Technical Aspects of Sustainability

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Michael Kohlhase, International University Bremen; et al.

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The Workshop

Technical Aspects of Sustainability

- Reusability
  - structuring in-the-large, "packages"
  - structuring in-the-small, views, variants
- Compatibility
  - standardized exchange formats + meta-data, tool integration
- Extensibility
  - of exchange formats, of tools, of the system, ...

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- Extensibility
  - of exchange formats, of tools, of the system, ...
- Changeability
  - versions, configurations, semantic interrelation, change management

Programme

- Thursday
  - Structuring Documents
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  - Metadata and Didactic Aspects
  - Evening Session: Standardization?
- Friday
  - Reuse, Semantic Interrelation
  - Reuse, Semantic Interrelation
  - Tools, Demonstrations

MMiSS
Multi-Media Instruction in Safe and Secure Systems

- Universität Bremen
  - B. Krieg-Brückner, A. Lindow, C. Lüth, A. Mahnke, G. Russell, et al.
- FernUniversität Hagen, Universität Kaiserslautern
  - B. Kraemer, M. Jelito, A. Poetzsch-Heffter, A. Bealu, et al.
- Universität Freiburg
  - D. Basin, J.-G. Smaus, et al.
- Universität des Saarlandes
  - D. Hutter, S. Autexier, C. Ullrich, E. Melis, et al.
- Ludwig-Maximilians-Universität München
  - M. Wirsing, R. Hennicker, P. Meier, et al.
- + U. Dresden, HU. Berlin, U. Darmstadt, U. Swansea, U. Ngaoundéré

Goals: Sustainable Development

- develop slides, lecture notes, courses
  - Detail selection

Goals: Sustainable Development

- develop slides, lecture notes, courses
- work on the board, with slides, interactively with tools
  - LayoutAttribute, AnimationAttribute

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- develop slides, lecture notes, courses
- work on the board, with slides, interactively with tools
- manage English and German documents in parallel
  - variants, Language, Formalism

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- work on the board, with slides, interactively with tools
- manage English and German documents in parallel
- embed mathematical formulae, programs, etc.
  - LaTeX, Literate Programming

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- embed mathematical formulae, programs, etc.
- (partially) re-use the slides of a colleague
  - re-use by structural sharing, views

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- develop slides, lecture notes, courses
- work on the board, with slides, interactively with tools
- manage English and German documents in parallel
- embed mathematical formulae, programs, etc.
- (partially) re-use the slides of a colleague
- agree with your colleague on a uniform terminology
  - semantic interrelation via an ontology

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- develop slides, lecture notes, courses
- work on the board, with slides, interactively with tools
- manage English and German documents in parallel
- embed mathematical formulae, programs, etc.
- (partially) re-use the slides of a colleague
- agree with your colleague on a uniform terminology
- be made aware of changes; completeness and consistency
  - versions, configuration management, change management

Structuring

Structuring in-the-Large and in-the-Small

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  - imports — folder hierarchy

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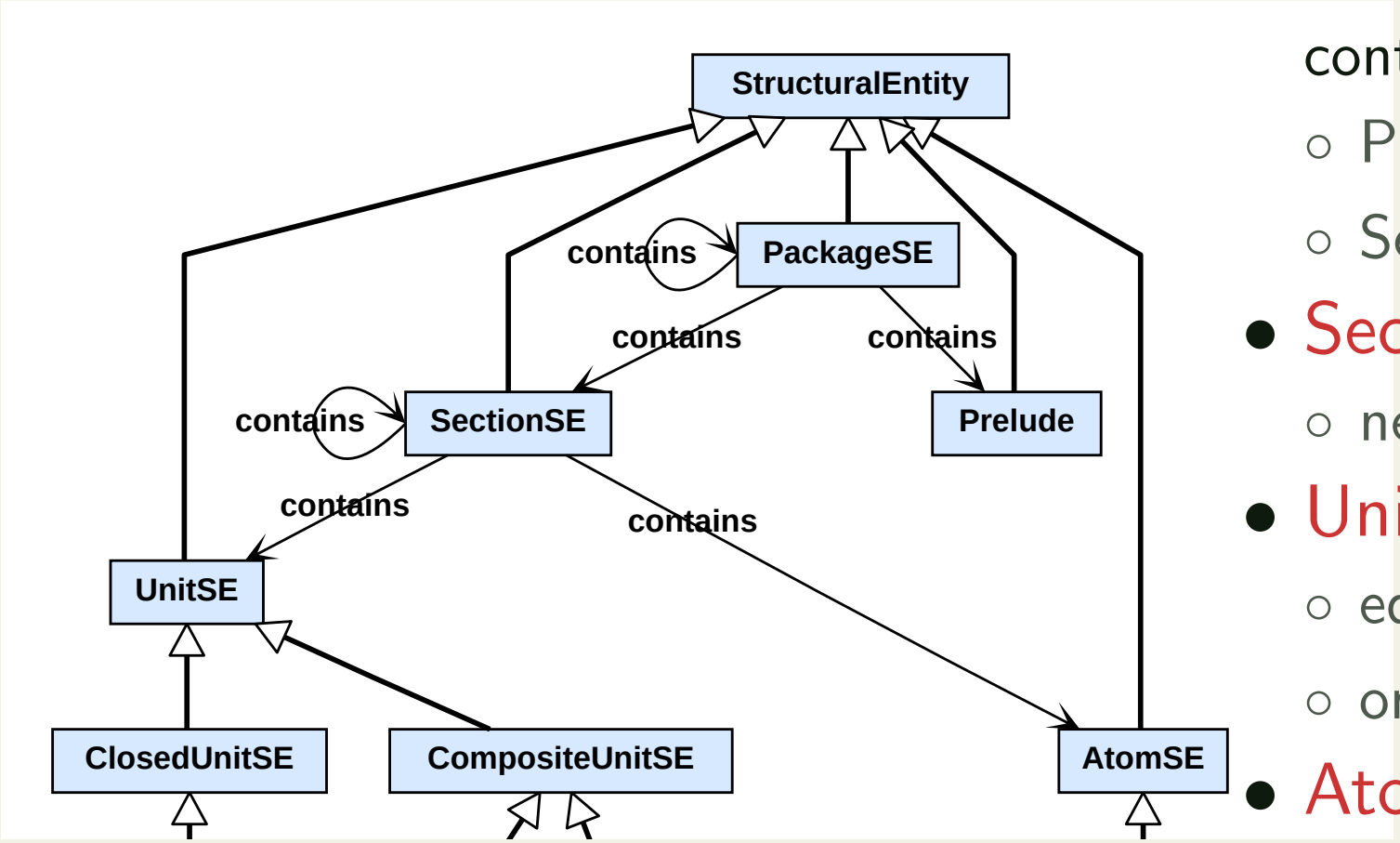
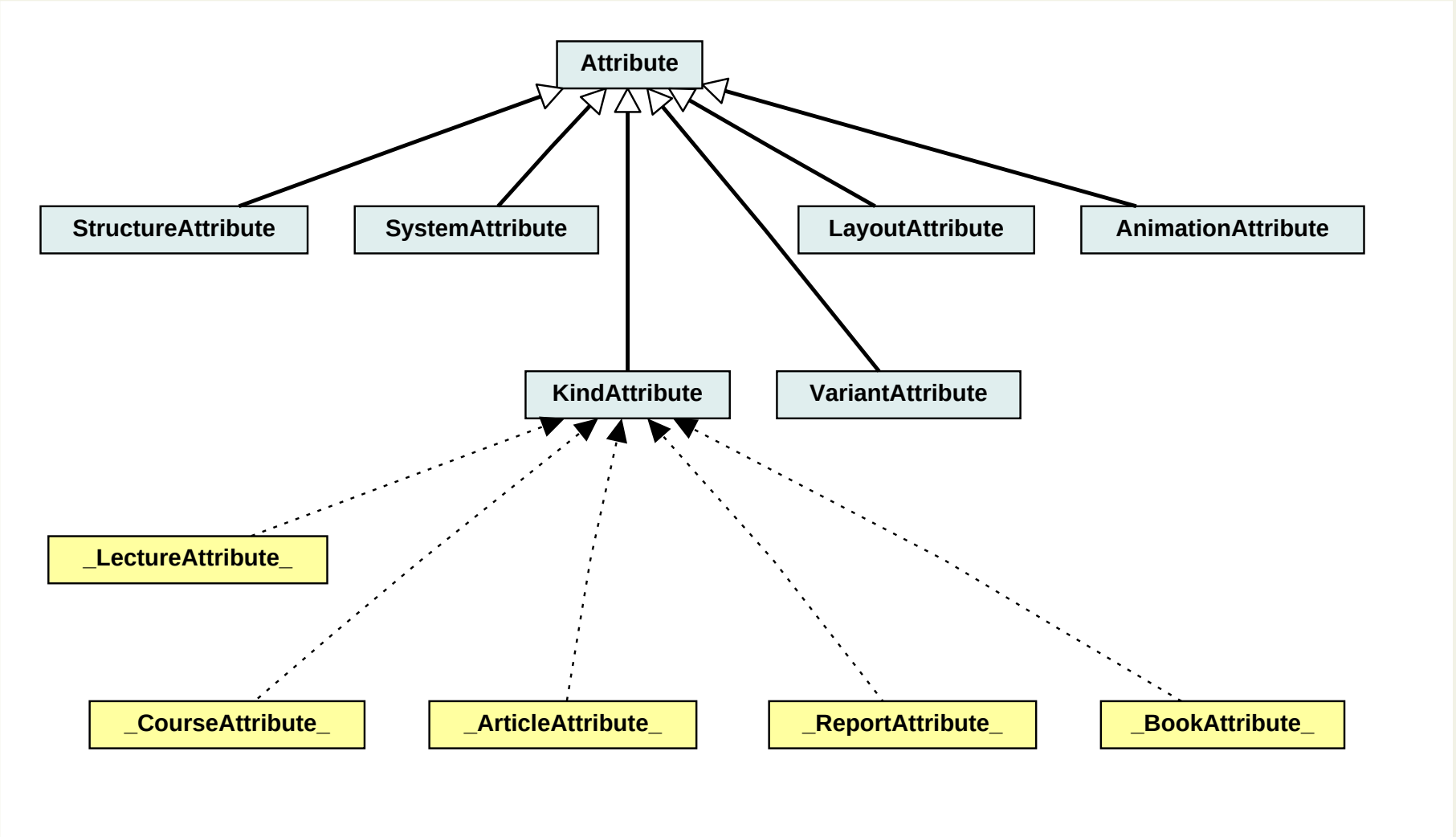
- Structuring in-the-Large: Packages
  - imports — folder hierarchy
- Embedding foreign documents: Package as wrapper
  - embedded foreign document — e.g. PDF, PowerPoint
- Structuring in-the-Small: Structural Entities
  - fine-grained representation of structure — XML
  - input (editing) and output (formatting) — LaTeX (or alternatives)
  - formatted documents — PDF



- Package
  contains
  - Preludes
  - Sections
- Sections
  - nested
- Unit
  - editing context
  - one page
- Atom
  - no structure

Attributes


Attribute
StructureAttribute
SystemAttribute
LayoutAttribute
AnimationAttribute
KindAttribute
VariantAttribute
LectureAttribute
CourseAttribute
ArticleAttribute
ReportAttribute
BookAttribute

Structure Attributes

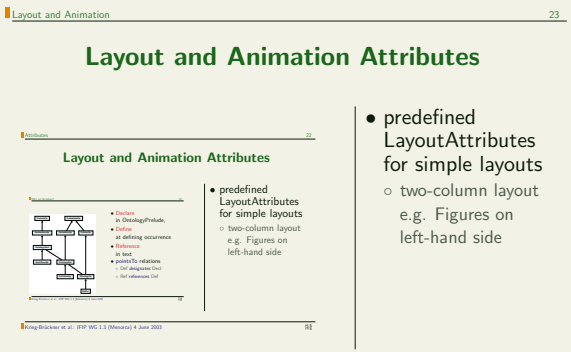
MMiSSLaTeX

```
\begin{Section}[Label=Attributes,Title=Attributes,
      Authors={Bernd~Krieg-Br{\"u}ckner}]
  \begin{Paragraph}[Title=Layout,
          Authors={Jan-Georg~Smaus, Markus~Roggenbach}]
  \end{Paragraph}
  \begin{Paragraph}[Title={Variant Attributes}]
```

- most recent Authors Attribute,
  trail of PriorAuthors Attributes
- Attributes are inherited downwards, may be overwritten

Layout and Animation Attributes

Layout and Animation Attributes



- predefined LayoutAttributes for simple layouts
  - two-column layout e.g. Figures on left-hand side

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Layout and Animation Attributes

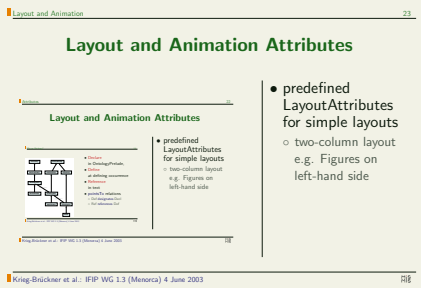
	Hyper	*Replay*	*Interactive*
Contents	***Hyper-Medium***	***Replay in Tool***	***Interaction***
skeleton			
Outline			
abstracts			
Lecture			
presentation	laptop browsing	demonstrate	experiment
in class	during lecture	use of tool	in tool
Lecture Notes			
annotated	offline browsing	demonstrate	experiment with
after presentation	personal annotation	examples	examples
Course			
self-contained	personal navigation	model	personal
for self-study	dynamic?	solutions	solutions

- predefined for simple layouts
  - n by m matrix (as list of lists)
- simple animations
  - rollout of list items
  - traversal of matrix
  - sequential build-up
  - pointers via arrows

(Black)Board Presentation, Notes

- overhead screen + script/annotations on laptop

Layout and Animation Attributes



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Layout and Animation Attributes

- predefined LayoutAttributes for simple layouts
  - two-column layout, e.g. for Figures on left-hand side
  - n by m matrix (as list of lists)
- predefined AnimationAttributes for simple animations
  - rollout of list items
  - traversal of matrix: left-to right or top-to-bottom
  - sequential build-up of Figures
  - pointers via arrows
- avoid tedious LaTeX commands or pause levels

Abstraction from Detail; Interaction

	Hyper	*Replay*	*Interactive*
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after presentation	personal annotation	examples	examples
Course			
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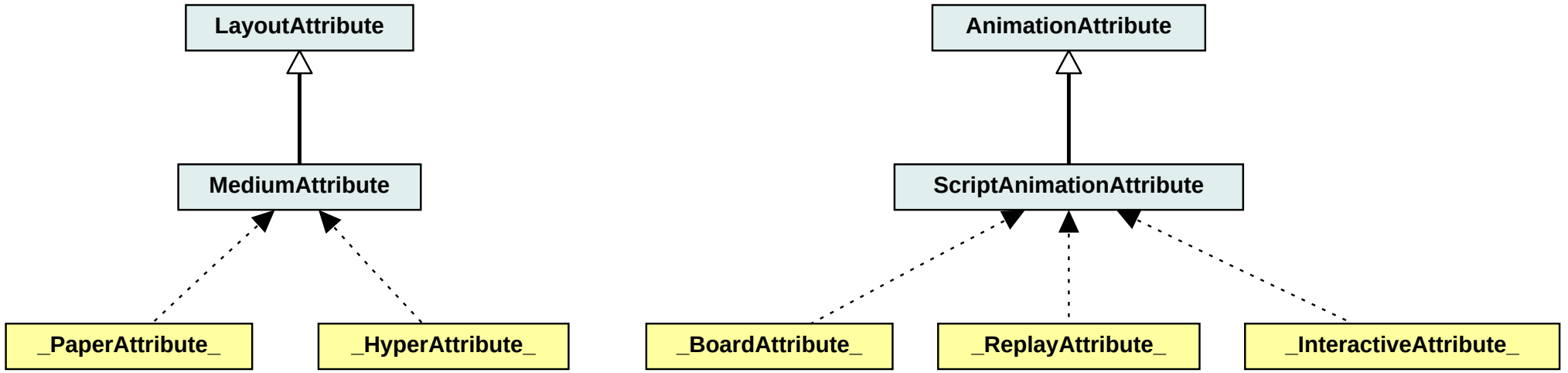
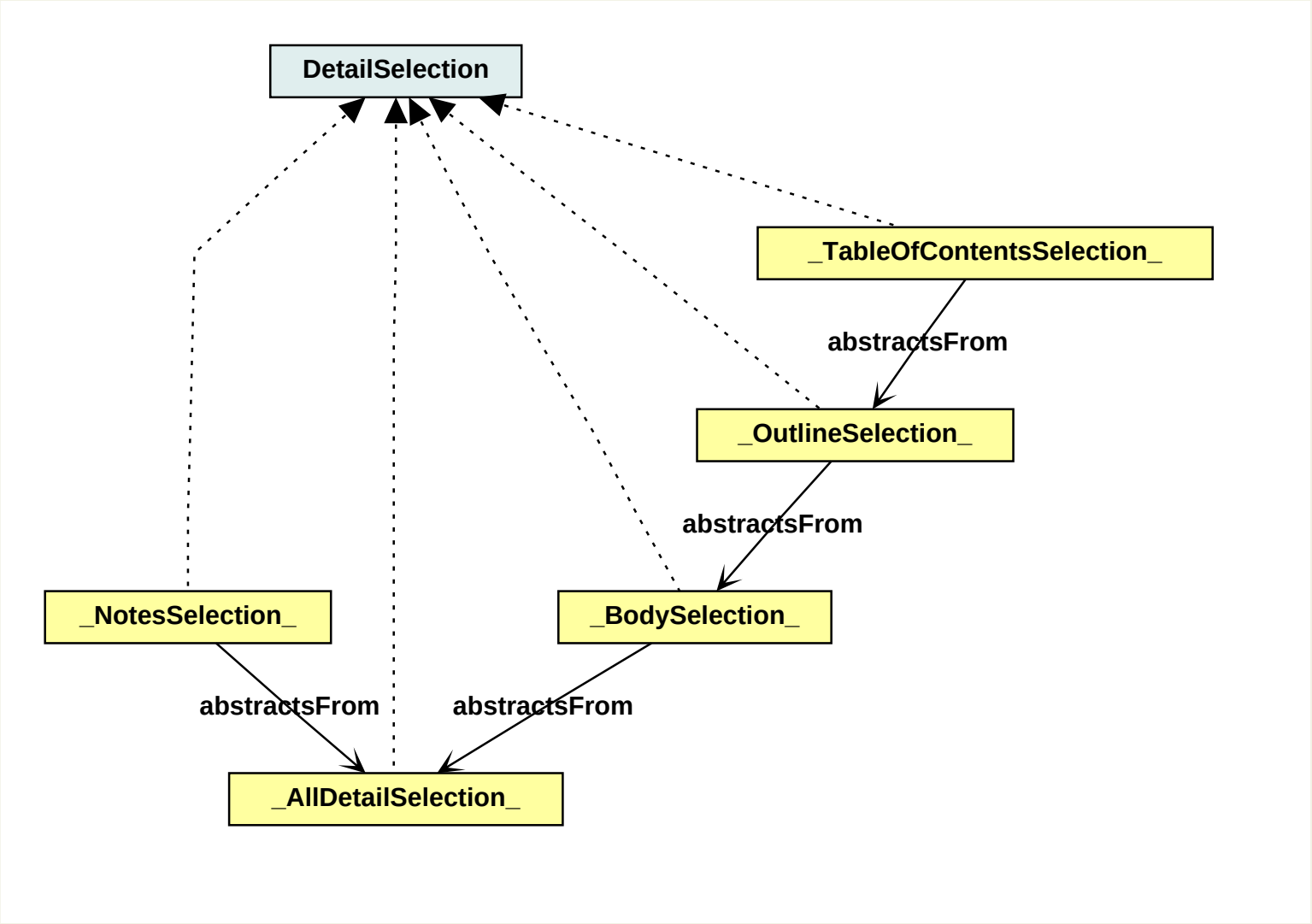
Medium and Script Animation Attributes




DetailSelection
TableOfContentsSelection
abstractsFrom
OutlineSelection
abstractsFrom
NotesSelection
BodySelection
abstractsFrom
abstractsFrom
AllDetailSelection

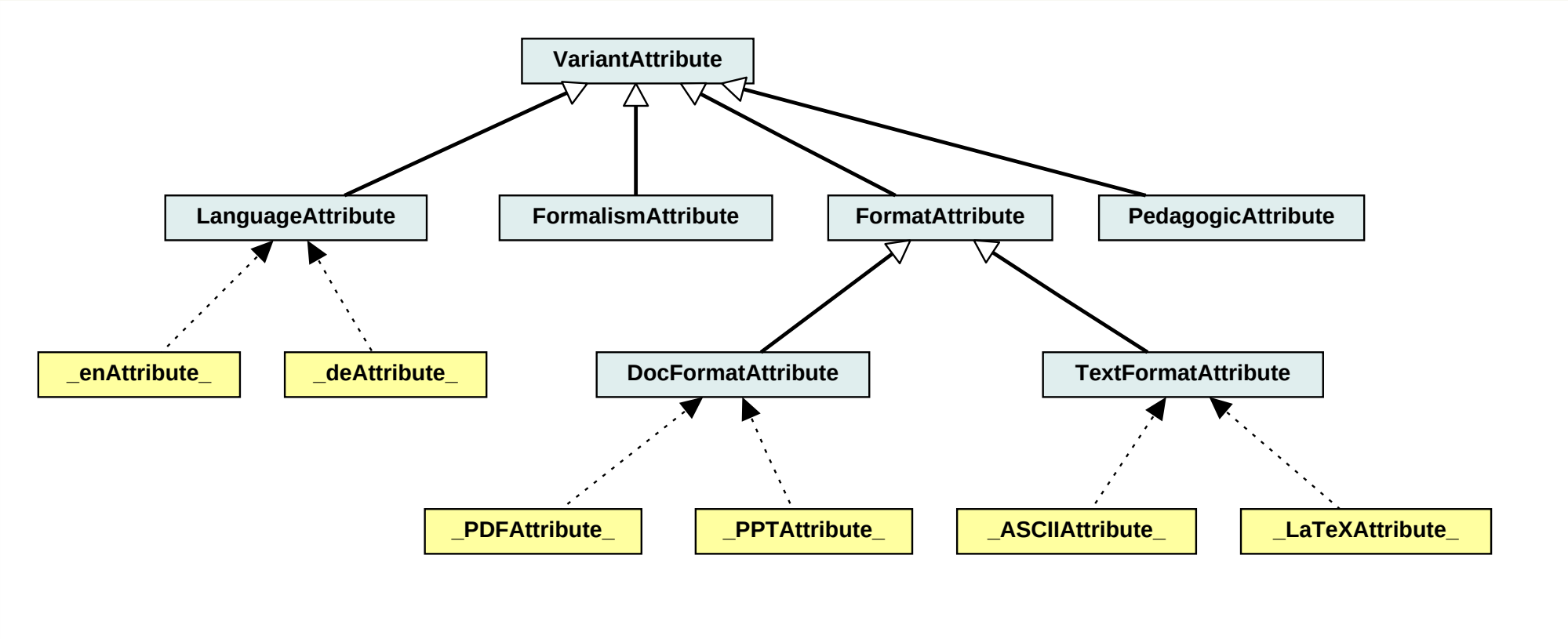
Structure and Attribute Selection

- choice of Kind in document header
  - e.g. Lecture
- Detail selection
  - e.g. Body + Notes
- possibly selection of structural entity(s) within the Body
  - e.g. Proof
- possibly selection of Variant(s)
  - e.g. de

$\rightsquigarrow$ all Proofs in German Lecture Notes

Variant Attributes

Variant Attributes Ontology

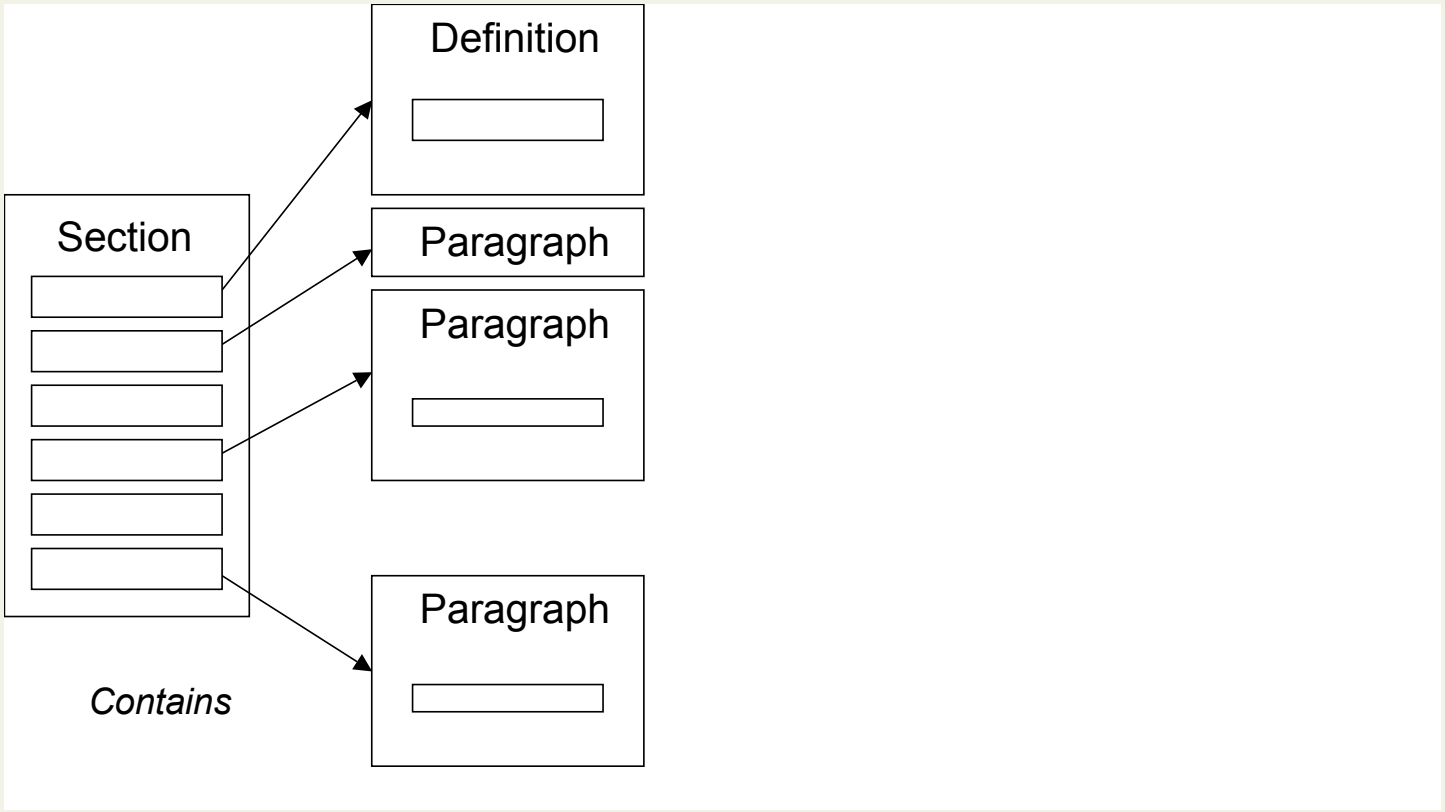


Variants

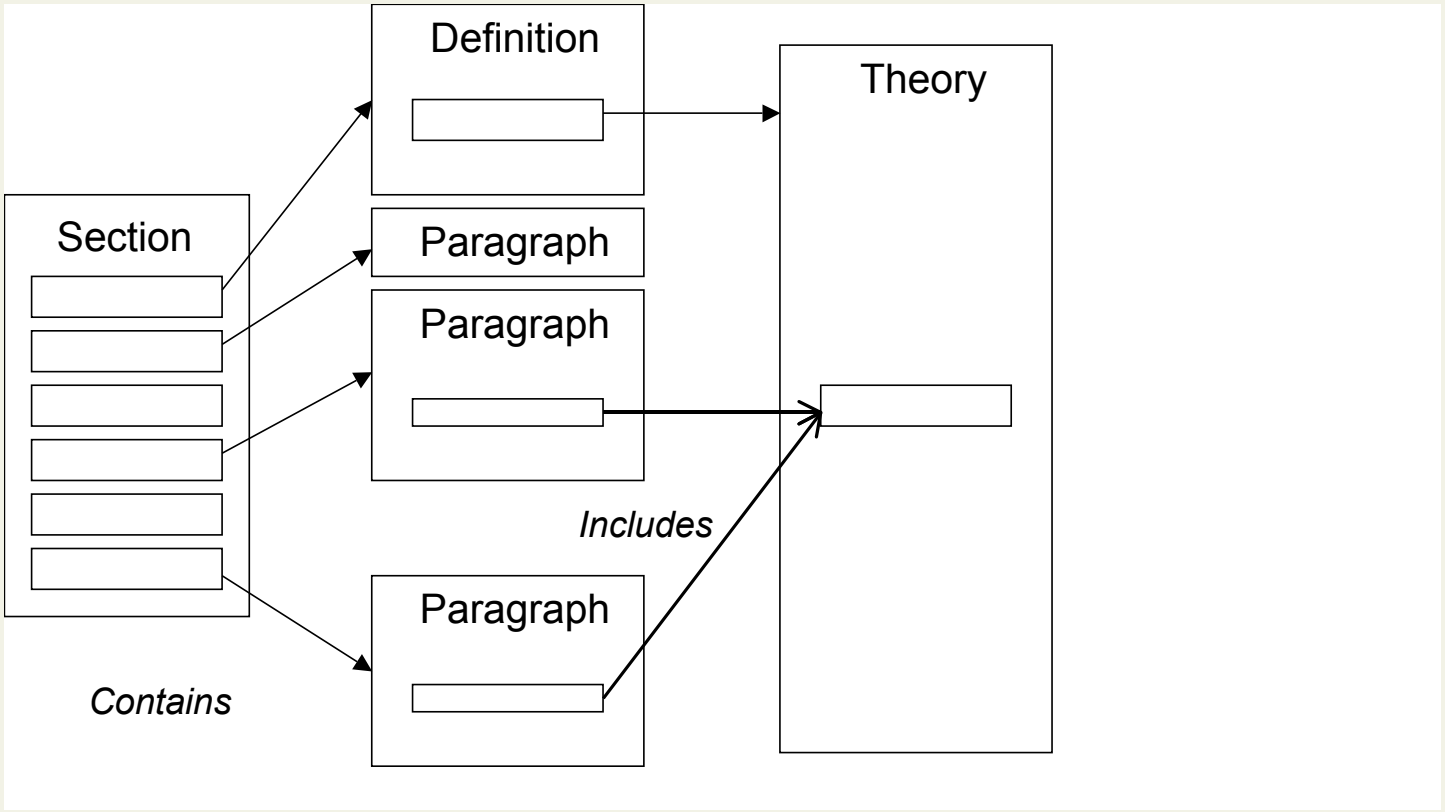
- one structure graph for all variants
- different variants for one node with the same Label
- attributes are inherited downwards, may be overwritten
- can be edited side-by-side, or
- for a given selection of VariantAttributes
  a projection of the structure graph
  can be used for specialised editing

Literate Programming

Structural Sharing



Structural Sharing



Literate Programming

- complete Program in extra Section (e.g. appendix)
  - complete Program with internal structure, e.g. program fragments
- Labels allow (structural) sharing
  - e.g. Included program fragment in document
- use of tools
  - tools can be applied to ASCII format
  - additional LaTeX variants are generated,
    associated one-to-one to ASCII variants in Repository
  - revisions are only made in source

Conclusion

Various Levels of Support

- high-quality LaTeX slides
  - structural re-use, sharing, selection
  - variants, refinement to/abstraction from article
- "literate programming/specification"
  - integrate CASL specifications with documentation, CATS tools

Various Levels of Support

- high-quality LaTeX slides
  - structural re-use, sharing, selection
  - variants, refinement to/abstraction from article
- "literate programming/specification"
  - integrate CASL specifications with documentation, CATS tools
- semantic interrelation of documents
  - ontology, ontology.sty; application: system ontology
  - structuring "in-the-large" via Packages
- version and configuration control, change management
  - manage variants; consistency and completeness

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