# Mechanisms of normative control

25 May 2024, Final DL4LD event @ UvA

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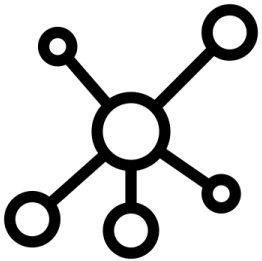
# Data Logistics for Logistics Data

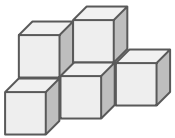
# Data Logistics for Logistics Data

**informational infrastructure**

data
connections
nodes
domains



functional containers



# Data Logistics for Logistics Data

**socio-physical infrastructure**

**informational infrastructure**

data
connections
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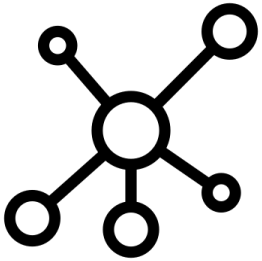

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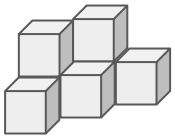


# Data Logistics for Logistics Data

**socio-physical infrastructure**

physical constraints
physical conditions
physical effects
(actual, potential)

# Data Logistics for Logistics Data

**socio-physical infrastructure**

physical constraints
physical conditions
physical effects
(actual, potential)

**problems of risk**

# Data Logistics for Logistics Data


physical constraints
physical conditions
physical effects
(actual, potential)

social practices

legal and other norms

# Data Logistics for Logistics Data

**socio-physical infrastructure**

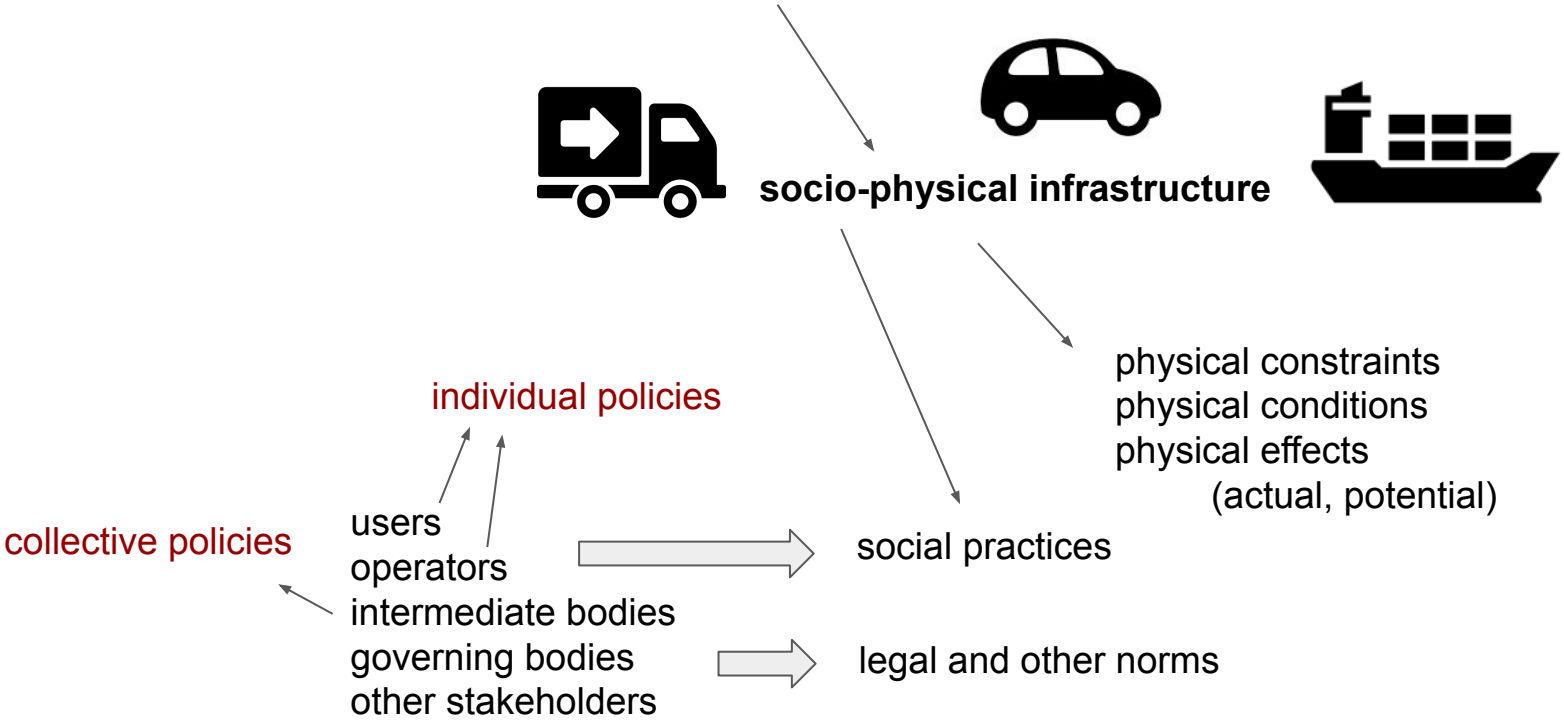
physical constraints
physical conditions
physical effects
(actual, potential)

users
operators
intermediate bodies
governing bodies
other stakeholders

→ social practices

→ legal and other norms

# Data Logistics for Logistics Data



# Data Logistics for Logistics Data

**socio-physical infrastructure**

physical constraints
physical conditions
physical effects
(actual, potential)

individual policies

collective policies

users
operators
intermediate bodies
governing bodies
other stakeholders

social practices

legal and other norms

**central role of policies → various forms of enforcement (*ex-ante*, *ex-post*)**

# Data Logistics for Logistics Data

**informational infrastructure**

**socio-physical infrastructure**

*having access to relevant information plays an important for agents!*

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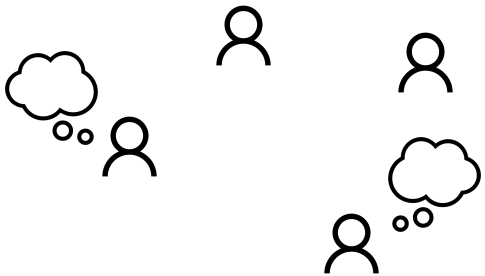

no exchange

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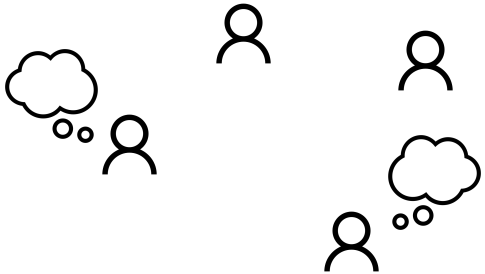

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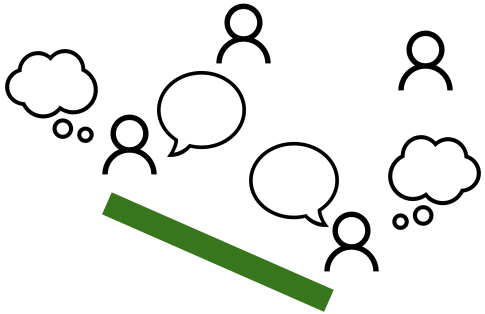

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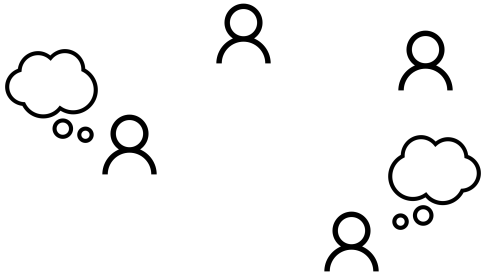

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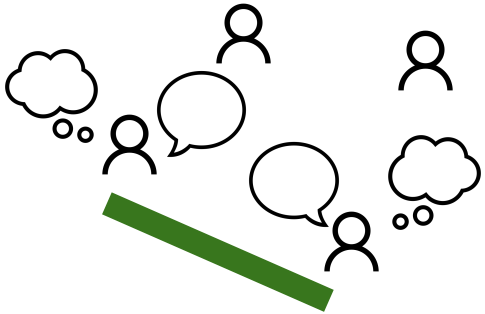

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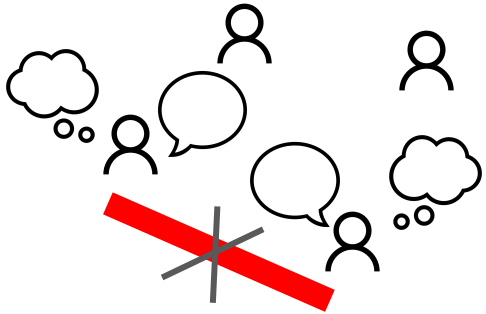


exchange disabled/disallowed

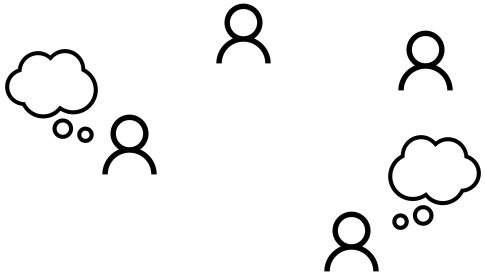
# Data Logistics for Logistics Data

**informational infrastructure**

**socio-physical infrastructure**

*having access to relevant information plays an important for agents!*

**regulations apply: e.g. privacy, GDPR, competition laws**



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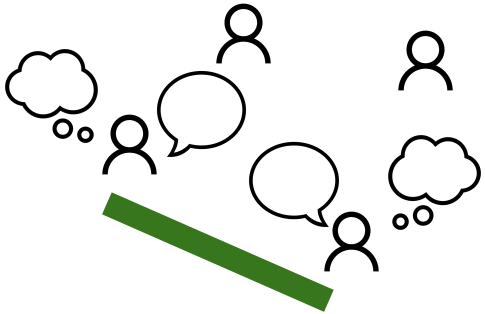

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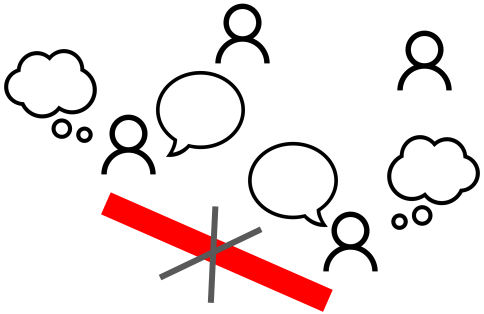

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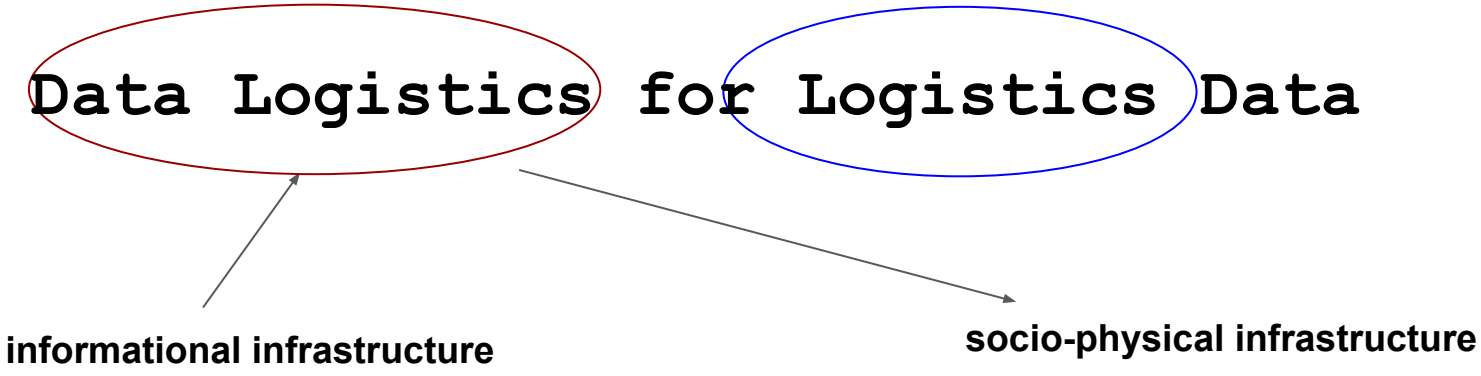



*the informational infrastructure runs in itself on a socio-physical infrastructure!*

# Data Logistics for Logistics Data

**informational infrastructure**

*the informational infrastructure runs in itself on a socio-physical infrastructure!*

**socio-physical infrastructure**

physical constraints
physical conditions
physical effects
(actual, potential)

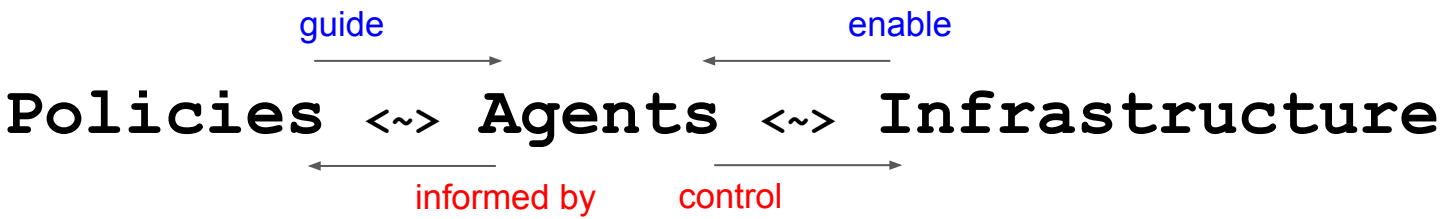
**network** users
**network** operators
**network** intermediate bodies
**network** governing bodies
**network** other stakeholders

→ social practices

→ legal and other norms

**two normative dimensions that interact with each other: informational and physical**

**Policies <~> Agents <~> Infrastructure**


guide
enable
Policies <~> Agents <~> Infrastructure
informed by
control

**Physical Logistics**

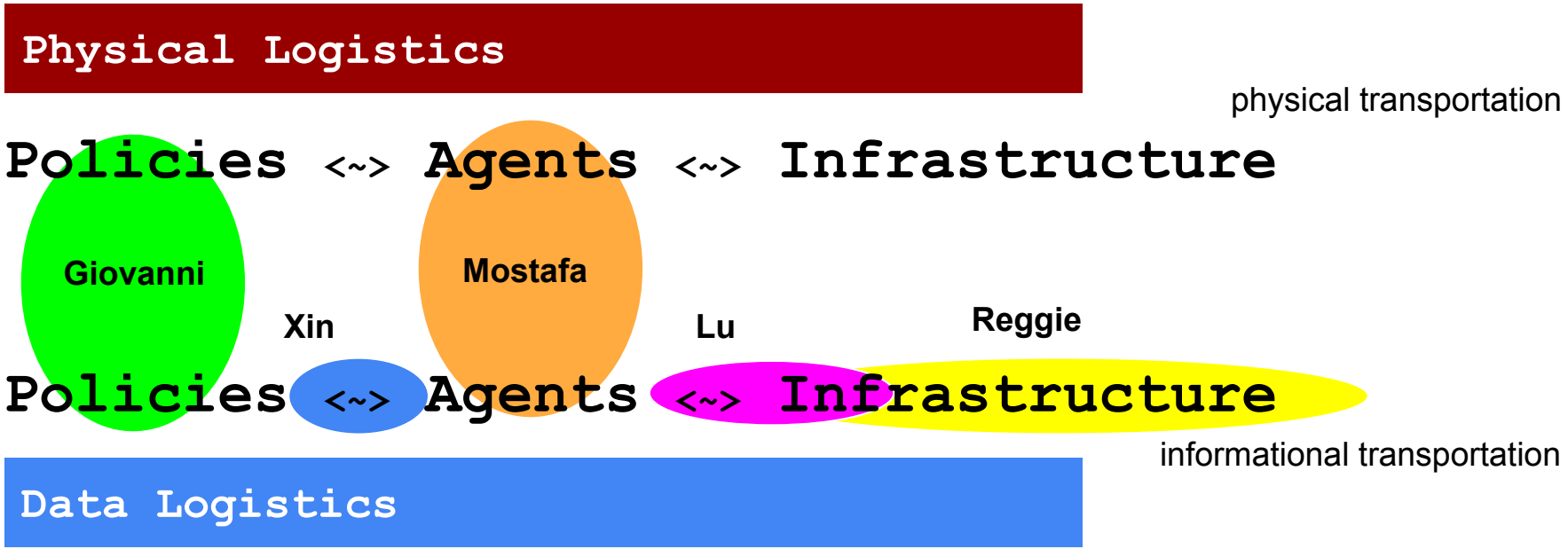
physical transportation

**Policies <~> Agents <~> Infrastructure**

**Policies <~> Agents <~> Infrastructure**

informational transportation

**Data Logistics**


Physical Logistics
physical transportation
Policies <~> Agents <~> Infrastructure
Giovanni
Mostafa
Xin
Lu
Reggie
Policies <~> Agents <~> Infrastructure
informational transportation
Data Logistics

Environment (physical, social, etc.)

(distributed) activities

**Policies <~> Agents <~> Infrastructure**

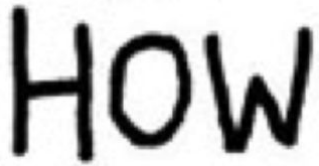
**Policies <~> Agents <~> Infrastructure**

informational transportation

Data Logistics

# Increasing depth of computational design abstraction: from algorithms…

Imperative programming



# Increasing depth of computational design abstraction: from algorithms…

Imperative programming

Declarative programming

# Increasing depth of computational design abstraction: from algorithms to governance of algorithms!

- Imperative programming
- Declarative programming
- Policy-based programming

# Increasing depth of computational design abstraction: from algorithms to governance of algorithms!

**Imperative programming**

**Declarative programming**

**Policy-based programming**

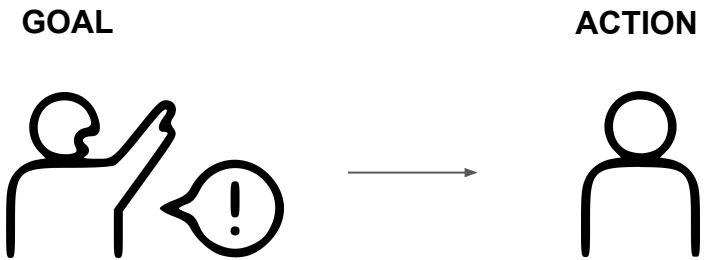
desires/preferences as **individual policies**

norms as **collective policies**

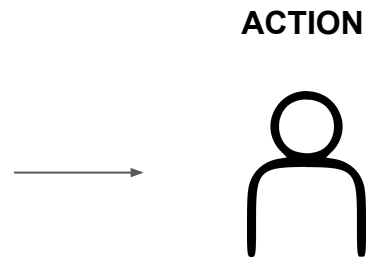
***Normative specifications***

***Agent-based Programming***

# First-order control



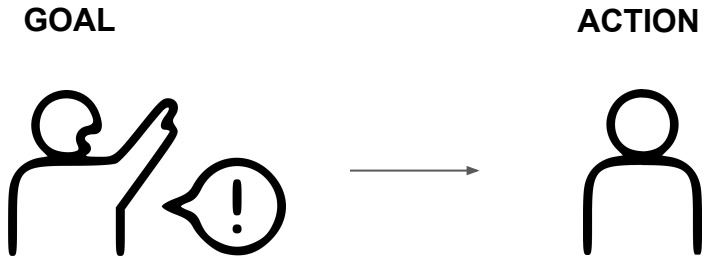
# First-order control



| GOAL | ACTION |
|---|---|
| ***code-driven*** instruction | operation |
| ***data-driven*** labelled dataset | ML black box |

# First-order control

*In both cases, some method has been used to select the action from a pool of actions…*


| | | |
|---|---|---|
| ***code-driven*** | instruction | operation |
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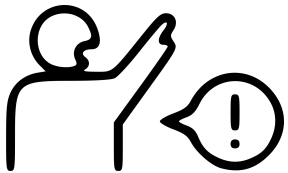
# First-order control

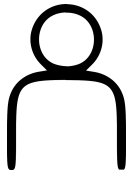
*But then, where the goal comes from?*

pool of actions

**GOAL**



**ACTION**



| | | |
|---|---|---|
| ***code-driven*** | instruction | operation |
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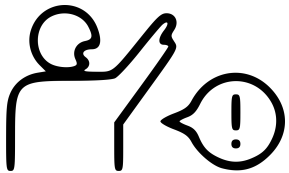
# Second-order control

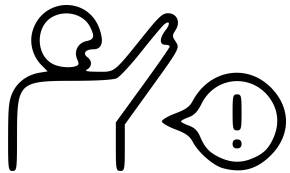
*Adding depth!*

pool of actions

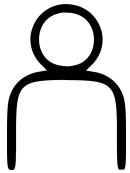
**STRATEGIC GOAL**



**TACTICAL GOAL**



**ACTION**



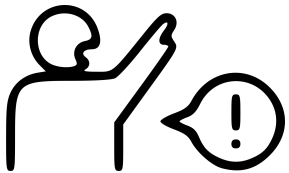
# Second-order control

*Adding depth!*

pool of goals

pool of actions

**STRATEGIC GOAL**



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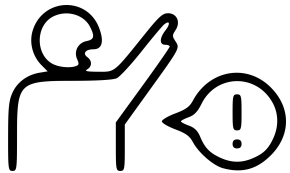
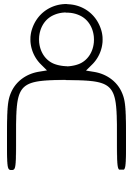


**ACTION**



# Second-order control

*Adding depth!*

pool of goals

pool of actions

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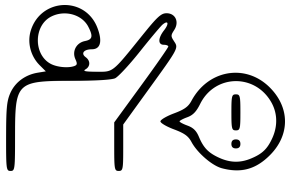

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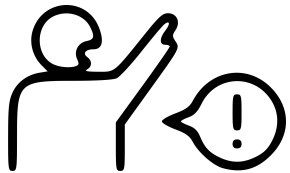

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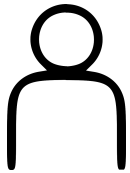


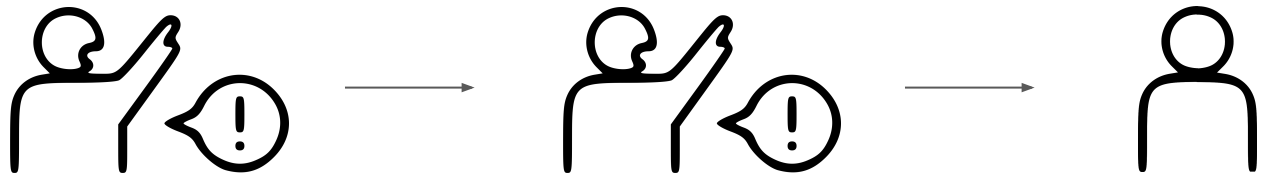
Sileno, G., Boer, A. and van Engers, T., The Role of Normware in Trustworthy and Explainable AI, Proceedings of XAILA workshop: Explainable AI and Law, in conjunction with JURIX 2018

***trustworthy AI*** *and* ***explainable AI*** *issues in ML due to lack of the strategic component*

# Second-order control

*cybernetic view on systems:* ***policy***, ***intelligence***, ***operations***

**STRATEGIC GOAL** **TACTICAL GOAL** **ACTION**



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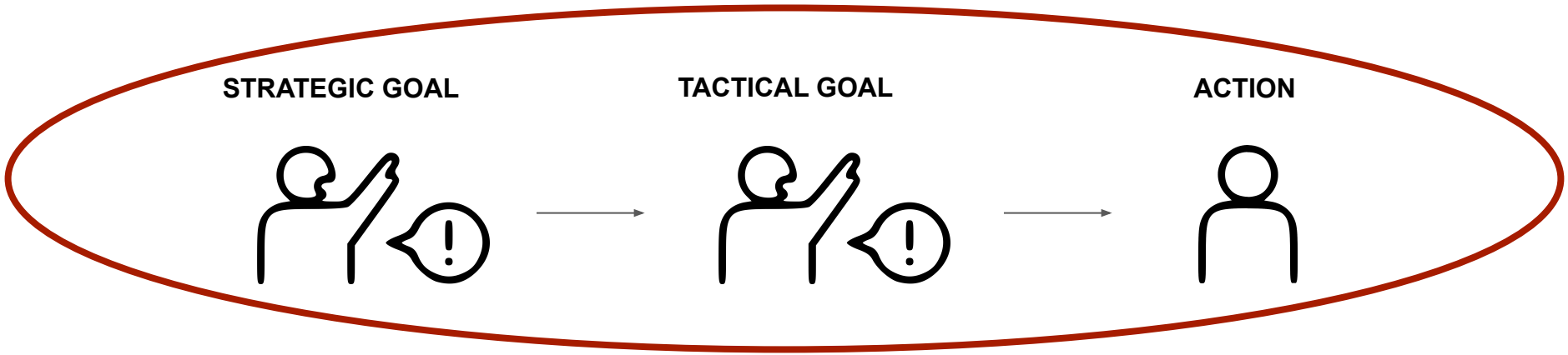
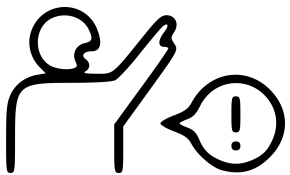


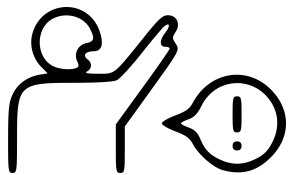

…yet it is about a single “organism”, not an “ecology”

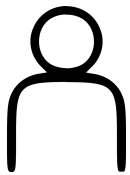
**“TOTALITARIAN” architecture**

# Plural second-order control

*we need to acknowledge the presence of several **autonomous entities**,*







# Plural second-order control

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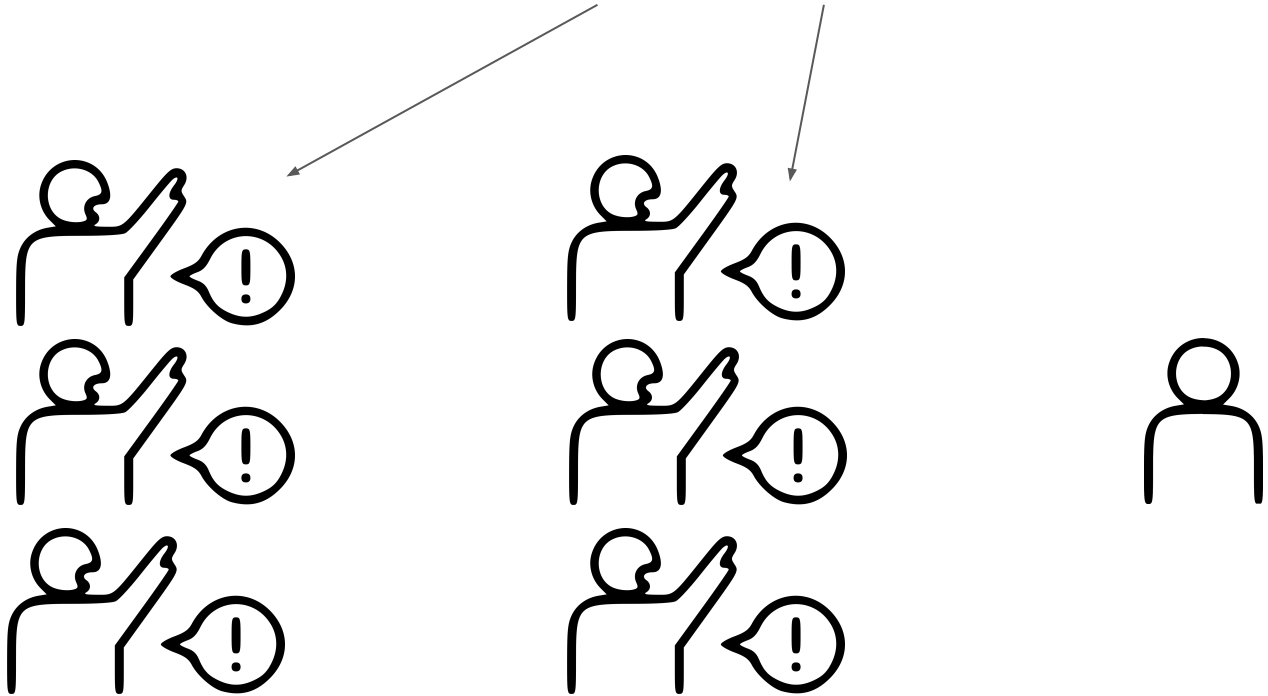
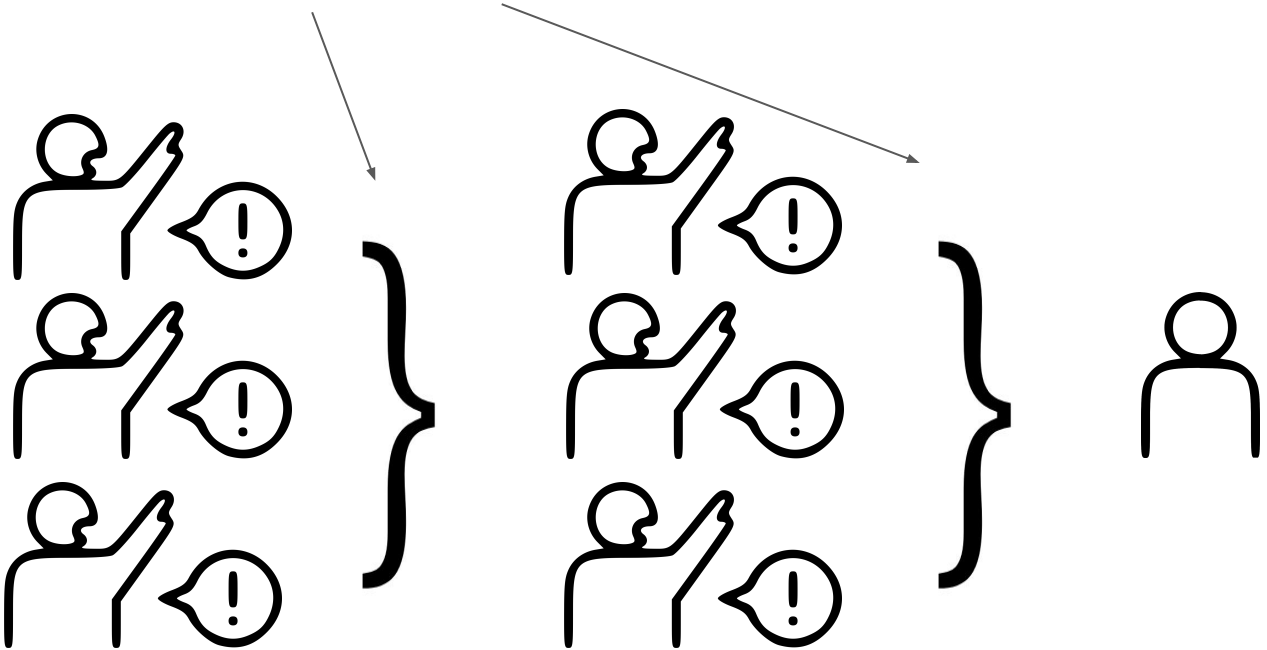


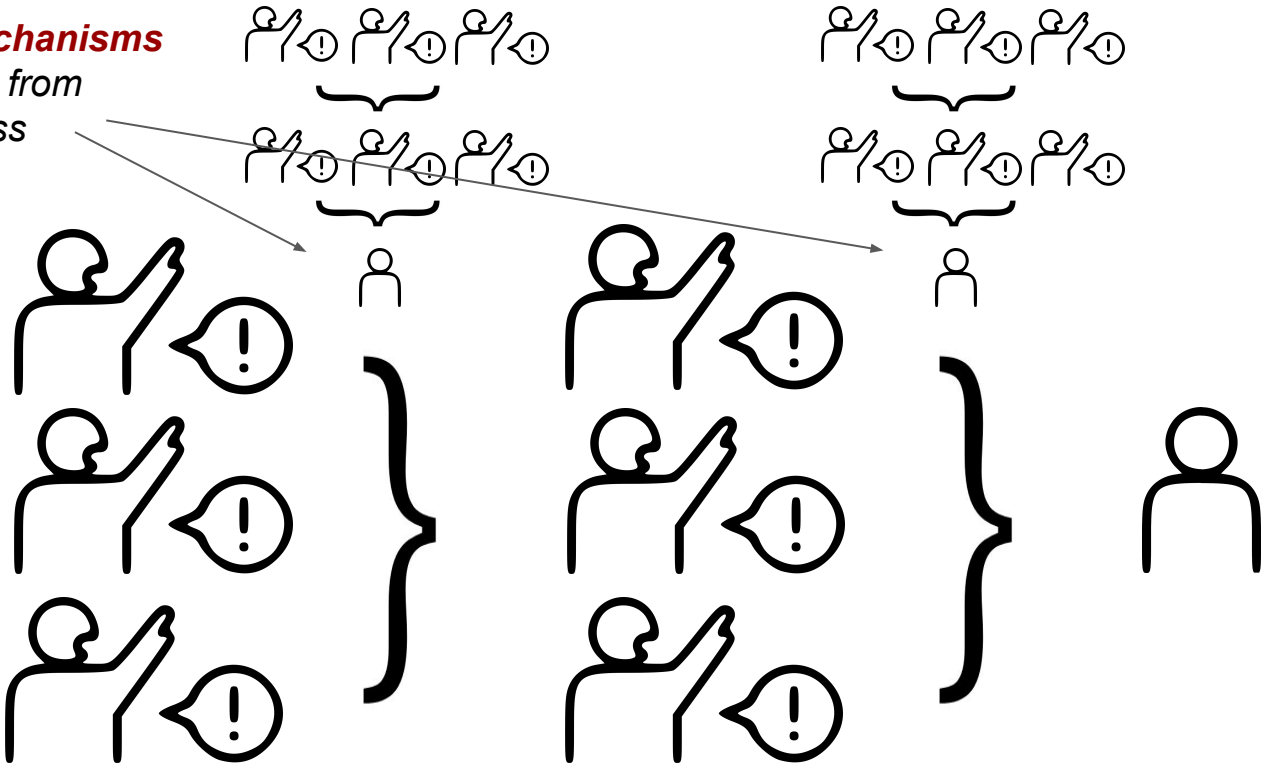
# Plural second-order control

*we need to acknowledge the presence of several **autonomous entities**,*
*and adequate conflict **resolution mechanisms***



# Plural second-order control

***resolution mechanisms***
*may also result from*
*a similar process*



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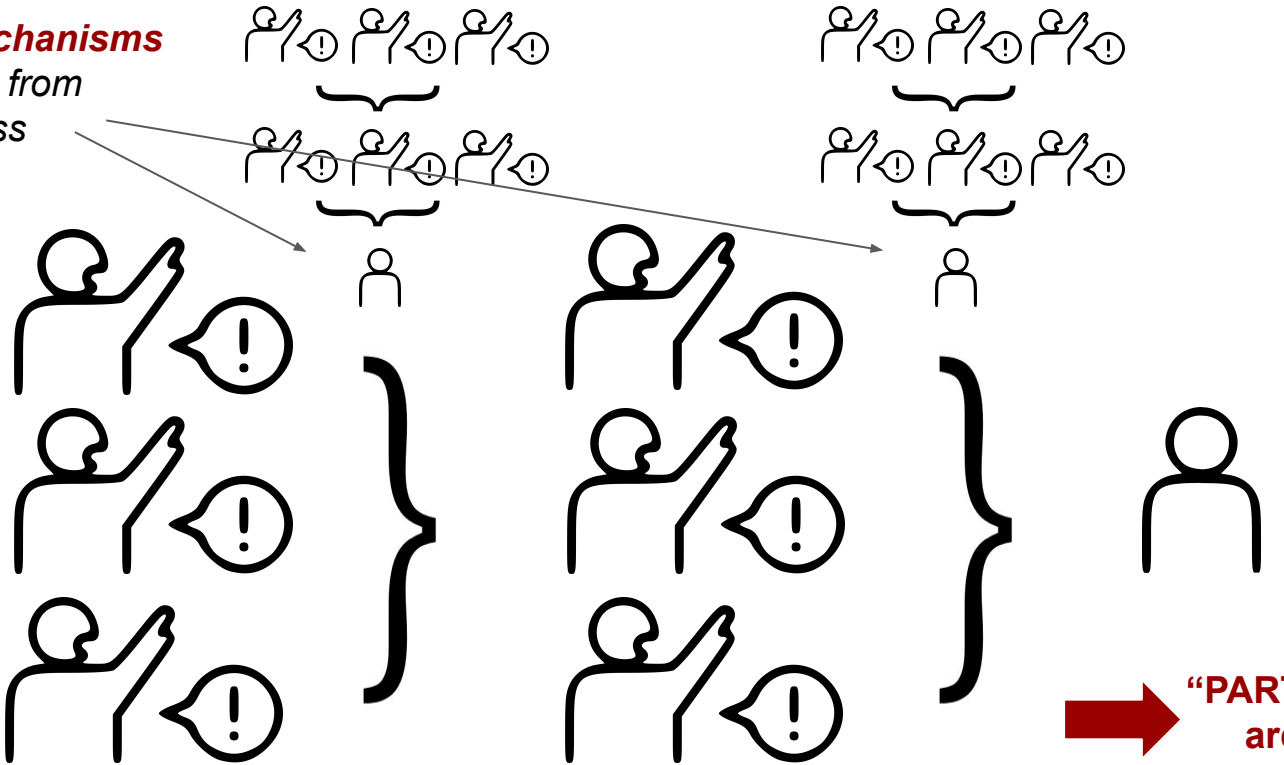
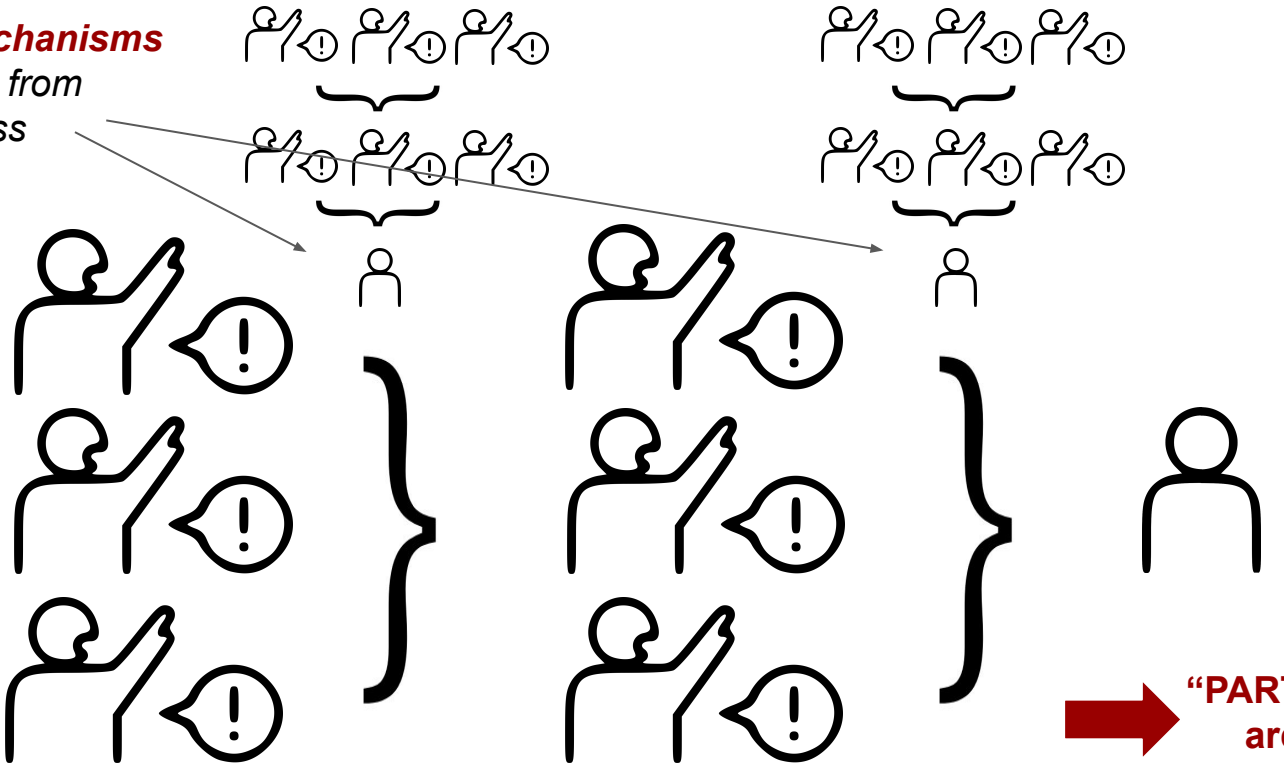


**“PARTICIPATORY” architecture**

# Plural second-order control

***resolution mechanisms*** *may also result from a similar process*



**“PARTICIPATORY” architecture**

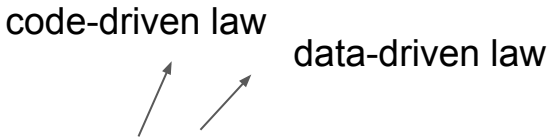
Sileno, G., Grosso, P., Accounting Value Effects for Responsible Networking. Proceedings of ACM SIGCOMM 2021 Workshop on Technologies, Applications, and Uses of a Responsible Internet (TAURIN2021).

Contemporary socio-technical challenge:

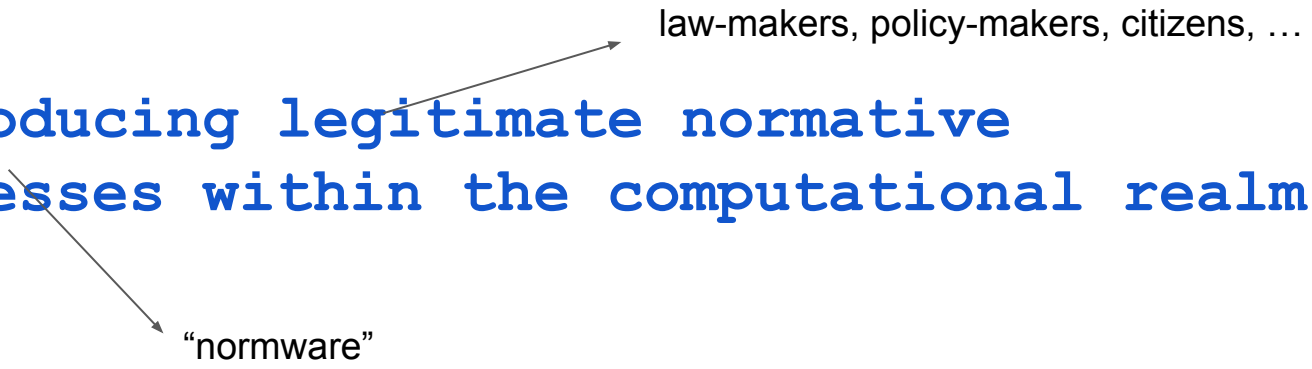
**NO** mechanizing law

**SI!** introducing legitimate normative processes within the computational realm

# Contemporary socio-technical challenge:



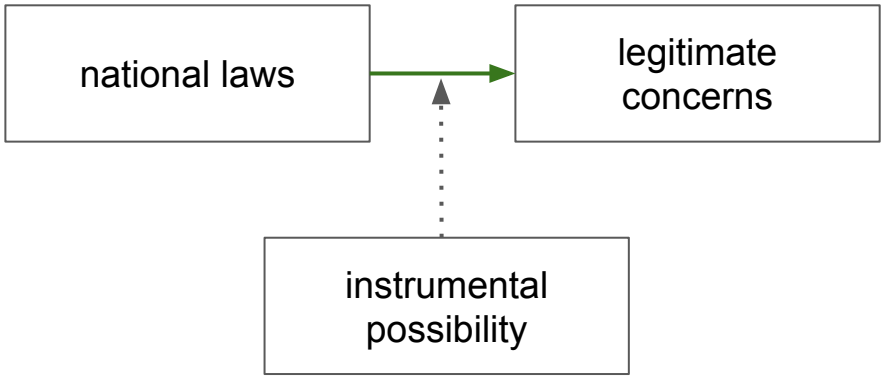

**NO** **mechanizing law**




**SI!** **introducing legitimate normative processes within the computational realm**

# Legality, Legitimacy, Instrumental possibility

*if it is (formally) legal*
*then it is legitimate*




Skorič, V., Sileno, G., Ghebreab, S., Legality, Legitimacy, and Instrumental Possibility in Human and Computational Governance for the Public Sector, International Forum on Digital and Democracy, 2nd edition (IFDaD 2022)

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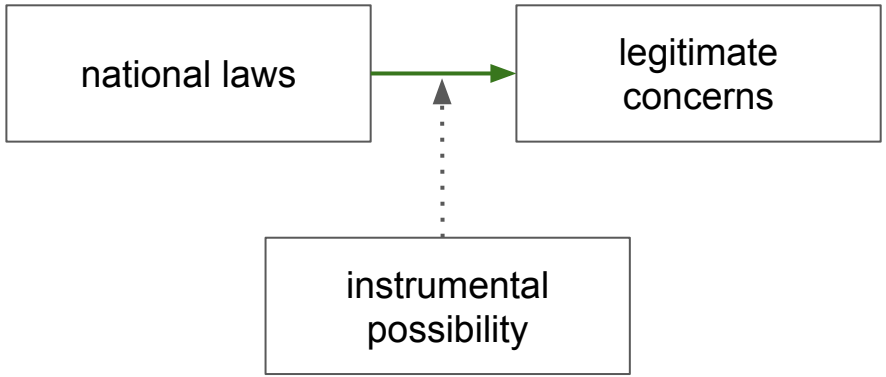
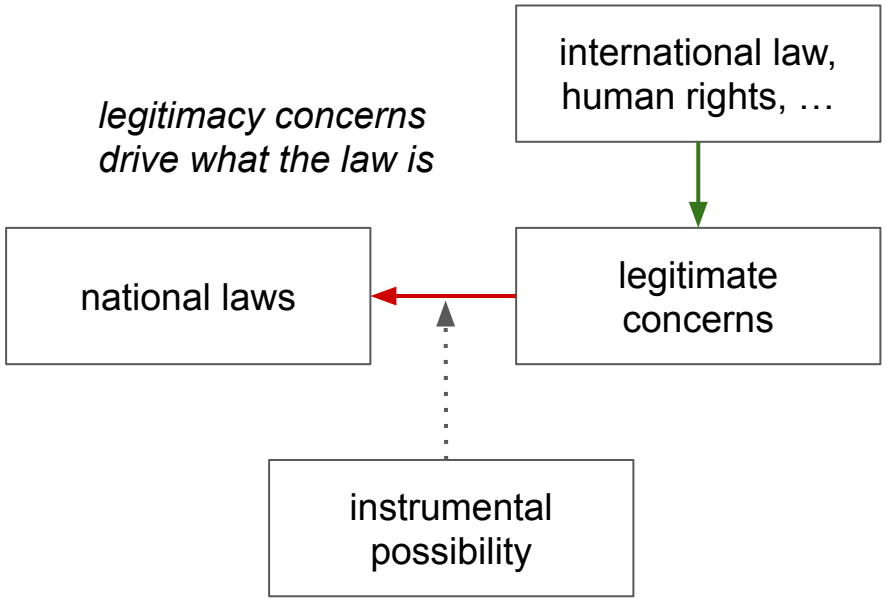



*legitimacy concerns drive what the law is*

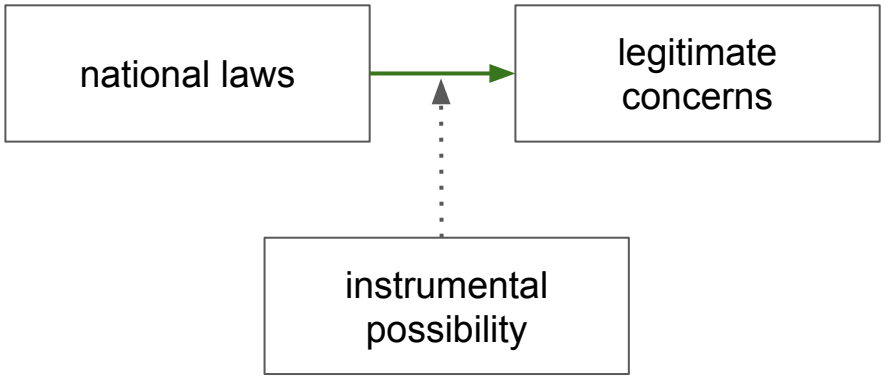



Skorič, V., Sileno, G., Ghebreab, S., Legality, Legitimacy, and Instrumental Possibility in Human and Computational Governance for the Public Sector, International Forum on Digital and Democracy, 2nd edition (IFDaD 2022)

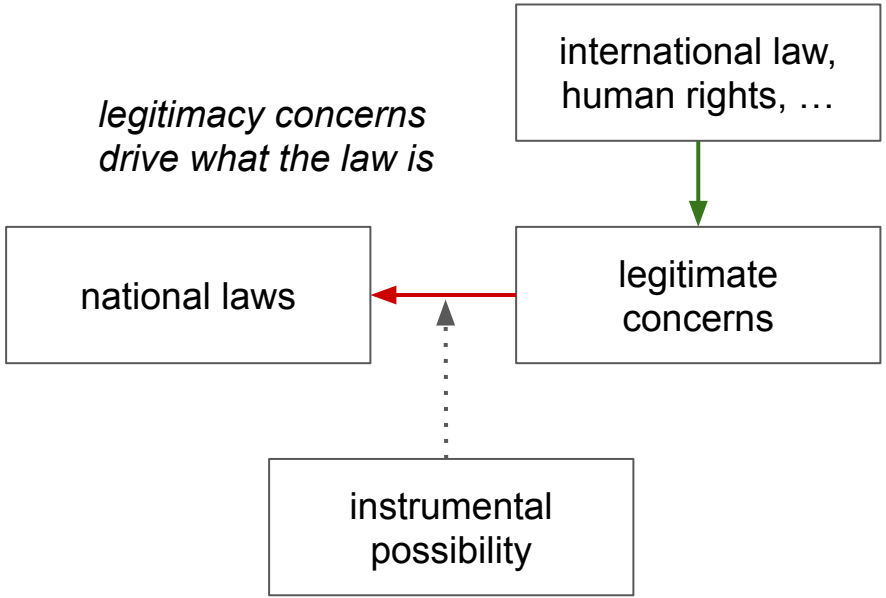
# Legality, Legitimacy, Instrumental possibility

**core problem: designing intervention points**

*if it is (formally) legal*
*then it is legitimate*




*legitimacy concerns drive what the law is*

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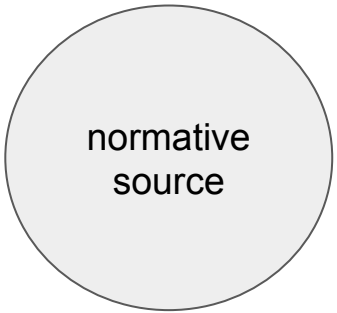
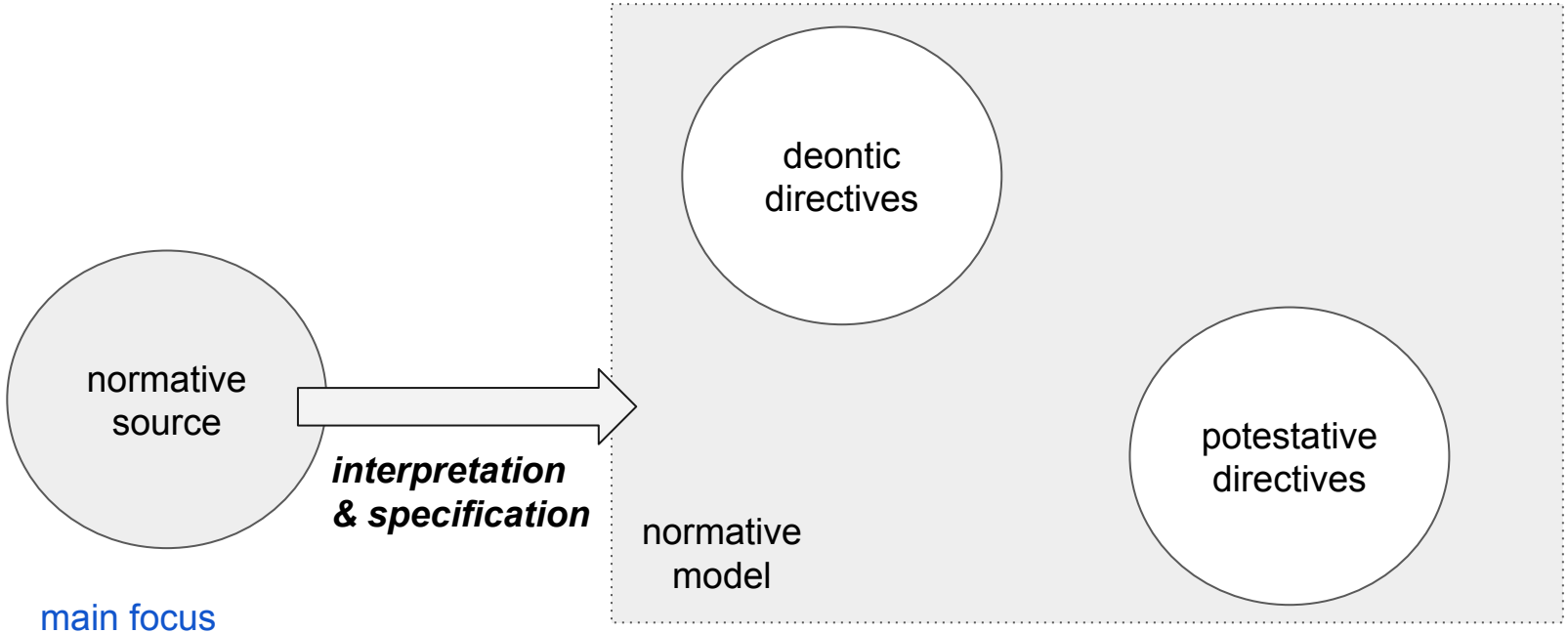
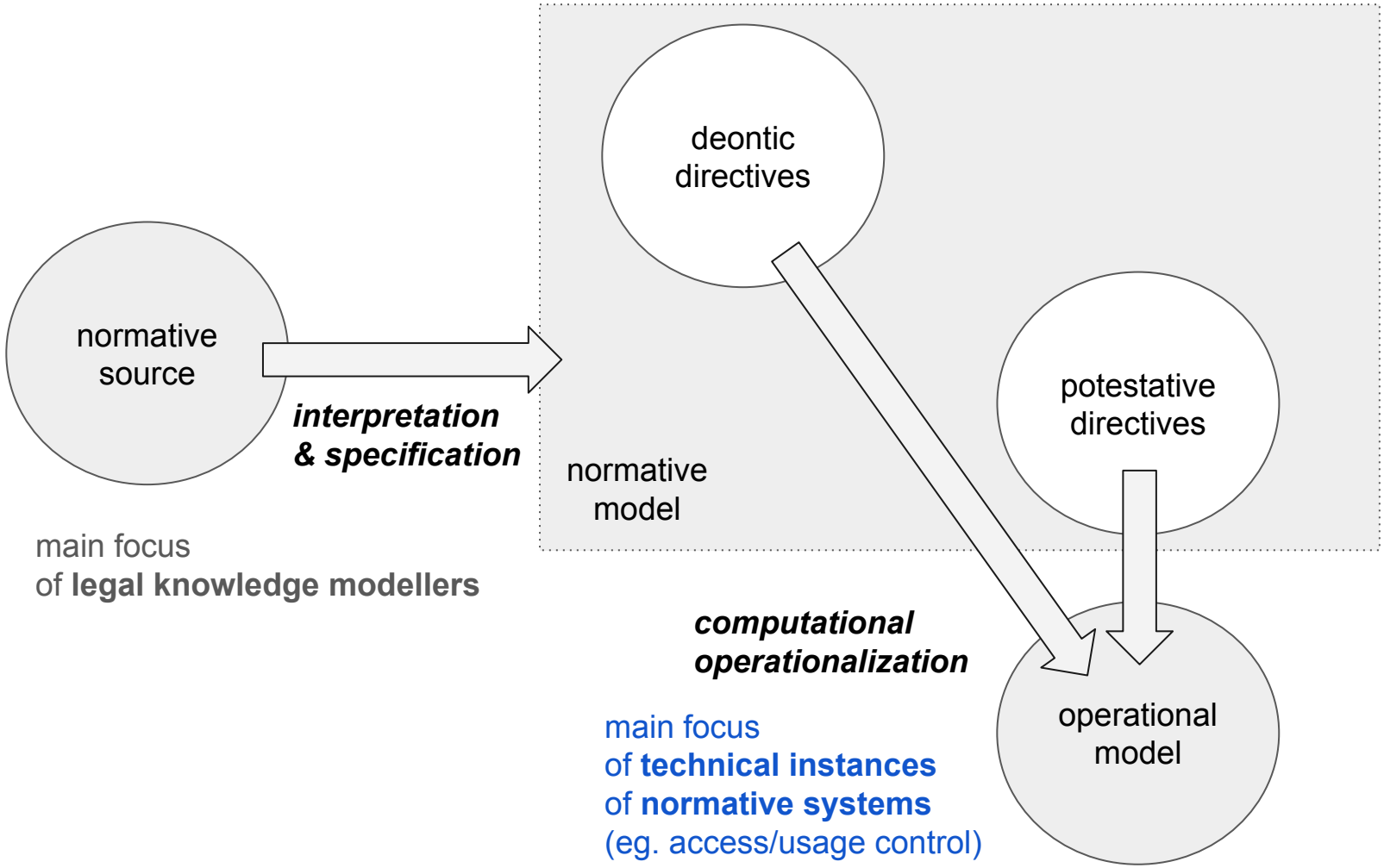
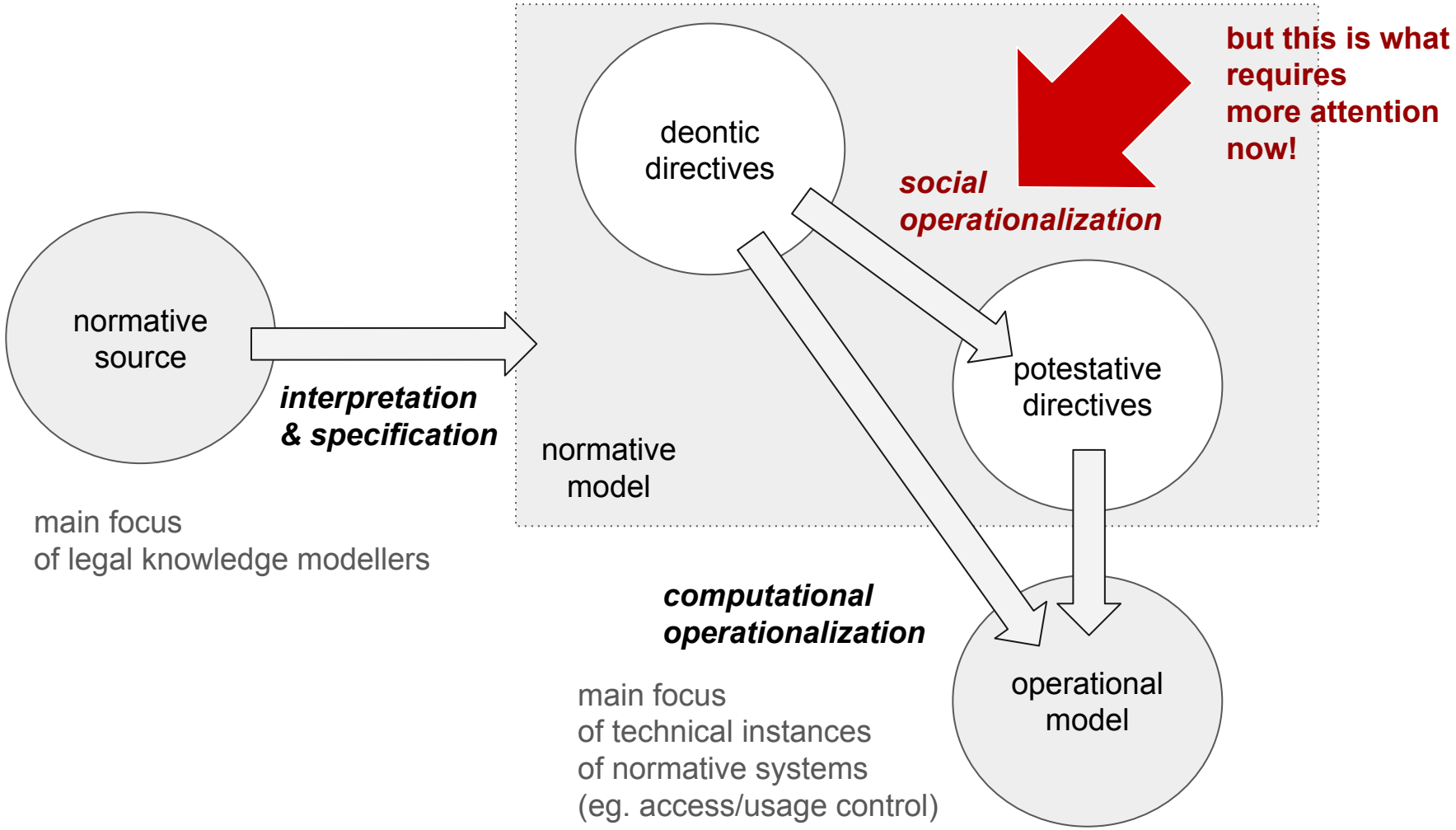

normative
source

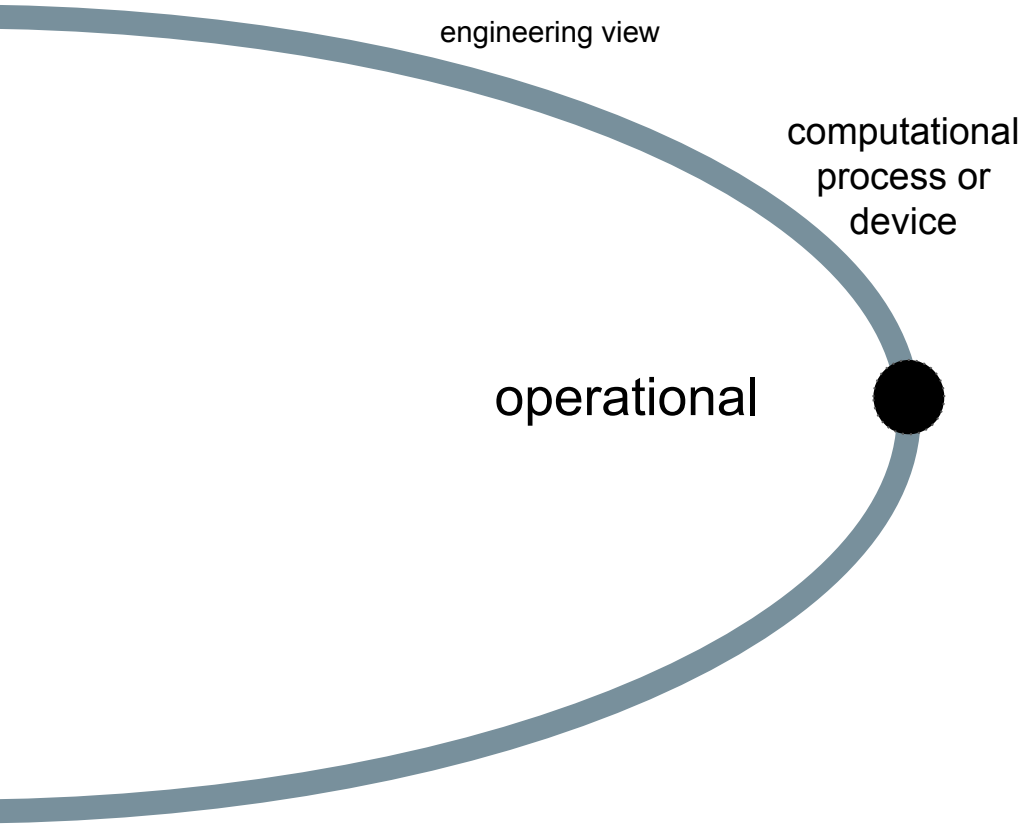



main focus
of **legal knowledge modellers**

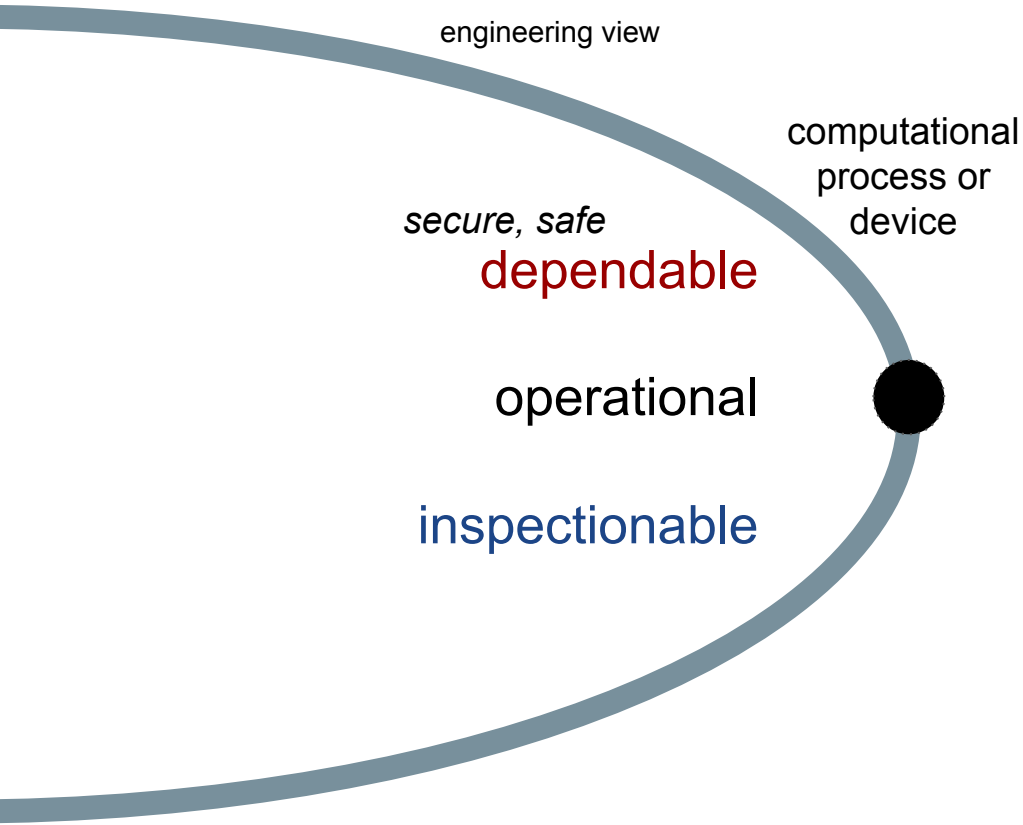

deontic
directives
normative
source
interpretation
& specification
normative
model
potestative
directives
main focus
of legal knowledge modellers
computational
operationalization
operational
model
main focus
of technical instances
of normative systems
(eg. access/usage control)


but this is what requires more attention now!
deontic directives
social operationalization
normative source
interpretation & specification
potestative directives
normative model
main focus of legal knowledge modellers
computational operationalization
operational model
main focus of technical instances of normative systems (eg. access/usage control)

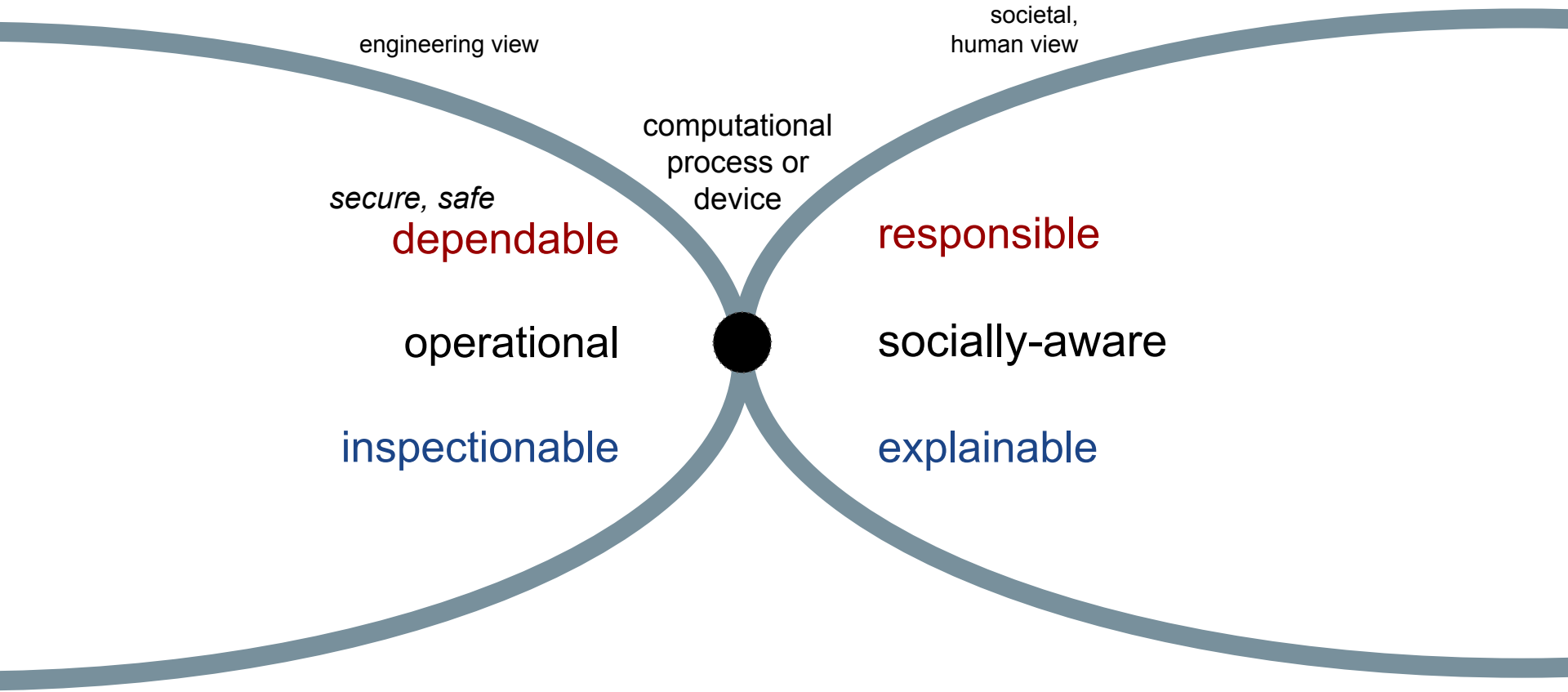
# From functional perspectives...



# to extra-functional...

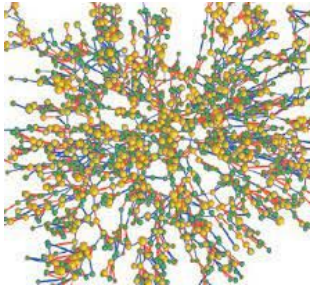


# and beyond extra-functional!



# Relevance

- Practically almost all real-world systems have a complex and distributed nature

# Mechanisms of normative control

25 May 2024, Final DL4LD event @ UvA

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