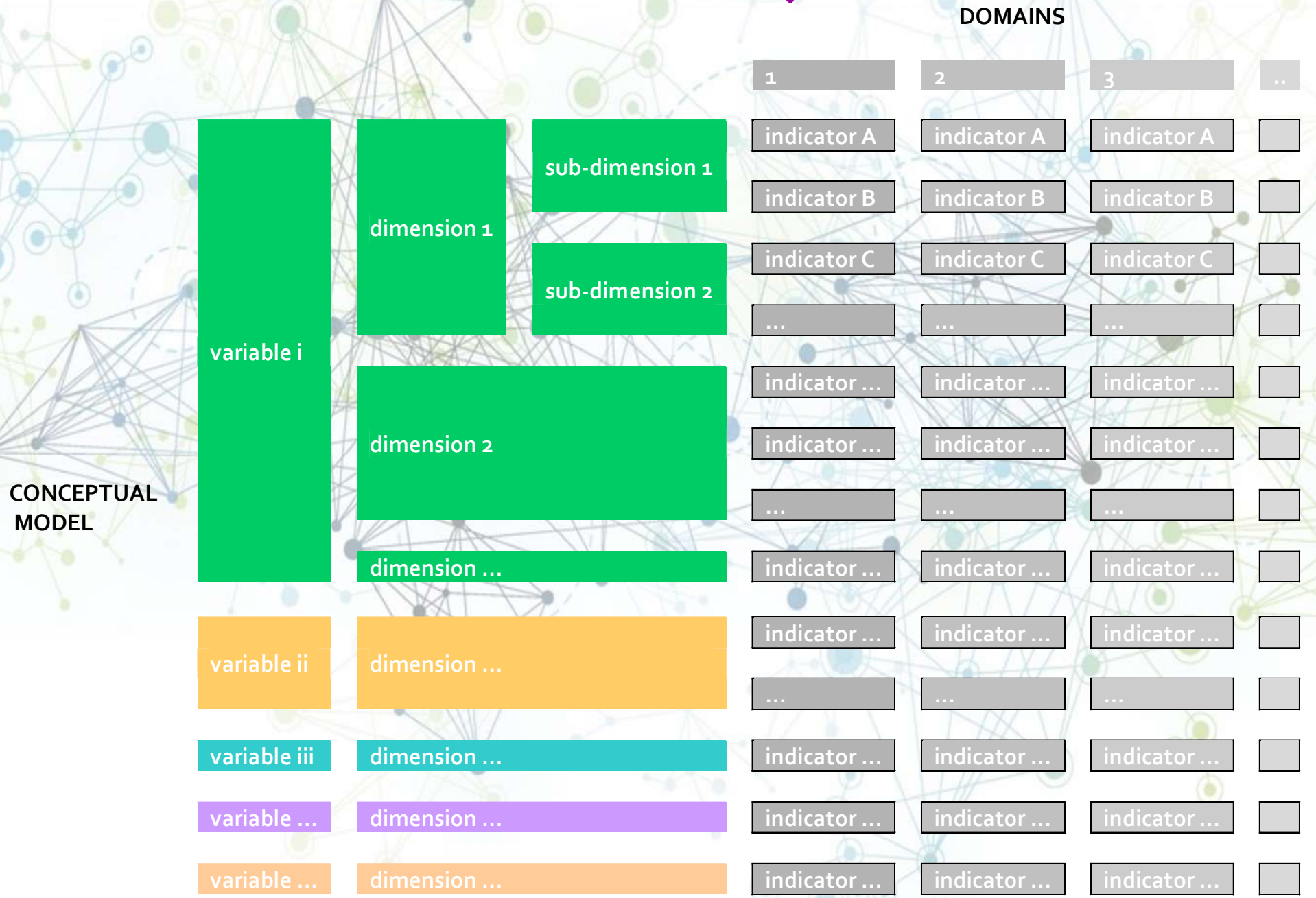
↓

System of indicators

From basic indicators to systems of indicators



From basic indicators to systems of indicators



Not each combination conceptual dimension / domain (→ cell) will be covered by indicators

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

System of indicators → valid support to

- form and develop particular sensitiveness
- inform and stimulate public debates
- pursue scientific or operative goals
- guide decisions and possible interventions (policies)
- evaluate impacts of different policies

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Principles defining a system

A system **is not** a simple collection of things (indicators, in our case).

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Principles defining a system

A system **is** an interconnected set of elements, organized consistently with a perspective.

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Principles defining a system

integrity

A system is more than the sums of parts.

"It may exhibit adaptive, dynamic, goal-seeking, self-preserving, and sometimes evolutionary behaviour"

(Meadows, 2008)

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Principles defining a system: check list

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Principles defining a system: check list

- ✓ Can we identify parts?
- ✓ Do the parts affect each other?
- ✓ Do the parts together produce an effect that is different from the effect of each part on its own?
- ✓ Does the effect, the behavior over time persist in a variety of circumstances?

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Three components

- Functions
- Elements
- Interconnections

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Three components

- Functions → the most crucial determinant of the system and its functioning
- Elements
- Interconnections

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Three components

- Functions → **purposes**
- Elements
- Interconnections

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Three components

- Functions → **purposes**
- Elements → **indicators**
- Interconnections

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Three components

- Functions → **purposes**
- Elements → **indicators**
- Interconnections → relationships holding elements together
  flows of signals and information

From basic indicators to systems of indicators

(2) System of indicators

Characteristics of a system

Three components

- Functions → **purposes**
- Elements → **indicators**
- Interconnections → **relationships**

From basic indicators to systems of indicators

(2) System of indicators

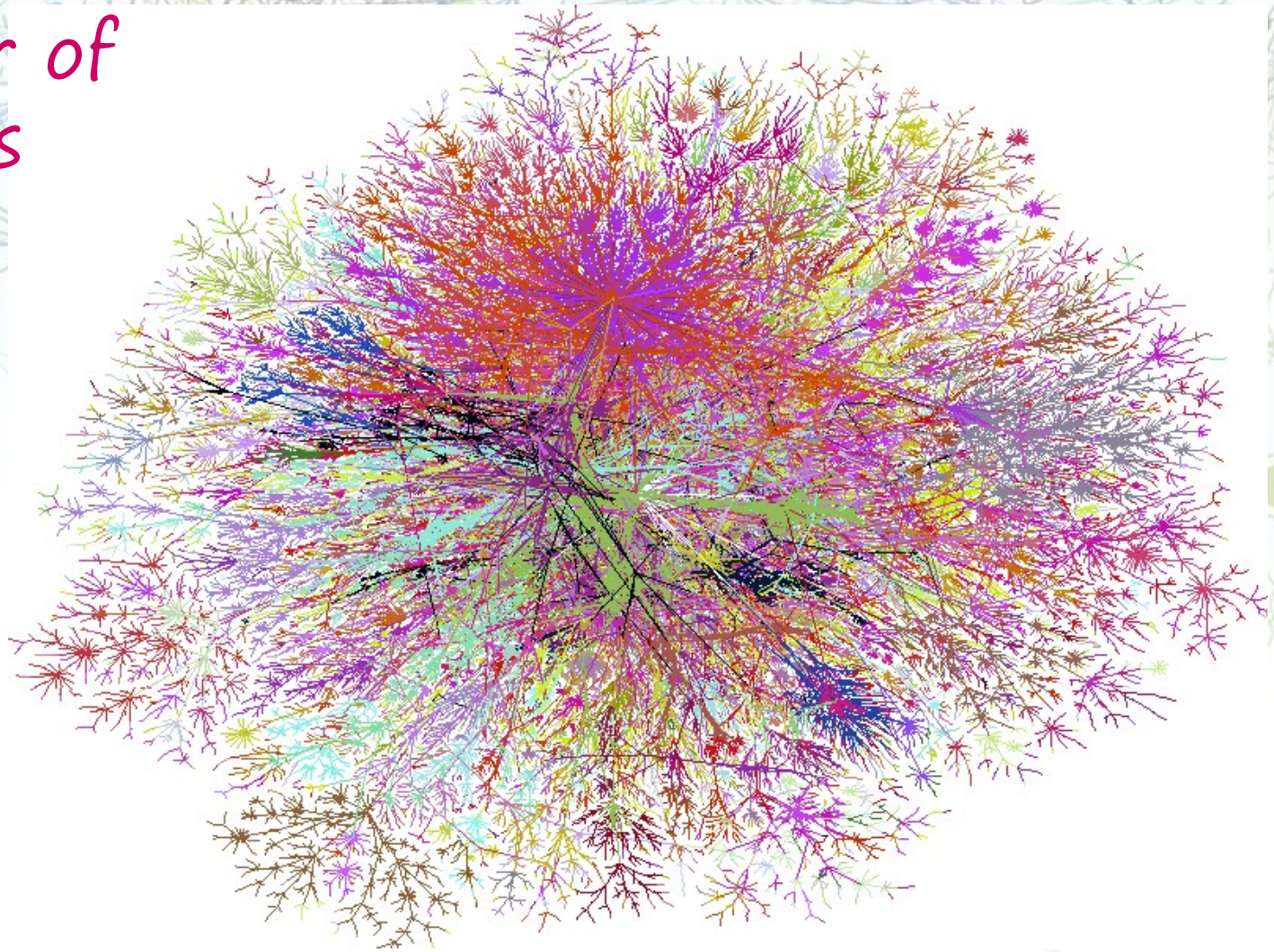
Parameters measuring complexity in a system

From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

number of elements



From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

1. … the **number of elements** within our system

A region is more complex than a city, having
- *more subsystems*
- *elements interacting on various scales*

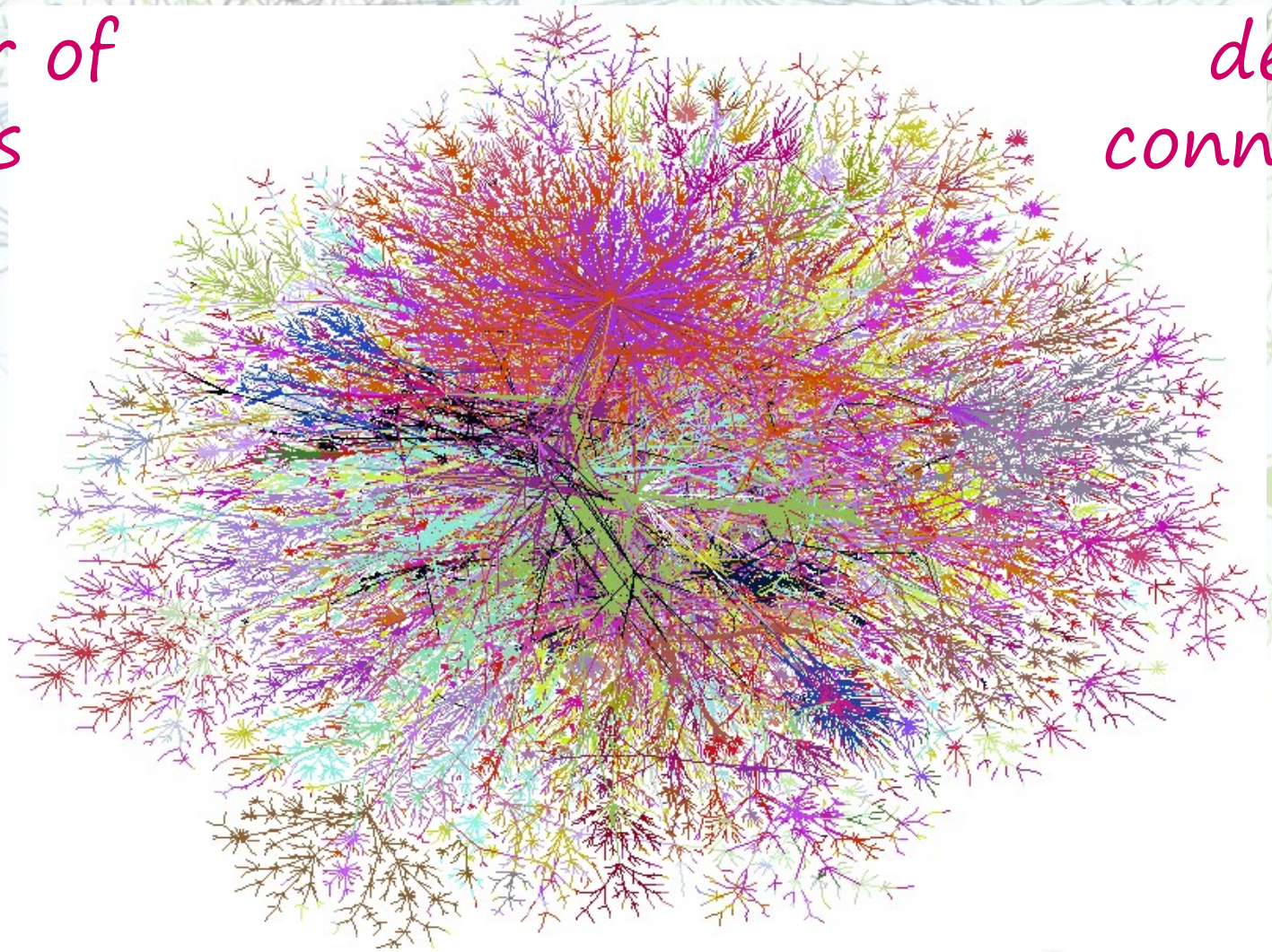
From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

number of elements

degree of connectivity



From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

❷ … the **degree of connectivity** within a system.

A few number of connections with a high level of connections describes a complex system.

From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

❷ … the **degree of connectivity** within a system.

A few number of connections with a high level of connections describes a complex system.

Complex systems are typically networks that can capture and quantify the relations between elements.

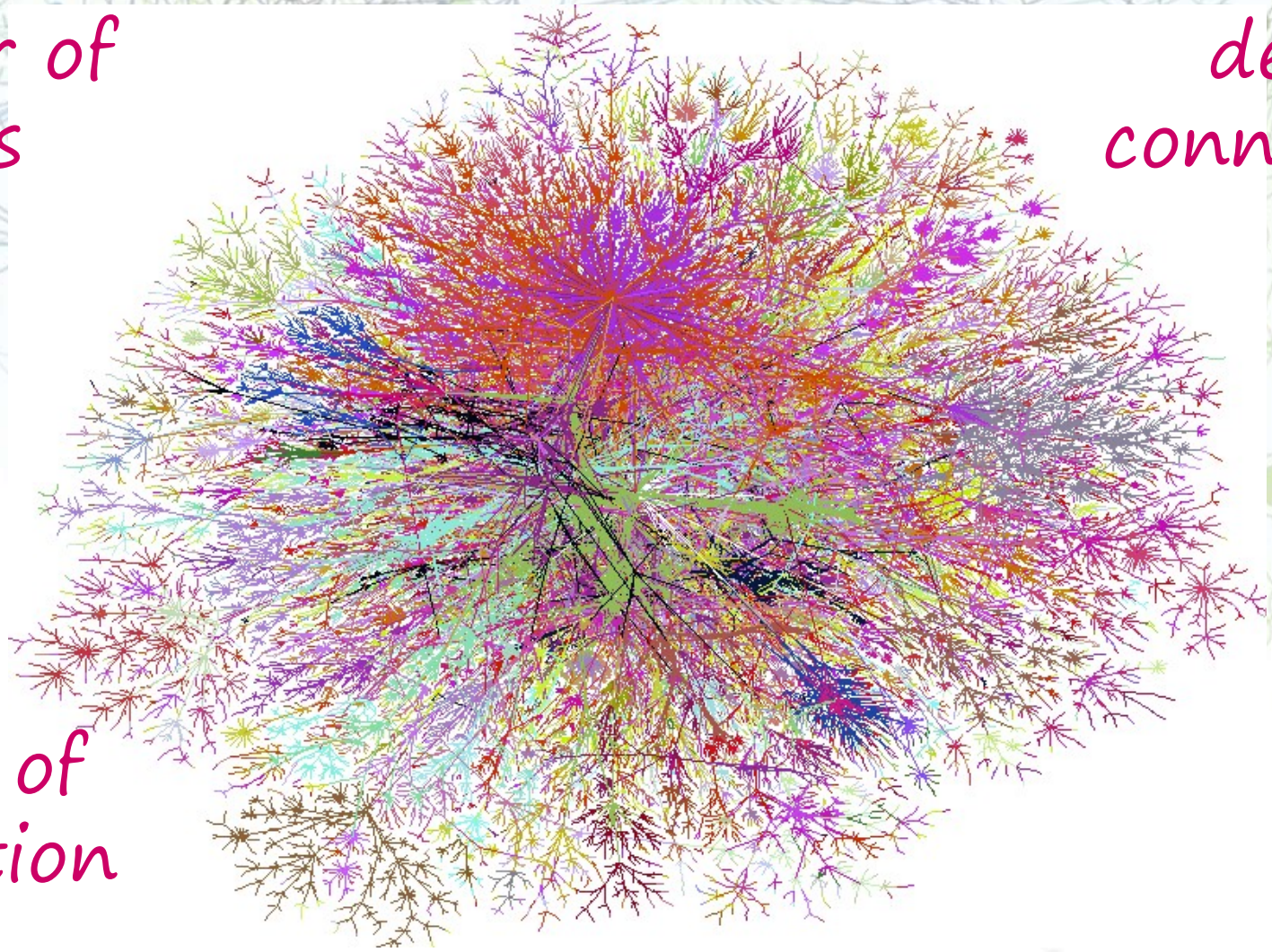
From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

number of elements

degree of connectivity



degree of adaptation

From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

❸ … the **degree of adaptation**

Complexity increases when elements become able to adapt their behavior over time

From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

❸ … the **degree of adaptation**

Complexity can be measured by seeing systems as the product of evolutionary dynamics which shaped them overtime.

From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

❸ … the **degree of adaptation**

Complexity can be measured by seeing systems as the product of evolutionary dynamics which shaped them overtime.

Not through static analysis of their individual parts.

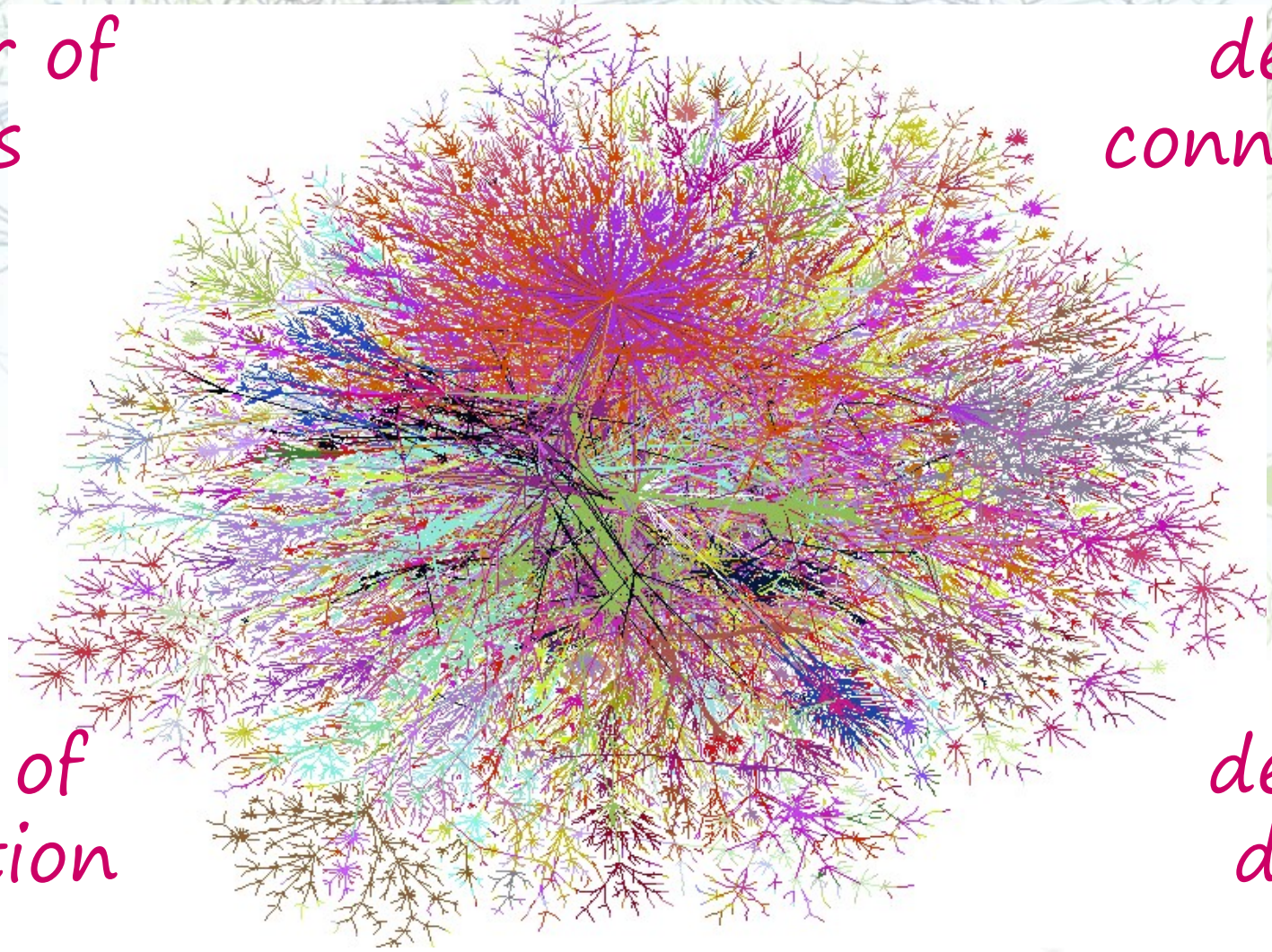
From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

number of elements

degree of connectivity



degree of adaptation

degree of diversity

From basic indicators to systems of indicators

(2) System of indicators

Parameters measuring complexity in a system

4. … the **degree of diversity** between elements

the greater diversity between the parts

the more complex the systems and the description of their features

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

In general terms (Michalos, 1992):

- forecast possible future trends
- show and point out particular critical issue
- help in defining priorities of policies
- allow territorial comparisons
- suggest new domains

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

Descriptive and explanatory functions	⇨ **Monitoring** ⇨ **Reporting**
Evaluation functions	⇨ **Forecasting** ⇨ **Accounting** ⇨ **Program management and performance evaluation** ⇨ **Assessment**

They can be seen in cumulative terms (each one requires the previous one)

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

- **Monitoring** → capacity of the system to monitor changes over time and meet the need of improving knowledge
- Reporting
- Forecasting
- Accounting
- Program/performance evaluation
- Assessment

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

- Monitoring
- **Reporting** → *monitoring* **+** *analysis* **+** *interpretation*
- Forecasting
- Accounting
- Program/performance evaluation
- Assessment

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

- Monitoring
- Reporting
- **Forecasting** → observed trends can help in supposing future trends and planning ex-ante analyses
- Accounting
- Program/performance evaluation
- Assessment

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

- Monitoring
- Reporting
- Forecasting
- **Accounting** → supporting decision concerning the allocation and the destination of resources
- Program/performance evaluation
- Assessment

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

- Monitoring
- Reporting
- Forecasting
- Accounting
- **Program / performance evaluation** → problem definition, policy choice and evaluation of alternatives and program monitoring
- Assessment

From basic indicators to systems of indicators

(2) System of indicators

Analytical purposes

- Monitoring
- Reporting
- Forecasting
- Accounting
- Program/performance evaluation
- **Assessment** → certificate or judge subjects (individuals or institutions) by discriminating their performances or infer functioning of institutions, enterprises or systems

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

- **Time view** →
- **Territorial view** →
- **Group view** →

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

time view

same phenomenon observed over time (year, month, …)

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

time view

cadence and continuity for collecting and updating each indicator

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

time view

cadence and continuity for collecting and updating each indicator

↓

depending on phenomenon dynamics

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

territorial view

same phenomenon observed at same moment across areas

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

territorial view

same phenomenon observed at same moment across areas

size of observed areas depends on the nature of the phenomenon

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

group view

same phenomenon observed at same moment in different population groups

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

group view

same phenomenon observed at same moment in different population groups

sampling design depends on the nature of the required comparisons

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

comparability

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

comparability

↓

adopted concepts | measurement tools

data sources harmonization | levels of observation

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

comparability

Comparing different realities (countries, areas, ...)
does not imply using same variables and indicators but
requires differentiated choices
(Stiglitz et al., 2009)

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

comparability

Comparing different realities (countries, areas, ...)
does not imply using same variables and indicators but
requires differentiated choices
(Stiglitz et al., 2009)

E.g.: Transferring a quality-of-life concept developed in a certain context could be misleading

From basic indicators to systems of indicators

(2) System of indicators

Architecture

Structure of observation and analysis

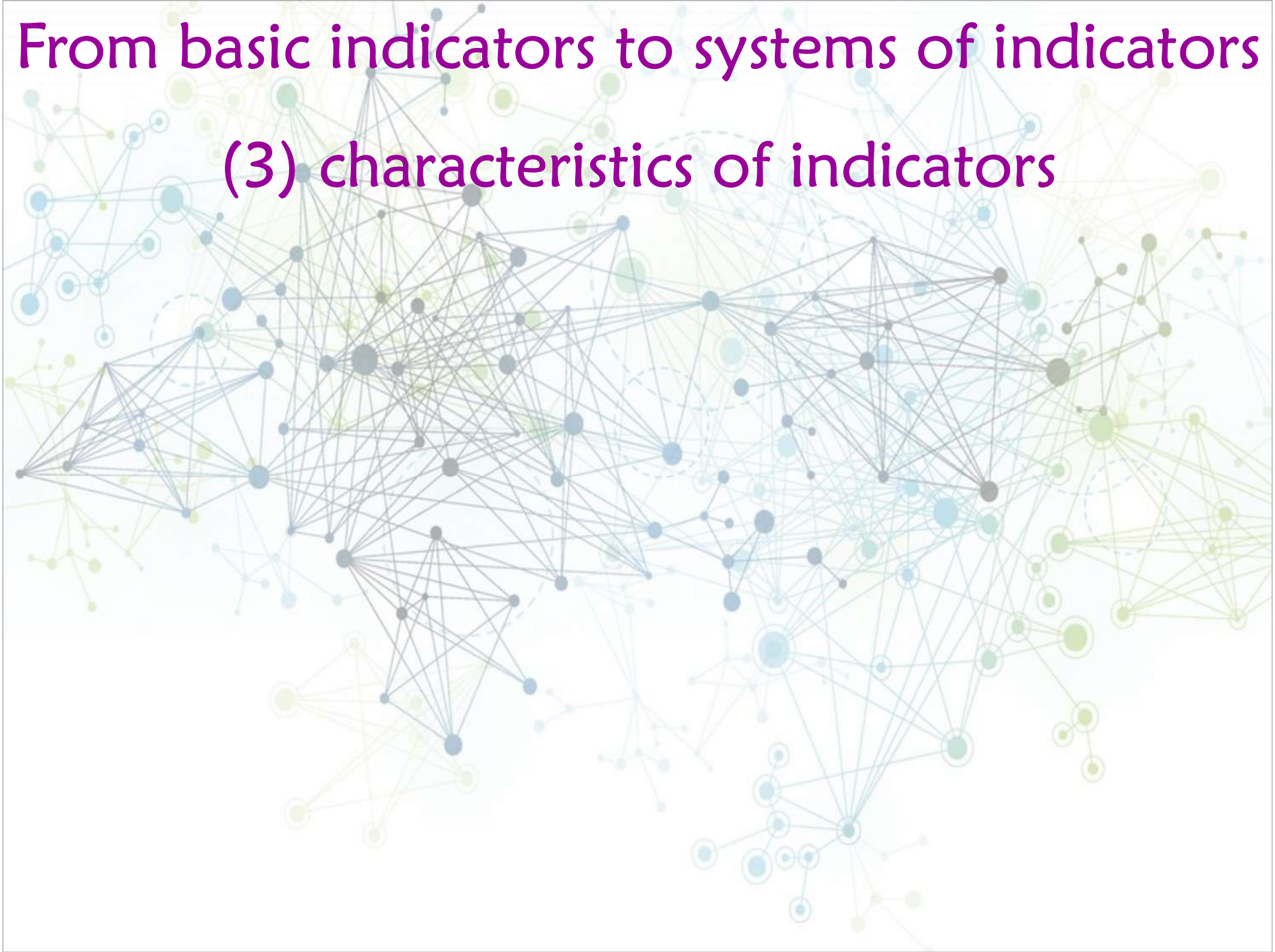
Vertical: data are collected from local levels (e.g. regions) in order to be systematized (aggregated) at a higher level (e.g. country). This structure allows policy goals to implemented, according to local information.

Horizontal: data are collected only at one level (e.g. regional) and allow particular observational ambits (environment, education) to be monitored and compared.

Local: this structure is typically designed in order to support local decisional processes. This kind of system is characterized by two levels, internal, when the indicators are aimed at monitoring the internal organization of the level, and external, when the indicators refer to parameters existing at higher levels (e.g. transportation).

From basic indicators to systems of indicators

(3) characteristics of indicators



From basic indicators to systems of indicators

(3) characteristics of indicators

Indicators developed through the hierarchical process are seen in relation to each other and show a meaningful and precise position in the system consistently with the conceptual model

From basic indicators to systems of indicators

(3) characteristics of indicators

(i) *perspective* through which the indicators are reporting the phenomenon to be observed

(ii) *communication context* in which the indicators are used

(iii) *interpretation* attributed to the indicators in statistical analyses

(iv) *criteria* of their adoption

(v) quality of indicators

From basic indicators to systems of indicators

(3) characteristics of indicators

(i) Perspective of observation

indicators can describe

status | trend

objective fact | subjective expression

positive aspect | negative aspect

conglomerative perspective | deprivational perspective

benefit | cost

input | outcome

cause | impact

From basic indicators to systems of indicators

(3) characteristics of indicators

(ii) Communication context

indicators can be

- cold indicators → complex and difficult, for specialists
- hot indicators → simple and easy
- warm indicators → good balance between quality, comprehensibility and resonance

From basic indicators to systems of indicators

(3) characteristics of indicators

(iii) Interpretation

indicators can be

- descriptive → informative about a situation
- explicative → interpreting results of other indicators
- predictive → delineating possible trend

From basic indicators to systems of indicators

(3) characteristics of indicators

(iii) Interpretation

Issues to be considered in interpreting indicators

- distributions → averages conceal
- distance impact → places where people live and facilities
- causal relations → difficult to be identified

From basic indicators to systems of indicators

(3) characteristics of indicators

(iv) Criteria

interpretation of the results according to a specific **reference frame**

From basic indicators to systems of indicators

(3) characteristics of indicators

(iv) Criteria

interpretation of the results according to a specific **reference frame**

↓

benchmark

From basic indicators to systems of indicators

(3) characteristics of indicators

(iv) Criteria

interpretation of the results according to a specific **reference frame**

↓

benchmark

helps in understanding where each case is in relation to a particular standard

From basic indicators to systems of indicators

(3) characteristics of indicators

(iv) Criteria

interpretation of the results according to a specific
reference frame
↓
benchmark

allows

- priorities to be established
- better practices to be defined
- impacts to be evaluated
- awareness amongst the stakeholders to be aroused

From basic indicators to systems of indicators

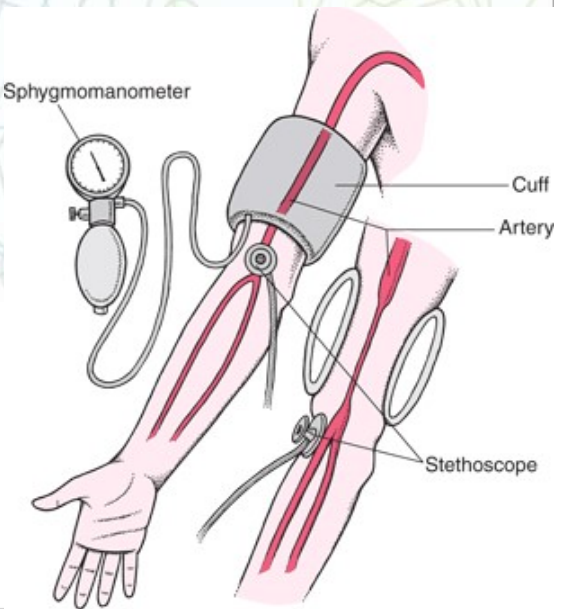
(3) characteristics of indicators

(iv) Criteria

Different forms

(Śleszyński, 2012)

Indicator: blood pressure



From basic indicators to systems of indicators

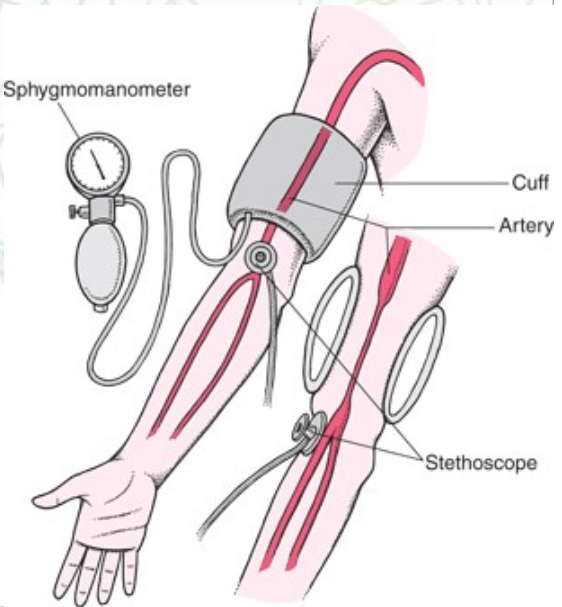
(3) characteristics of indicators

(iv) Criteria

Reference point (critical value)

information established thanks to scientific research or to desired norms

"the pressure is lower than normal"



Indicator: blood pressure

From basic indicators to systems of indicators

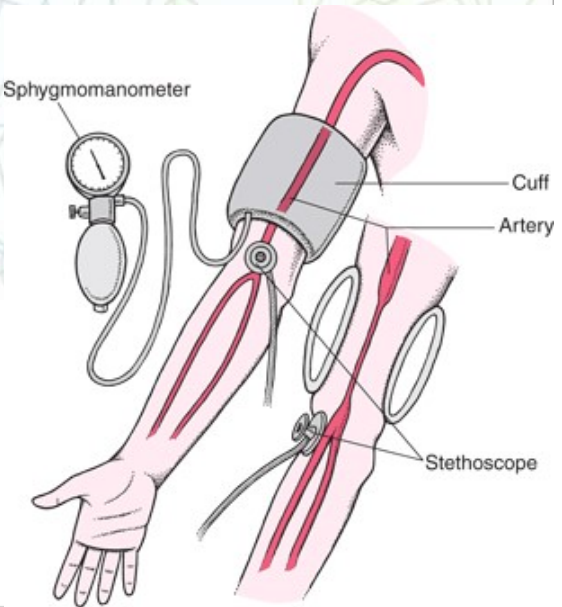
(3) characteristics of indicators

(iv) Criteria

Signpost arrow (what direction)

information compared with previous performances

"the pressure is getting lower"



Indicator: blood pressure

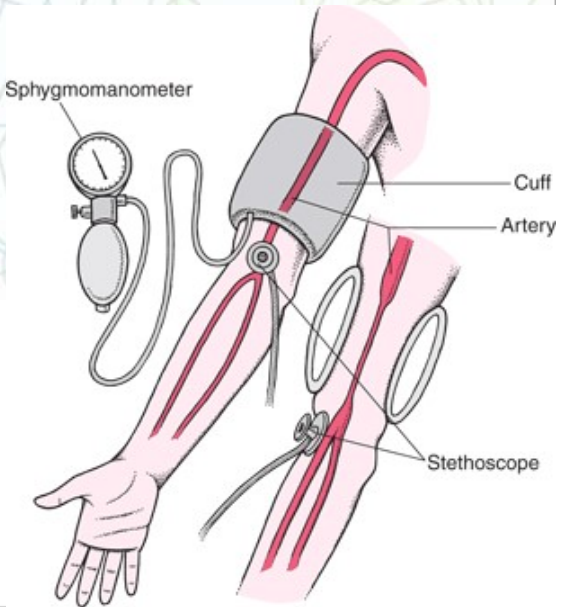
From basic indicators to systems of indicators

(3) characteristics of indicators

(iv) Criteria

Best practice

a model to be followed



Indicator: blood pressure

From basic indicators to systems of indicators

(3) characteristics of indicators

(iv) Criteria

requires

a wide consensus (not easy to be reached)

and

involves

cultural paradigms, normative demands, expert groups' pressure, shared wishful ideas

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Dimensions

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Dimensions

An indicator should be able to:	• define and describe • observe unequivocally and stably • record by a degree of distortion as low as possible	**METHODOLOGICAL SOUNDNESS**
	• adhere to the principle of objectivity	**INTEGRITY**
	• reflect adequately the conceptual model • meet current ad potential users' needs • be observed through realistic efforts and costs • reflect the length of time between its availability and the event of phenomenon it describes • be analyzed in order to record differences and disparities	**SERVICEABILITY**
	• be spread	**ACCESSIBILITY**

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Dimensions

AN INDICATOR SHOULD BE	clear, meaningful, consistent	in describing the conceptual model s and in relating to the defined aims and objectives	ACCURACY AND VALIDITY	**METHODOLOGICAL SOUNDNESS**
	appropriate, exhaustive, pertinent	in meeting requirements underlying its construction (knowing, monitoring, evaluating, accounting, ...)		
	repeatable, robust	in measuring the underlying concept with a degree of distortion as low as possible	PRECISION	
	reproducible, stable		RELIABILITY	
	transparent, ethically correct	in data collection and dissemination	OBJECTIVITY	**INTEGRITY**
	relevant, credible	in meeting users' needs	APPROPRIATENESS	**SERVICEABILITY**
	practicable, up-to-datable, thrifty	in observing through realistic efforts and costs in terms of development and data collection	PARSIMONY	
	well-timed, timely, punctual	In reporting the results with a short length of time between observation and communication	AVAILABILITY	
	periodic, regular	In observing the phenomenon over time (for example, short time between observation and data availability)		
	discriminant, disagregable,	in recording differences and disparities between units, groups, geographical areas and so on	COMPARABILITY	
	accessible, interpretable, comprehensible, simple, manageable	in being findable, accessible, useable, analyzable, and interpretable	USABILITY	**ACCESSIBILITY**

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Further dimensions

completeness, embedding responsibility, verifiable through external bodies and organizations, continuously improved

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Further dimensions

completeness, embedding responsibility, verifiable through external bodies and organizations, continuously improved

↓

accountability

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Further dimensions

completeness, embedding responsibility, verifiable through external bodies and organizations, continuously improved

↓

accountability

indicator construction is not simply a technical problem but should become part of a larger debate concerning how to construct indicators obtaining a larger legitimacy to be promoted.

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Prerequisites

From basic indicators to systems of indicators

(3) characteristics of indicators

(v) Quality

Prerequisites

- Legal and institutional environment (conceptual framework coordination, and data and resources)
- Quality awareness informing statistical work

1. Developing indicators

2. From basic indicators to systems of indicators

3. Managing indicators: instructions for use

Managing indicators: instructions for use

a challenge

a risk

a need

Managing indicators: instructions for use

a challenge

↓

complexity

Managing indicators: instructions for use

(1) A challenge: complexity

- **Multidimensionality**
  different aspects to be identified, not necessarily consistent among them
- **Nature**
  - objective vs. subjective
  - quantity vs. quality
- **Levels of observation**
  - micro vs. macro
- **Dynamics**
  - internal levels vs. external conditions
  - trends, not necessarily linear
  - relationships between phenomena

Managing indicators: instructions for use

(1) A challenge: complexity

The reality is complex with reference to

(A) STRUCTURE OF VALUES

Managing indicators: instructions for use

(1) A challenge: complexity

Functioning and capability to select goods and services that one desires → Income considered as a mean to achieve an acceptable standard of living

Normative ideals → set of characteristics inspired by normative aims, grounded in moral values or policy goals

Subjective experiences → Individual's cognitive and affective reactions to his/her whole life (or specific domains) and societies

Managing indicators: instructions for use

(1) A challenge: complexity

The reality is complex with reference to

(A) STRUCTURE OF VALUES

(B) OBSERVATIONAL PERSPECTIVES

Managing indicators: instructions for use

(1) A challenge: complexity

PROCESSES

- growth
- progress
- development
- ….

CONDITIONS

- ✓ availability of resources
- ✓ distribution of resources
- ✓ impact of policies
- ✓ …

GOALS

- ➢ sustainability
- ➢ quality of life
- ➢ well-being
- ➢ …

Managing indicators: instructions for use

(1) A challenge: complexity

The reality is complex with reference to

(A) STRUCTURE OF VALUES

(B) OBSERVATIONAL PERSPECTIVES

(C) POINTS OF OBSERVATION

Managing indicators: instructions for use

(1) A challenge: complexity

individuals

⇩

Quality of life

- resources approach
- capabilities approach
- subjective well-being approach
- basic needs approach
- objective living conditions and subjective well-being approach

societies

⇩

Quality of societies

- liveability and quality of nations
- societal integration, solidarity and stability
  - social cohesion
  - social exclusion
  - social capital
- sustainability
- human development
- social quality

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

conglomerative ←→ deprivational

input ←→ outcome

positive ←→ negative

benefits ←→ costs

status ←→ trends

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

micro ←→ macro

internal ←→ external

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

objective ←→ subjective

quantitative ←→ qualitative

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics
- Level of dis/aggregation

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Time frame
- Area sizes

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics
- Level of dis/aggregation
- Criteria

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- goals
- identifying benchmarks
- reference standards
- …

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics
- Level of dis/aggregation
- Criteria
- Levels of complication

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- cold indicators
- hot indicators
- warm indicators

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics
- Level of dis/aggregation
- Criteria
- Levels of complication
- Purposes

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- descriptive
- explicative
- predictive
- normative
- problem-oriented
- evaluating

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics
- Level of dis/aggregation
- Criteria
- Levels of complication
- Purposes
- Governance context

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- public debate
- policy governance
- administrative guidance

Managing indicators: instructions for use

(1) A challenge: complexity

Complexity in constructing indicators

- Perspective of observation
- Level of observation
- Nature of the observed characteristics
- Level of dis/aggregation
- Criteria
- Levels of complication
- Purposes
- Governance context
- ……

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

Indicators → numbers

????

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

An indicator is **not** necessarily a **number**

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

An indicator can be an **object**

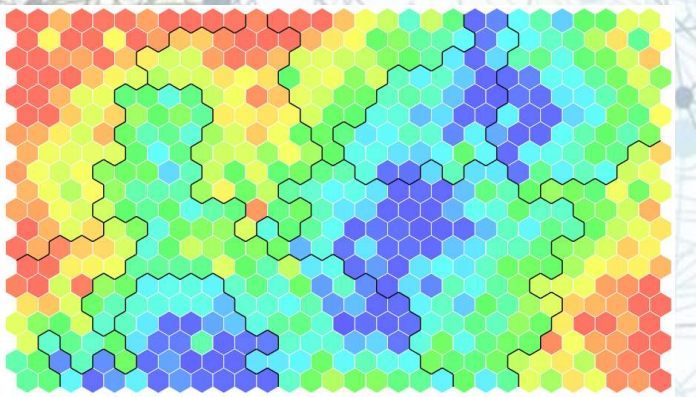
able to preserve the complexity by stylizing it

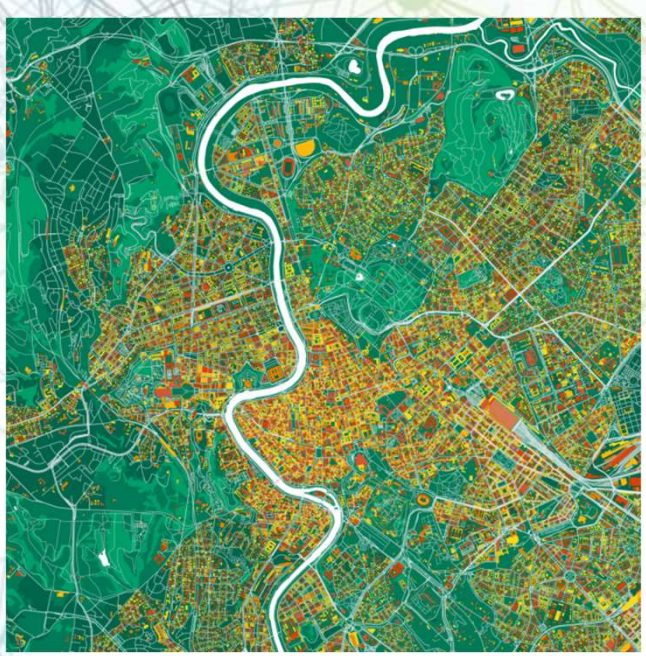
Managing indicators: instructions for use

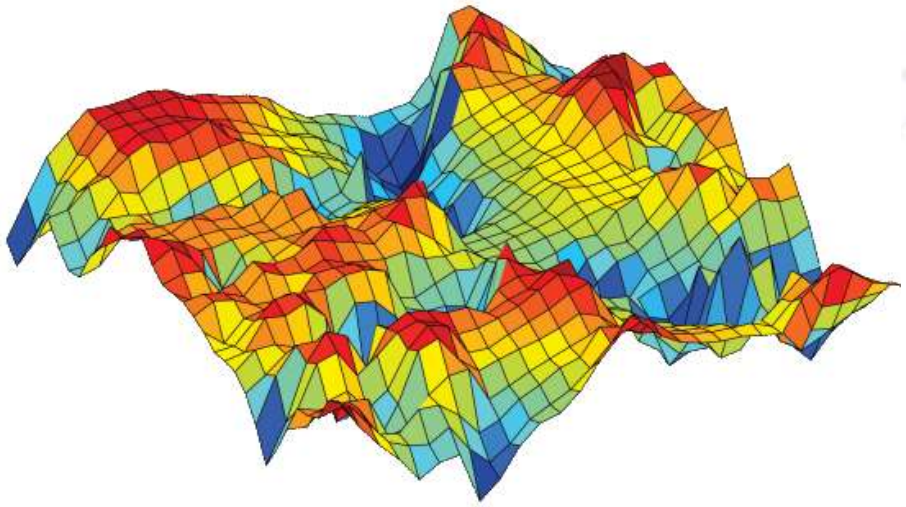
(1) A challenge: complexity

Consequences of complexity in constructing indicators

a map







Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

This has methodological consequences

⬇

*what we are going to construct should be an **authentic representation** of the reality*

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

This has methodological consequences

not a compress / pointfold / pointform representation

but

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

This has methodological consequences

not a compress / pointfold / pointform representation

but

a representation preserving the systemic characteristic of the phenomena

defined by ***elements and*** *their* ***relationships***

Managing indicators: instructions for use

(1) A challenge: complexity

Consequences of complexity in constructing indicators

This has methodological consequences

⬇

from

points (numbers)

to

pattern (simplified shape and structure)

Managing indicators: instructions for use

(1) A challenge: complexity

interpretative and explorative models

↓

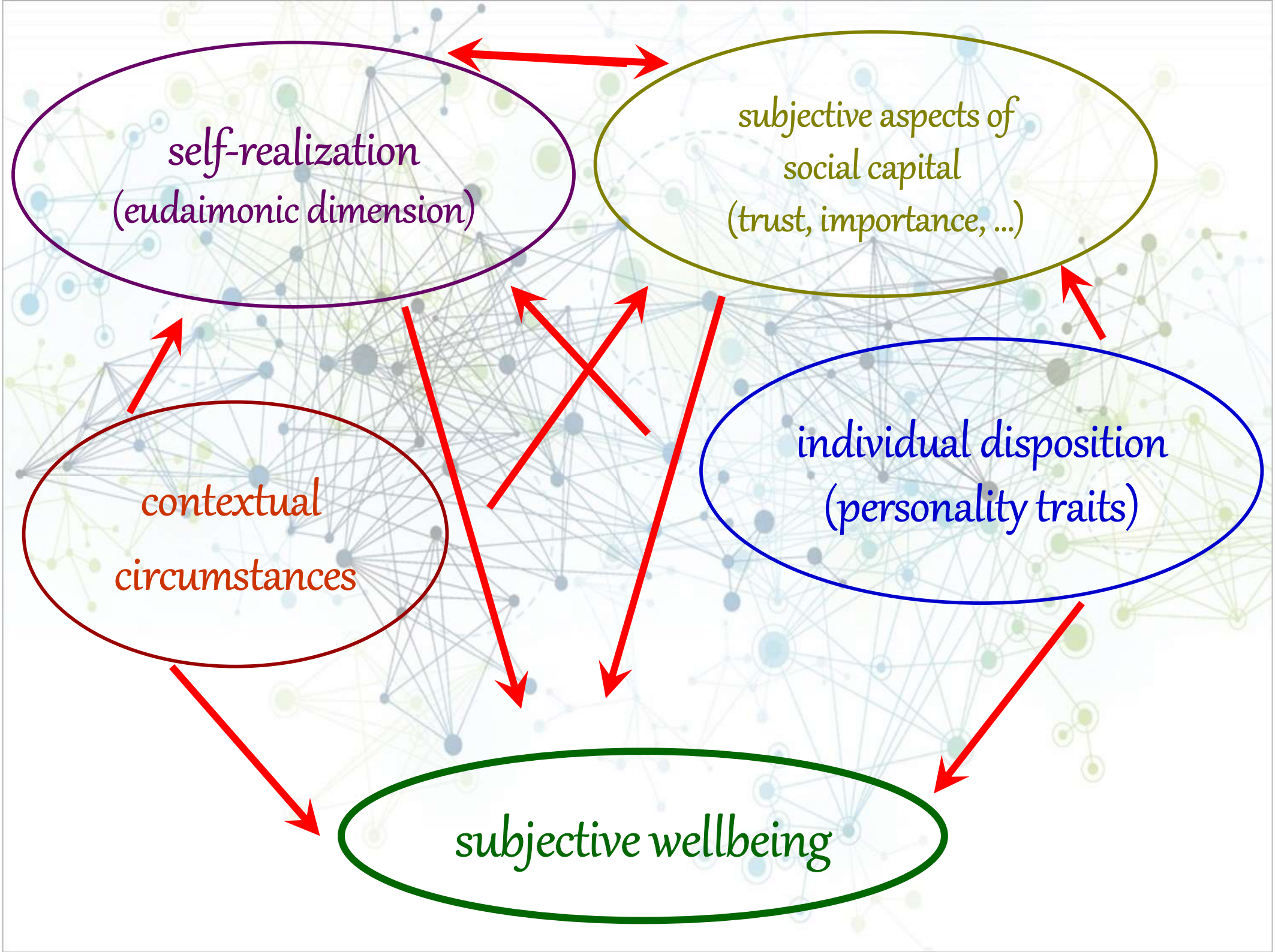
understanding phenomena

↓

policies

Managing indicators: instructions for use

(1) A challenge: complexity


self-realization
(eudaimonic dimension)
subjective aspects of
social capital
(trust, importance, ...)
contextual
circumstances
individual disposition
(personality traits)
subjective wellbeing

Managing indicators: instructions for use

a challenge

↓

complexity

making relative

↑

a need

Managing indicators: instructions for use

(2) A need: making relative

From the conceptual point of view

in terms of

- consistency with the defined concept
- adequacy with reference to territory / group

e.g., nr. of beds in hospital

Managing indicators: instructions for use

(2) A need: making relative

Making relative has strong implications with reference to ***comparability*** of indicators

Managing indicators: instructions for use

(2) A need: making relative

Making relative has strong implications with reference to ***comparability*** of indicators

	over time	across territories / areas	between groups
concepts			
data			
analysis			

Managing indicators: instructions for use

(2) A need: making relative

Making relative has strong implications with reference to ***comparability*** of indicators

Need of different expertises (e.g., linguistic)

Example:

In English "happiness" → to happen

In Italian "felicità" → *felix* = luck

Managing indicators: instructions for use

(2) A need: making relative

Making relative has strong implications with reference to ***comparability*** of indicators

Differences

social structures, legal systems, politics, economics, cultures, value systems, …

In social sciences, the issue cannot be faced through an experimental approach since the context is not under observers 'control.

Managing indicators: instructions for use

(2) A need: making relative

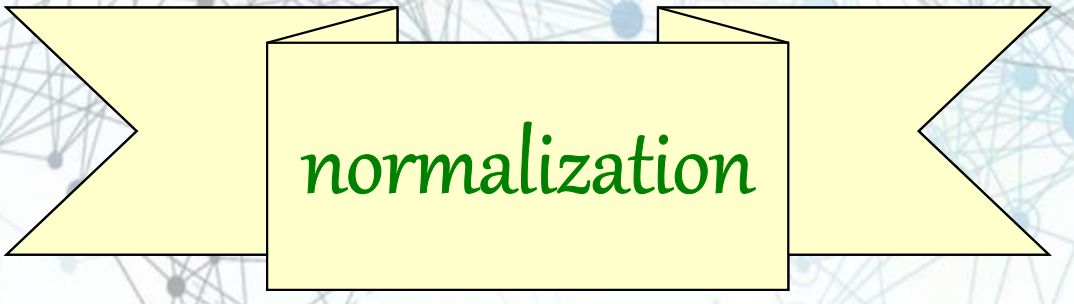
Making relative has strong implications with reference to ***statistical treatment*** of indicators

- Sampling design
- Questionnaire design
- Data collection method
- …

Managing indicators: instructions for use

(2) A need: making relative

Making relative has strong implications with reference to ***statistical treatment*** of indicators



Which should consider:

- data properties
- original meaning of indicators
- values to be emphasized or penalized
- whether or not absolute value are used
- whether or not cases are compared to each other or to a reference unit
- whether or not units are evaluated across time

Managing indicators: instructions for use

a challenge

↓

complexity

a risk

↓

reductionism

making relative

↑

a need

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

unavoidable ⇙ ⇘ dangerous

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

system of indicators

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

system of indicators

Complexity of systems of indicators **may require** approaches allowing more **synthetic views** through more comprehensive measures **……**

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

system of indicators

… by taking into account that

all elements included in the system are organically integrated

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

in

system of indicators

… by taking into account that

all elements included in the system are organically integrated

⇩

they are not chosen independently

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

in

system of indicators

Reducing data complexity

integral part of the process leading to indicators development

Managing indicators: instructions for use

(3) A risk: reductionism

reductionism

in

system of indicators

Reducing data complexity

↓

Solutions

Managing indicators: instructions for use

(3) A risk: reductionism

(a) reducing the number of indicators

Managing indicators: instructions for use

(3) A risk: reductionism

(a) reducing the number of indicators

Need of a solid conceptual framework

Managing indicators: instructions for use

(3) A risk: reductionism

(a) reducing the number of indicators

Statistical rational → correlations

Managing indicators: instructions for use

(3) A risk: reductionism

(a) reducing the number of indicators

Statistical rational → correlations

nr. of firemen vs. amount of damages of fires

Managing indicators: instructions for use

(3) A risk: reductionism

(b) synthesizing indicators

Managing indicators: instructions for use

(3) A risk: reductionism

(b) synthesizing indicators

(Noll, 2009)

- answer the call by 'policy makers' for condensed information
- improve the chance to get into the media
- allow to make multi-dimensional phenomena uni-dimensional
- allow situations across time more to be easily compared
- compare cases (e.g. countries) in a transitive way (ranking and benchmarking)
- allow clear cut answers to defined questions (related to change across time, difference between groups of population or comparison between cities, countries, and so on)

Managing indicators: instructions for use

(3) A risk: reductionism

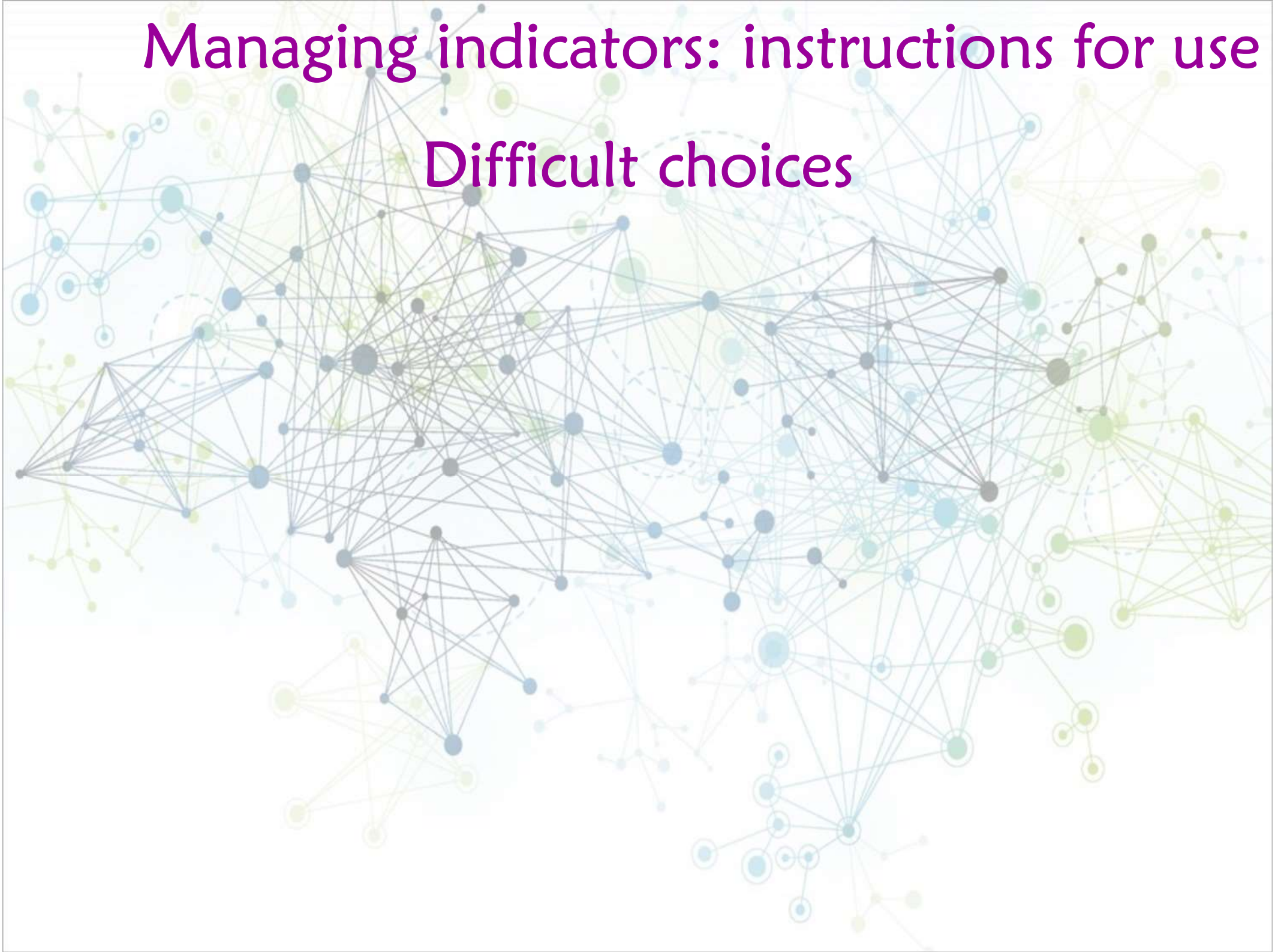
(b) synthesizing indicators

Statistical rational → correlations

e.g. composite indicators

Managing indicators: instructions for use

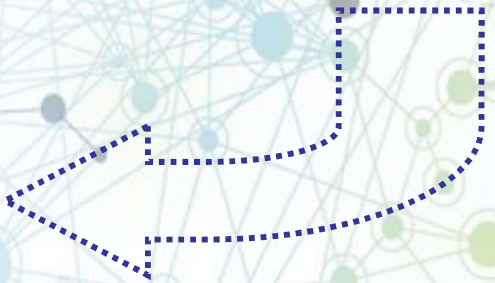
Difficult choices



Managing indicators: instructions for use

Difficult choices

divorce rate



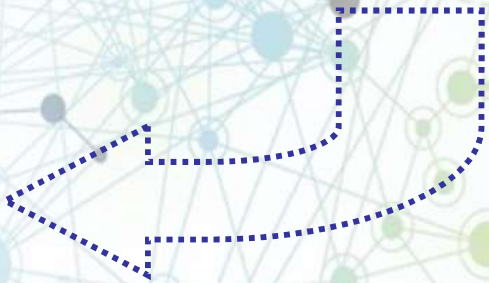
How can we interpret it?

Managing indicators: instructions for use

Difficult choices

hourly access to nursery

How can we interpret it?



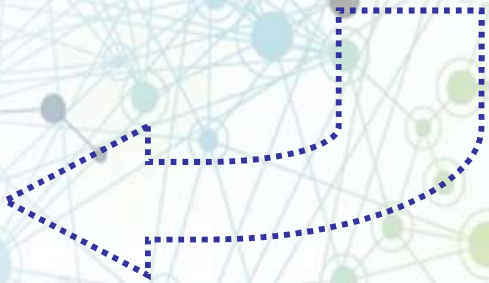
Parents' or children's wellbeing?

Managing indicators: instructions for use

Difficult choices

hospital beds / population

How can we interpret it?



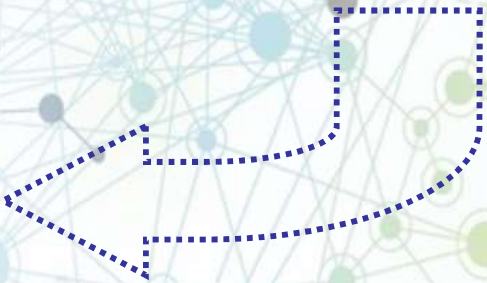
Welfare or [widespread] illness?

Managing indicators: instructions for use

Difficult choices

shops / population

How can we interpret it?



Superstores or local markets?

Managing indicators: instructions for use

Difficult choices

technologies' spread

How can we interpret it?

Which are population's advantages?

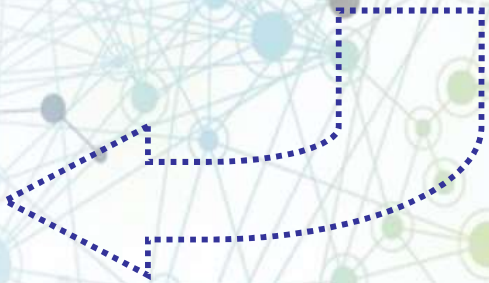
More free time for all or increasing of unemployment rate?

Managing indicators: instructions for use

Difficult choices

Commuting time

How can we interpret it?



What is uncomfortable? Length or irregularity?

Managing indicators: instructions for use

Difficult choices

Hours devoted to family care

How can we interpret it?

Many → low quality of welfare system?

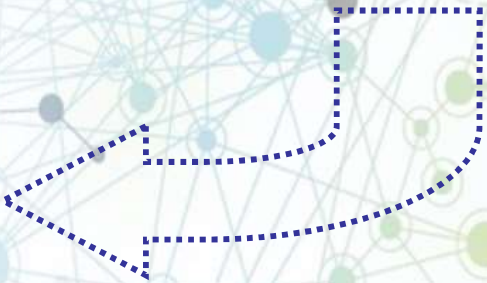
Few → low quality of family/social network?

Managing indicators: instructions for use

Difficult choices

Hours devoted to family care

What we want to measure?



Many → low quality of welfare system?

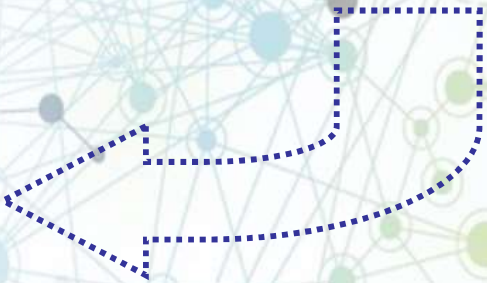
Few → low quality of family/social network?

Managing indicators: instructions for use

Difficult choices

Unemployment rate

What we are going to measure?



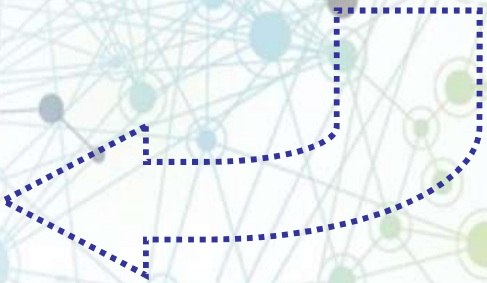
Production or individual resource?

Managing indicators: instructions for use

Difficult choices

Unemployment rate

What we are going to measure?



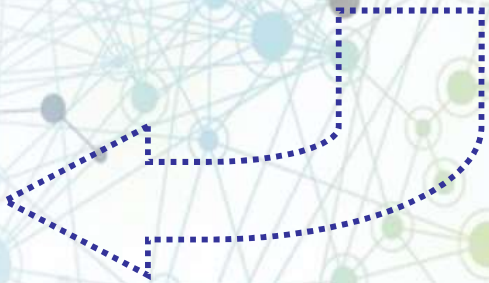
Production: unpaid trainees are excluded

Managing indicators: instructions for use

Difficult choices

Unemployment rate

What we are going to measure?



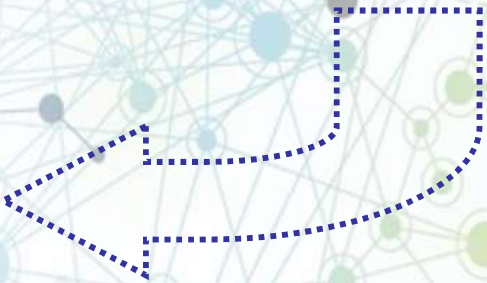
Individual resource: unpaid trainees are included

Managing indicators: instructions for use

Difficult choices

Unemployment rate

What we are going to measure?



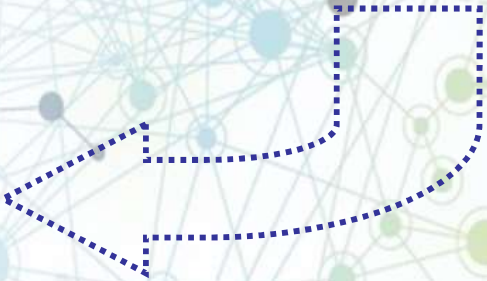
Production: parental leave are excluded

Managing indicators: instructions for use

Difficult choices

Unemployment rate

What we are going to measure?

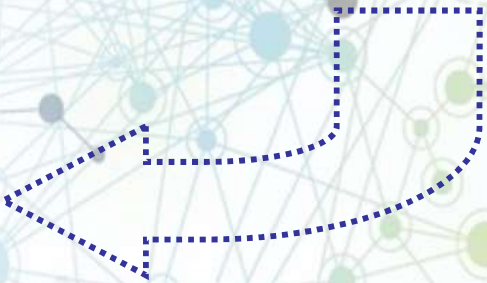


Individual resource: parental leaves are included

Managing indicators: instructions for use

Difficult choices

Temporary contracts rate



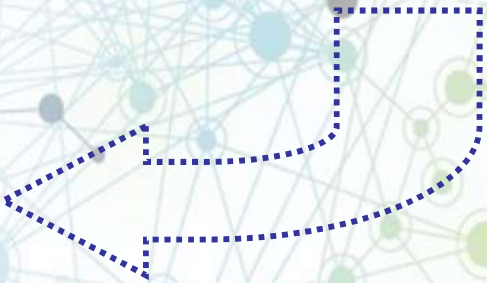
How to interpret it?

Managing indicators: instructions for use

Difficult choices

Long-term contracts rate

How to interpret it?



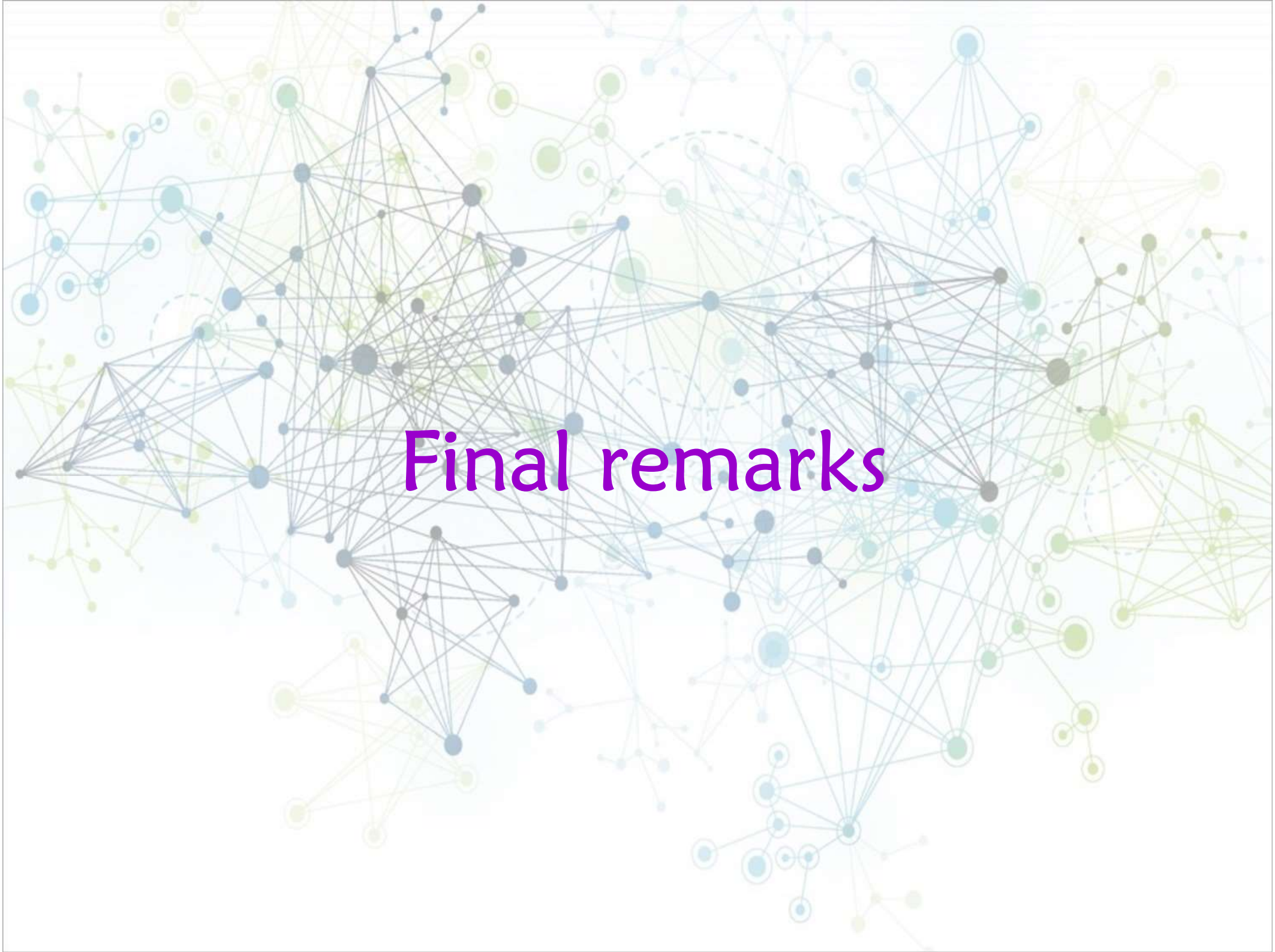
Managing indicators: instructions for use

Difficult choices

Long-term contracts rate

How to interpret it?

	low	high
temporary contracts rate		
long-term contracts rate		


Final remarks

Are indicators enough?

Are indicators enough?

Let's image

an airplane → a community

the flight desk → governance

lights → markers of indicators

Are indicators enough?

- experts develop indicators
- policy makers should be able to read them
- citizens should be able to understand them

Are indicators enough?

In order to take off, we need:

- a clear definition of destination (→ *goals*)
- a democratic process allowing the community to take a shared decision concerning destination (→ *democracy*)
- a deep knowledge of pre-conditions (→ *resources*, …)
- a constant monitoring of flight conditions (→ *monitoring*)
- a continuous transmission and sharing of information on flight conditions (→ *communication and information system*)
- a cultural environment available to support *scientific research* (basic and applied) to improve the whole system's conditions
- a system allowing the community to face and manage emergencies (→ *welfare and social security*, …)

The monitoring of societal wellbeing should be grounded on:

- a solid *democratic system*
- a transparent *media system*
- *education* of the citizens

In this, an important role is played by

- the education and university system
- the official statistics

… two strategic and institutional sectors

… both should meet social consensus

If even just one of these items is missed, pursuing a *good society* is seriously damaged.