Vlaanderen
is milieu

International Conference Regions in numbers: connecting diversity

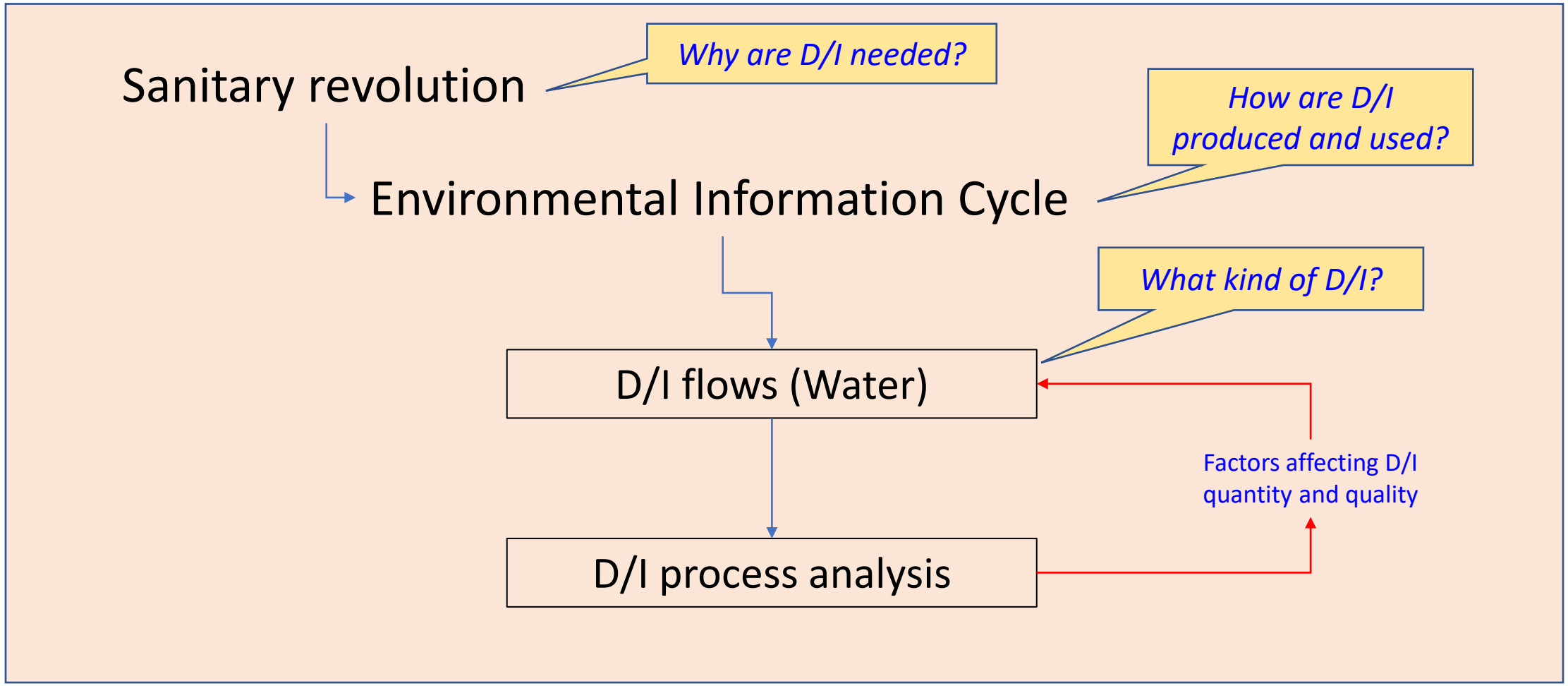
Brussels, 10 May 2022

Improving international water statistics

Rudy Vannevel

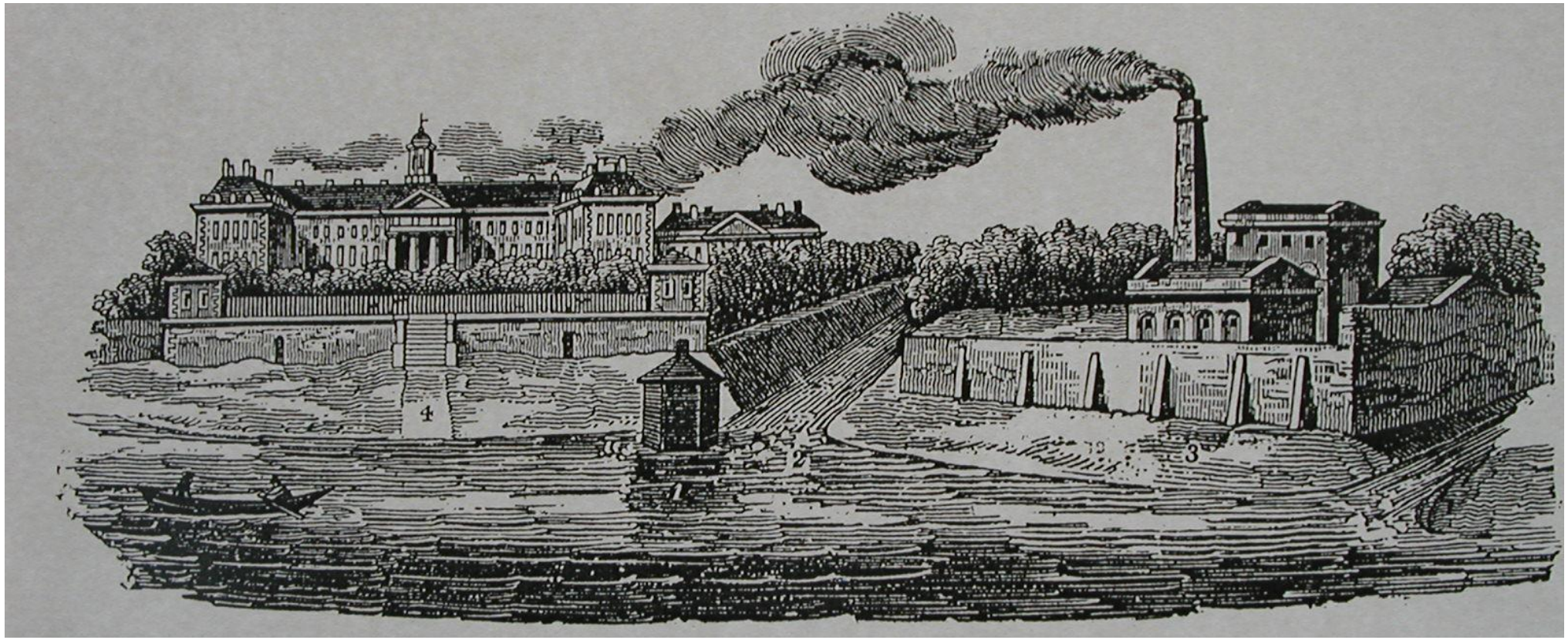
VLAAMSE
MILIEUMAATSCHAPPIJ

OUTLINE – Data / Information

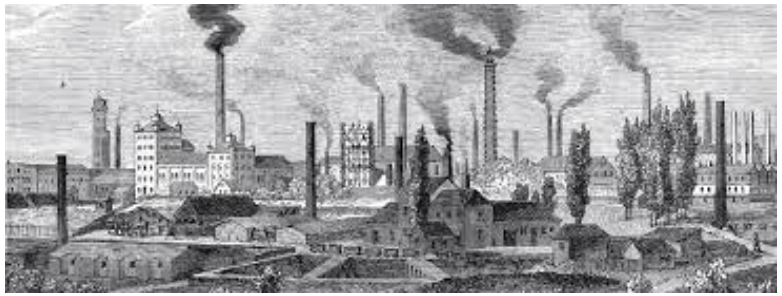


PINK FLOYD
ANIMALS
Battersea Power Station
Chelsea Bridge
Grosvenor Bridge
LONDON, Grand Junction Cy (19th C)
Pumping Station
Grosvenor Waterside
Grosvenor Dock
Grosvenor Waterside Play Area

London, Theems - "The Dolphin or Grand Junction Nuisance" ***(John Wright, 1827)***

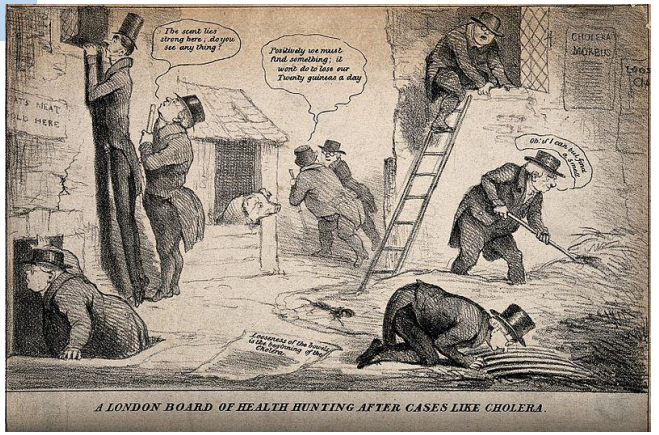


- Industrial revolution

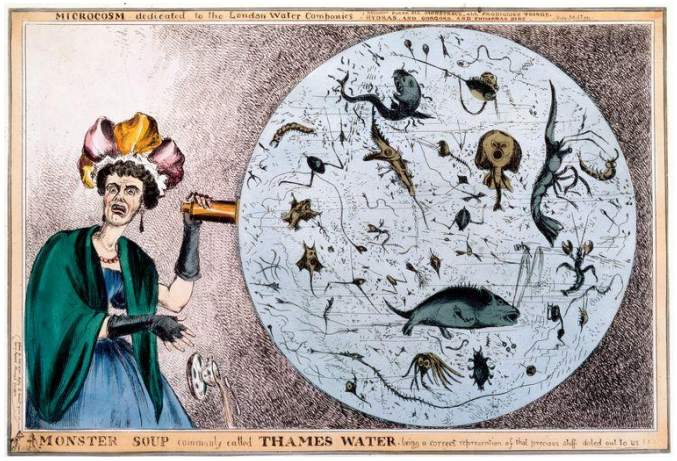


- Cholera epidemics

Causes?



Miasma theory



Knowledge

Facts & figures?

Monitoring

- Cholera epidemics

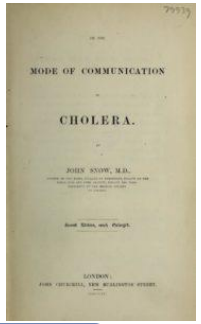
- Sanitary revolution
  - Bacteriology
  - Epidemiology
  - Drinking w. supply
  - Waste w. treatment
  - Firefighting
  - …
  - Environm. law
  - Institutional reform
  - …

Germ theory *(1880)*

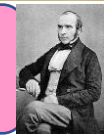
Edwin Chadwick (social reformer)

Knowledge

Reporting

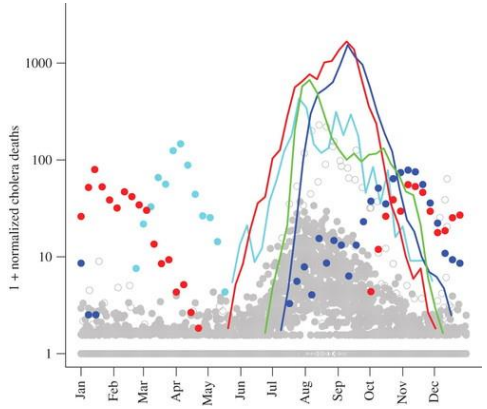


John Snow (anaesthetist)



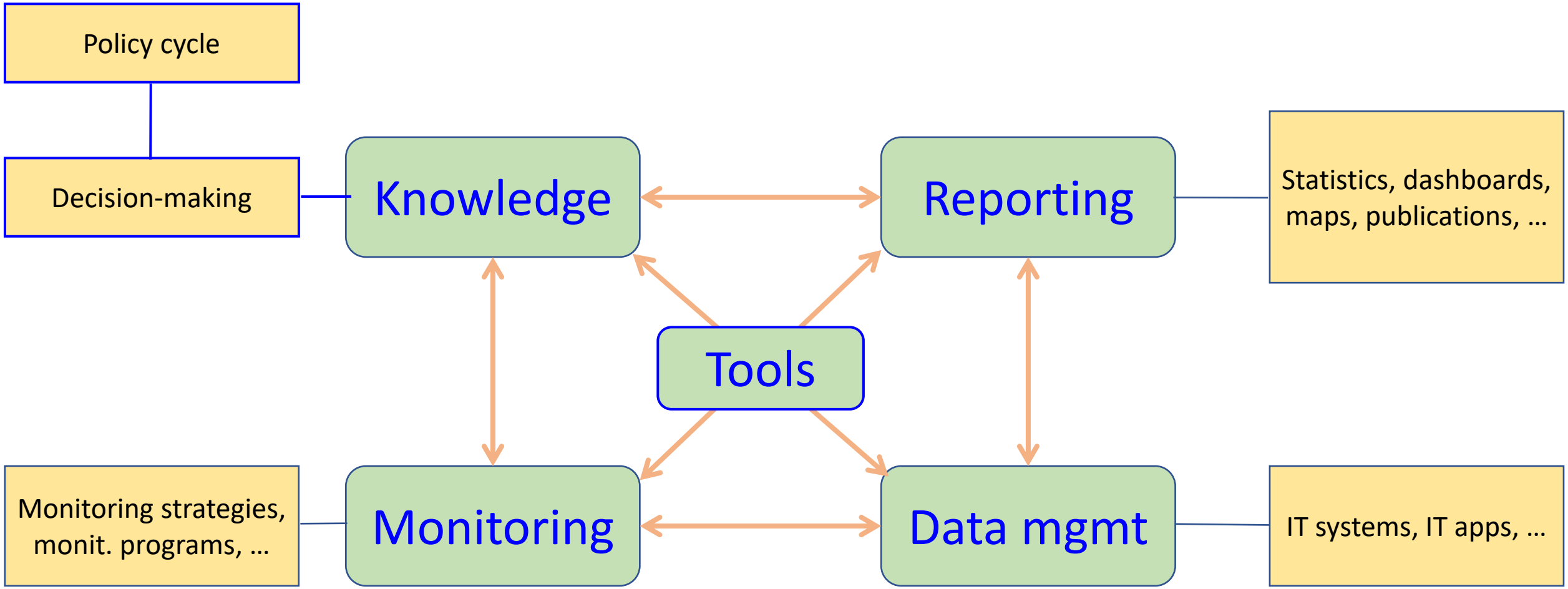
Monitoring

Data mgmt

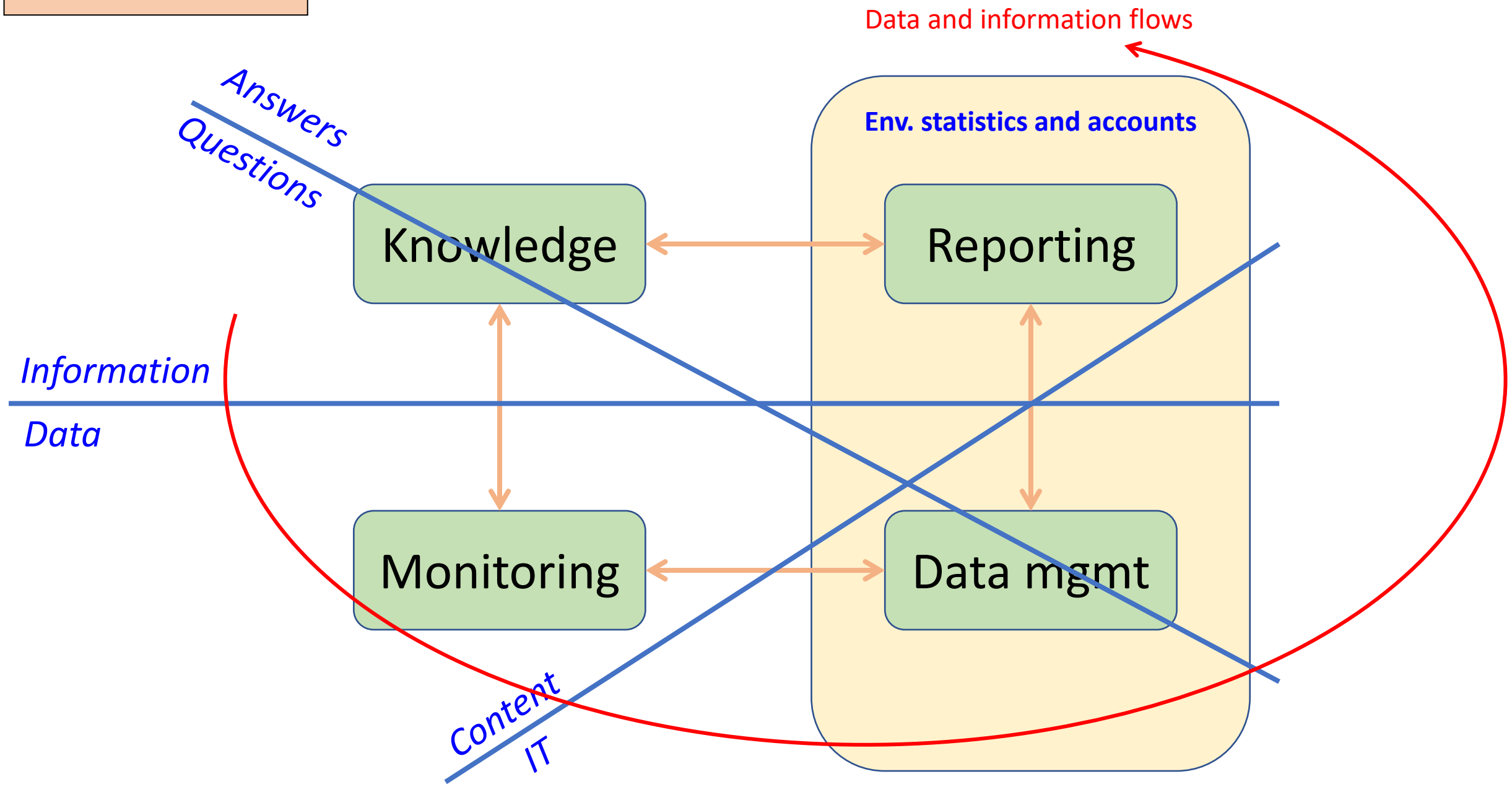


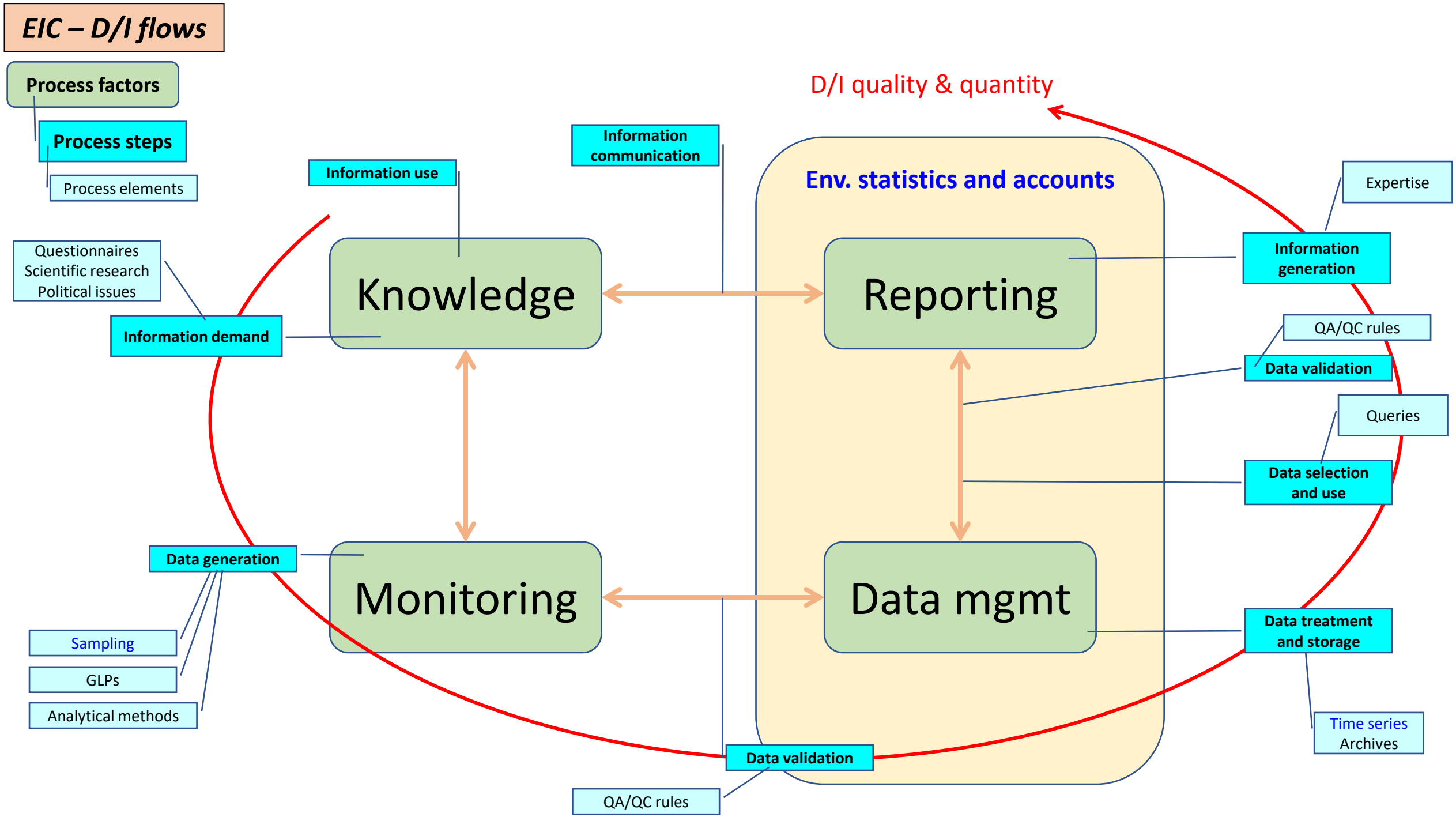
William Farr (statistician)

Environmental Information Cycle (EIC) – Process factors



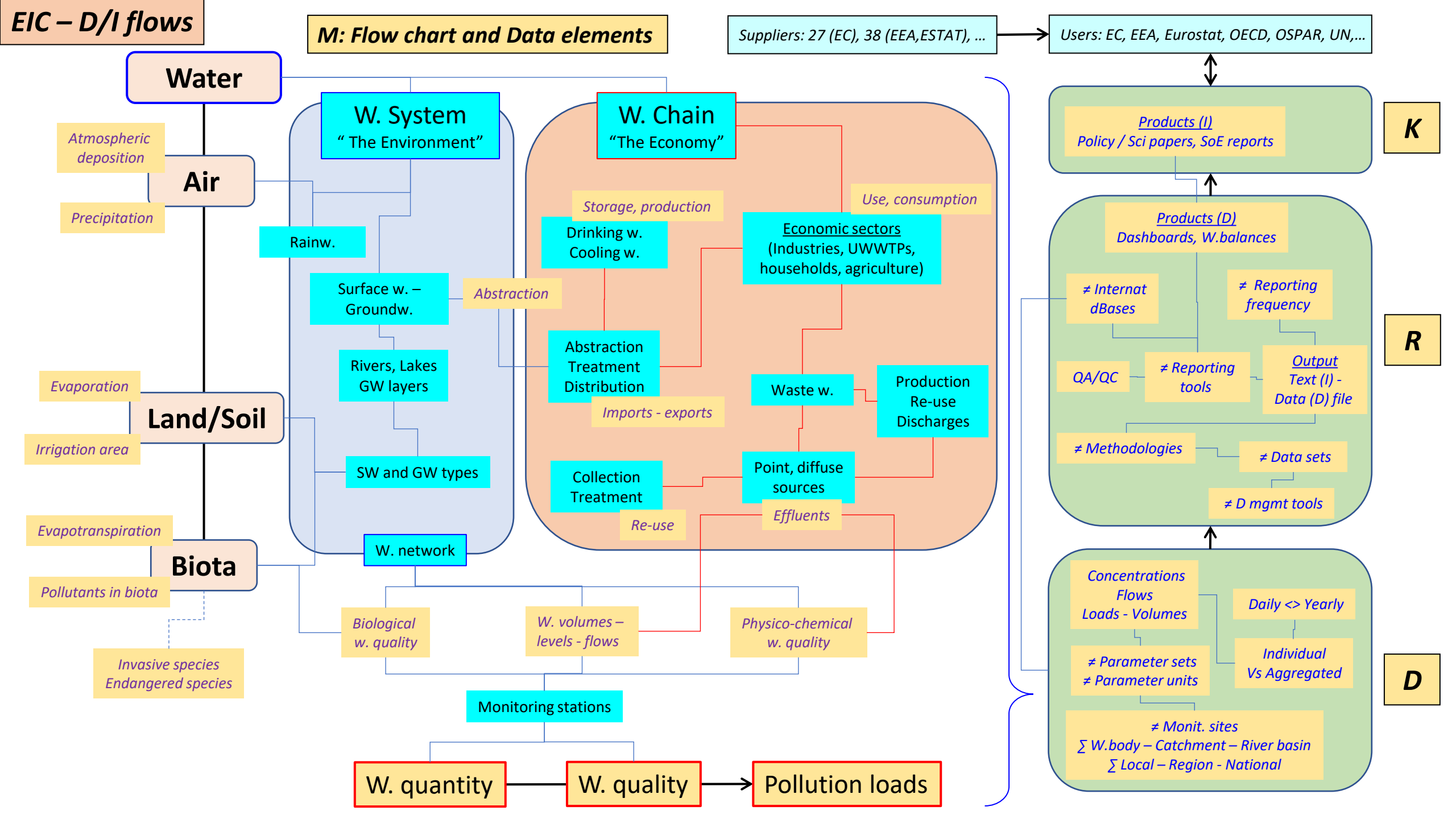
EIC – Sections




EIC – D/I flows
Process factors
Process steps
Process elements
D/I quality & quantity
Information communication
Information use
Env. statistics and accounts
Expertise
Questionnaires
Scientific research
Political issues
Knowledge
Reporting
Information generation
Information demand
QA/QC rules
Data validation
Queries
Data selection and use
Data generation
Monitoring
Data mgmt
Data treatment and storage
Sampling
GLPs
Analytical methods
Time series
Archives
Data validation
QA/QC rules

Example Data quality: data generation - biological water quality monitoring

Gaps and uncertainties


EIC – D/I flows
M: Flow chart and Data elements
Suppliers: 27 (EC), 38 (EEA,ESTAT), …
Users: EC, EEA, Eurostat, OECD, OSPAR, UN,…
Water
Air
Land/Soil
Biota
Atmospheric deposition
Precipitation
Evaporation
Irrigation area
Evapotranspiration
Pollutants in biota
Invasive species
Endangered species
W. System
" The Environment"
Rainw.
Surface w. – Groundw.
Rivers, Lakes GW layers
SW and GW types
W. network
Biological w. quality
W. volumes – levels - flows
Physico-chemical w. quality
Monitoring stations
W. Chain
"The Economy"
Storage, production
Drinking w. Cooling w.
Abstraction
Abstraction Treatment Distribution
Imports - exports
Use, consumption
Economic sectors (Industries, UWWTPs, households, agriculture)
Waste w.
Production Re-use Discharges
Collection Treatment
Re-use
Point, diffuse sources
Effluents
W. quantity
W. quality
Pollution loads
K
Products (I)
Policy / Sci papers, SoE reports
R
Products (D)
Dashboards, W.balances
≠ Internat dBases
≠ Reporting frequency
QA/QC
≠ Reporting tools
Output Text (I) - Data (D) file
≠ Methodologies
≠ Data sets
≠ D mgmt tools
D
Concentrations Flows Loads - Volumes
Daily <> Yearly
≠ Parameter sets ≠ Parameter units
Individual Vs Aggregated
≠ Monit. sites
∑ W.body – Catchment – River basin
∑ Local – Region - National

Data extracted on 29/10/2021 10:06:27 from [ESTAT]

Dataset: **Population connected to urban wastewater collecting and treatment systems, by treatment level [TEN00020]**

Last updated: 08/02/2021 23:00

Time frequency Annual

Unit of measure Percentage

Wastewater treatment plants Urban wastewater collecting system

TIME	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GEO (Labels)												
European Union - 27 countries (from	:	:	:	:	:	:	:	:	:	:	:	:
European Union - 28 countries (2013	:	:	:	:	:	:	:	:	:	:	:	:
Euro area - 19 countries (from 2015)	:	:	:	:	:	:	:	:	:	:	:	:
Belgium	87,4 e	88,2 e	88,5	82,2	84,4	74,13 e	86,85 e	87,09 e	87,59 e	87,83 e	87,98 e	:
Bulgaria	69,65	69,96	70,4	70,62	74,09	74,33 e	74,7 e	74,88 e	75,5 e	75,69 e	76,03 e	76,19 e
Czechia	78,6	81,1	81,1	82,3	83,4	83	84,7	83,9	84,2	84,7	85,5	85,5
Denmark	:	:	89,7	90,3	90,7	90,7	90,8	91 e	91,2	91,8	91,9	92
Germany (until 1990 former territory	97,1	:	:	95,7	95,9 e	96,007 e	96,158	96,48 e	96,802 e	97,124	:	:
Estonia	75	81	81	81,6	82,2	82,7	82,4	82 e	82,6	82,8	82,9	:
Ireland	65 e	:	77 e	:	69 e	63,89 e	63,97 e	64,05 e	64,14 e	64,23	64,23 p	:
Greece	85	:	87,3	87,3	88,1	92,04	92,8	92,8	93,4	93,4	:	:
Spain	:	92	:	98	:	95,58	:	96,39	:	96,52	:	:
France	:	:	:	82	82 e	82 e	82,1 e	80,1 e	81,9 e	81,7 e	81,4 e	81,1 e
Croatia	:	:	:	:	54,6	54,6	54,6	54,6	54,6	54,6	54,6	54,6
Italy	:	:	94 e	:	:	:	:	:	:	:	:	:
Cyprus	:	:	:	:	:	:	:	:	:	:	:	:
Latvia	71,13	65,95	68,22	67,63	76,29	75,39	76,24	75,74	77,27	77,42	81,83	79,95
Lithuania	:	70,3	71,5	:	:	67	67	69,609	72,451	73,671	73,907	75,884
Luxembourg	:	:	:	97,1	99	99	99	100 e	100 e	100 e	100 e	:
Hungary	69,8 e	71 e	72 e	72,3 e	72,7 e	74 e	74,99 e	76,64 e	78,56 e	80,65 e	81,368 e	82,002 e
Malta	98,27	98,3	98,33	98,35	98,37	98,39	98,43	98,48	98,51	98,54	98,82	98,87
Netherlands	:	99,3	:	99,3	99,4	99,4	99,4	99,4	99,43	99,45	99,5	99,5
Austria	:	92,7	:	93,9	:	94,5	:	95	:	95,2	:	95,95
Poland	62,3 e	63,1 e	64,2 e	64,6 e	65,6 e	68,7 e	70,3 e	71,4 e	72,6 e	73,587 e	73,673 e	74,118 e
Portugal	74	78,2	81,3	:	:	:	:	:	:	:	85,82	:
Romania	42,65	43	43,1	43,5	43,5	46,9	46,7	47,2	47,8	49,2	50,9	52,9
Slovenia	62,6	62,6	62,6	62,6	62,6	62,6	62,6	62,6	62,6	67,1	70,8	71,5
Slovakia	58,2	59,3	59,5	60,4	61,6	62,4	63,6	64,7	65,2	66,4	67,7	68,4
Finland	:	:	:	83	83 e	83 e	83 e	85	:	:	:	85
Sweden	86	86	86	86	86	87	87	87	87	87	87	:
Iceland	:	:	:	91 e	:	:	:	:	:	:	:	:
Liechtenstein	:	:	:	:	:	:	:	:	:	:	:	:
Norway	83,7	83,8	85,2	85	85	85,2	85,3	85,3	86,2	86,4	86	87,1
Switzerland	:	:	:	99 e	:	:	98,3 e	:	:	:	:	:
United Kingdom	:	97,3	97	97,3	:	:	:	:	:	:	:	:
Montenegro	:	:	:	:	:	:	:	:	:	:	:	:
North Macedonia	:	:	:	:	:	:	:	:	:	:	:	:
Albania	:	:	:	:	:	:	:	47,5 e	49,8 e	51,2 e	50,19 e	52
Serbia	48,6	51,8	54,1	51,7	53,1	55,49	57,75	59,01	60,13	61,26	62,18	63,03
Turkey	71,1	73,2	73,4	78,8	:	83,8	:	87	:	87,553	:	88,5
Bosnia and Herzegovina	21,4	24,29	24,91	25,86	26,82	27,79	31,08	32,08	33,66	34,87	36,09	36
Kosovo (under United Nations Securi	:	:	:	:	:	53,75	55,77	59,17	67,11	69,75	69,81	69,65

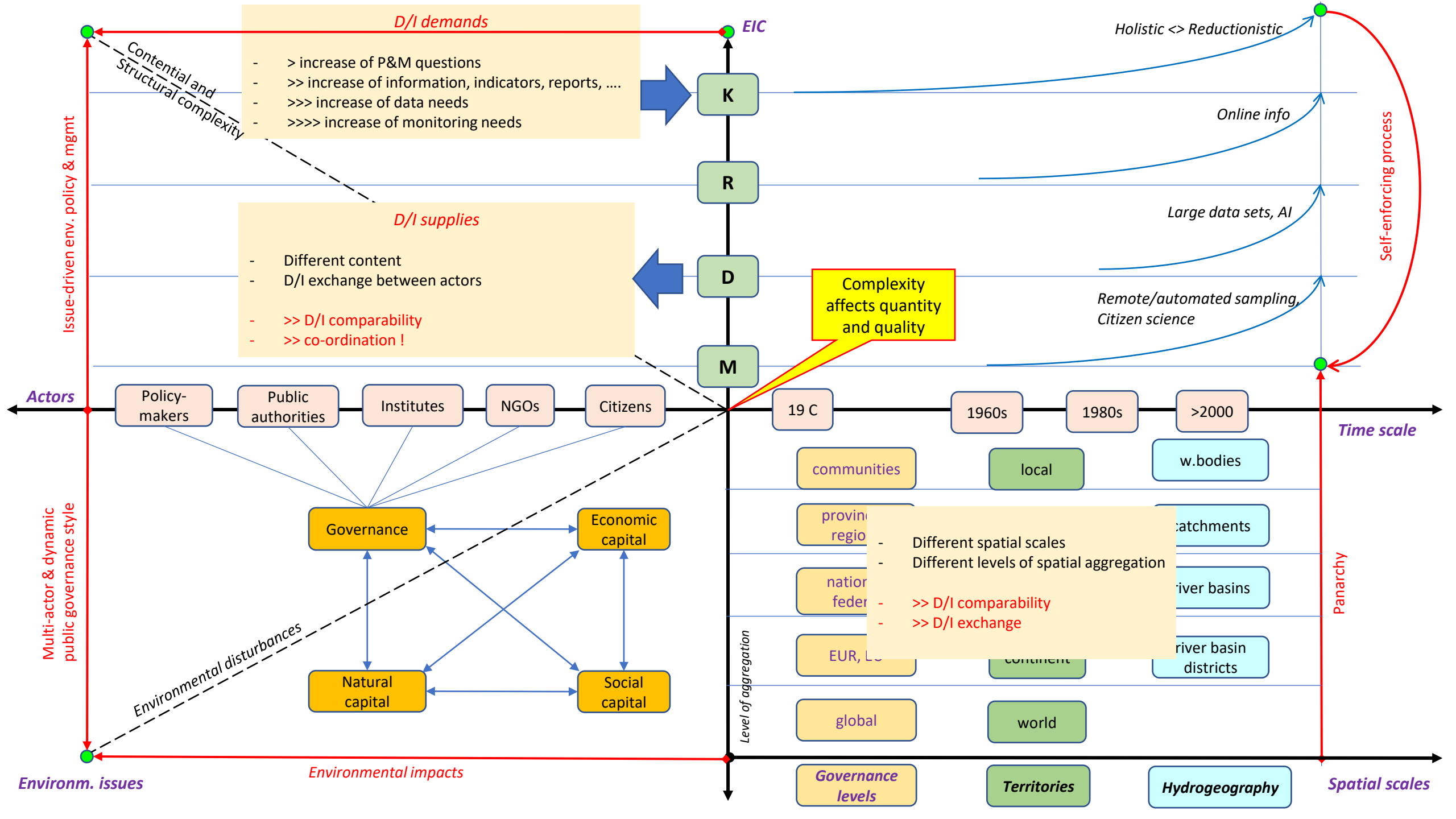
Special value

: not available

Available flags:

e estimated

p provisional


D/I demands
- > increase of P&M questions
- >> increase of information, indicators, reports, ….
- >>> increase of data needs
- >>>> increase of monitoring needs
Contential and Structural complexity
D/I supplies
- Different content
- D/I exchange between actors
- >> D/I comparability
- >> co-ordination !
EIC
K
R
D
M
Holistic <> Reductionistic
Online info
Large data sets, AI
Remote/automated sampling, Citizen science
Self-enforcing process
Complexity affects quantity and quality
Issue-driven env. policy & mgmt
Actors
Policy-makers
Public authorities
Institutes
NGOs
Citizens
19 C
1960s
1980s
>2000
Time scale
Governance
Economic capital
Natural capital
Social capital
Multi-actor & dynamic public governance style
Environmental disturbances
communities
local
w.bodies
catchments
river basins
river basin districts
global
world
- Different spatial scales
- Different levels of spatial aggregation
- >> D/I comparability
- >> D/I exchange
Level of aggregation
Panarchy
Environm. issues
Environmental impacts
Governance levels
Territories
Hydrogeography
Spatial scales

Main difficulties

- Complexity increase is intrinsic to societal developments (= driver)
  - Increase of D/I demands ☹
- Different approaches & methodologies:
  - terminology – definitions – descriptions – methods >> D/I comparability
- Different monitoring strategies & different tools:
  - Cognitive uncertainty >> D/I comparability
- Changing governance and institutional roles:
  - Institutional uncertainty >> co-ordination & D/I continuity
- Organisational capacity (financial, human, technological means):
  - Monitoring capacity >> data gaps >> D/I completeness
  - Historical data sets (LT time series)

How to improve statistics?

- Monitoring to support policy, modelling, … and statistics?
- Enhance involvement of co-operation betw. regional/(inter)national authorities
  - Inform about objectives and D/I use (for international purposes)
  - Harmonisation of processes – methodologies – terminology
- Improve data mgmt and reporting processes
  - Understanding EIC processes + identifying bottle-necks
  - Streamlining processes across authorities / data flows
  - QA/QC (by international authorities)