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A Polysyntactic View on the Encoding of Semantics in Legal Visualizations

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Agenda

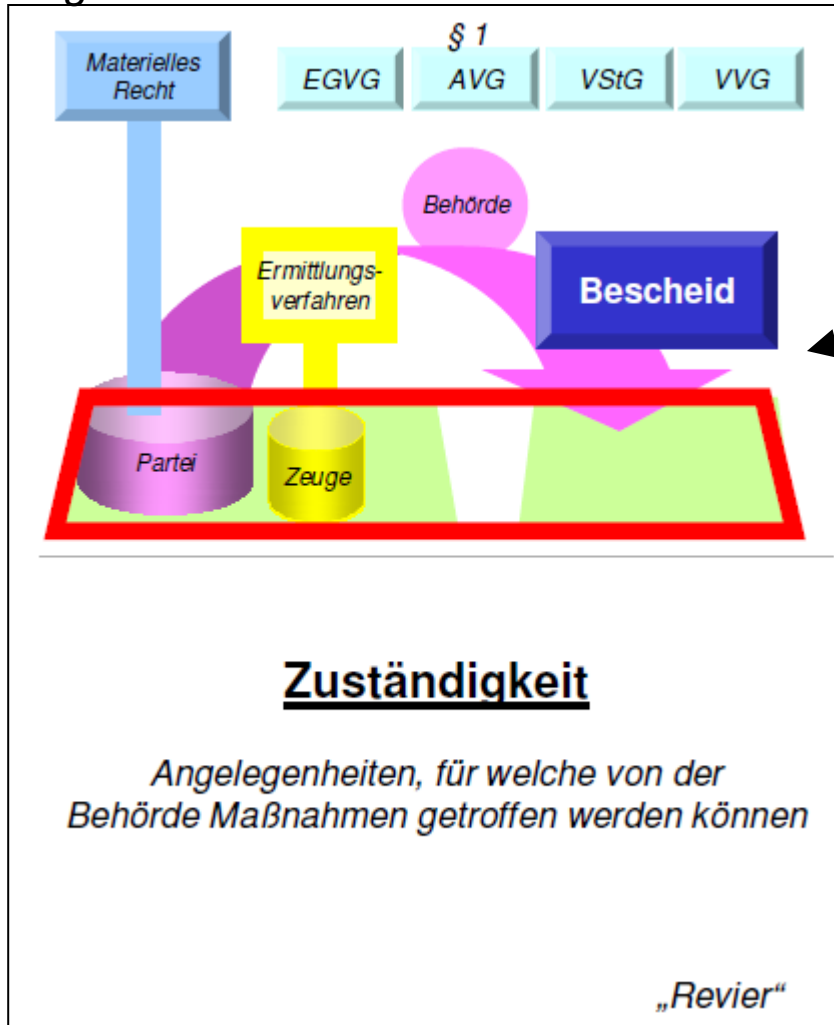
- Motivation
- View on Syntax – Semantics
- A Polysyntactic View on Legal Visualizations
- Conclusion and Outlook

Motivation

- Encoding of semantics in legal visualizations as a central task
- Goal: Support (semi-) automatic processing of semantics
- Two directions for encoding:
 - Direct Encoding
 - Legal facts and relationships are main focus
 - Direct correspondence between legal statements and visual representation
 - Indirect Encoding
 - Main focus on domains outside of law
 - Influence of legal facts and relationships on the visual representation

Example for a Direct Encoding

Legal Visualization



Domain of Law (e.g. AVG
Allgemeines Verwaltungsverfahrensgesetz)

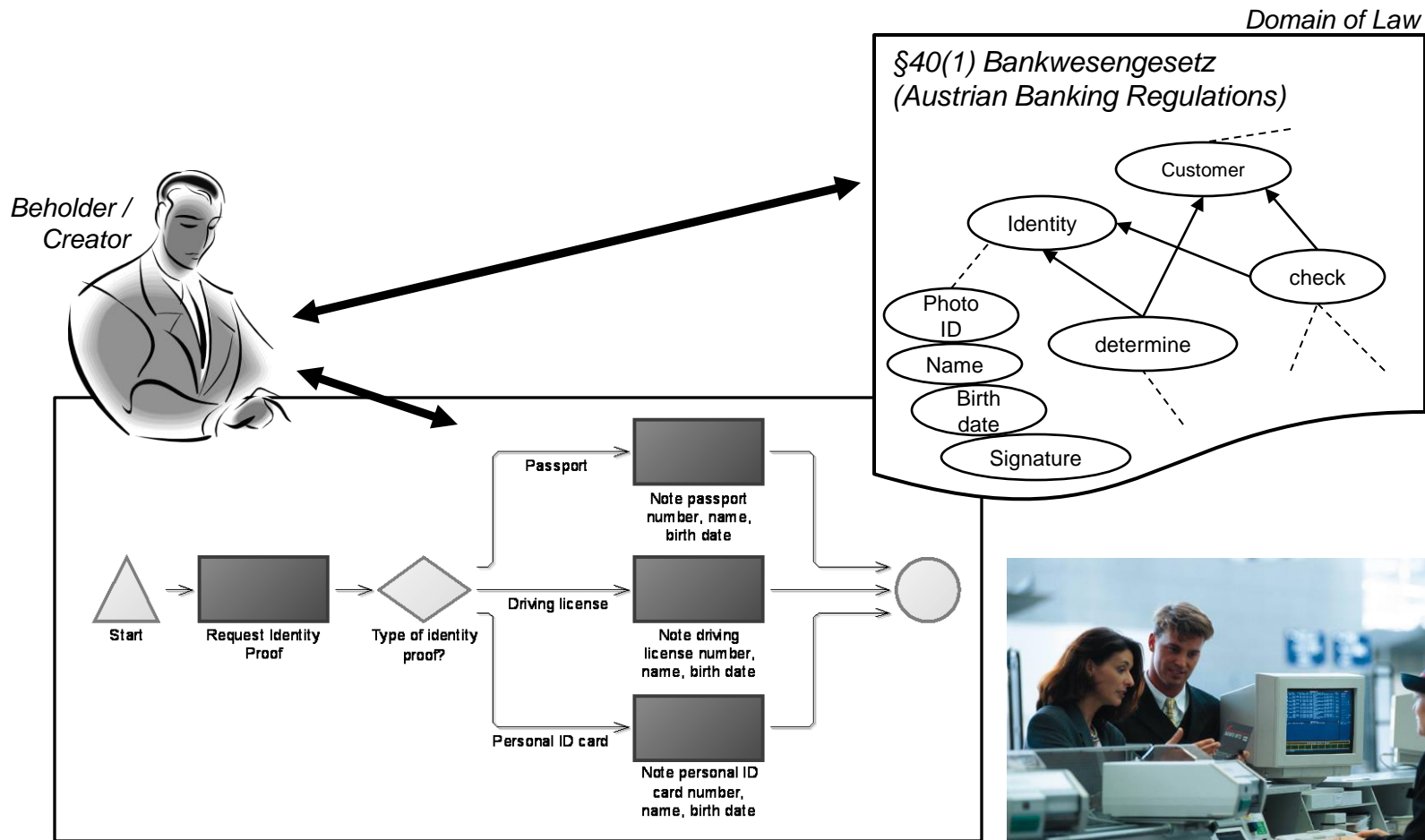
I. Teil: Allgemeine Bestimmungen
I. Abschnitt: Behörden
Zuständigkeit

§ 1. Die sachliche und örtliche Zuständigkeit der Behörden richtet sich nach den Vorschriften über ihren Wirkungsbereich und nach den Verwaltungsvorschriften.

Source: RIS

Source: (Lachmayer/Pabst, 2008),
www.legalvisualization.com

Example for an Indirect Encoding



(Legal) Visualization of Business Process Model

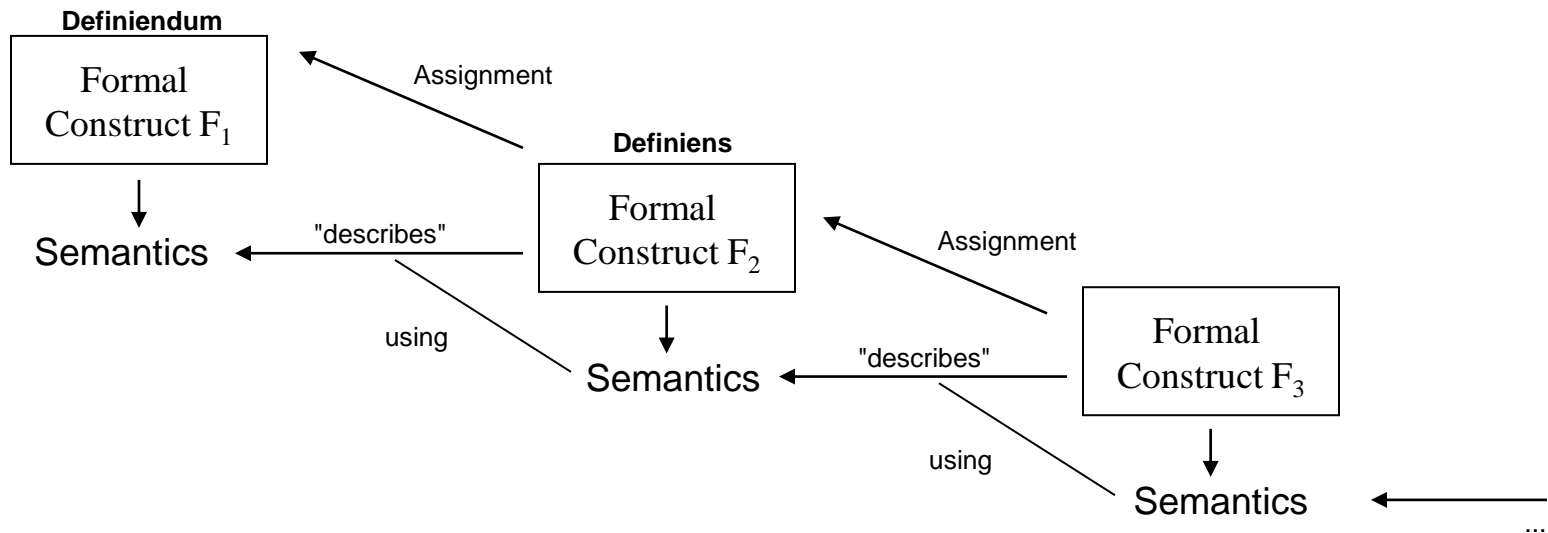


Account Opening at a bank

View on Syntax - Semantics

We take the following view:

- Syntax as a formal construct
 - = Elements
 - + Rules how to assemble these elements
- Semantics
 - = Mappings between different syntaxes/formal constructs

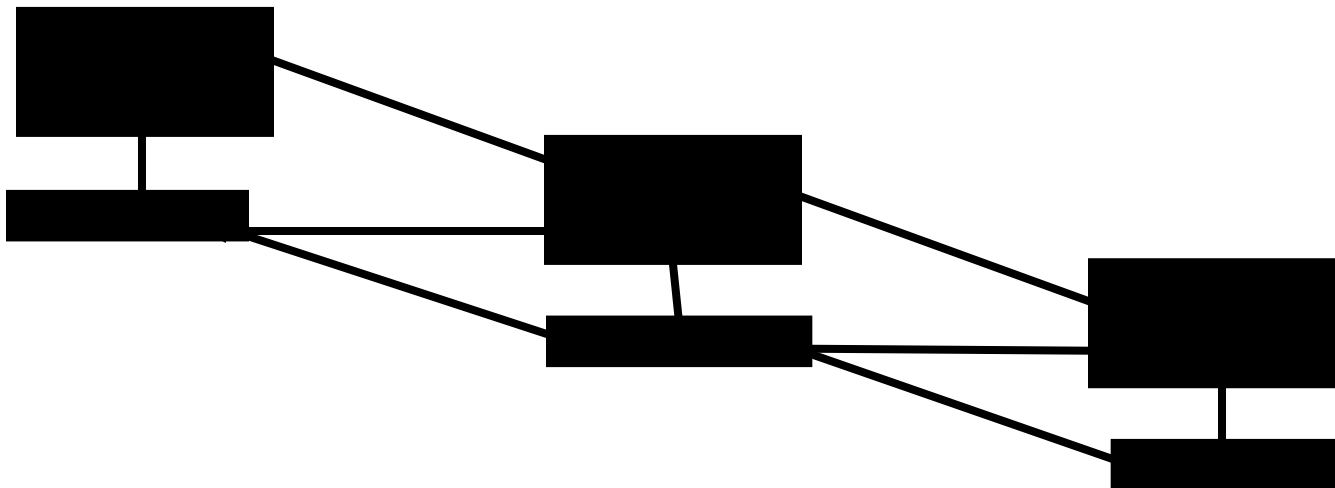


Source: after Messer (1999)

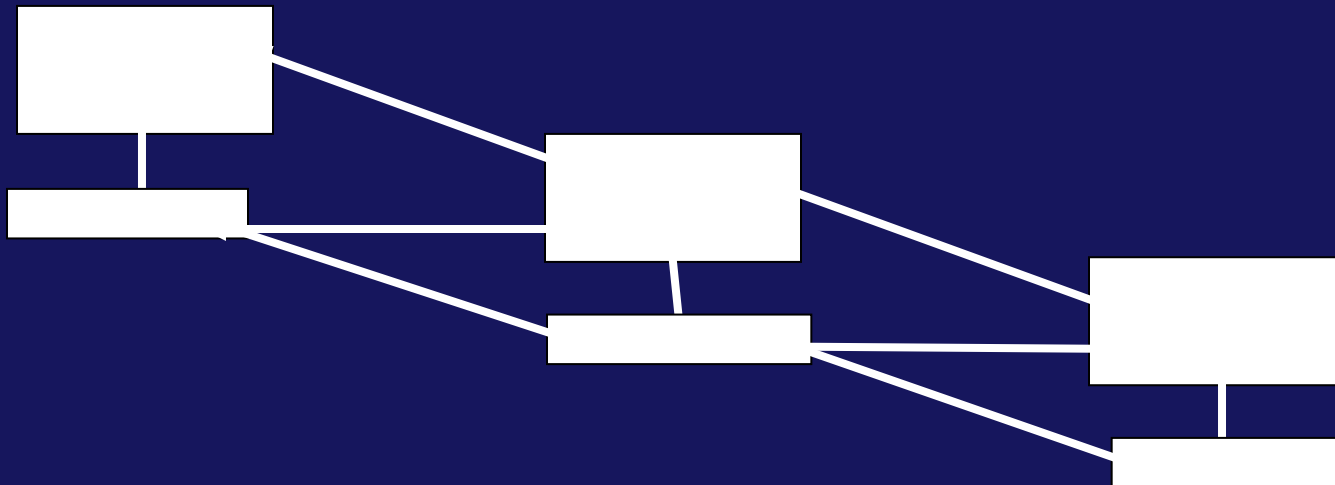
View on Syntax - Semantics

In the following we take the following view:

- Syntax as a formal construct
 - = Elements
 - + Rules how to assemble these elements
- Semantics
 - = Mappings between different syntaxes/formal constructs



Semantics as Mapping



Example for Syntax/Semantics

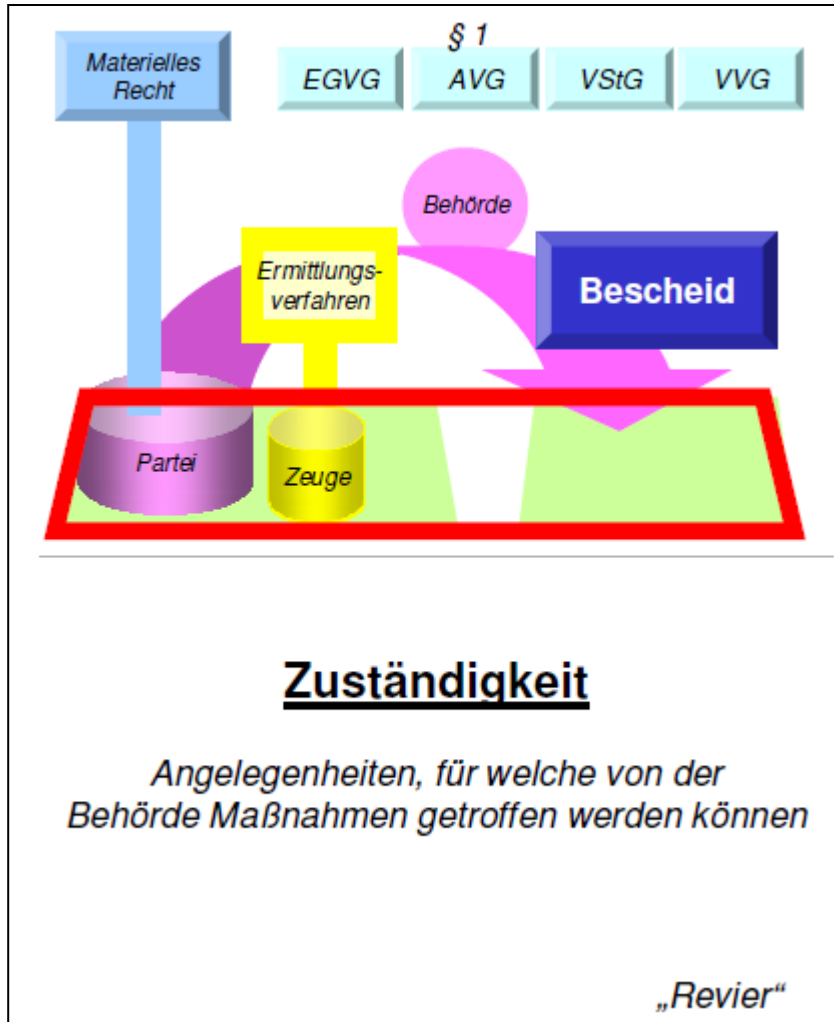
- Syntax:
 - Alphabet + Grammar
 - E.g. the elements A-Z; a-z; 0-9
 - Grammar (Rule) based on Dictionary:
vi·su·al·ize
- Semantics:
 - Mapping to Dictionary:
 1. *To form a mental image of; envisage: tried to visualize the scene as it was described.*
 2. *To make visible.*
 - Mapping to pronunciation language:
(vīzh'oo-ə-līz')

Source: <http://www.thefreedictionary.com>

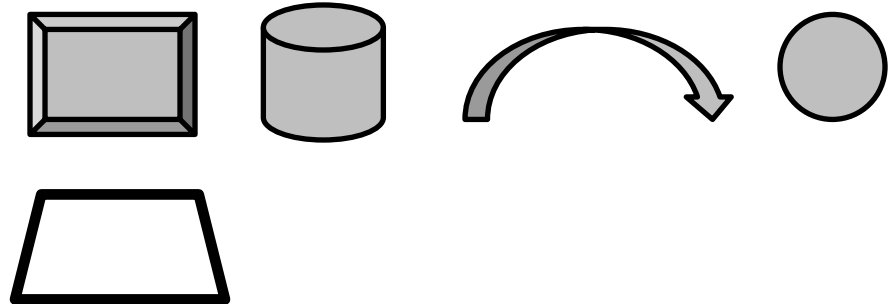
A Polysyntactic View

- We assume that the semantics in legal visualizations is encoded using multiple syntaxes.
- *E.g. (MacEachren, 2004) lists twelve syntax dimensions for visualizations in geo-visualization:*
location, size, crispness, resolution, transparency, color value, color saturation, color hue, texture, orientation, arrangement, and shape
- Influence on:
 - a. Creation of visualizations
 - b. Understanding of visualizations
- Consequences:
 - Supporting IT functionalities need to take this into account:
E.g. for the (Semi-) automatic processing of semantics in legal visualizations

Polysyntactic View: Example for Direct Encoding



Syntax of Shapes:



Syntax of Colors:

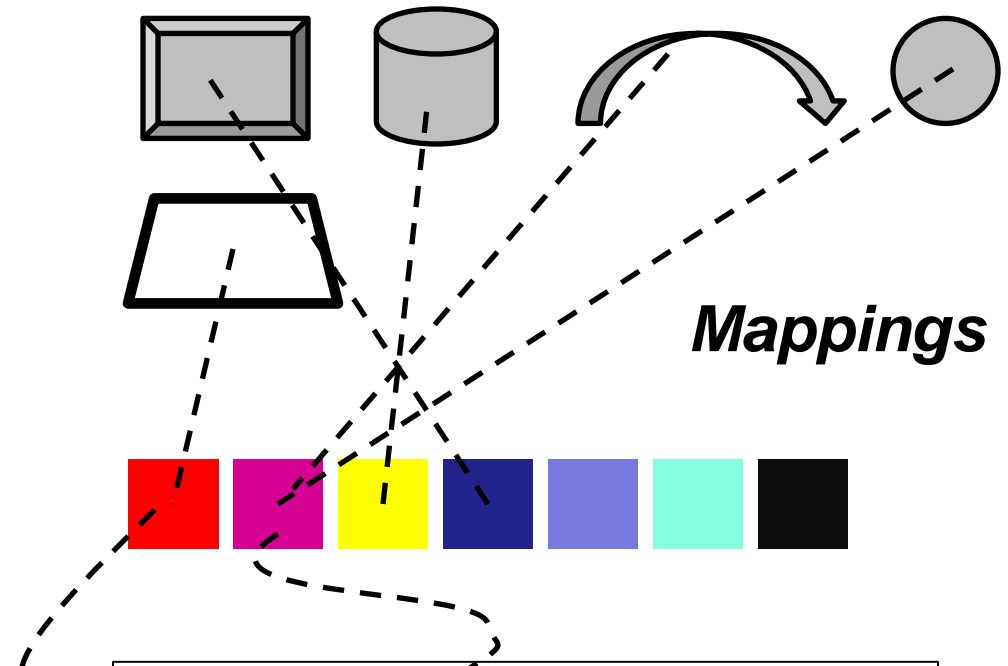
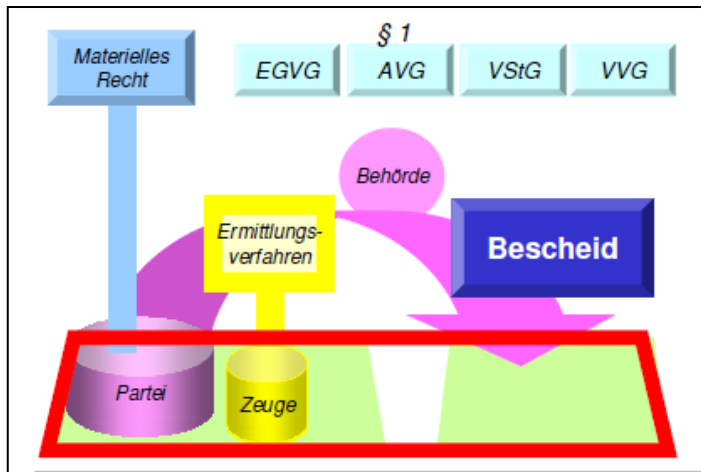


Syntax of Law (AVG):

§ 1. Die sachliche und örtliche Zuständigkeit der Behörden richtet sich nach den Vorschriften über ihren Wirkungsbereich und nach den Verwaltungsvorschriften.
 § 2. Enthalten die in § 1 erwähnten Vorschriften über die sachliche Zuständigkeit keine Bestimmungen

Source: (Lachmayer/Pabst, 2008),
www.legalvisualization.com

Polysyntactic View: Example for Direct Encoding

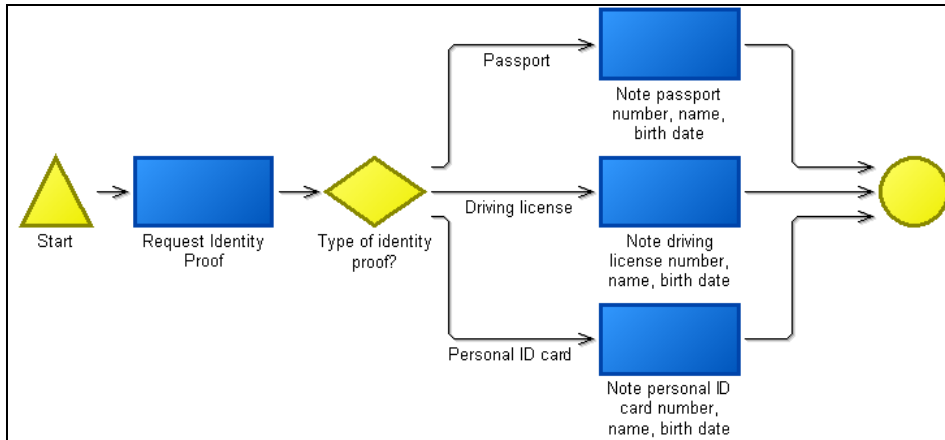


Mappings

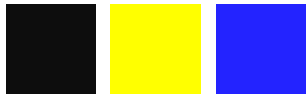
§ 1. Die sachliche und örtliche Zuständigkeit der Behörden richtet sich nach den Vorschriften über ihren Wirkungsbereich und nach den Verwaltungsvorschriften.
 § 2. Enthalten die in § 1 erwähnten Vorschriften über die sachliche Zuständigkeit keine Bestimmungen

Polysyntactic View: Example for Indirect Encoding

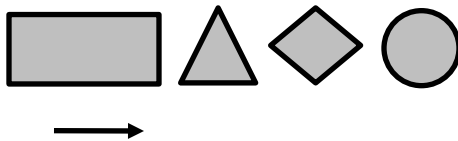
Visualization:



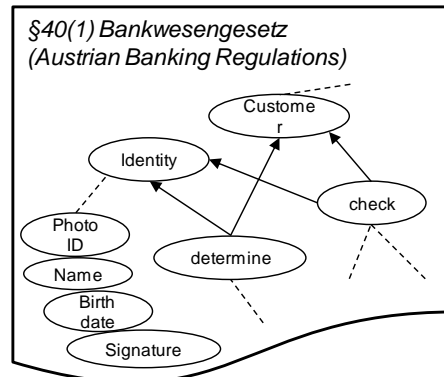
Syntax of Colors:



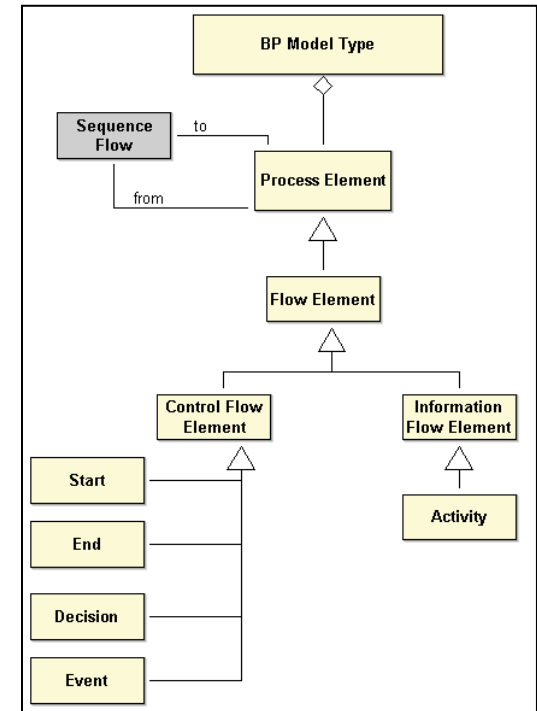
Syntax of Shapes:



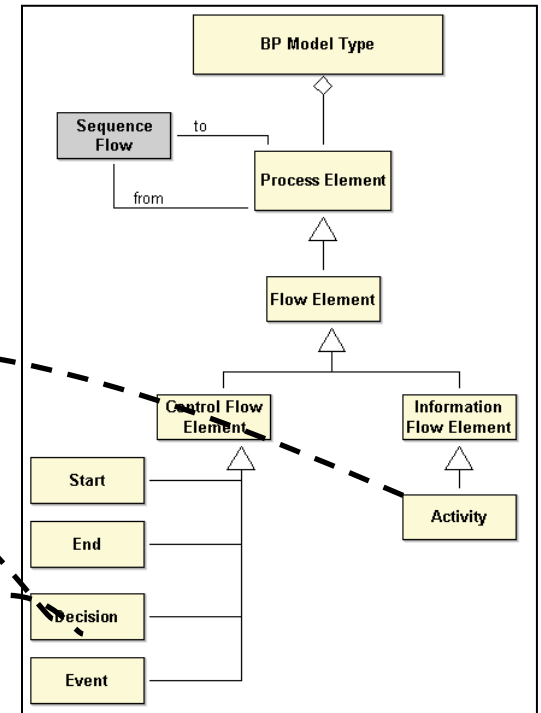
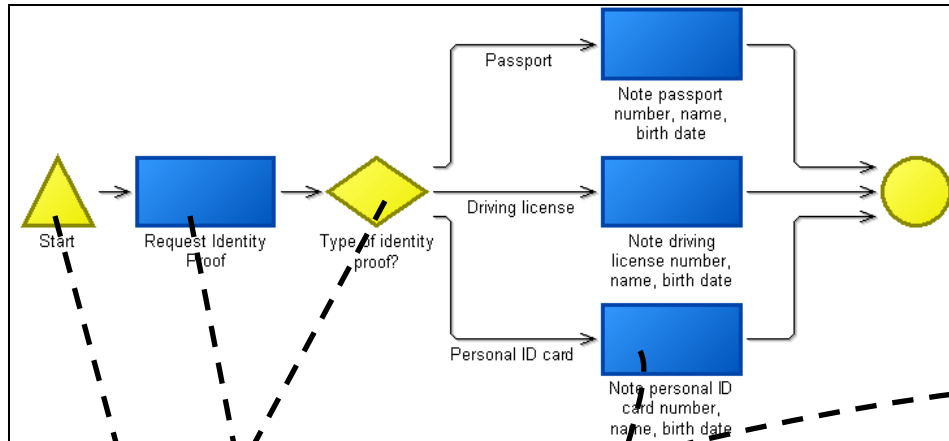
Syntax of Law, e.g. in Ontology Language



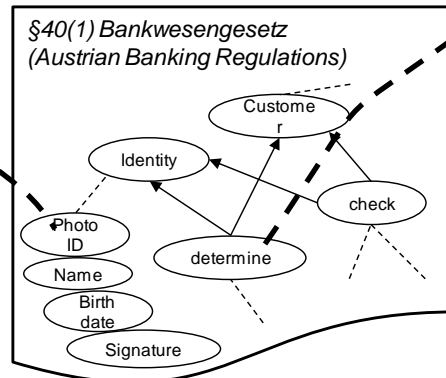
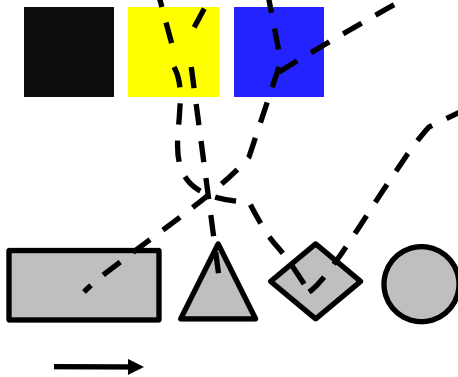
Syntax of Modelling Language (Meta Model):

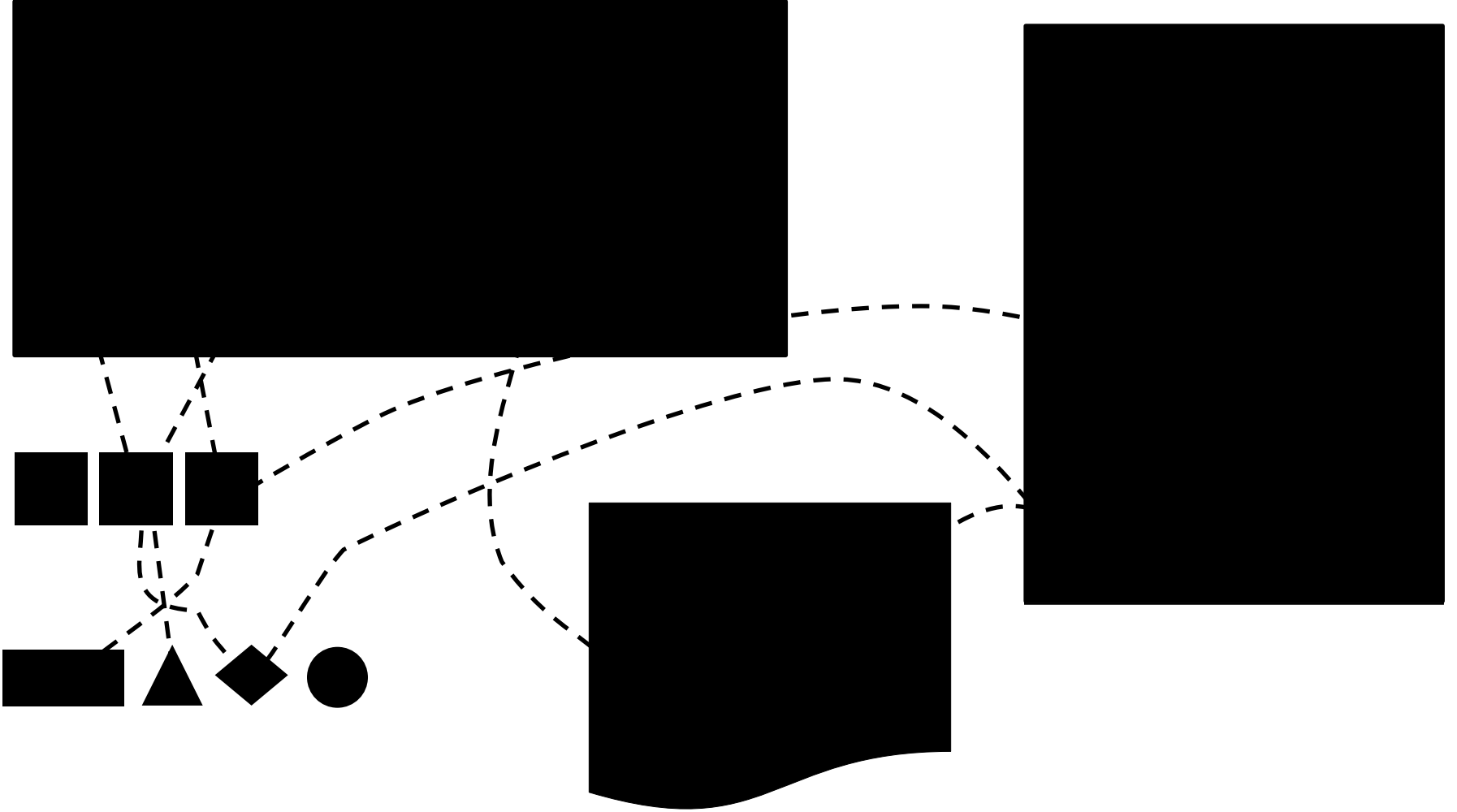


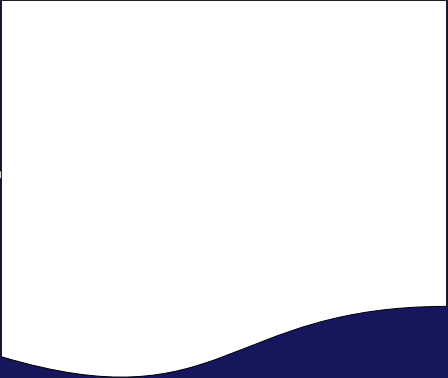
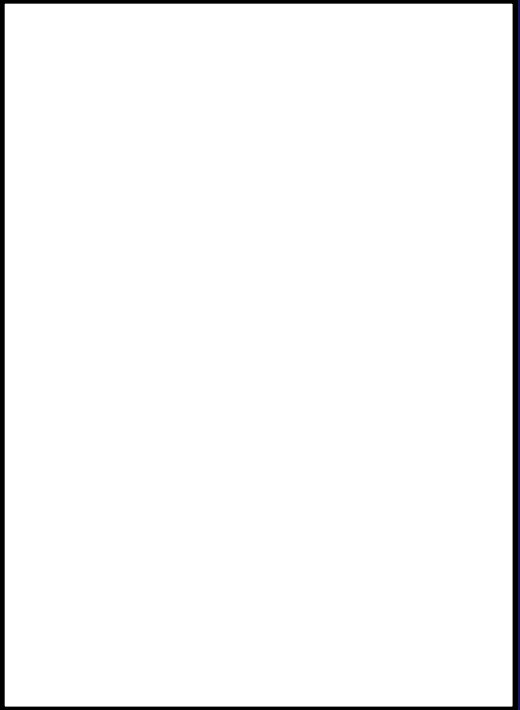
Polysyntactic View: Example for Indirect Encoding

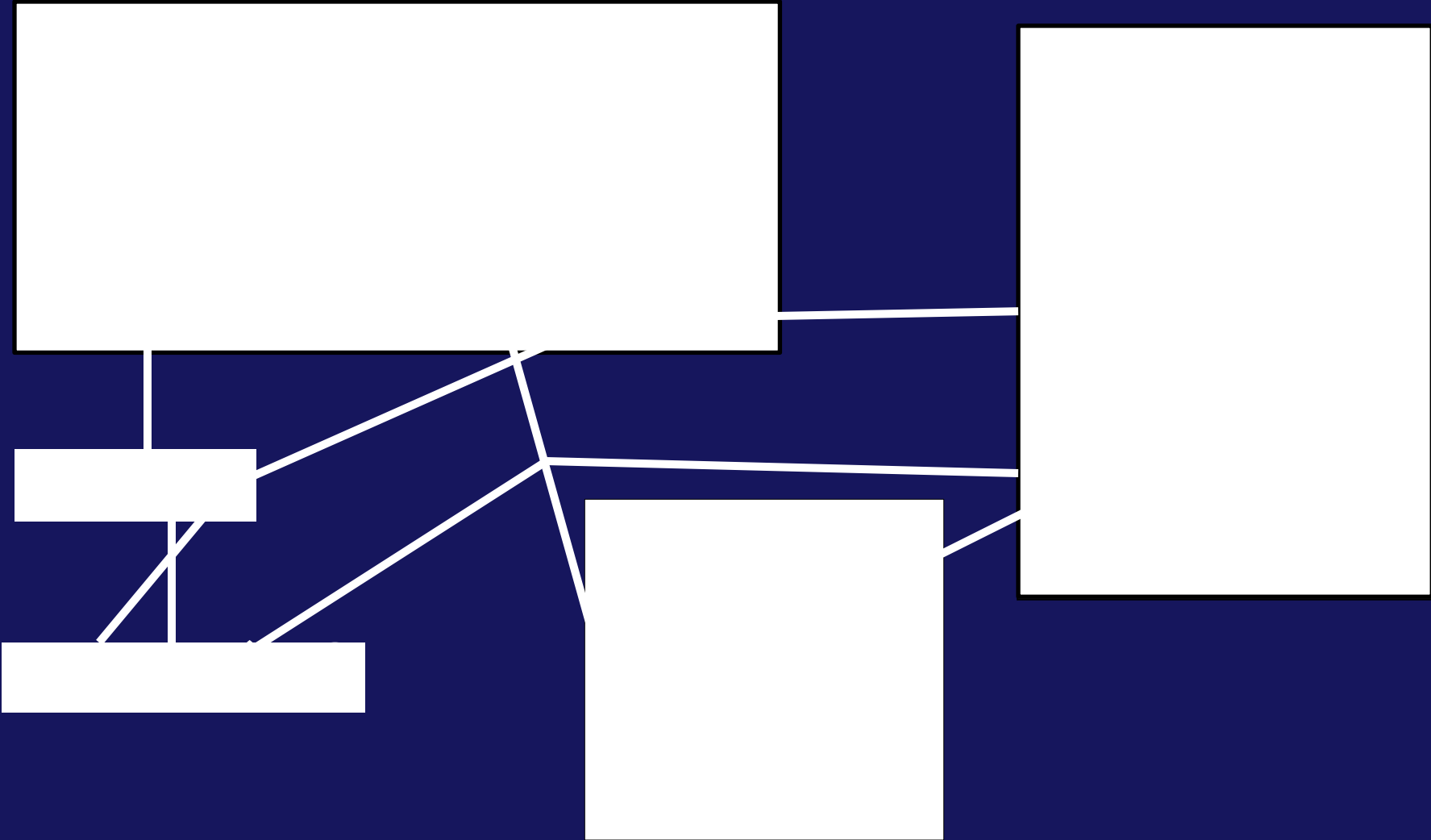


Mappings

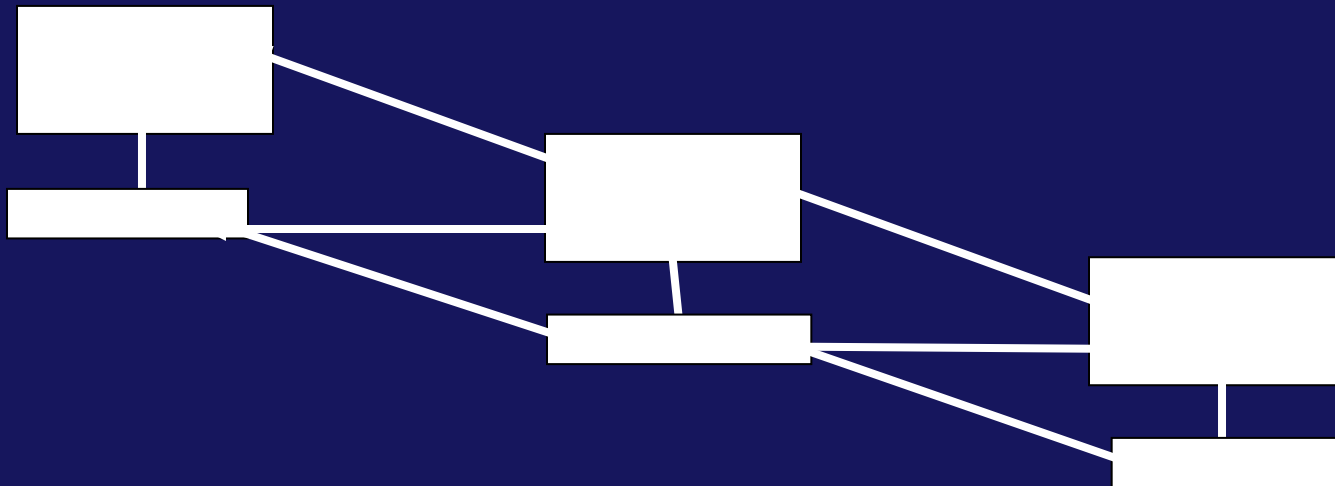




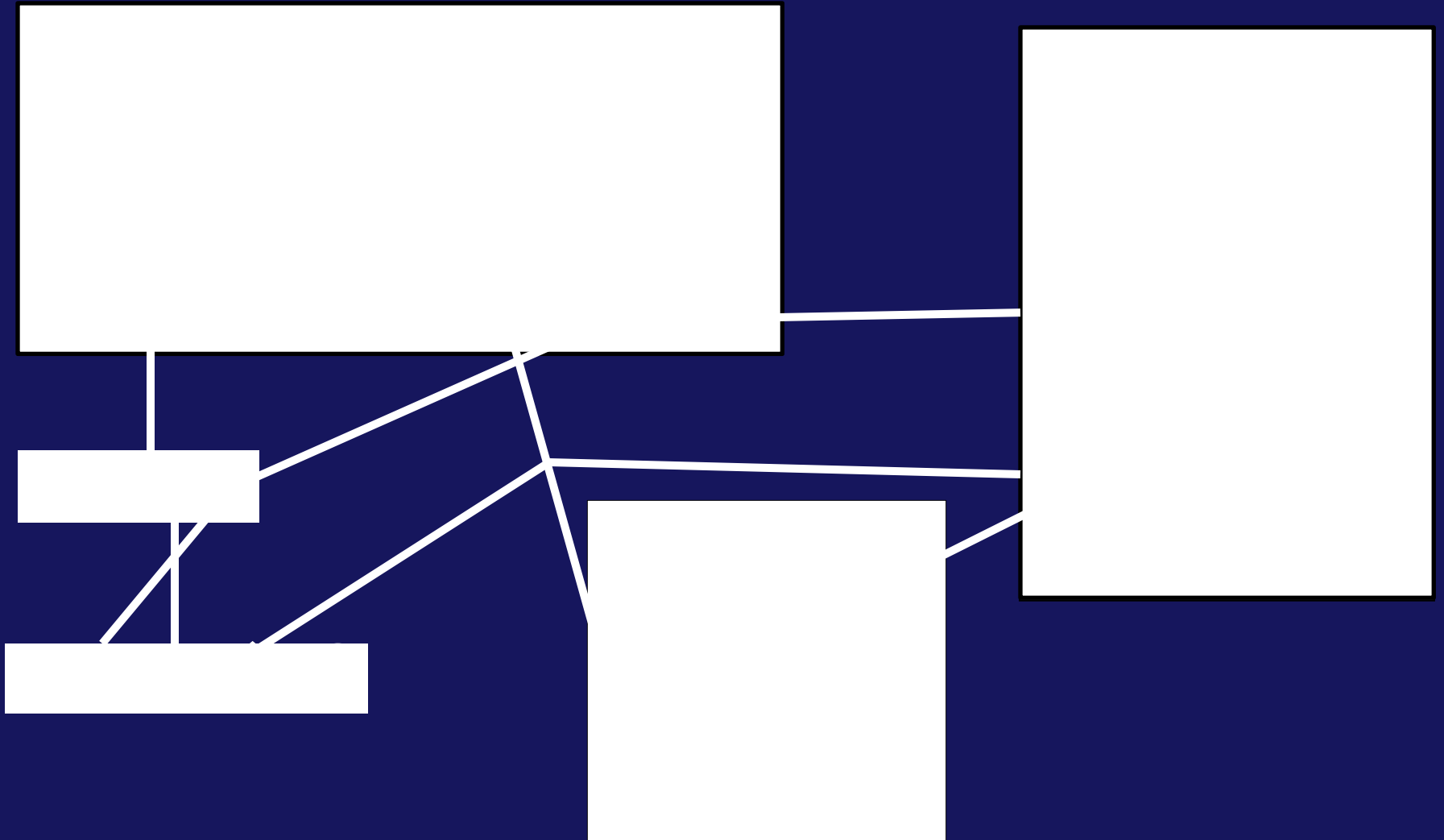




Semantics as Mapping



Actual Semantic Mapping



Conclusion

- Polysyntactic view can be well applied to legal visualizations
- Multiple dependencies between involved syntaxes
- Machine processing requires formalization of the:
 - Visualization syntax, cf. (Fill, 2009)
 - Legal syntax, e.g. using ontologies cf. (Schweighofer et al., 2002)
 - In case of indirect encoding:
 - Domain syntax, e.g. the meta model cf. (Karagiannis et al., 2002)
 - Mappings between syntaxes
- Possible future applications:
 - Support of semantic search for legal visualizations
 - Automatic analyses of legal visualizations

References

- *Fill, H.-G. (2009): Visualisation for Semantic Information Systems, Gabler.*
- *Karagiannis, D. and Kühn, H. (2002): Metamodelling Platforms, in K. Bauknecht, A. Min Tjoa & G. Quirchmayer (Eds.), Third International Conference EC-Web 2002 – Dexa 2002 (pp. 182). Aix-en-Provence, France: Springer.*
- *Lachmayer, F. and Pabst, R. (2008): Einführung in das Verwaltungsverfahren, www.legalvisualization.com*
- *Schweighofer, E. , Haneder, G., Rauber, A., Dittenbach, M. (2002): Improvement of Vector Representations of Legal Documents with Legal Ontologies, 5th International Conference on Business Information Systems, Poznań, Poland.*

Thank you for your attention!

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