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Teleological Networks in Normative Systems

Vytautas ČYRAS
Vilnius University,
Faculty of Mathematics and Informatics,
Vilnius, Lithuania
Vytautas.Cyras@mif.vu.lt

Friedrich LACHMAYER
University of Innsbruck,
Faculty of Law,
Austria
Friedrich.Lachmayer@uibk.ac.at

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University of Salzburg

1. Introduction

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Motivation

- Teleological statements are especially found in the legislative workflow
  - governmental drafting; parliamentarian decisions; publication of the valid laws
- Law and Artificial Intelligence (AI)
  - Different methodological paradigms
  - Approaches
    - Via natural language
    - Via formal notation. This is our approach.
- Characterisation of legal order: many **implicit** and rare **explicit** teleological structures

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Teleological structures in context

- "Goal" is not among fundamental legal concepts!?
  - However, in G. Sartor, 2006 "Fundamental legal concepts"
- Teleology
  - Berman & Hafner 1993; Bench-Capon; Prakken; Sartor etc in *AI and Law* journal, Vol.10 (2002), No.1-2
  - Goals
    - Interests, values
    - Purposes, policies
    - Intentions of a legislator
- Theory of teleological relations in law? Why not?

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Teleological reasoning vs. norm-based reasoning

- General legal reasoning, especially by non-experts in law, is driven,

1. primarily, by **purposes**,

2. then by **norms**

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2.
Goals in Software Engeneering

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Our approach: to treat a teleological network in law similarly to the goal model in RE

Assumption: a statute is a system.

Conclusion: system design methods might be used in legislative drafting.

- Teleological network in a statute ~ goal model in requirements engineering

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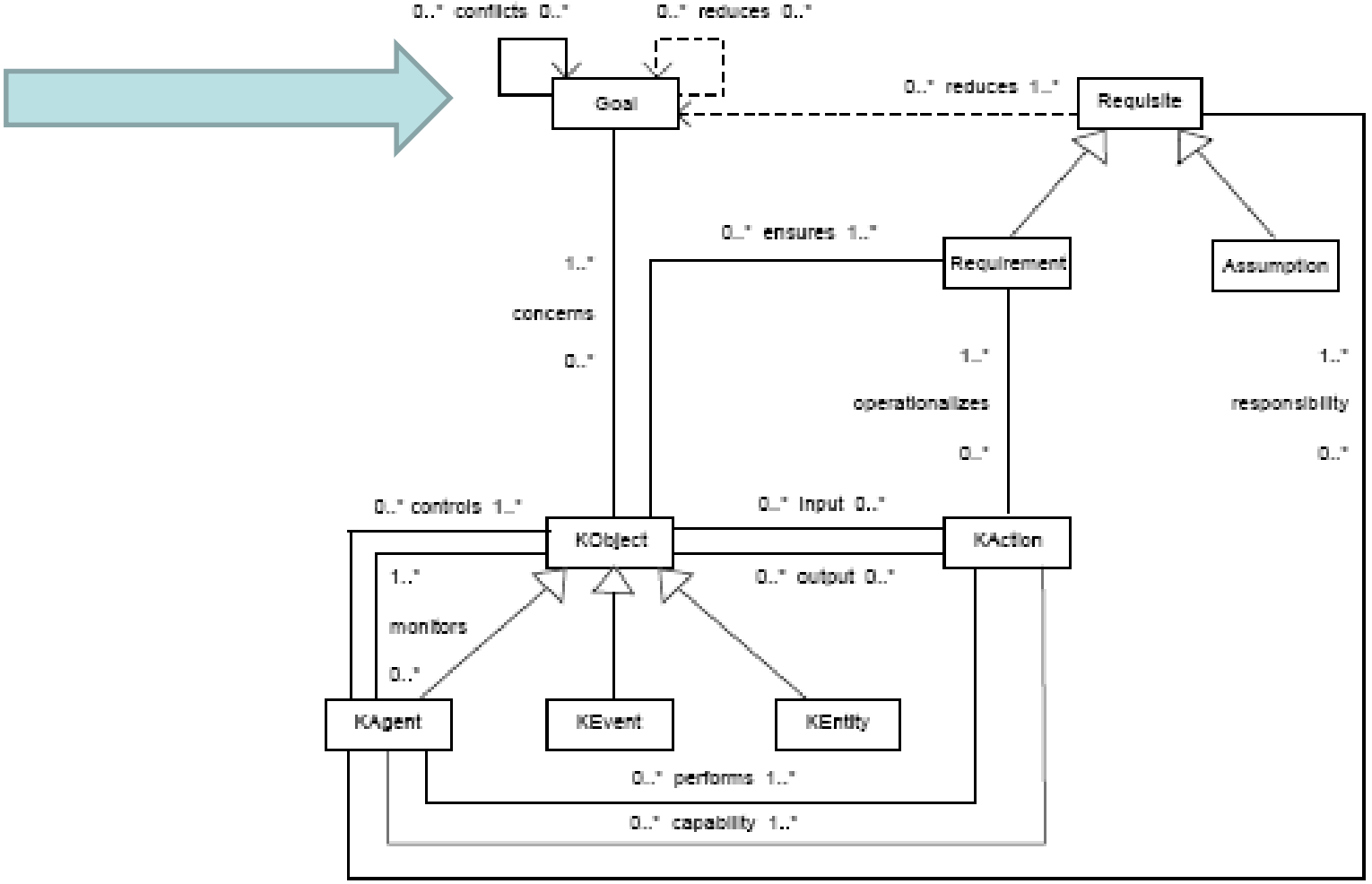
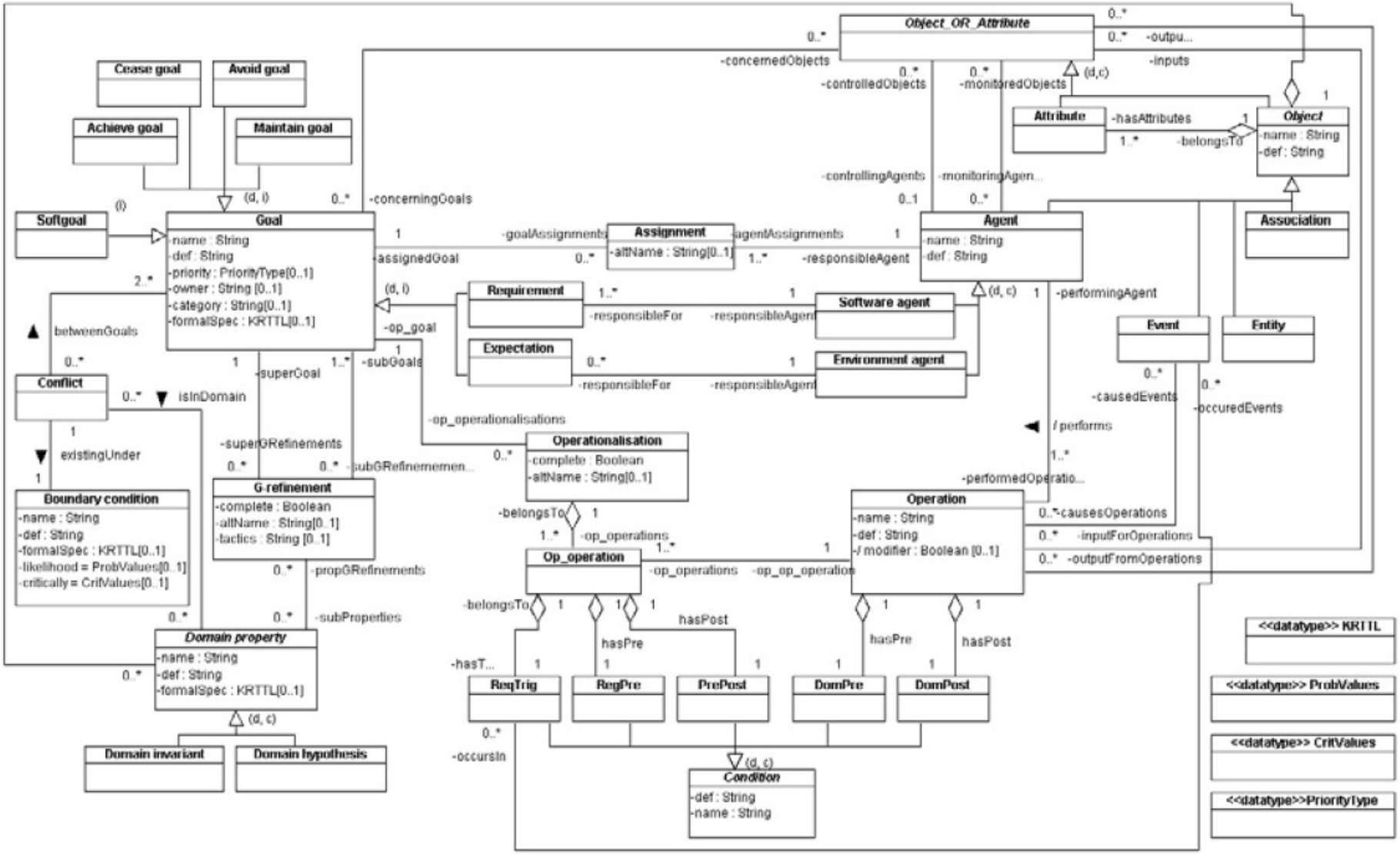
Goals in software engineering

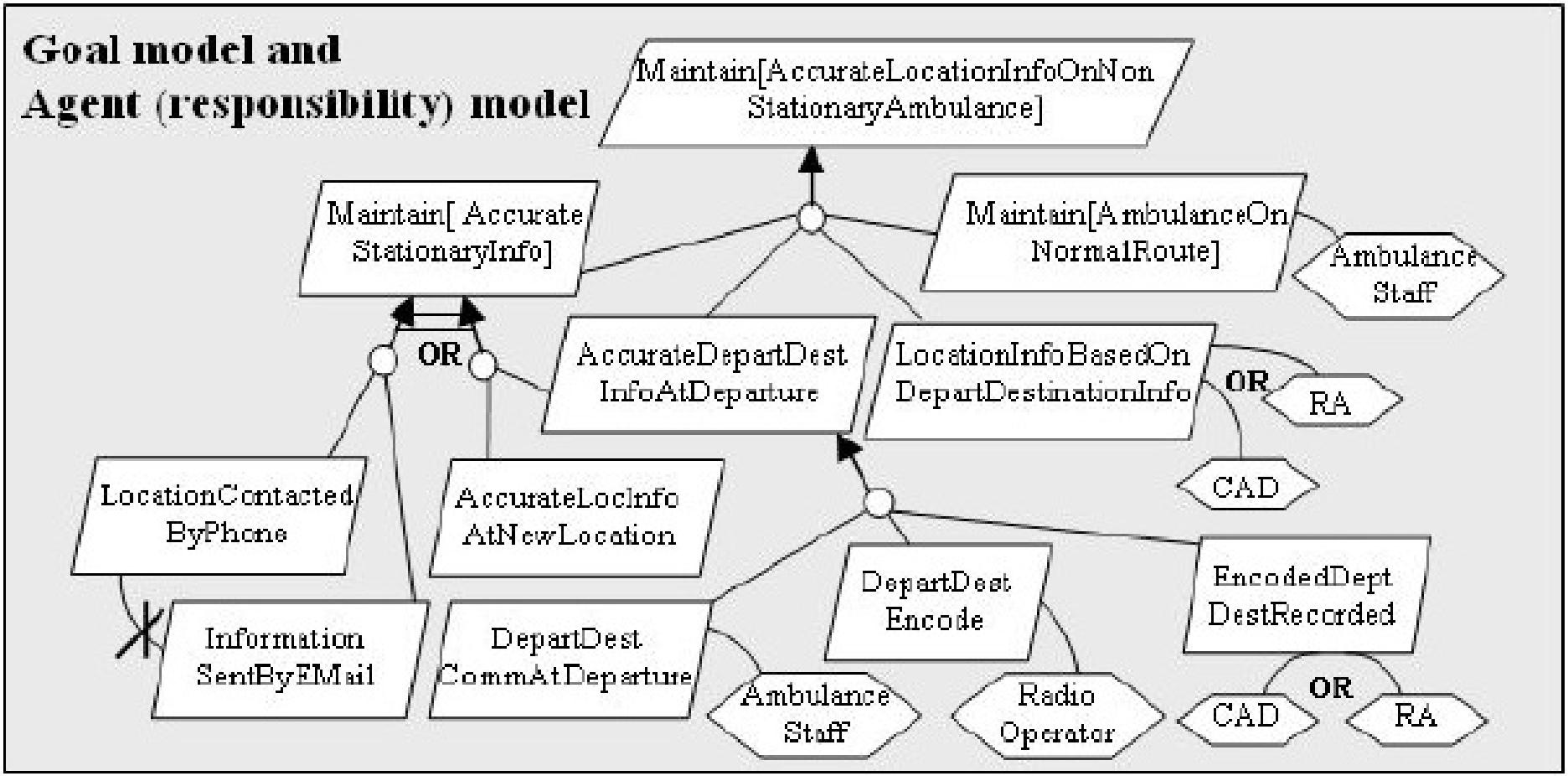


KAOS metamodel [Heaven, Finkelstein 2004]. KAOS – goal-oriented requirements engineering methodology, see van Lamsweerde

KAOS goal model [Matulevičius, Heymans 2005]

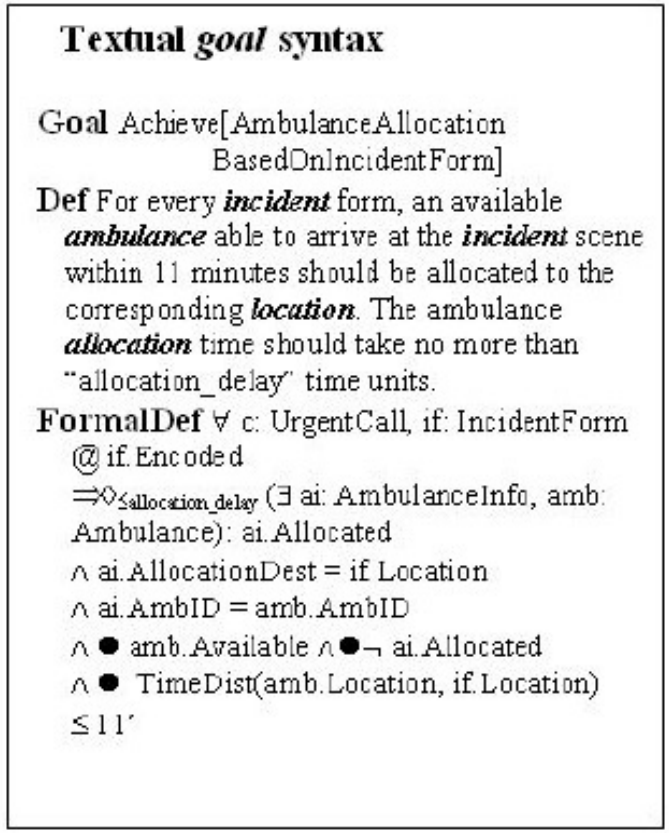


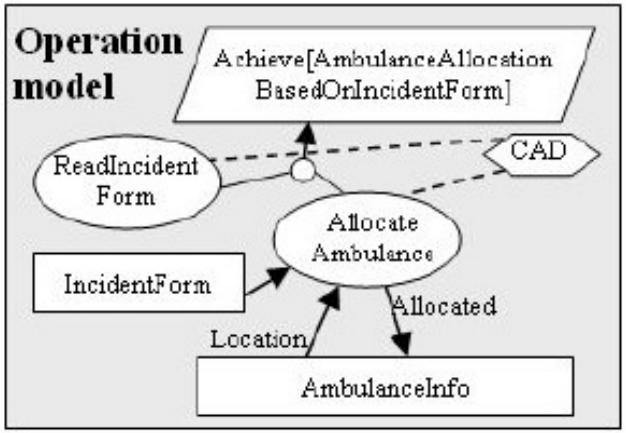
Example: KAOS model for the London Ambulance Service system

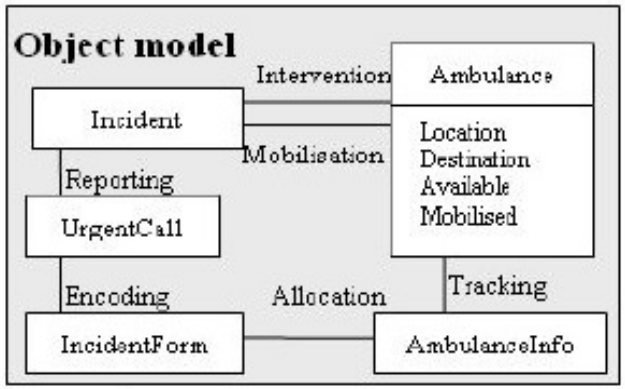


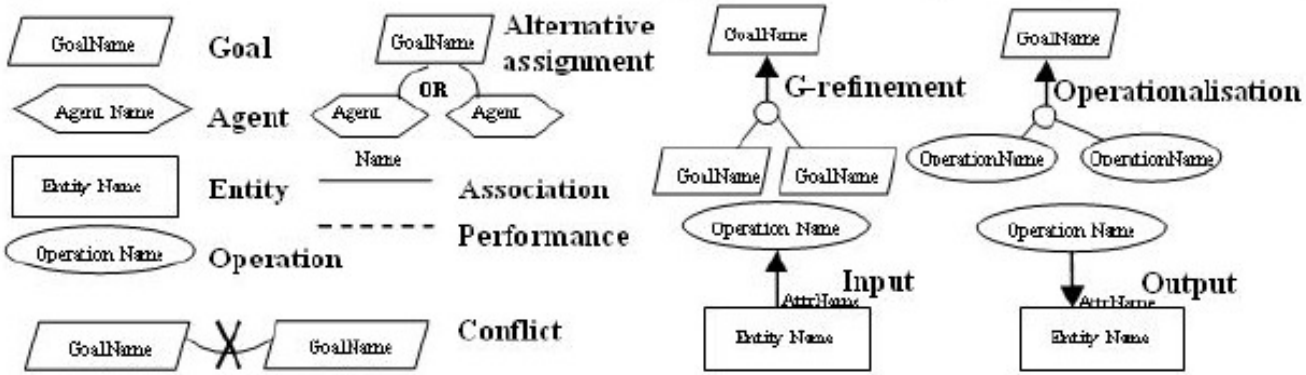
See [Heaven, Finkelstein 2004], adapted from [Letier 2001]

Continued from [Heaven, Finkelstein 2004], adapted from [Letier 2001]



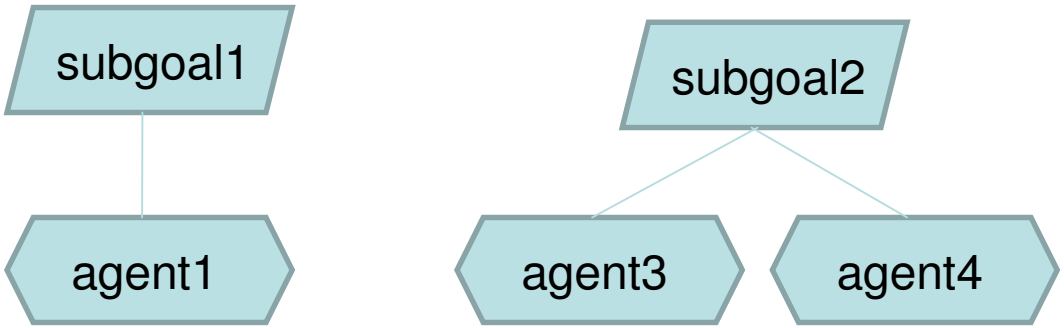






Goals and agents

- Responsibility link assigns a goal to an agent. A bottom level subgoal is related to an ***agent***



- The agent is responsible for goal satisfaction
- ***Agent*** of a requirement ~ ***subject*** of a norm
- ***Goal*** *and* ***agent*** in requirements engineering ~ ***telos*** *and* ***subject*** in the law

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Types of goals

- Different goal types
  - ***Achieve*** goals require that some property *eventually* holds. In deontic logic, ◊ G.
  - ***Maintain*** goals require that some property *always* holds. □ G.
  - ***Cease*** goals requires that some property *eventually stops* to hold. Negation of achieve.
  - ***Avoid*** goals require that some property *never* holds. Negation of maintain.
  - ***Optimise***, ***Test***, ***Query***, ***Perform***, ***Preserve*** [Braubach et al. 2004] about Belief-Desire-Intention agent systems

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Expected usage

- Annotation of a statute with goals – a commentary
- Goal representation forms
  - Textual annotation
  - A network of goal identifiers
- An example to start: a constitution for Europe
    - Article I-2 The Union's values
    - Article I-3 The Union's objectives

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3.
Teleological Statements and the Context of Teleology

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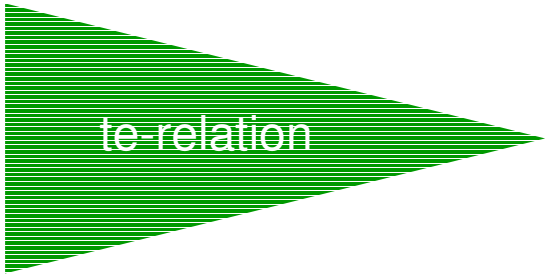

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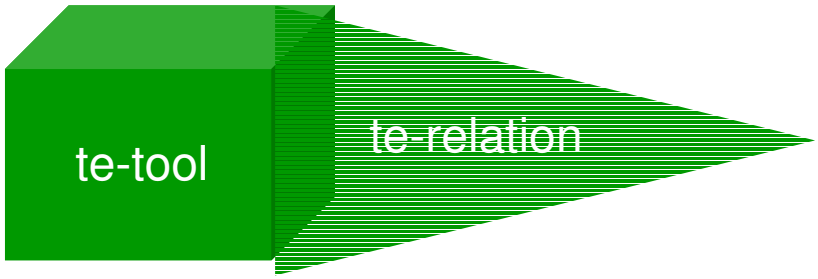

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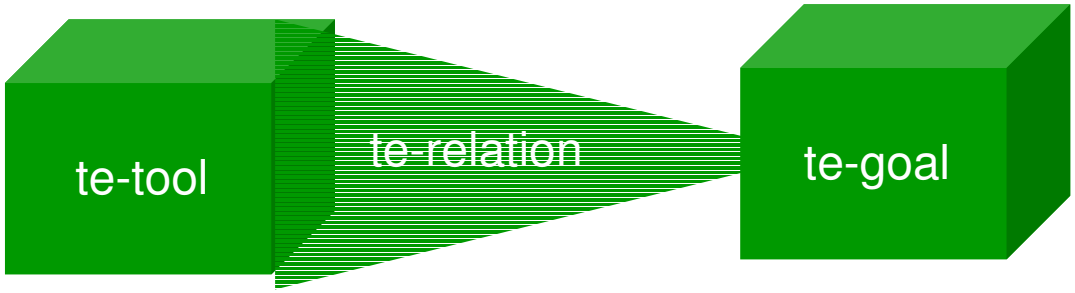

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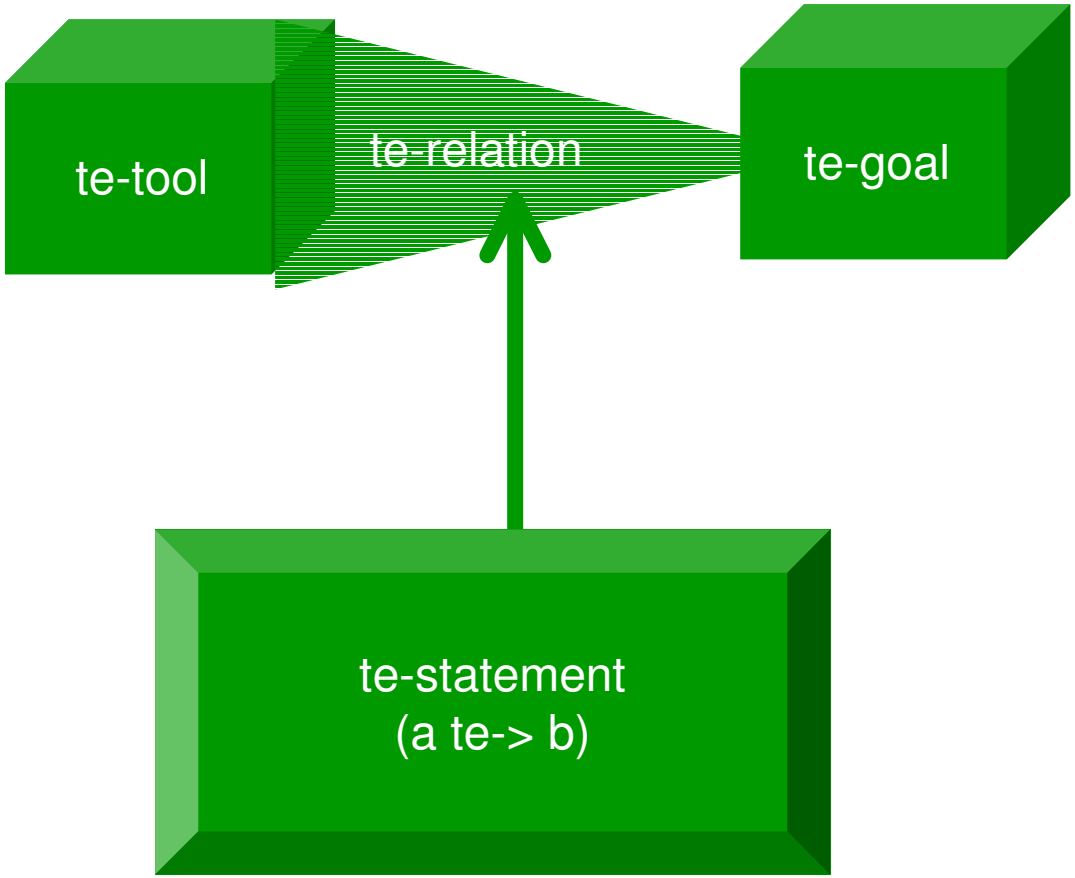

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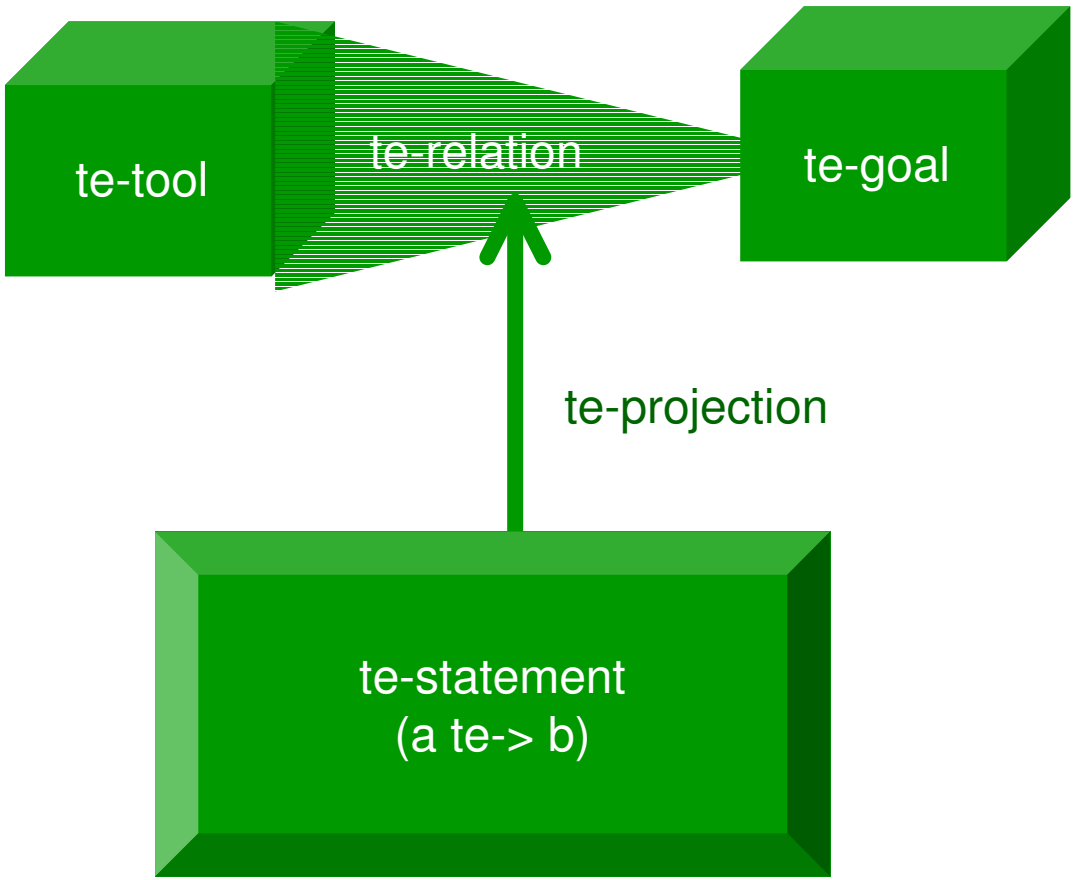

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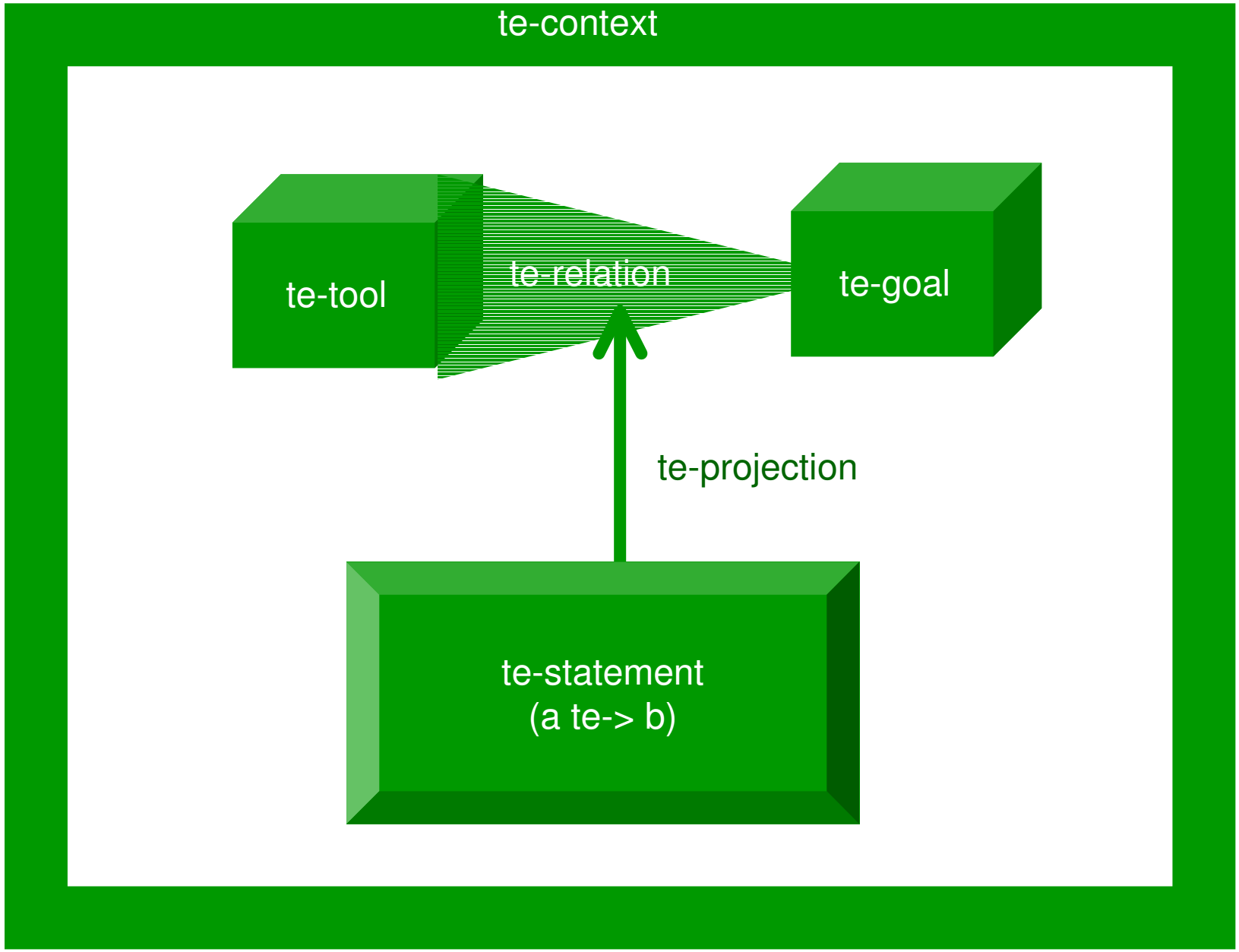

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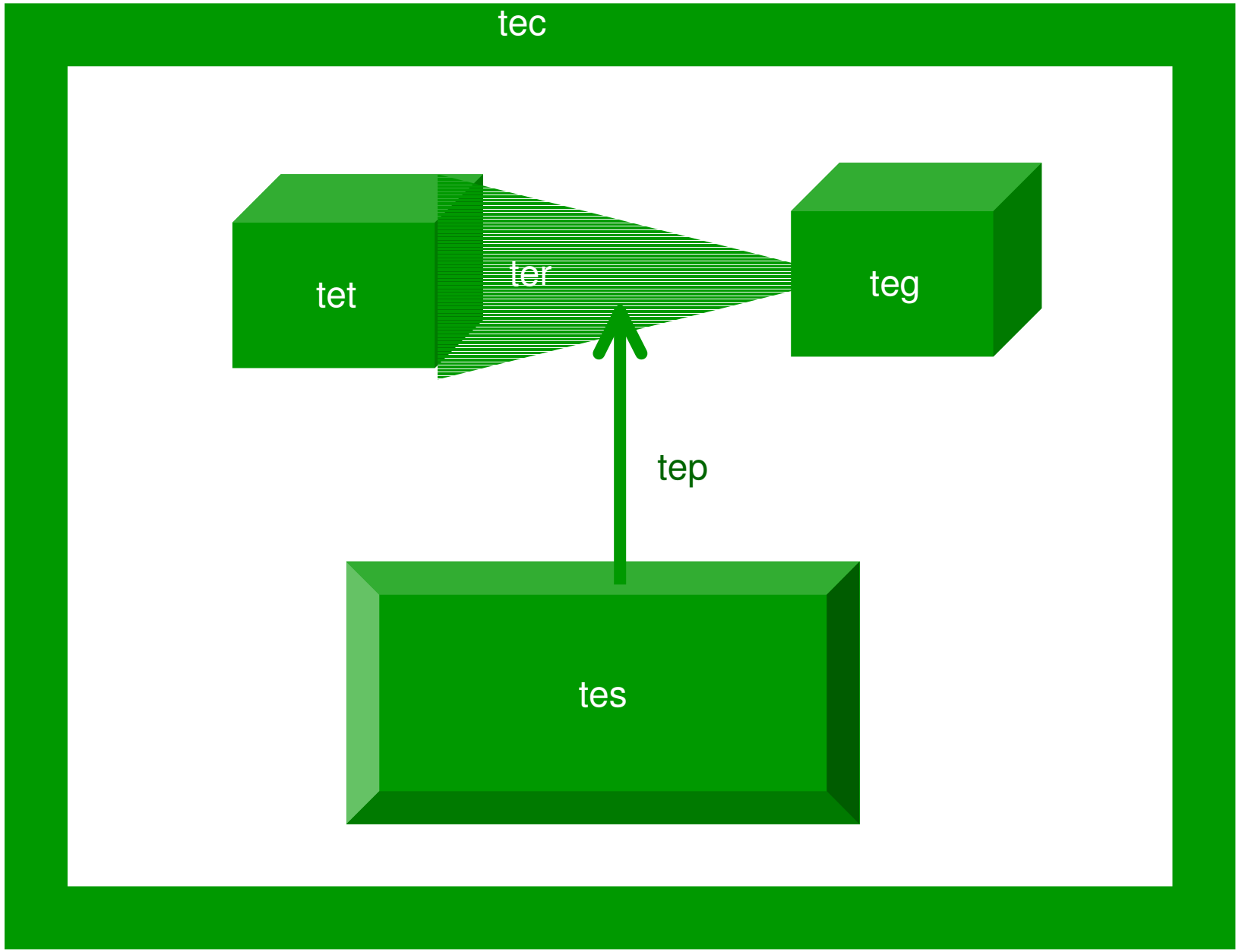

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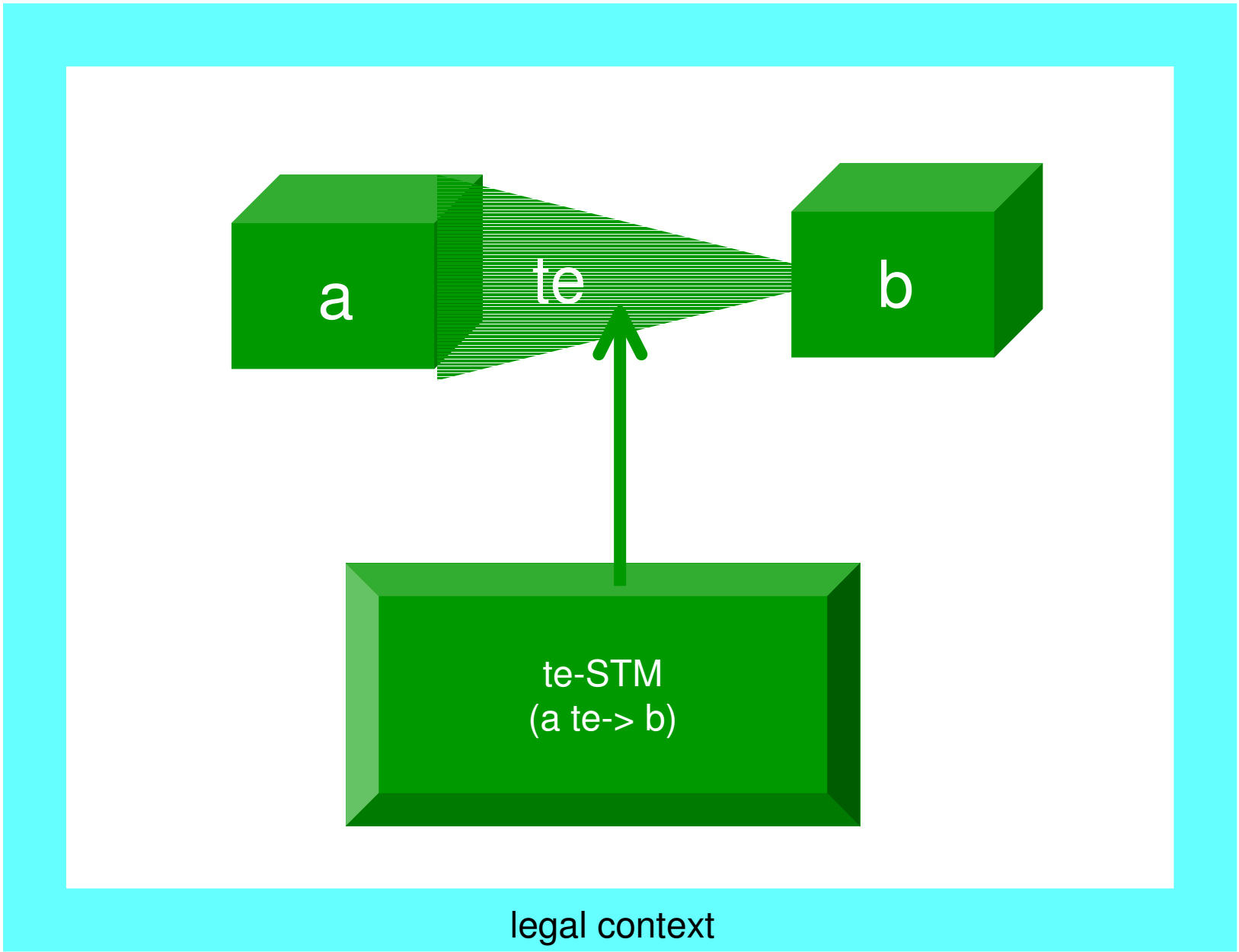
Teleological Statement, Context



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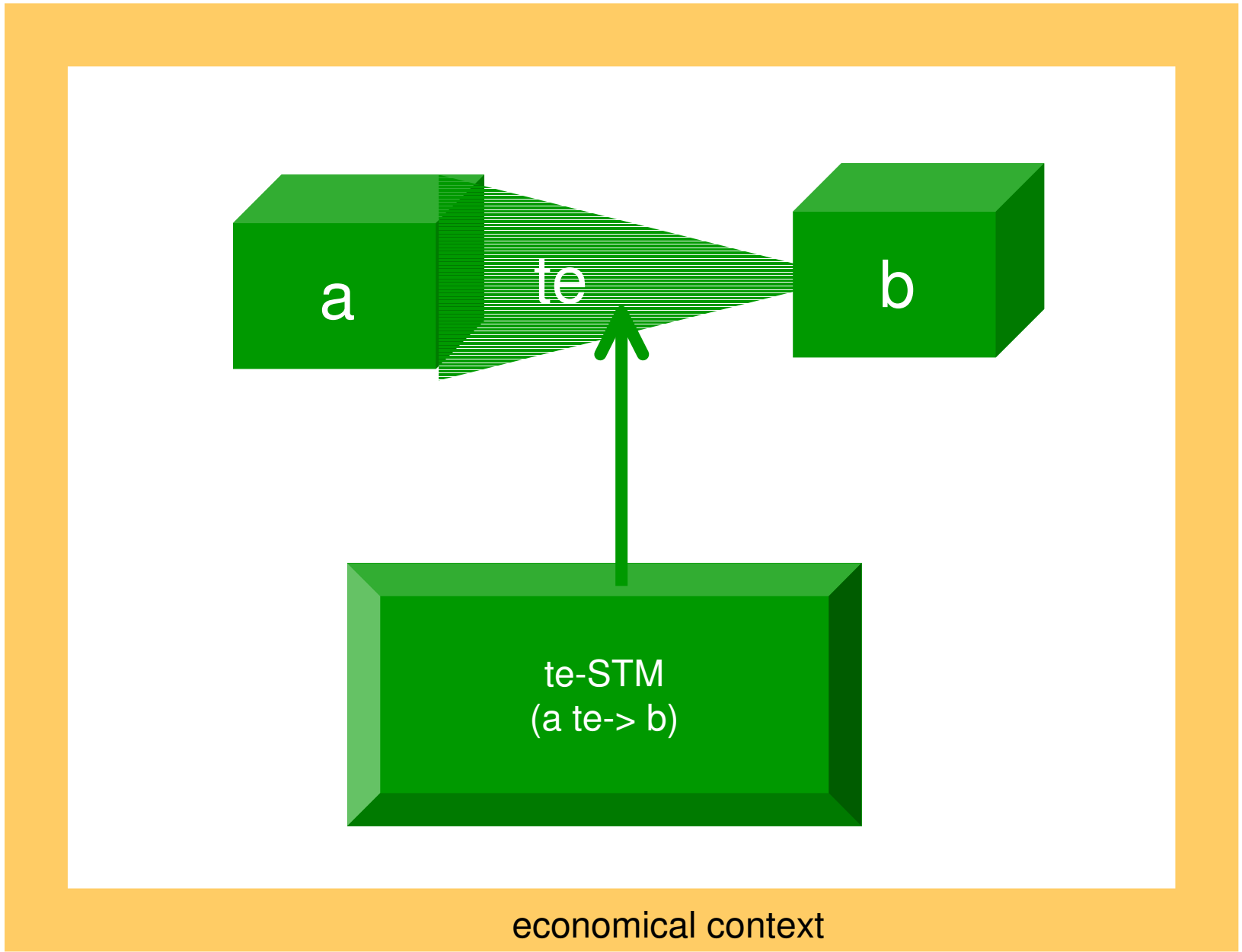
Teleological Statement, Context



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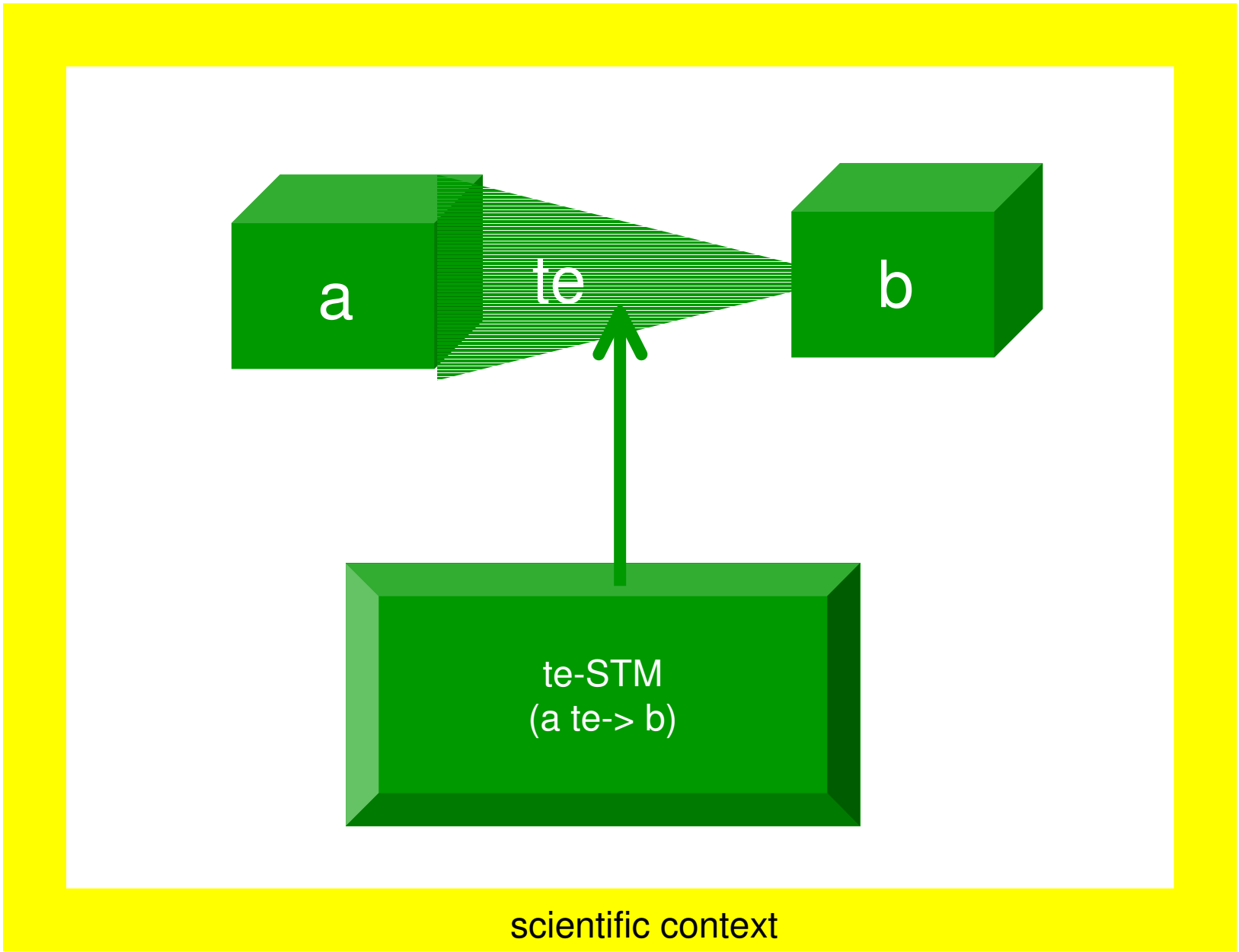
Teleological Statement, Context



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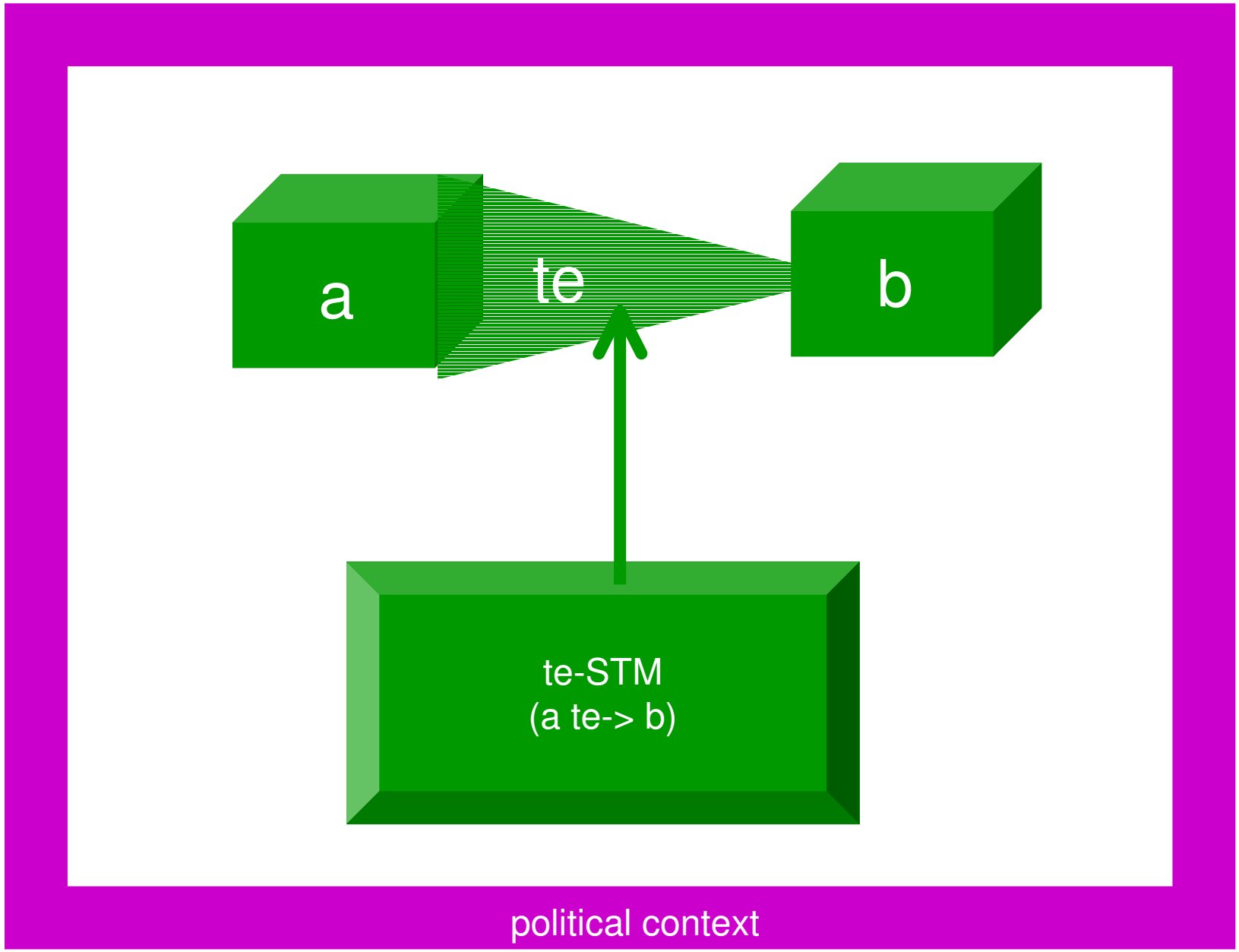
Teleological Statement, Context



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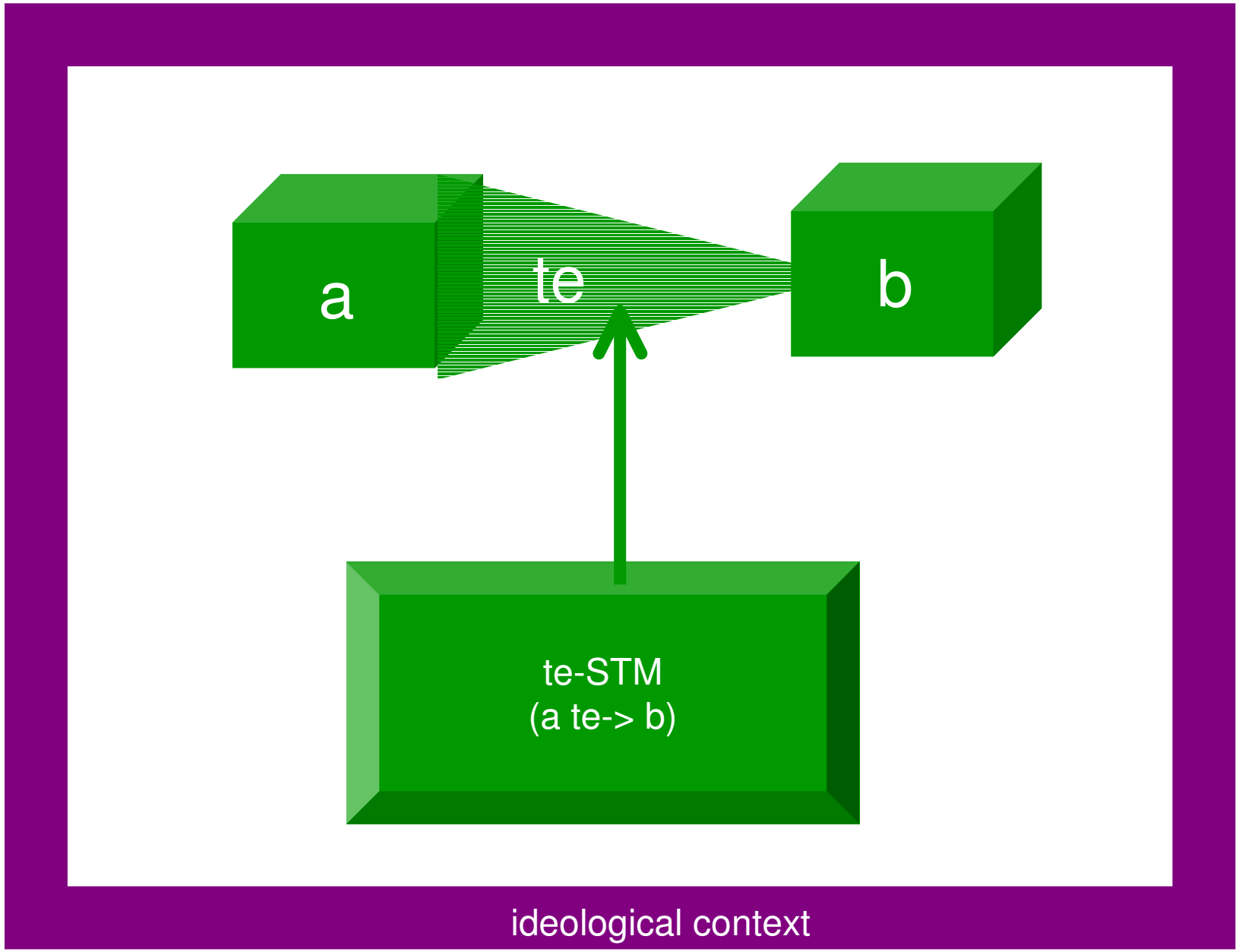
Teleological Statement, Context



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tec	te-context	{ STM (a te-> b) }
teg	te-goal	a te-> b
tep	te-projection	STM (a te-> b)
ter	te-relation	a te-> b
tes	te-statement	STM (a te-> b)
tet	te-tool	a te-> b

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4.
Explicit teleological element within the norm

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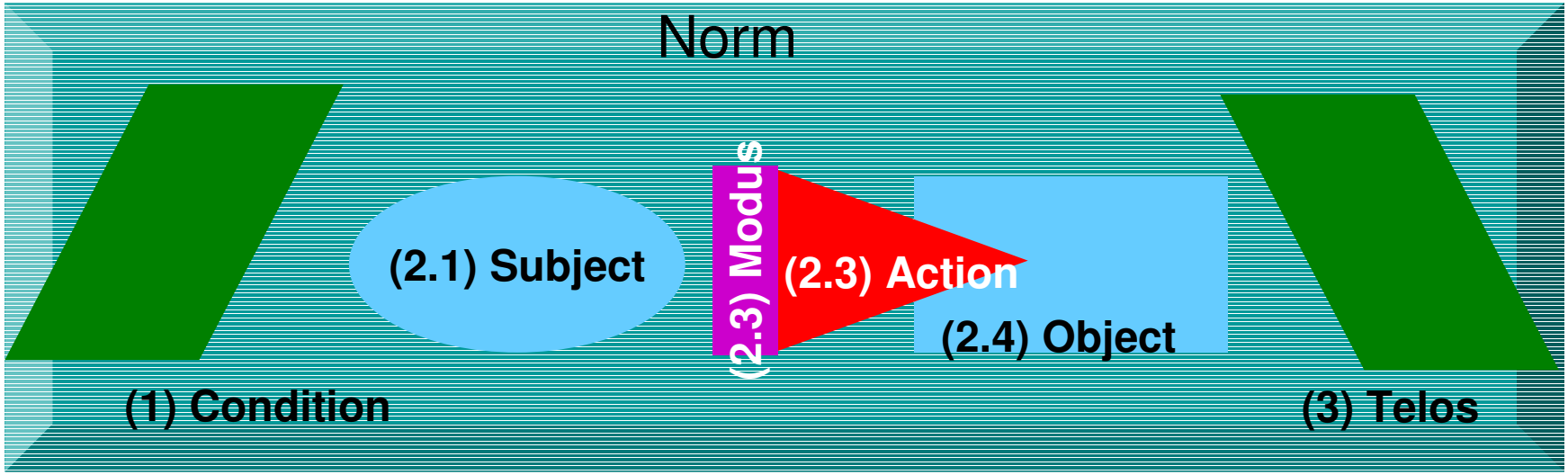

Consider the structure of a norm to be composed of the following elements:

(1) **Condition**

(2) Disposition

(2.1) **Subject**. This is an actor;

(2.2) **Action**;

(2.3) Normative **modus** of the action;

(2.4) **Object** of the action.

(3) **Telos** – the explicit teleological element of the norm. We add the *telos*.

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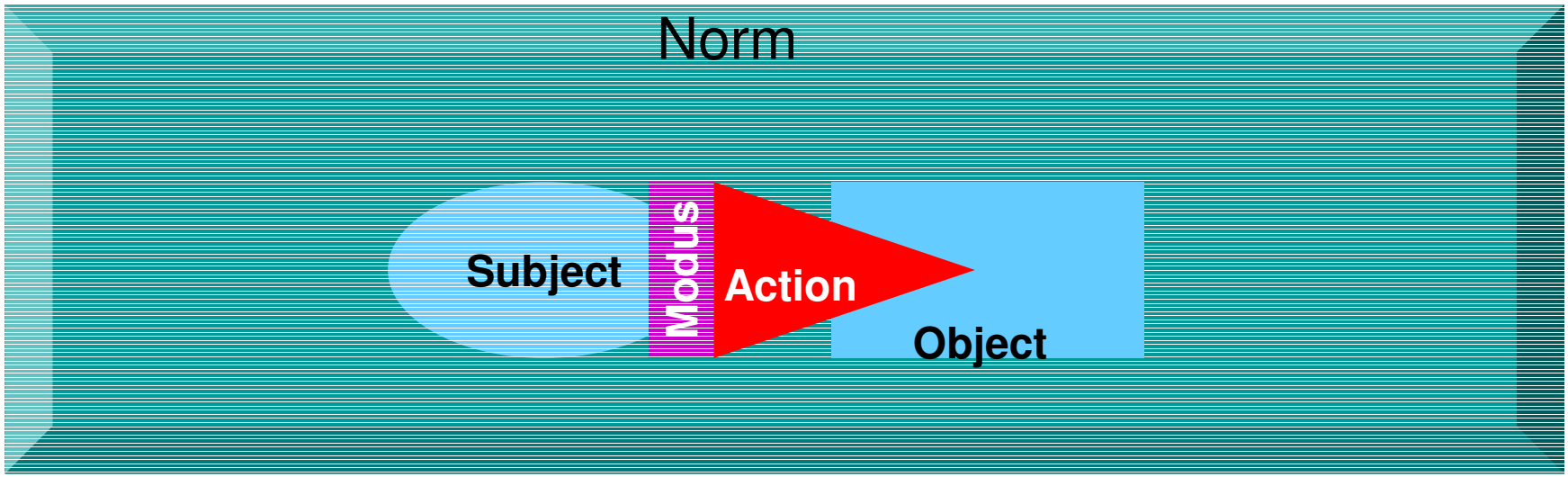

Example 1: “Open the door”

(1) Condition: empty
(2.1) Subject: implicit
(2.2) Action: “open”
(2.3) Modus: implicit in the verb “open”
(2.4) Object: “the door”
(3) Telos: empty

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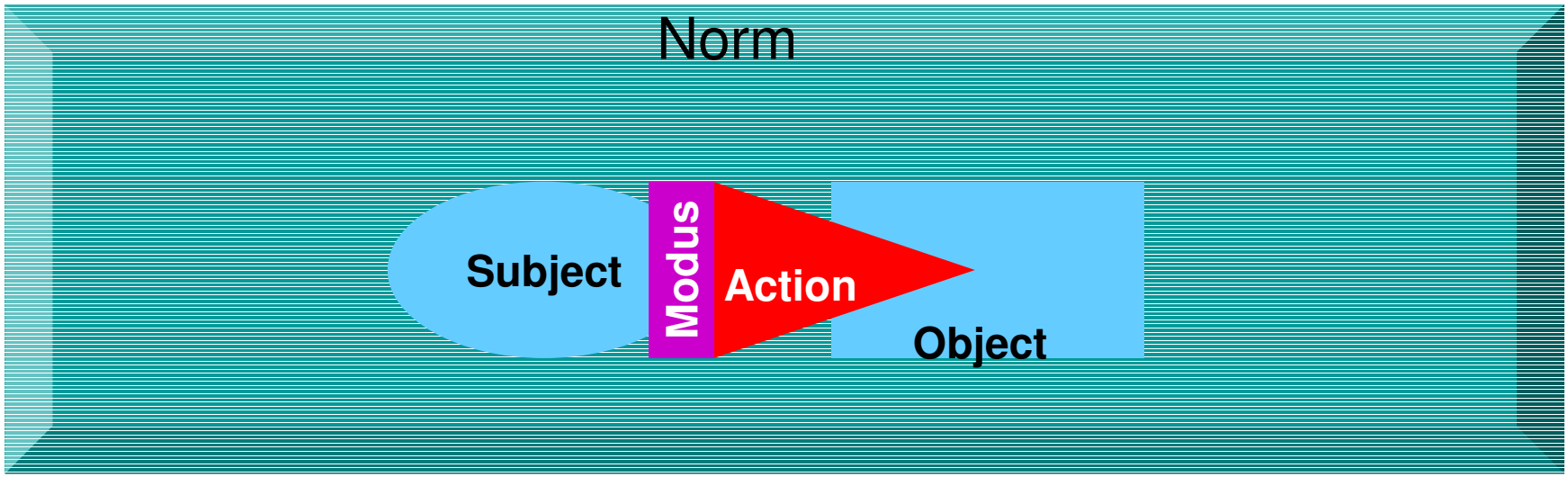

Example 2: “You must open the door”

(1) Condition: empty

(2.1) Subject: “you”

(2.2) Action: “open”

(2.3) **Modus: “must”**

(2.4) Object: “the door”

(3) Telos: empty

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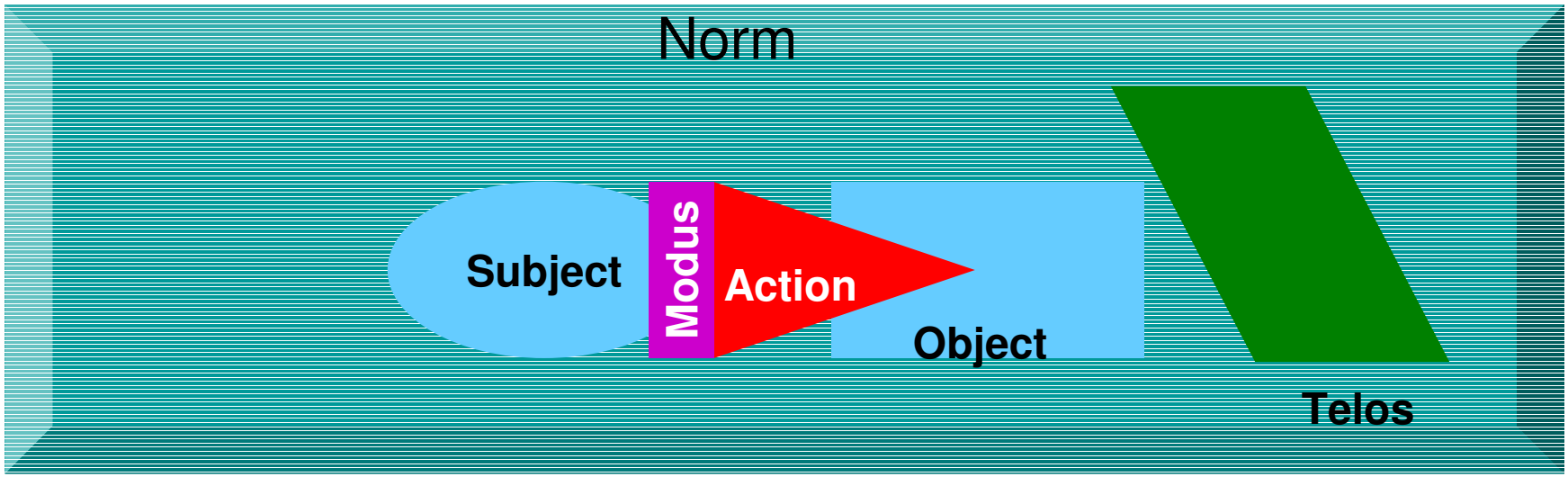

Example 3: “You must open the door for fresh air”

(1) Condition: empty

(2.1) Subject: “you”

(2.2) Action: “open”

(2.3) Normative modus of the action: “must”

(2.4) Object the action: “the door”

(3) **Telos: “for fresh air”**

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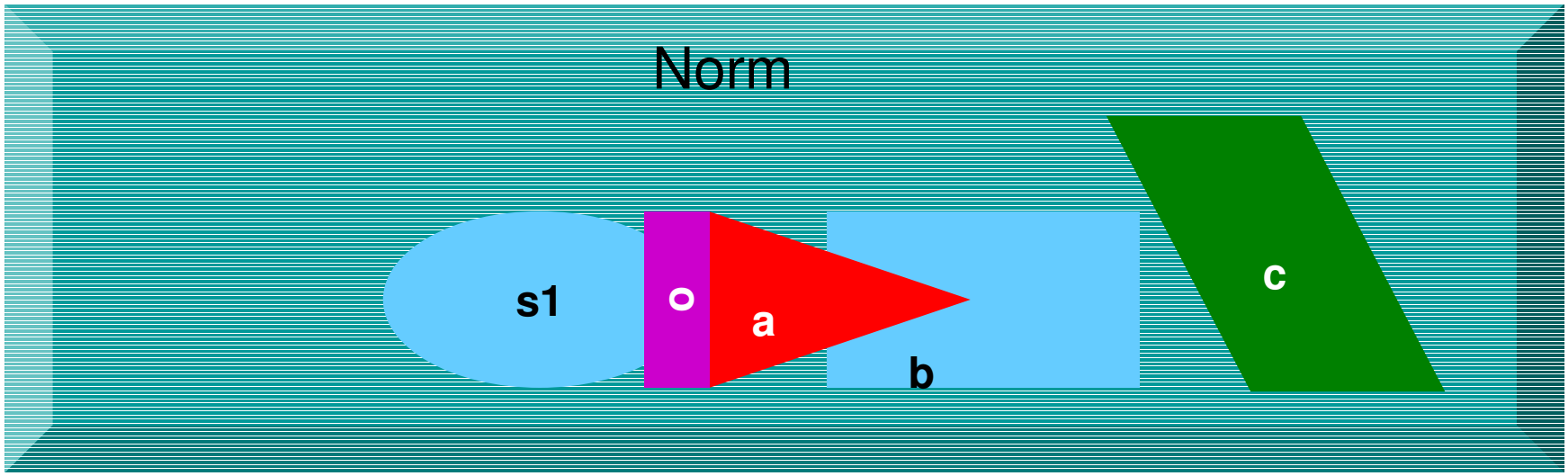

Example 4: "Subject 1 must open the door for fresh air"

Formal notation (in the form of relation):

disposition ***te***→ telos

Notation within the elements of a norm:

$$o_{s1}(a \rightarrow b)\ \mathbf{te} \rightarrow \mathbf{c}$$

Notation in algorithmical language:

norm(condition=empty,
disposition(subject=s1, action=a, modus=o, object=b),
telos=c)

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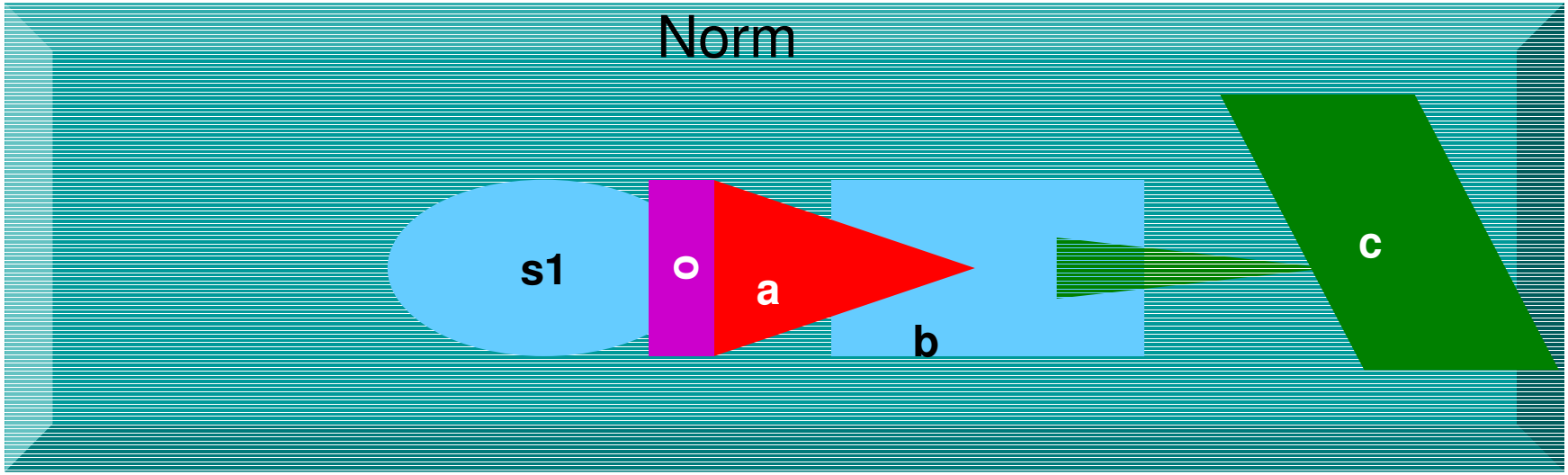

Example 4: “Subject 1 must open the door for fresh air”

Visualization:

The teleological relation is depicted by a sharp green transparent triangle.

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External and internal teleology of the norm

- **External teleology**

$$norm(A) \ te\rightarrow \ G$$

E.g. *A = open_door* and *G = fresh_air*

A = close_door and *G = security*

- **Internal teleology**

$$norm(A \ te\rightarrow \ G)$$

E.g. “Open the door for fresh air”

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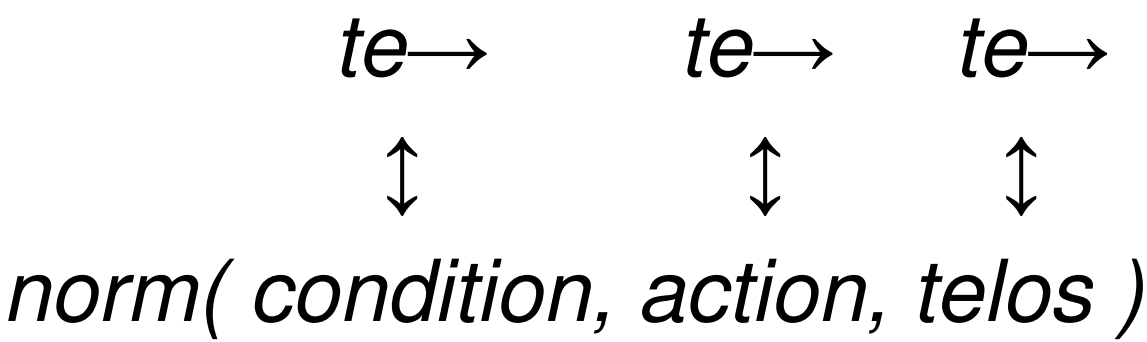
Variations of teleology within the content of a norm



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Symbolisation and formalisation

- **Symbolisation** is more or less domain notation like *te→.*
- **Formalisation** is a correct logical notation.
- The relation between them:

norm(A te→ G) does not necessarily imply *N te→ G*

- In other words:

$$norm(A\ te\rightarrow G) \neq N\ te\rightarrow G$$

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5.
Explicit teleological Statements within and outside the Law

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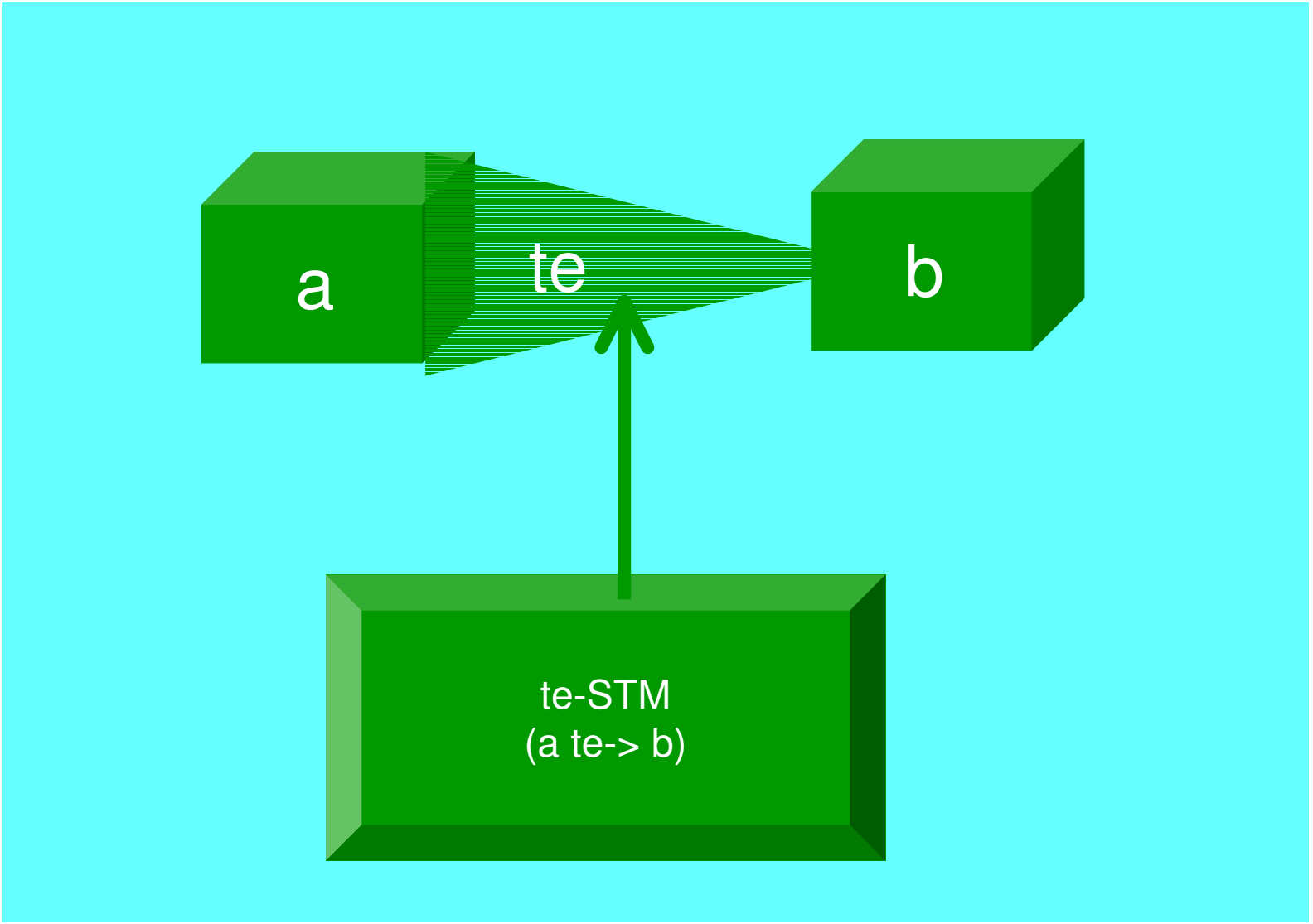
Teleological Structure within the Law



preamble of a regulation

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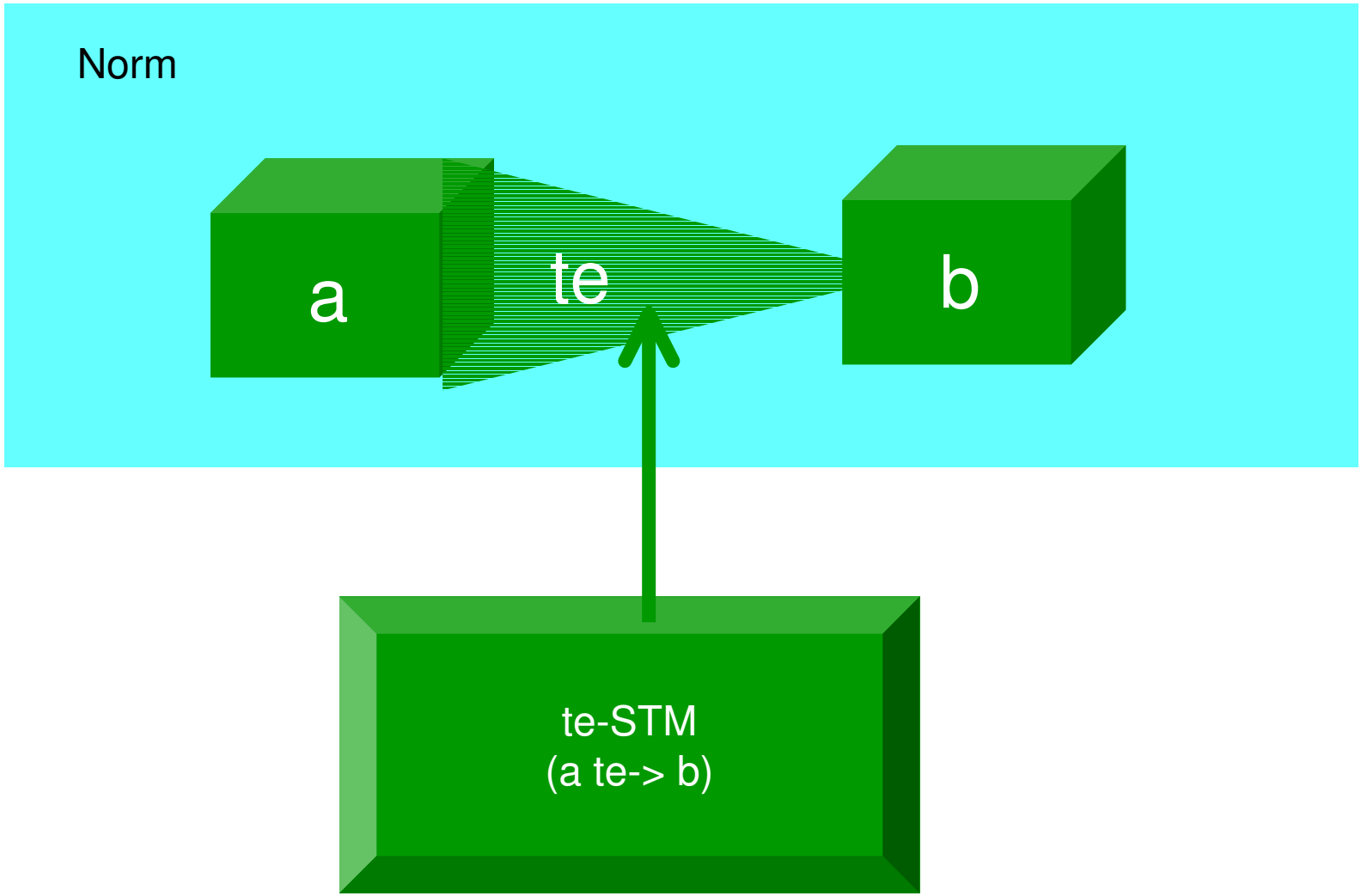
Teleological Structure concerning the Norm



parliamentarian materials

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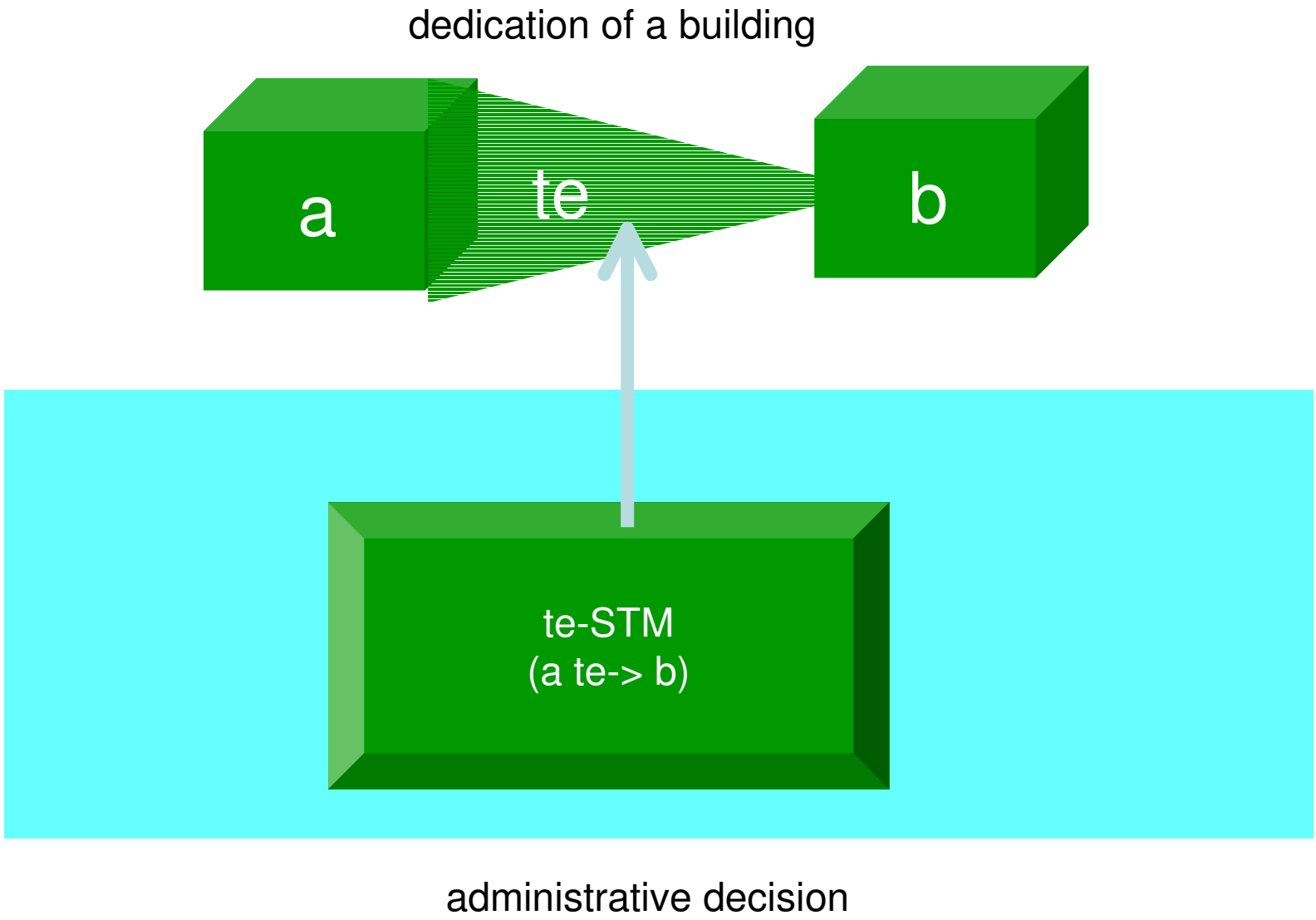
Normative Teleological Statement



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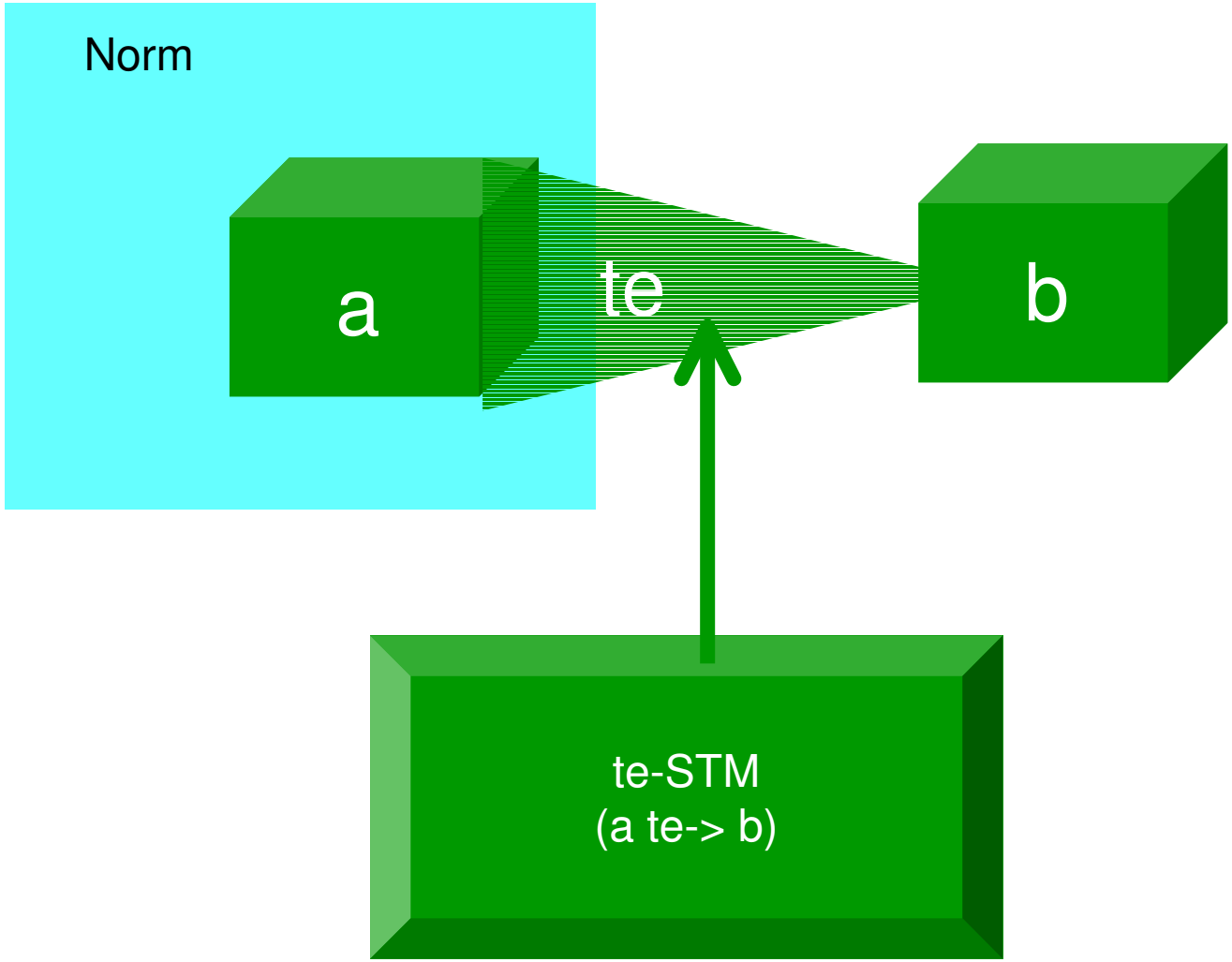
Teleological Statement, Norm as Tool



juridical commentaries upon an article of a law

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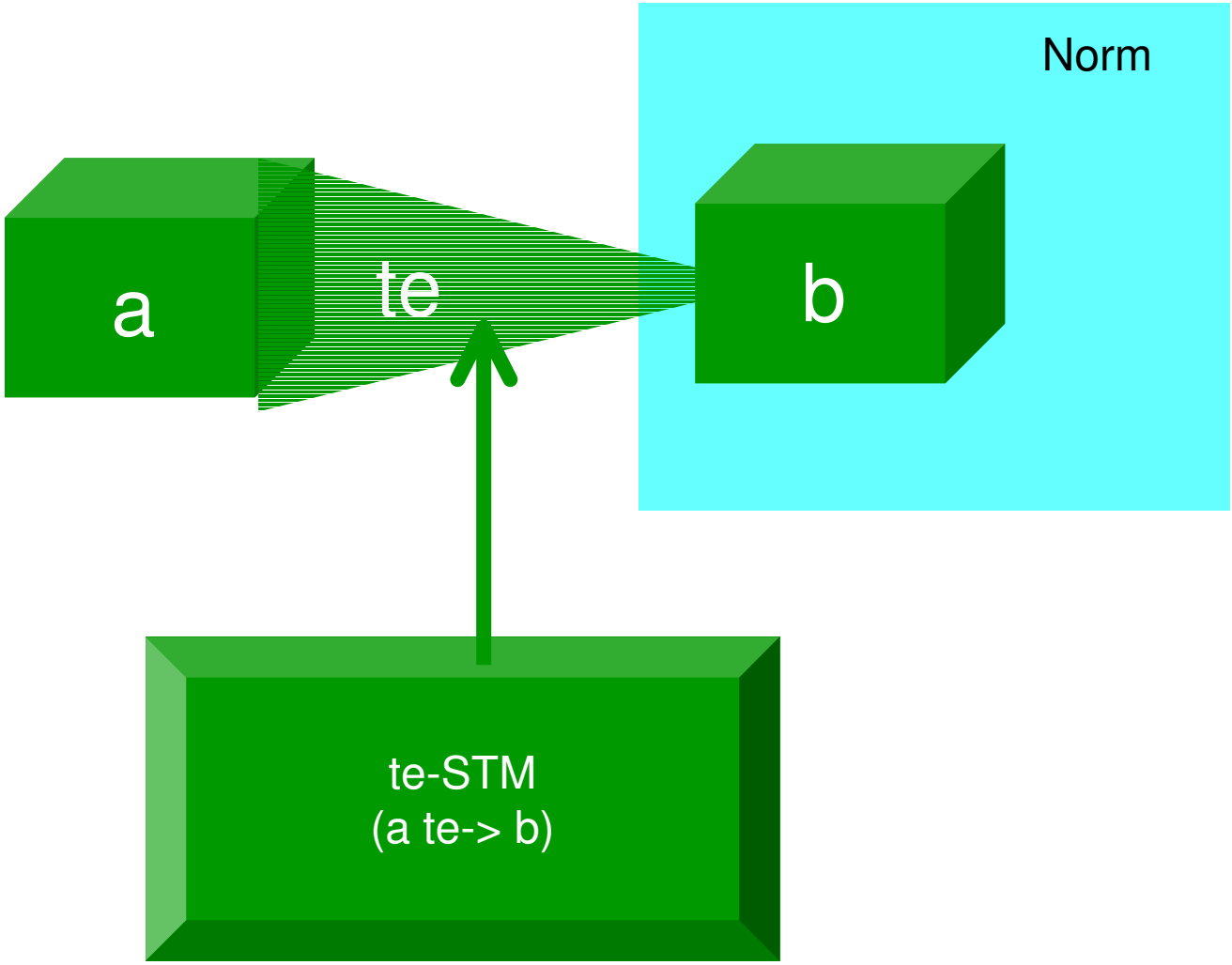
Teleological Statement, Norm as Goal



political commentaries upon a legislative initiative

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6.
Teleological Networks and Legal Knowledge Representation

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Norms

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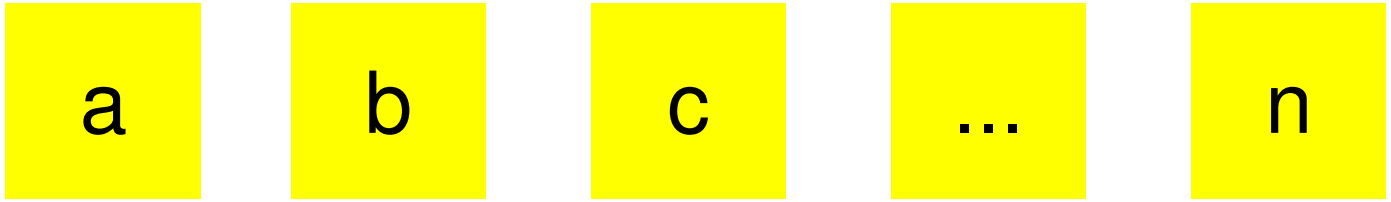
MIS Modal Indifferent Substratum



Norms

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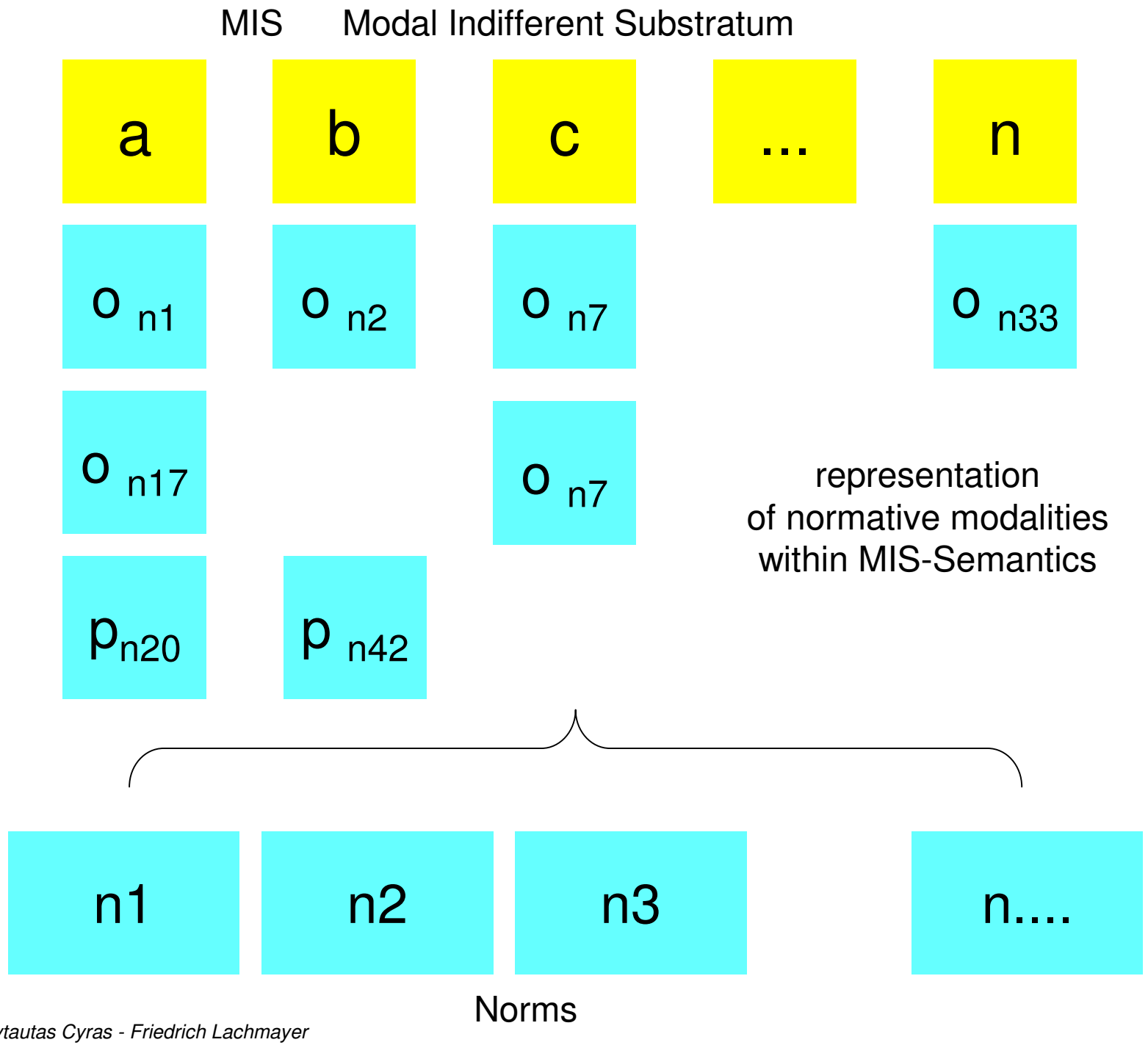

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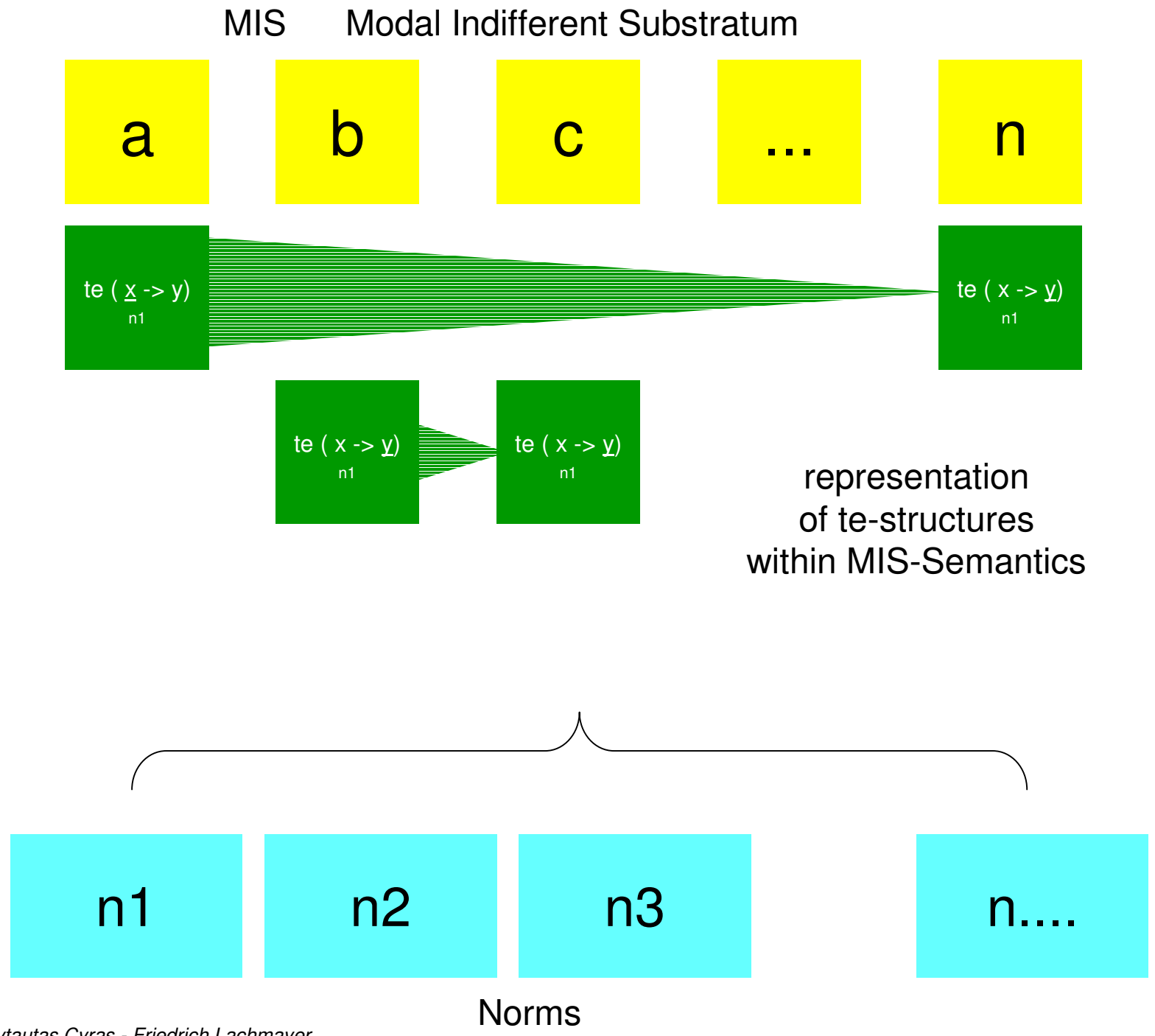

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7.
Summary

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(1) Formal analysis of goals is utilized in systems engineering. We aim to apply goals (teleology) in legal knowledge representation.

(2) Teleology can be associated with different elements of a norm.

(3) Textual statements concerning legal goals are mostly rational. Therefore explicit instruments (like formalisation and symbolisation) are adequate.

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(4) From the viewpoint of legal knowledge representation the normative layer of a legal system can be supplemented with a teleological layer.

(5) Teleology appears both inside and outside of a legal system.

Thank you for your attention

Vytautas.Cyras@mif.vu.lt Friedrich.Lachmayer@uibk.ac.at