

Digital Revolution

challenges and constraints:

how we can (must) adapt - together

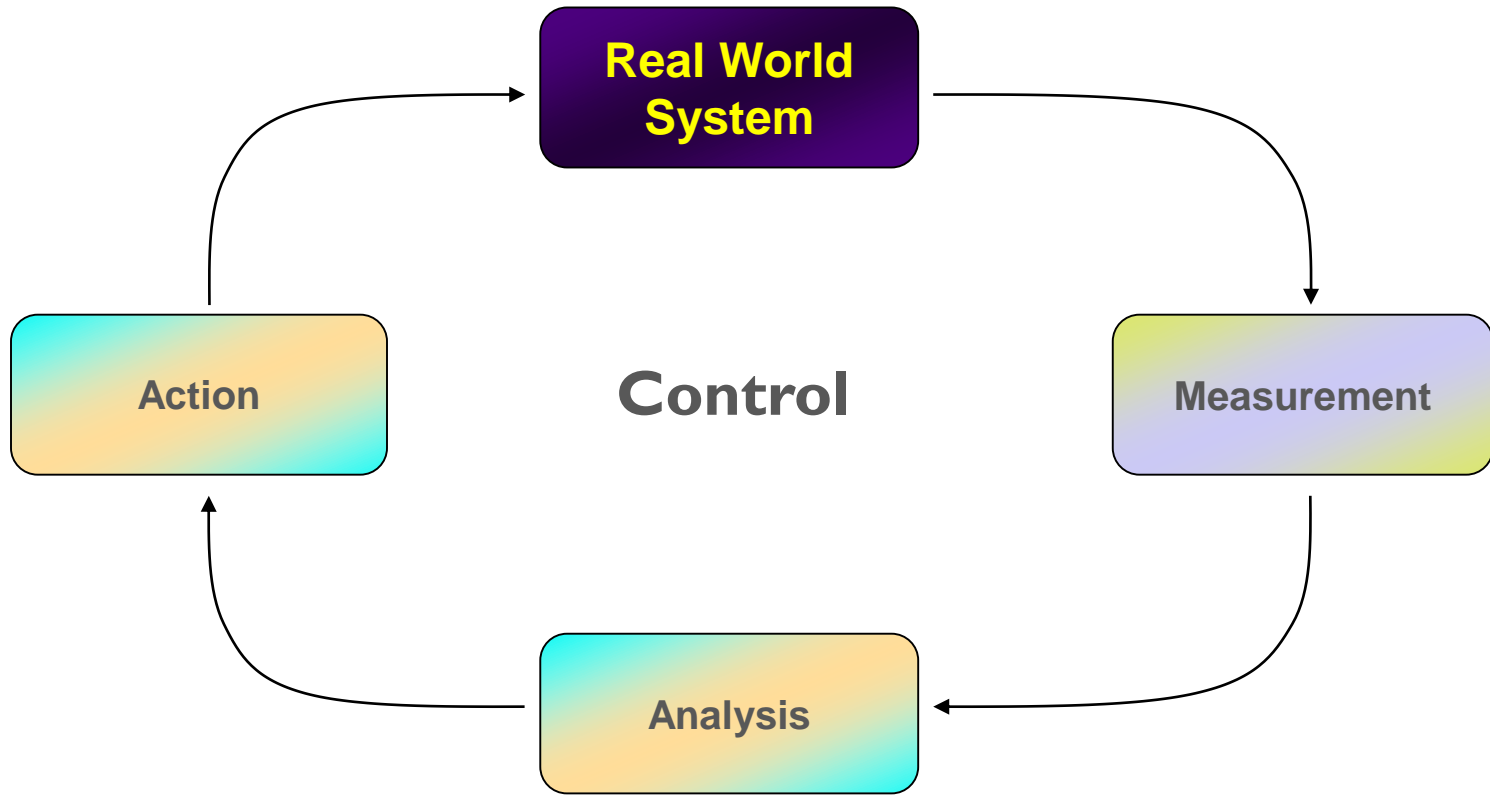
Francis Gross

Senior Adviser
DG Statistics

NEW GENERATION OPERATIONAL RISK: EUROPE

CeFPro - London, 13 March 2019

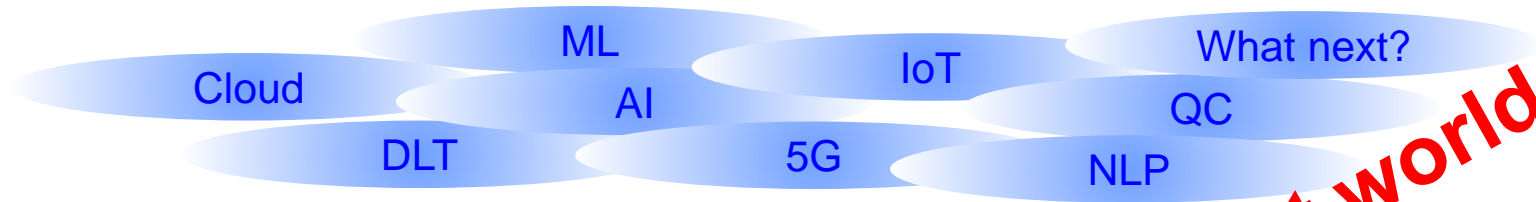
The views expressed are those of the author and do not necessarily represent the views of the ECB or the ESCB.



alert, fast, precise and fit survives

Technology is changing our world – sounds trivial? Think again

Tech



Each new wave ~~adds to~~ **multiplies** the cumulated previous

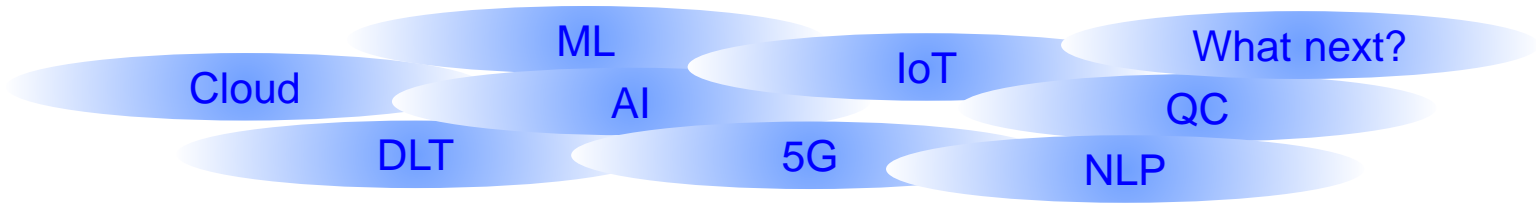
- Cloud and DLT allow all to share data massively, worldwide
- ML and AI take computing beyond human scale and capability
- NLP will leverage all written and said into the machines
- 5G will connect everything faster; connected machines turn into a large single machine
- IoT will multiply data volumes
- Quantum Computing will multiply processing power

**what world
in
10 years?
20 years?**



Technology is taking our usual ways to their limit. And soon beyond?

Tech



EMERGING: an underlying global tech-”hyper-organism”, messy – a new source of risk driven by ongoing, exponential growth of data volumes, speed, complexity, reach

Data



society, economy and technology

-

the challenge

Economy and finance

human layer

people
social group
produce, consume
exchange

technical layer

The Great Transformation

people sovereign
agreements, behaviours
work, earn, law, politics
spend, consume borrow, invest
contracts
representation documentation
processes, execution
statistics bureaucracy

Economy and finance

human layer

people sovereign
agreements, behaviours
work, earn, spend, consume law, politics
borrow, invest

technical layer

contracts
representation documentation
processes, execution
statistics bureaucracy

The Next Transformation

identity, security, stability
diversity
stable, slow operations
fragmented territories:
geography, laws, cultures

from passive medium to active medium
integrating beyond sovereign territories
moving on fast with technology
automating beyond human capacities

Economy and finance

human layer

people sovereign
agreements, behaviours
work, earn, law, politics
spend, consume borrow, invest

technical layer

contracts
representation documentation
processes, execution
statistics bureaucracy

The Next Transformation

human society
fragmented
slow, reliable
identity & diversity

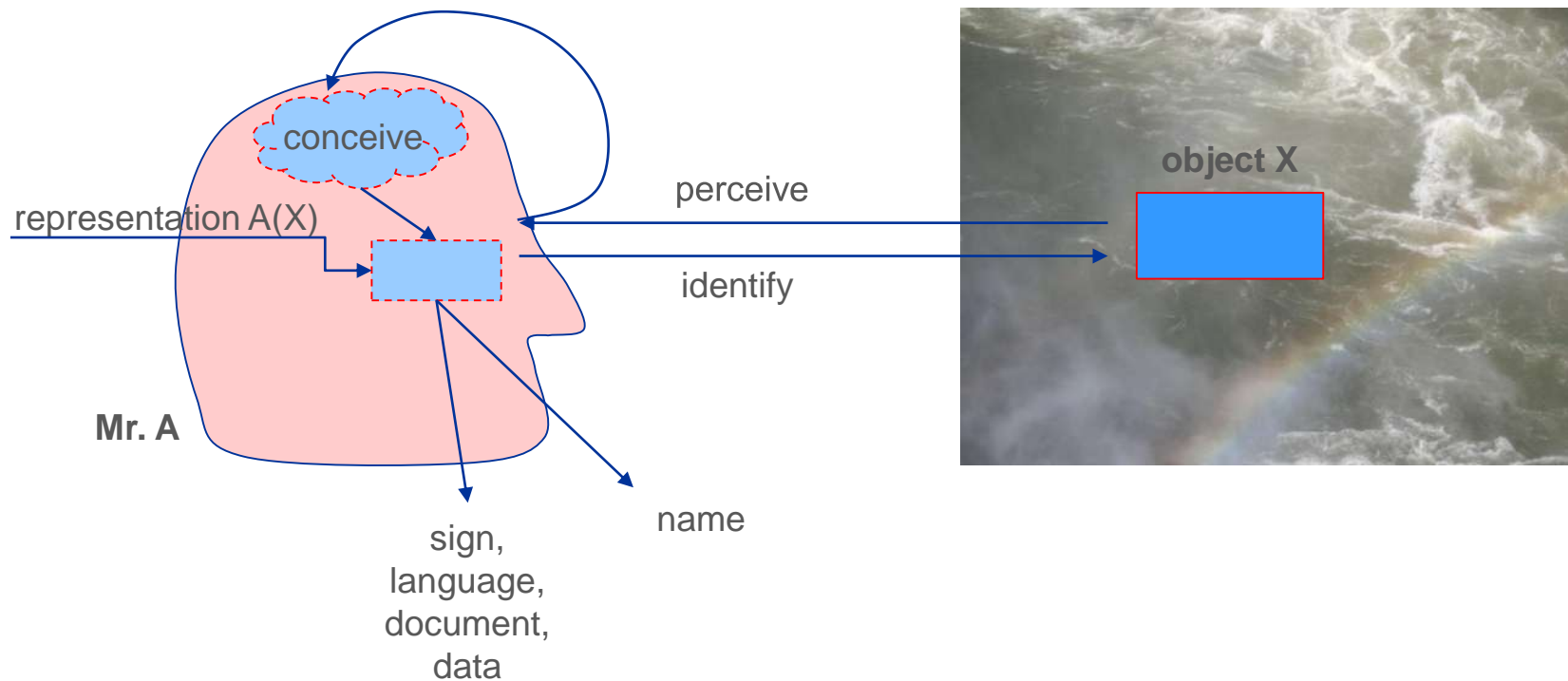
technical,
global,
fast
“hyperorganism”

people and technology

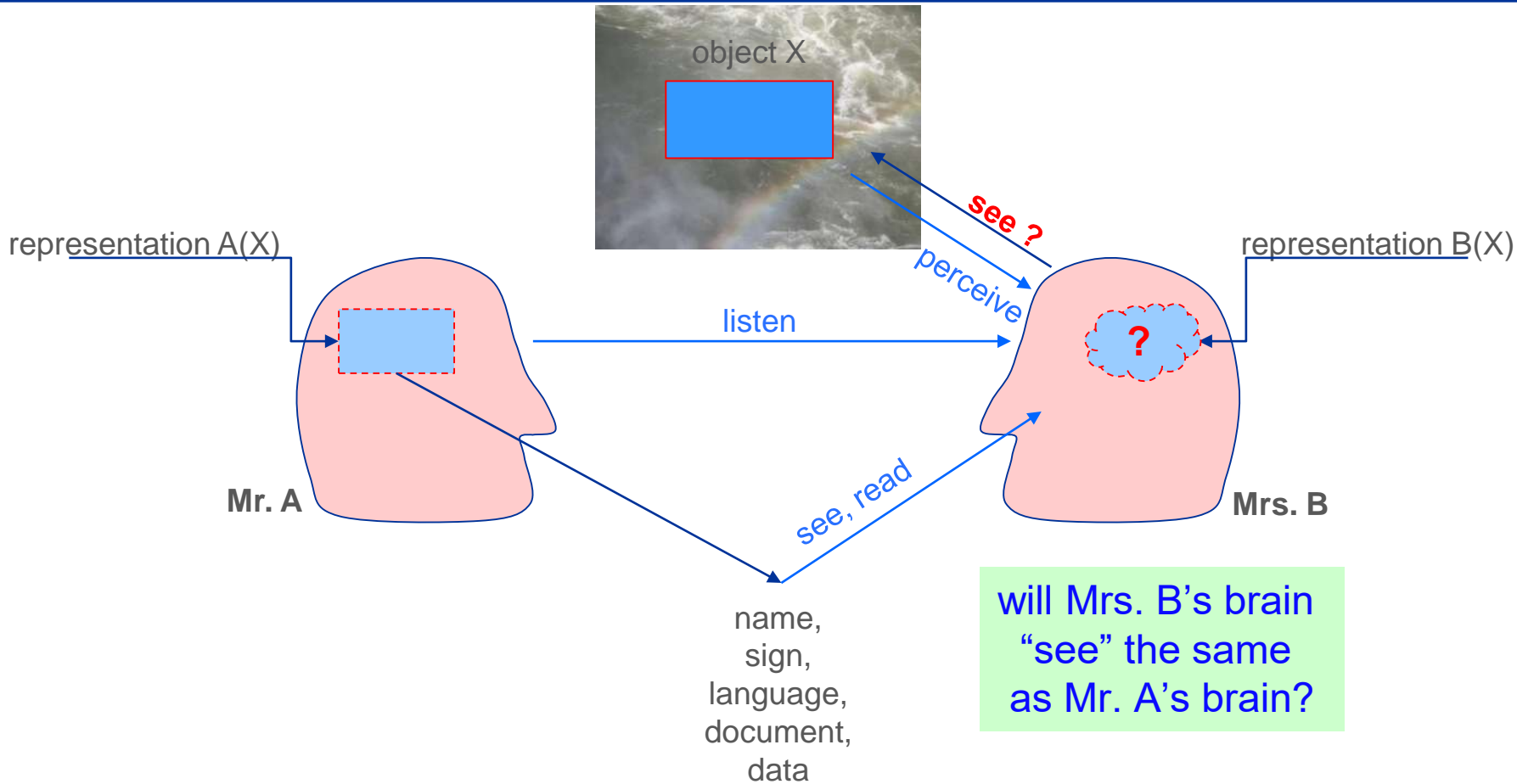
-

the challenge

Perception: seeing material objects in a complex environment

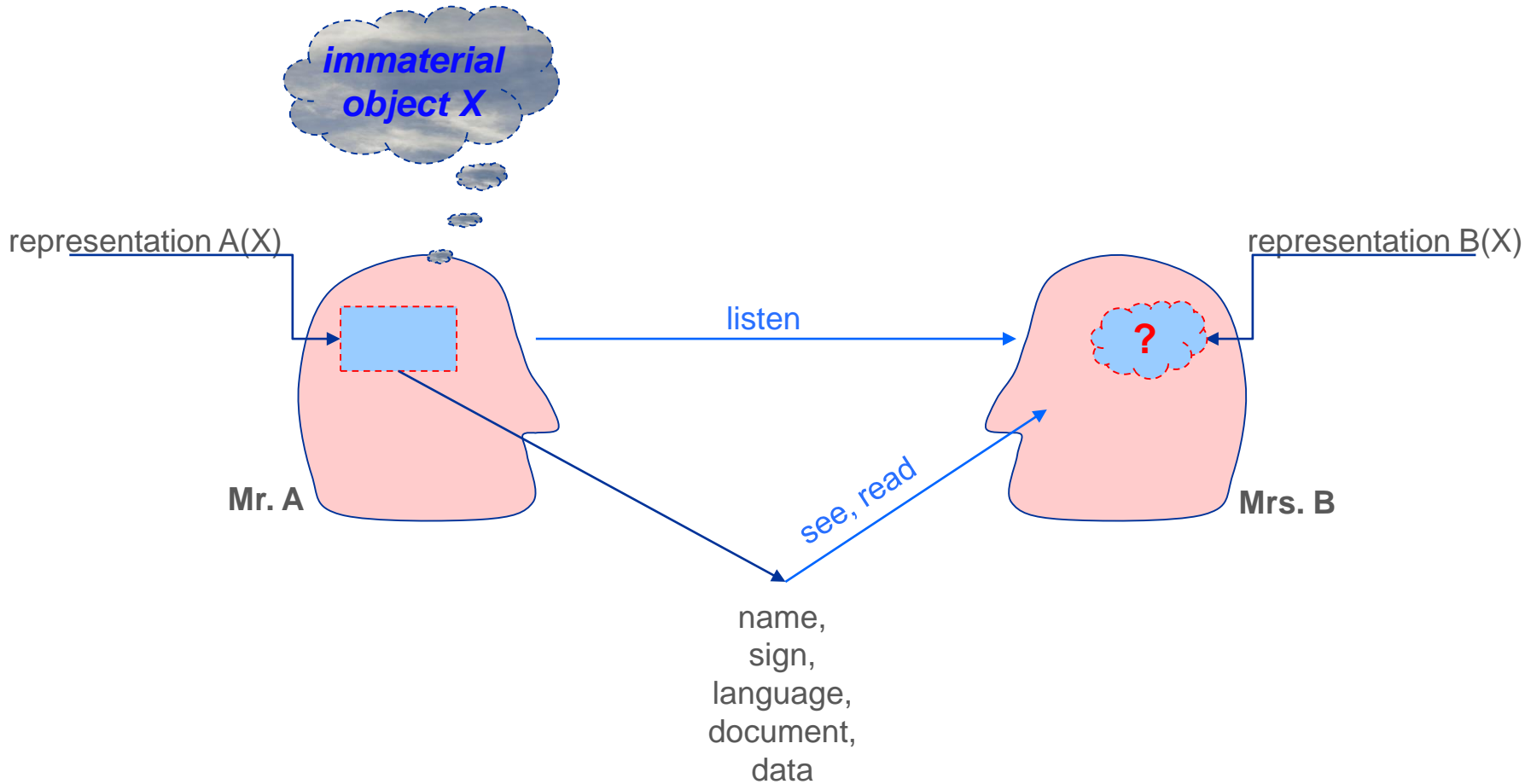


our eyes perceive light – but **we see with our brain**



will Mrs. B's brain "see" the same as Mr. A's brain?

Recognition and identification of immaterial objects



the economy and finance are **entirely immaterial** systems

-

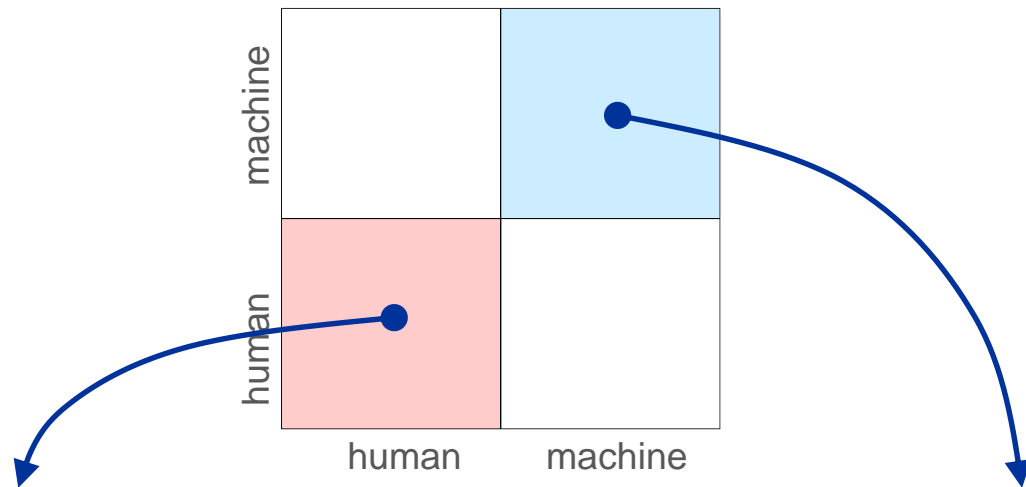
out of reach of our natural senses

-

we need **artificial senses** to “see” them

-

effective senses work at the **speed and scale** of the system



People exchange words.

**If unclear,
people talk, ask, adjust.**

Machines exchange data.

**If unclear,
machines don't talk, ask, adjust.**

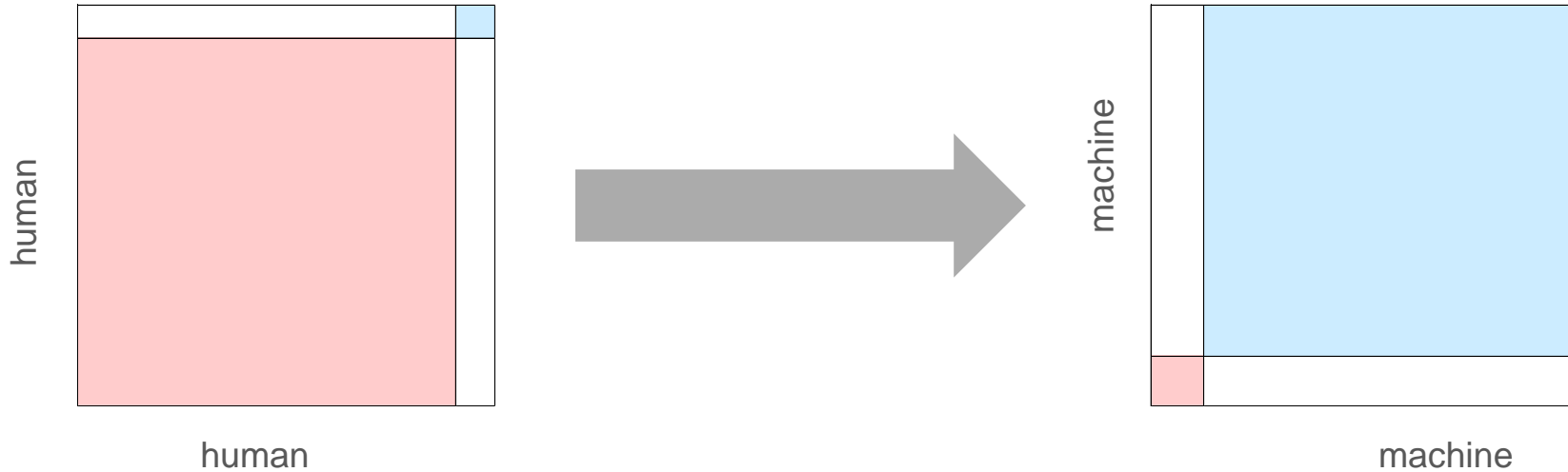
**They stop or, worse,
they do just something.**

artificial senses for the economy and finance in the digital age

-

what specification?

Technology has shifted the human-machine interface



US military doctrine, Directive 3000.09 from 2012:

- “**human-in-the-loop**”: a human has the last call in a decision

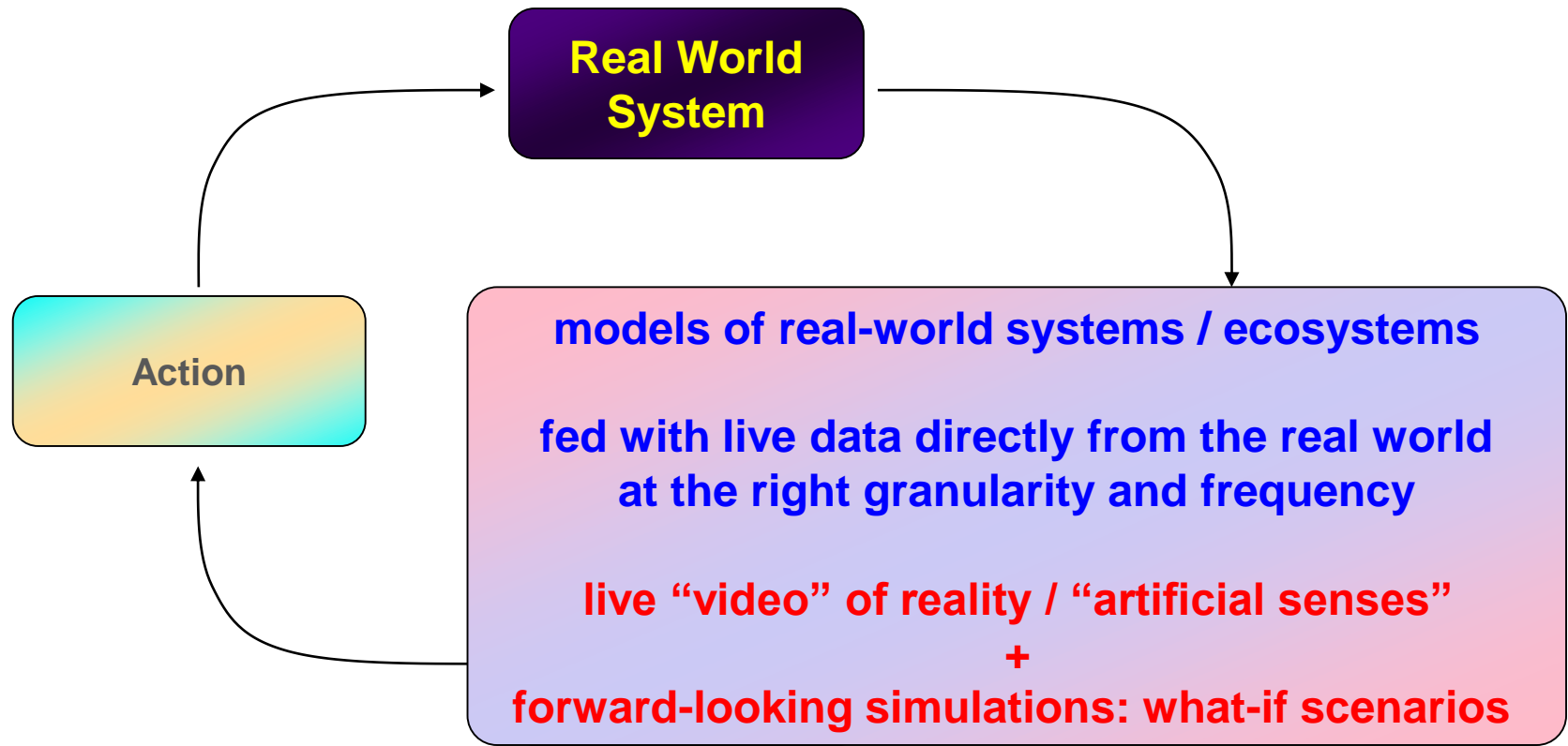
When human brain capacity is dwarfed by machines’ speed, data volumes, AI:

- How do we keep the “human-in-the-loop”?

DARPA’s “Mosaic Warfare” foresees complexity itself as a weapon:

*“An **orchestrated multitude of systems** overwhelm the enemy by creating a range of **simultaneous dilemmas in multiple domains**”*

In finance, ORM in particular, we could face that same kind of situation and we didn’t need an enemy – we did it to ourselves



1. measure at scale and speed of the system (global, real time)
2. analysis flexible and fast enough to address sudden surprises
3. granular data serves system-level analysis (*)
4. large scale granular data
5. collected near time
6. data direct from operational systems to analytical systems, for speed
7. fully automated chain from reality through measurement to analysis
8. standardise data globally (identifiers first)
9. operational data standardised at sufficient depth, all systems in markets
10. all contracts represented in a single, universal algorithmic language

(*) *everything in a single agent-based model*

iron age

stone age

digital age

...and now to the basics:
how will we master data?

bronze age

Chinese 人人生而自由

Three fundamentally different
approaches to language...

Persian همه افراد بشر آزاد به

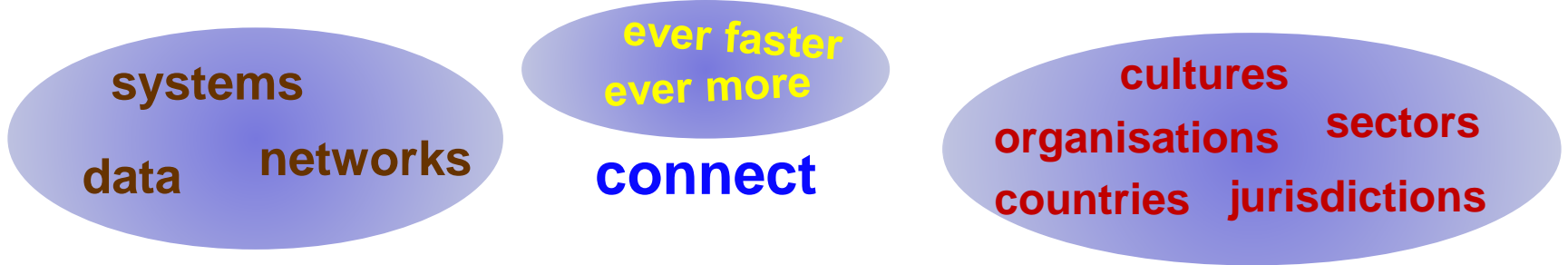
... and there are and were many
more.

English All human beings are born free

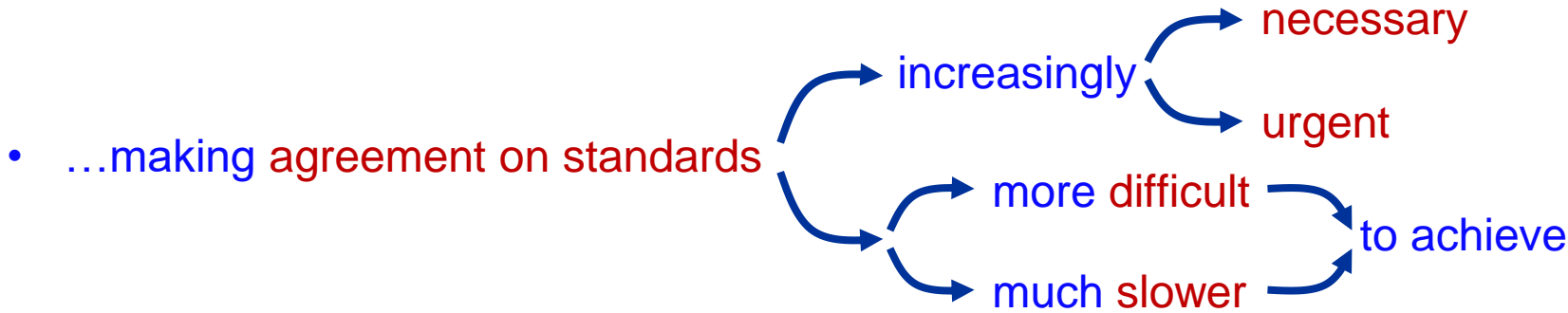
Data is language!

...as diverse as human language...

...but computers need it clear and homogeneous




Technology increases social complexity by connecting more diverse people



Technology creates a “Data-Tower-of-Babel” that impedes effectiveness

➔ More IT can deliver value only if data quality improves

What strategy is possible?

The problem  is deep, global, growing fast, potentially even to critical
is beyond a single solution

A possible strategy: **transformational power**

- Feasible measures with immediate benefits to many across the system
- Designed to free potential for market forces to reconfigure the system

Standardisation is often at the heart of
deep transformational processes.

Shipping container

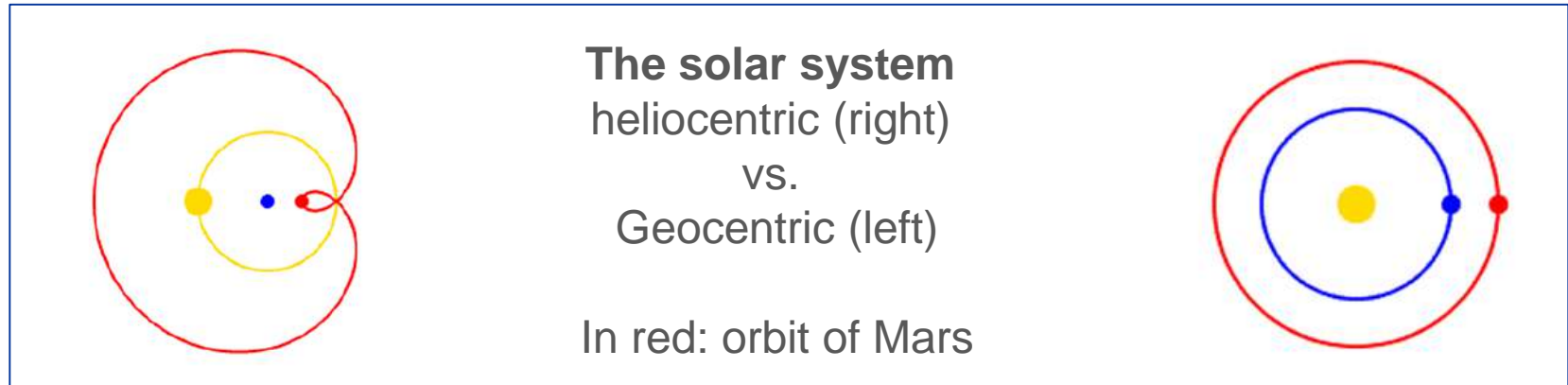
Bar code

Time and date

Business English

vision

- A way we choose to view the world
- A representation that structures our perception, shapes our action



- *“All models are wrong; some models are useful”* George E.P. Box, statistician
- *“It is the theory that decides what we can observe”* Albert Einstein
- *“Combining visions gives us more possibilities”* Hans Poser, philosopher

- Our **vision** of digital finance conditions the **solutions** we can conceive **together**
- The technical substance underlying finance has changed radically:
 - **Global reach for all**: technology makes financial operations blind to borders
 - **Speed**: real-time interaction is independent of physical distance
 - **Data volumes and complexity** have by far outgrown human brain capacity
- The technical substance of digital-age finance can be seen as:

a **Network of Contracts** connecting a **Global Population of Agents**

Economy and finance

human layer

Vision 1
Closed Systems
(e.g. national economies)
with
Perturbations
(e.g. international trade and investment)

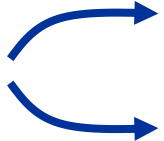
human diversity

reconcile

technical layer

Vision 2
a **Network**
of
Contracts
connecting a
Global Population
of
Agents

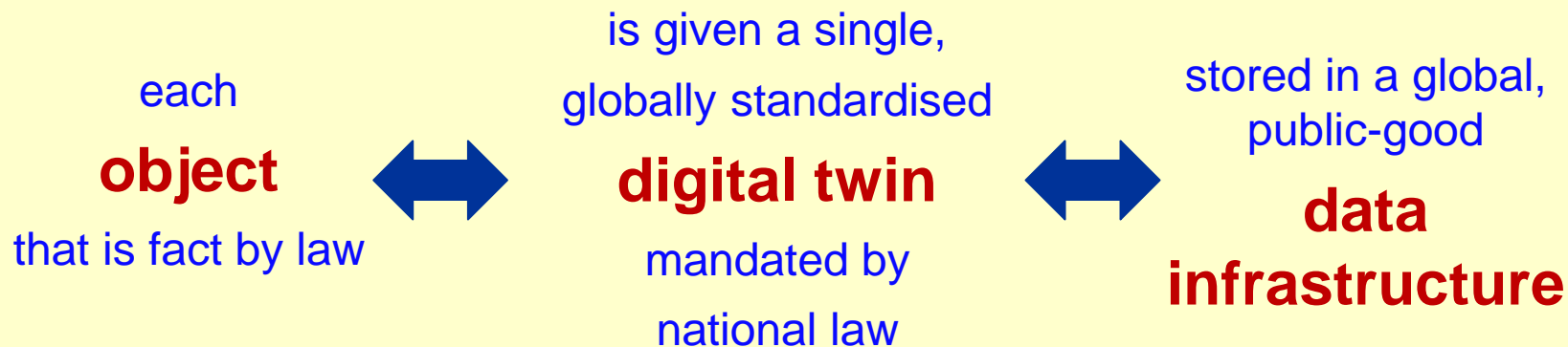
technical unity

Law  establishes social consensus, e.g. about a legal entity
makes an abstract object into a fact, for all, globally

A fact can be given  **identification** (a name, a number)
and
representation (a data sheet, paper, photo)

Law  makes a legal entity into a fact, for all, globally
should also **mandate** a globally standardised, unique **digital representation** (identification) of that legal entity

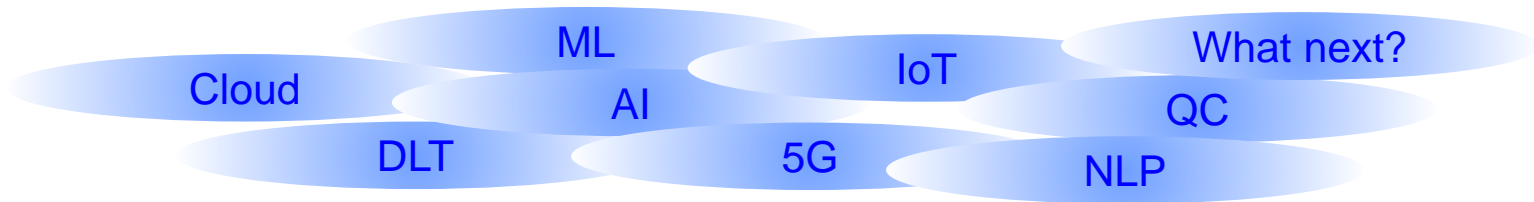
An operational solution could reflect a simple architecture:



Then, all processes use the same digital twin, interoperate more easily, globally

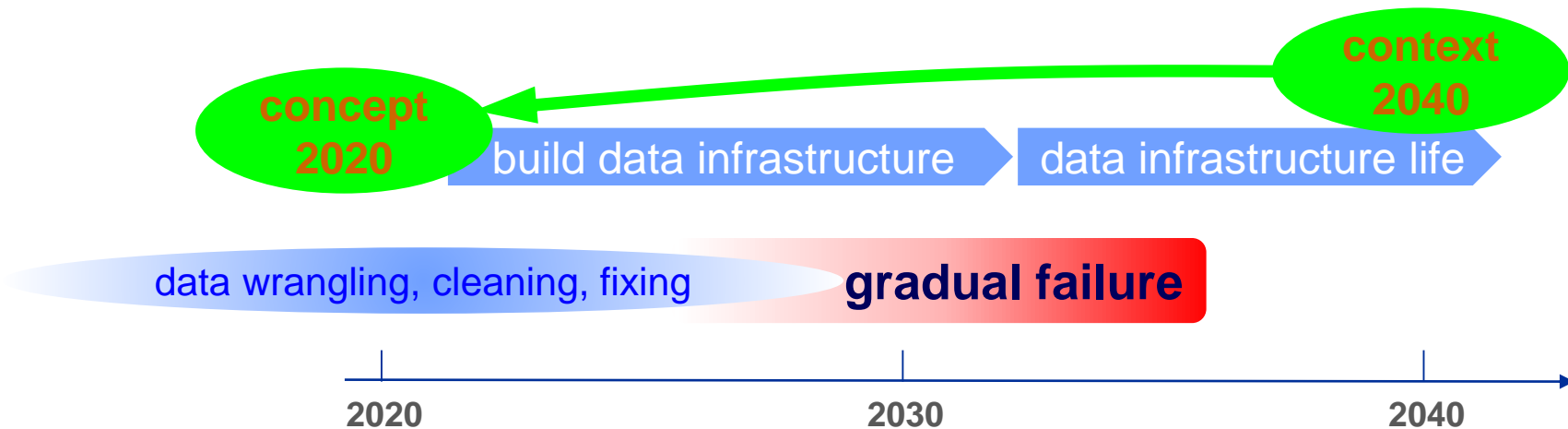
Tech take our usual ways to their limit – we must think again, big, long term, together

Tech



EMERGING: an underlying global tech-”hyper-organism”, messy – a new source of risk driven by ongoing, exponential growth of data volumes, speed, complexity, reach

Data



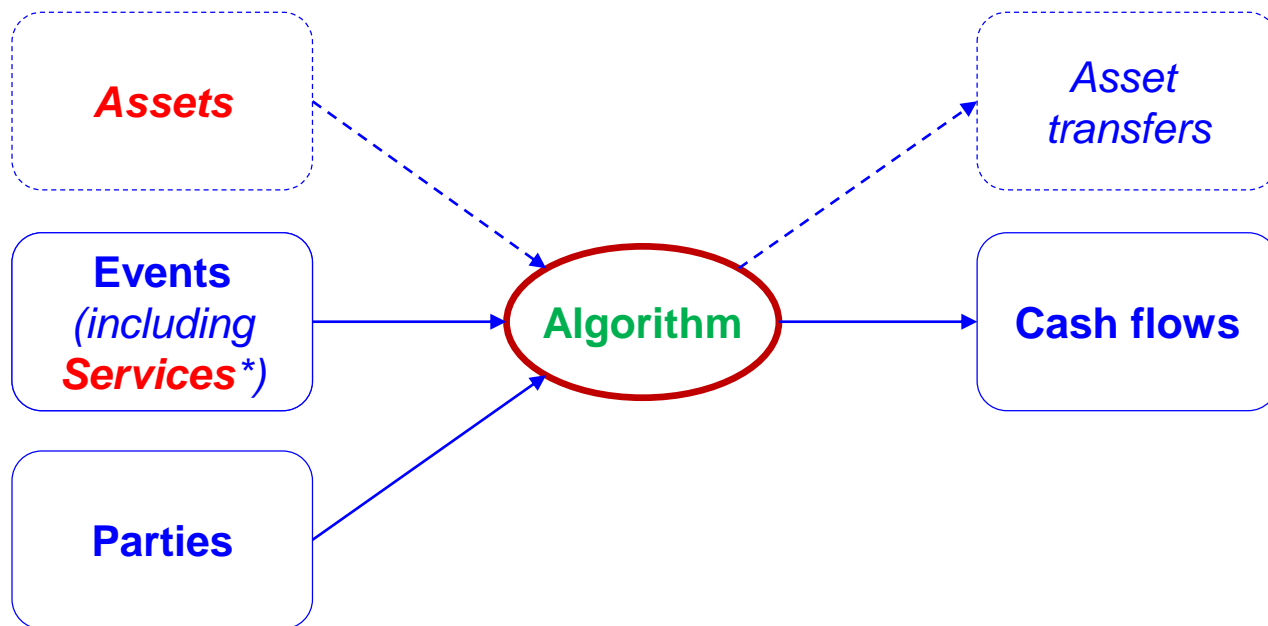
- A possible first step: **standardised Digital Twin of each Contract**
- The ultimate stage should be imagined one step further:
 - **Algorithm and Data ARE the Contract** - *no longer a paper, a prospectus*
 - Written in a standardised, rigorous, machine-compatible language
 - Under a general standard, valid across a wide range of contract types

the “0”s and “1”s

for building **contract algorithms**

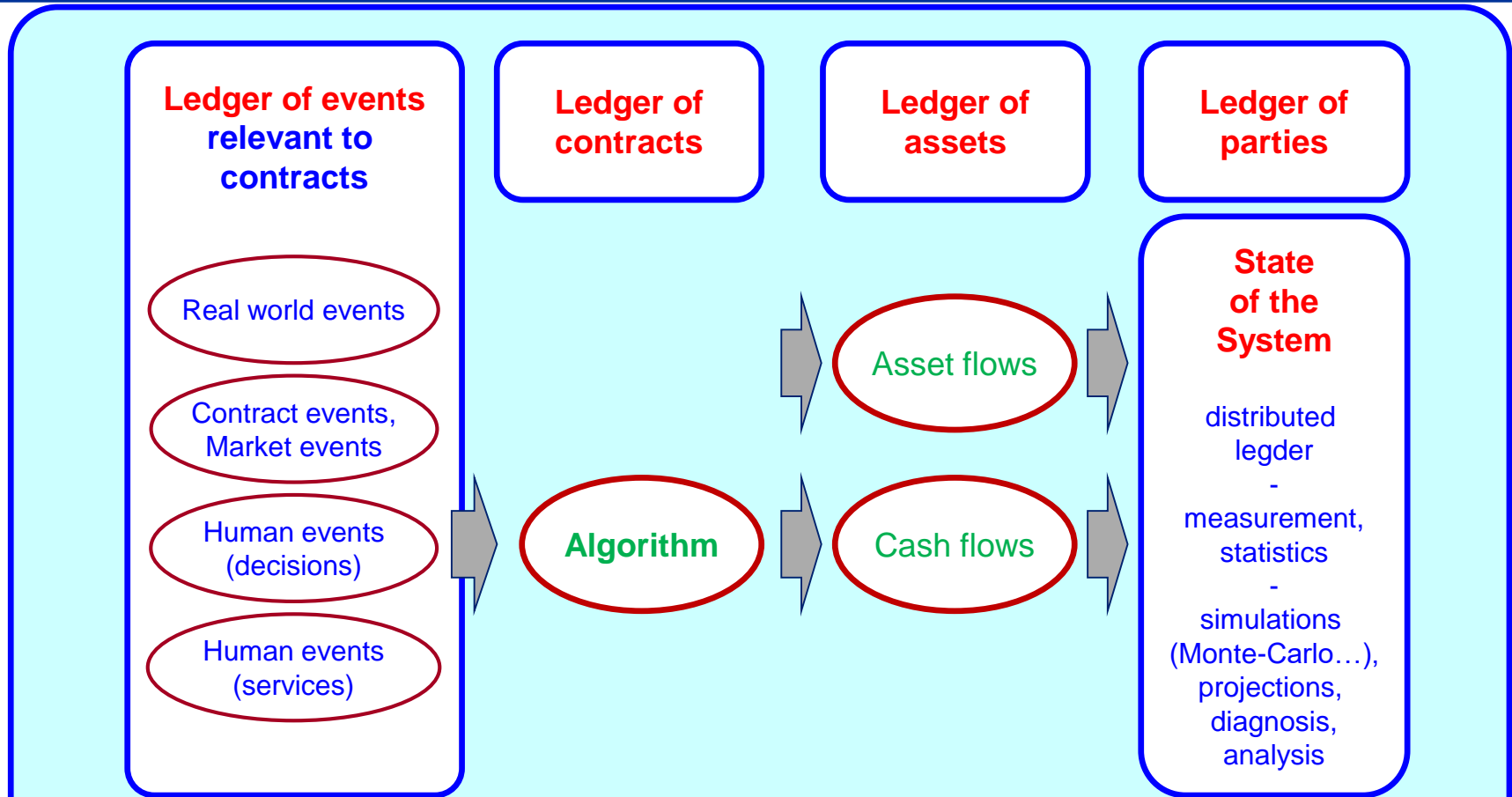
the “Lego” set

generalised here to cover all types of contracts (financial, goods, services)



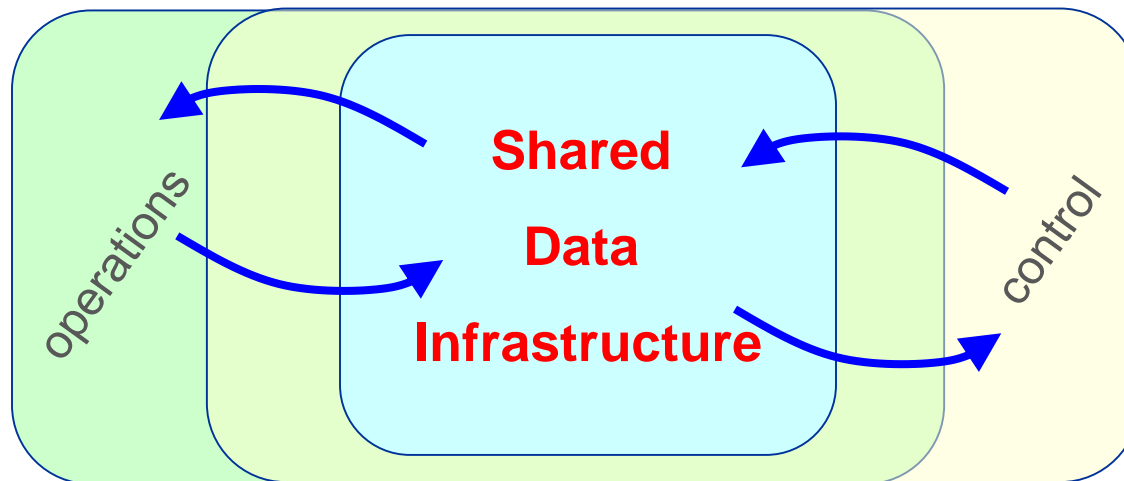
** delivery of a service is treated as an event in this conceptual framework*

A suite of ledgers to represent the populations of contracts in a single language



the **Ledgers** could be our **Shared Data Infrastructure**

Industry and its regulators operate from a single, shared data infrastructure



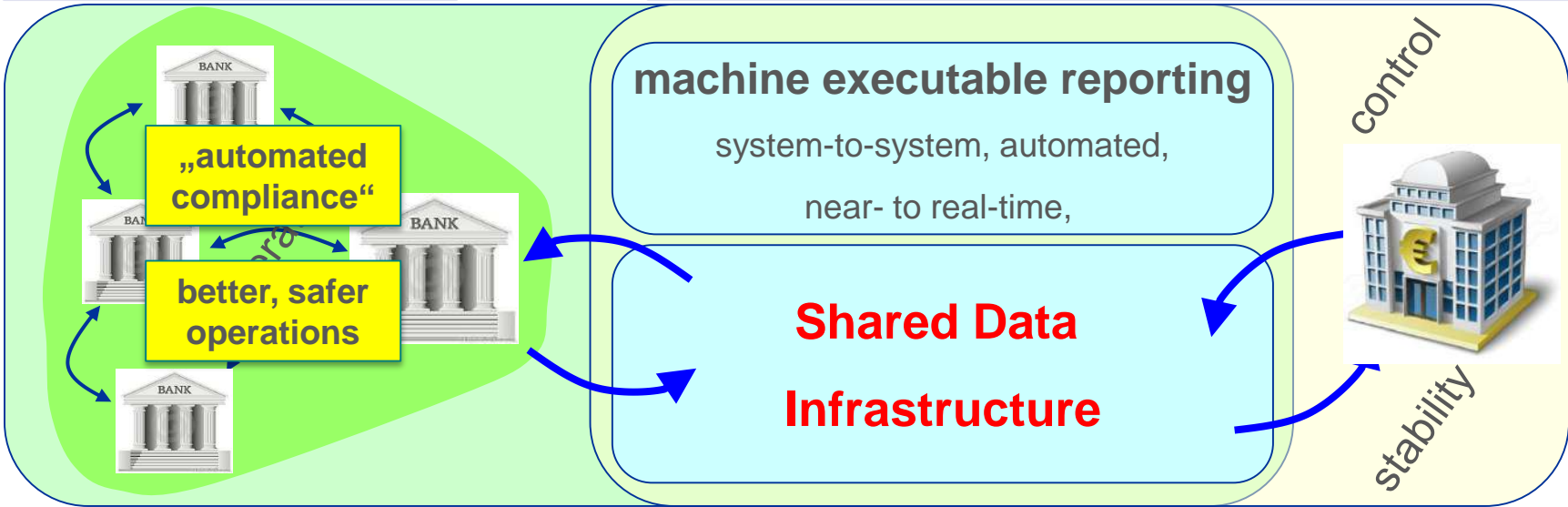
Smart Regulation: a long-term benefit from standardising identifiers and contracts?

**Ordnungspolitik
for Data**



Sound data infrastructure
gives markets more freedom, industry lower costs and risks while enabling low-burden, automated reporting for near-time, flexible, system-scale measurement and analysis.
Infrastructure is a public mission

„Smart Regulation“



The **Global Legal Entity Identifier (LEI) System** is the first part in operation

A broad **public-private** initiative has shaped the concept

Global public leadership has established the **Global LEI System**

- credible public governance and privately run global operations are running

Local public leadership needs to become **more decisive**

- establish universal coverage, making it de facto a shared data infrastructure

**Broadening LEI coverage to universal must be
public institutions' goal - and industry's demand!**