SPLICR: A Web-Platform for Exploring, Querying and Distributing Linguistic Resources

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Overview

- **Project Background: Aim of the Project**
- **Different Annotation Strategies**
- **Generalised Architecture for Sustainability of Linguistic Data (GENAU)**
- **Merging differently annotated corpora**
  - **Transforming Single Rooted Trees**
  - **Transforming Annotation Graphs**
  - **Transforming Stand-off Annotations**
- **The Platform SPLICR**

Project: Sustainability of Linguistic Data

Principal Investigators:

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Project Members:

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Programming:

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Aim of the Project: Sustainability of Linguistic Data

- Main goal:
  - Resources acquired in long-term projects from three Collaborative Research Centres have to be converted in one format to be sustainably usable by researchers and applications
- Additional aims:
  - Provide unified access for the heterogeneous data acquired in the projects
  - General methodologies and ‘Rules of Best Practice’

The unusual starting point of the project

- In 2005 the German Science Foundation (DFG) initiated a joint project of three Collaborative Research Centres:
  - *Linguistic Data Structures*
    Research Centre 441 located in Tübingen
  - *Multilingualism*
    Research Centre 538 located in Hamburg
  - *Information Structure*
    Research Centre 632 located in Potsdam and Berlin
- Each Collaborative Research Center is a combination of ~15 research projects

Working areas / Areas of research

- Annotation formats
- Metadata
- Ontologies
- Corpus query
- Data visualization
- Legal Issues

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- The Platform SPLICR
- Future developments

Resources and Annotation Schemes

- Researchers create linguistic data with a specific linguistic theory and a concrete research question in mind
- This results in highly heterogeneous approaches to linguistic data handling and markup languages
- All three research centres involved address this problem: at each site, a central project is assigned with the task of developing methods:
  - for the creation,
  - annotation and
  - analysis of linguistic data

Tübingen: Linguistic Data Structures

- Topic: Linguistic Data Structures
- Established: 1999
- At the moment ca. 100 researchers are involved
- projects investigating specific linguistic phenomena
  - with regard to general methodological issues, or
  - concerning a particular language or language family
- Almost all projects use corpora
- About 20 corpora have been created

TUSNELDA

- Despite the diversity of the corpora created in Tübingen, they all share the same generic data model
- All corpora are structured hierarchically
- A common annotation scheme, called TUSNELDA, was developed:
  - DTD
  - Annotation guidelines

Annotation Procedure

- Annotation: manual and automatic
- Embedded (inline) annotation, immediately modelling hierarchical structures by XML hierarchies
- Main Reason for using embedded markup:
  - Standard XML tools (such as XML editors and XML-parsers) are optimised for processing hierarchical XML structures with embedded annotation

TUSNELDA-Annotation: An Tibetan Example

khra·phru·gu *med·tshug* |

child-Abs NEG-exist

Translation: ‘Ø [=They] had no children.’

Structure of the annotation/Example annotation:

```
<s>
  <clause>
     <ntNode>…</ntNode>
     <tok id="v6">…</tok>
     <clauseCat>…</clauseCat>
  </clause>
  <punct>|</punct></s>
```

```
<s><clause><ntNode>
    <tok>
        <orth>khra•phru•gu</orth>
        <pos>NOM:anim~pers</pos>
    </tok>
    <ntNodeCat>NP</ntNodeCat>
    <desc><case>Abs</case></desc></ntNode>
    <tok id="v6">
        <orth n="2">med-tshug</orth>
        <pos>VFIN</pos>
        <desc>     ...</desc>
            <feature type="part">Neg</feature>
            <frame>... </frame>
            <realframe>... </realframe>
                        .........</clause></s>
```

Hamburg: Research Centre on Multilingualism

- 14 projects, all of them work empirically
- Written or transcribed spoken language
- Different linguistic research topics, e.g. language acquisition

→ The data differ with respect to many dimensions

- To provide a unified access the EXMaRALDA system was developed

EXMaRALDA's Basic Data Model

- Based on the "Single Timeline, Multiple Tiers" model (annotation graphs framework)
- Individual descriptions (events) are grouped into a number of tiers (or layers)
- Ideally, a start and an end point of each event is marked on a single, fully ordered timeline
- This model is also used in other systems and tools, e.g. Praat, ELAN, TASX
- Directed, acyclic graphs
- XML as storage format, no hierarchies
- Ontologically empty framework, i.e. it abstracts from linguistic theories

Example

Transcription: [v]
Description: [nv]
Annotation: [sup],[en],[pho]

DS [sup]	*faster*	
DS [v]	Okay. D'accord d'accord.	
DS [en]	Okay. Agreed, agreed.	
DS [nv]	*right hand raised*	
FB [v]	Alors ça dépend ((cough)) un petit peu.	
FB [en]	That depends then, a little bit.	
FB [pho]		[étipø:]

Potsdam/Berlin: Information Structure

- Information Structure concerns the means used by the speaker or writer to structure discourse and utterances
- Languages differ a lot with regard to the means to express Information Structure, e.g., intonation, word order, etc.
- Empirical base: Different types of corpora, languages, and annotations

Potsdam's Corpus Interchange Format

- Stand-off XML-annotation
  - allows for conflicting hierarchies
  - extensive use of XLinks, XPointers to link files
- Generic XML elements
  - based on upcoming ISO-Standard Linguistic Annotation Framework
  - flexible enough to encode all kinds of data structures
  - flat lists of XML elements; hierarchies encoded by XLinks

`<mark>`	markables
`<struct>`	hierarchical structures
`<feat>`	annotations

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Motivation: Why yet another format?

- TUSNELDA, EXMARaLDA and PAULA all generalise over project-specific data models and formats
- We need: a data model which generalises over TUSNELDA, EXMARaLDA and PAULA.
- This model must be applicable for all the language data already annotated:
  - Hierarchical annotations with embedded markup
  - Graph based annotations
  - Distributed markup using stand-off techniques
- Exchange format should be as simple as possible

Generalised Architecture for Sustainability of Linguistic Data

- “Genau”:
  - ***Ge***neralisierte ***Na***chhaltigkeitsarchitekt***u***r für linguistische Daten
    (Generalised Architecture for Sustainability for linguistic data)
  - German for: accurate, close, correct, definite, demanding, detailed, exact, faithful, fine, just, minute, pedantic, precise, right, strict
- Provides a format for an Unified Linguistic Annotation
- The original annotation format becomes irrelevant

Genau: Format description

- In general, the Genau-Format can be modeled by means of Multi-rooted trees (MRTs)
- MRTs are neither as constrained as a tree, nor as open as an unrestricted graph
- Storing:
  - in an XML-Database (for processing, e.g. querying)
  - in individual XML files (as a sustainable interchange format)
- Each file represents all the information related to a single linguistic annotation layer

Transformatios into the Genau-Format

- *Corpora* annotated based on the *hierarchical* model are analysed semi-automatically
- After the analyses, information on the layers is included in the (still single rooted) XML document instance
- In the next step, the hierarchically annotated corpora is split into individual XML files
- *Timeline-based corpora* are split using another tool in order to separate the graph annotations
- *Standoff annotations* and the text are merged

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Transforming Single Rooted Trees

- A tree-based XML document (such as a corpus) with multiple annotation layers may need to be separated
- “Leveler” is a pipeline for XML-document transformations
- Leveler serves two purposes:
  1. Moving PCDATA text to attributes (thereby separating any PCDATA annotations from the actual primary data)
  2. Splitting the corpus into different files according to the different layers of annotation (e.g., syntactic, morphological, etc.).
- The transformations are carried out using XSLT
- The configuration files for XSL-processing are created in a web application

Examples for Text Transformations

- Original

  `<w>Peter</w>`

  `<pos>NN</pos>`

  `<punct>!</punct>`

- “Real PCDATA”

  `<w>Peter</w>` (identity)

- “Annotation”

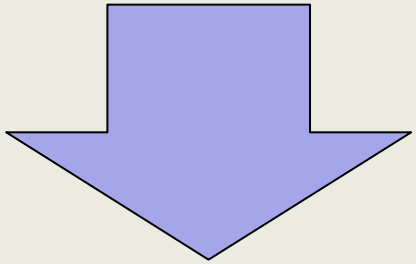
  `<pos leveler:text="NN"/>`

- Mixed

  `<punct leveler:text="!">!</punct>`

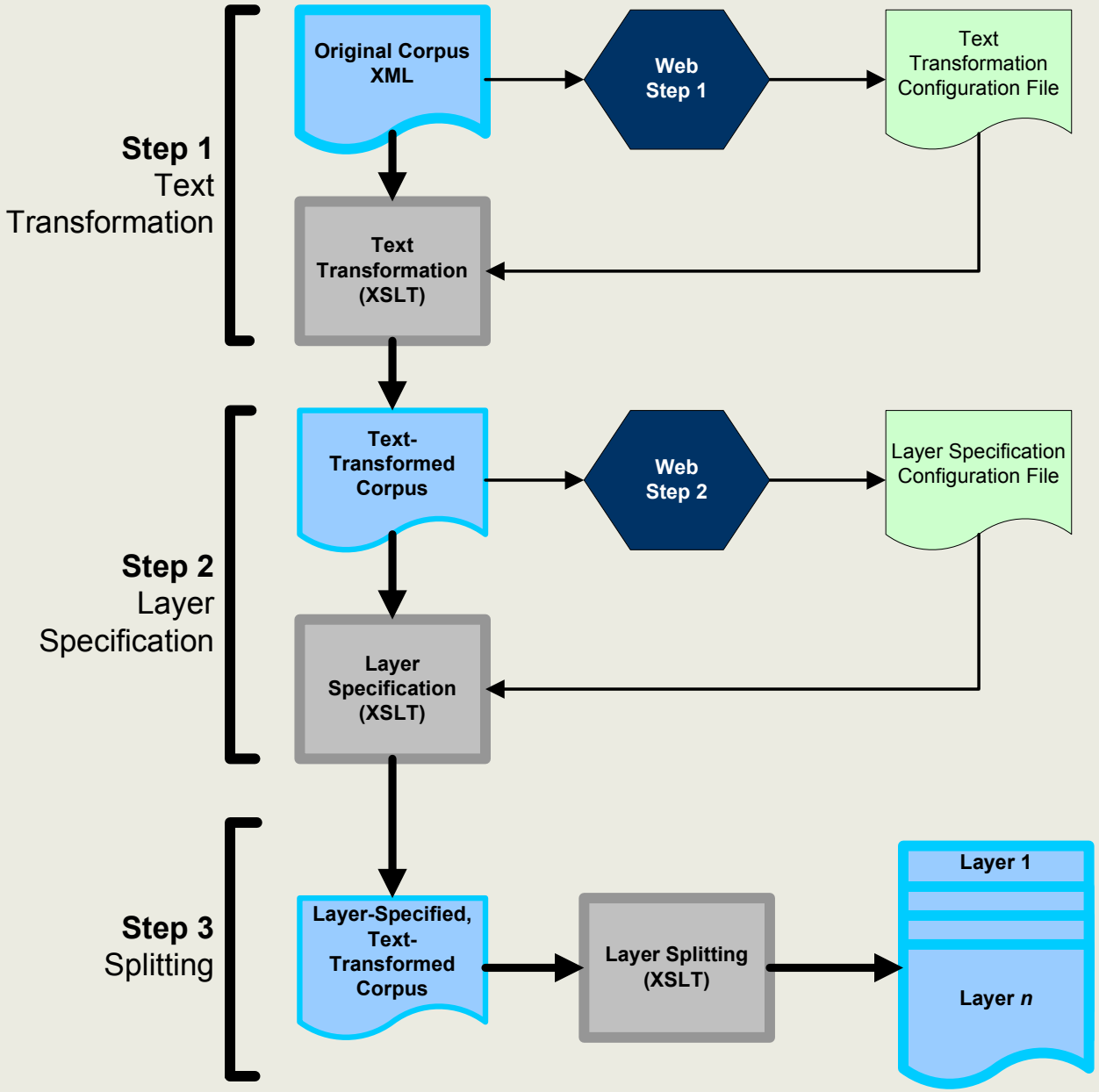
Example: Text Transformation

```
<tok i d="s_18_n_2">
<o r t h>L a n d e s v o r s i t z e n d e</ o r t h>
<pos func="HD">NN</ pos>
</ tok>
```



```
<tok i d="s_18_n_2">
<o r t h>L a n d e s v o r s i t z e n d e</ o r t h>
<pos func="HD" l e v e l e r : t e x t="NN" />
</ tok>
```

Leveler Pipeline



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File Edit Find Project Perspective Options Tools Debugger Document Window Help

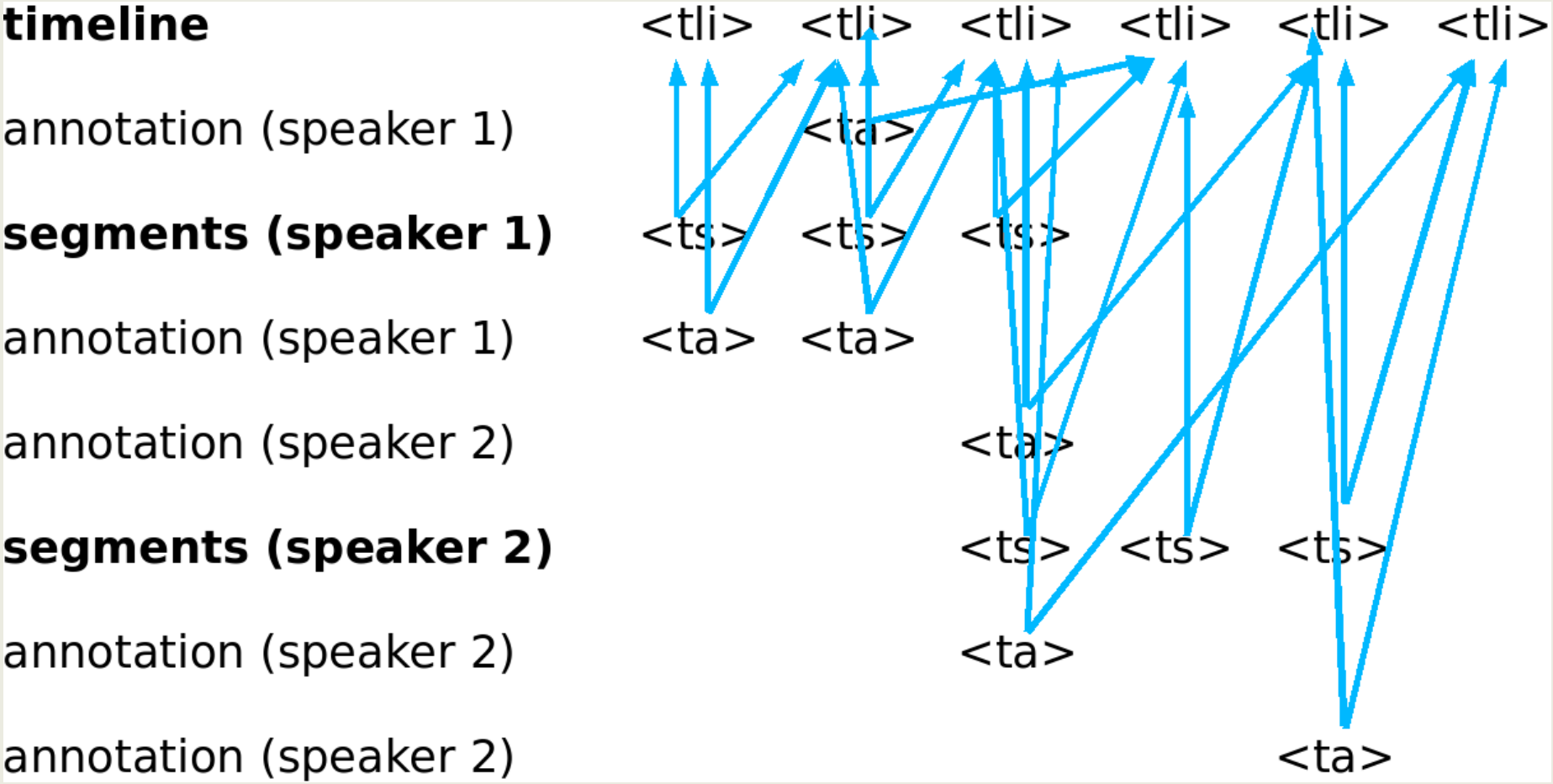
Untitled1.xml*

```xml
<?xml version="1.0" encoding="UTF-8"?>
<basic-transcription>
  <head><!-- ... --></head>
  <basic-body>
    <common-timeline>
      <tli id="T0" time="0.0"/><tli id="T1"/><tli id="T2"/><tli id="T3"/><tli id="T4"/><tli id="T5"/>
    </common-timeline>
    <tier id="TIE0" speaker="DS" category="sup" type="a">
      <event start="T1" end="T3">faster</event>
    </tier>
<!-- ... -->
    <tier id="TIE4" speaker="FB" category="v" type="t">
      <event start="T2" end="T3">Alors ça</event>
      <event start="T3" end="T4">dépend ((cough))</event>
      <event start="T4" end="T5">un petit peu.</event>
    </tier>
    <tier id="TIE5" speaker="FB" category="en" type="a">
      <event start="T3" end="T5">That depends, then, a little bit.</event>
    </tier>
    <tier id="TIE6" speaker="FB" category="pho" type="a">
      <event start="T4" end="T5">[ɛ̃tipø:]</event>
    </tier>
  </basic-body>
</basic-transcription>
```

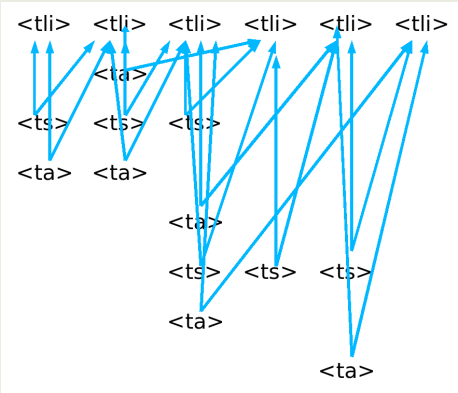
Text Grid

Realisation in EXMARaLDA

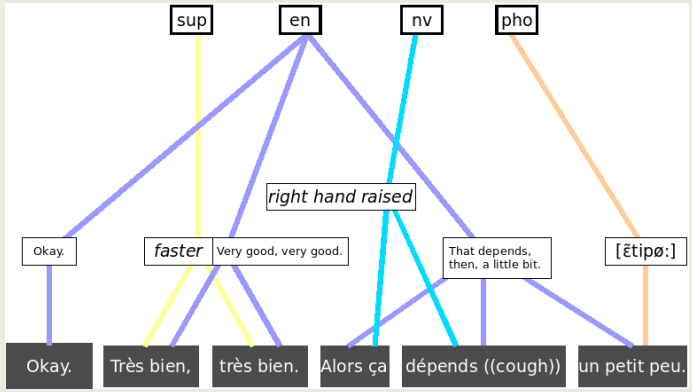
The relations of segments and annotation are conveyed by attribute references to time line items.



Splitter



splitter.xsl



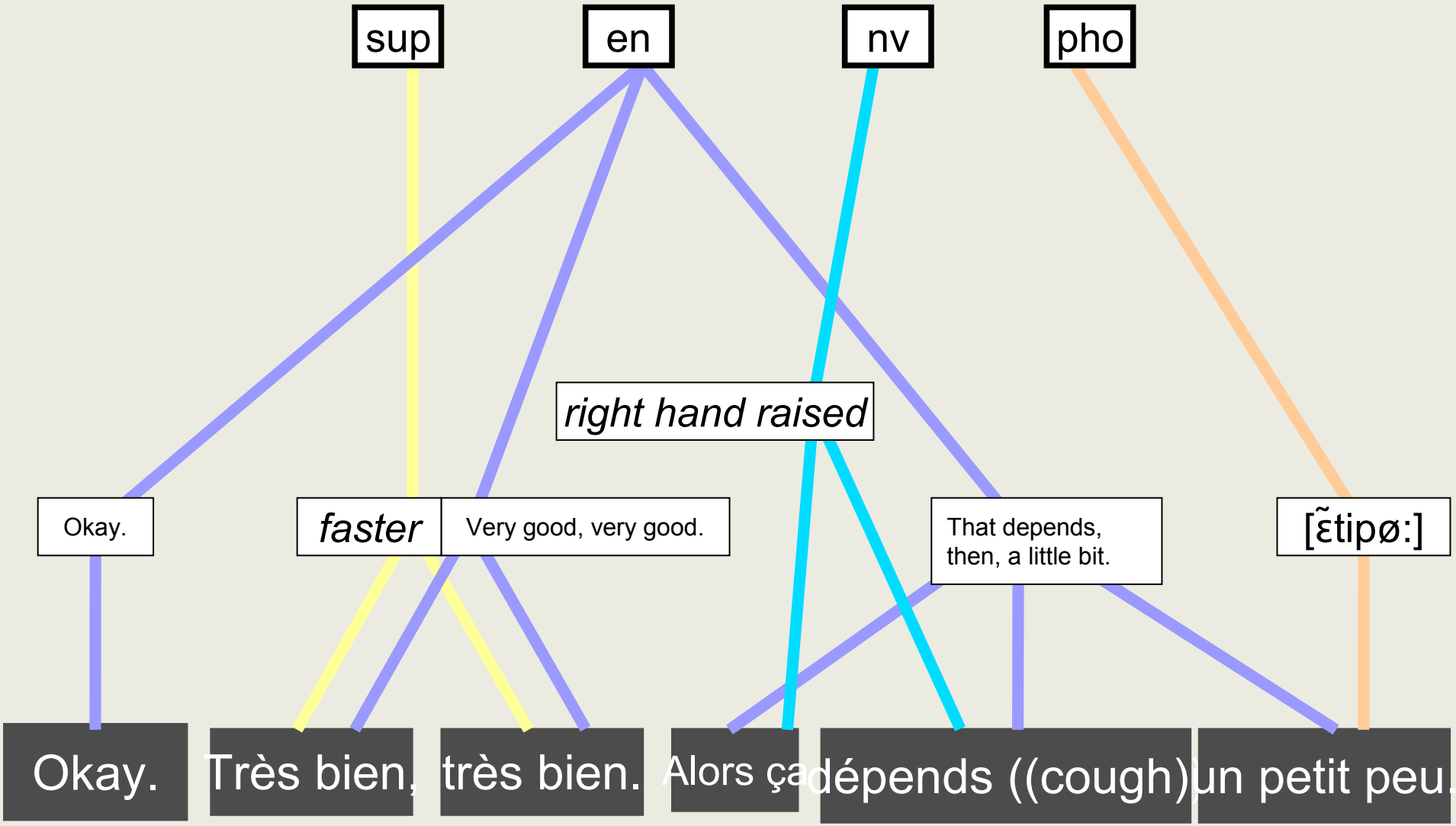
EXMARaLDA
segmented transcription

GENAU

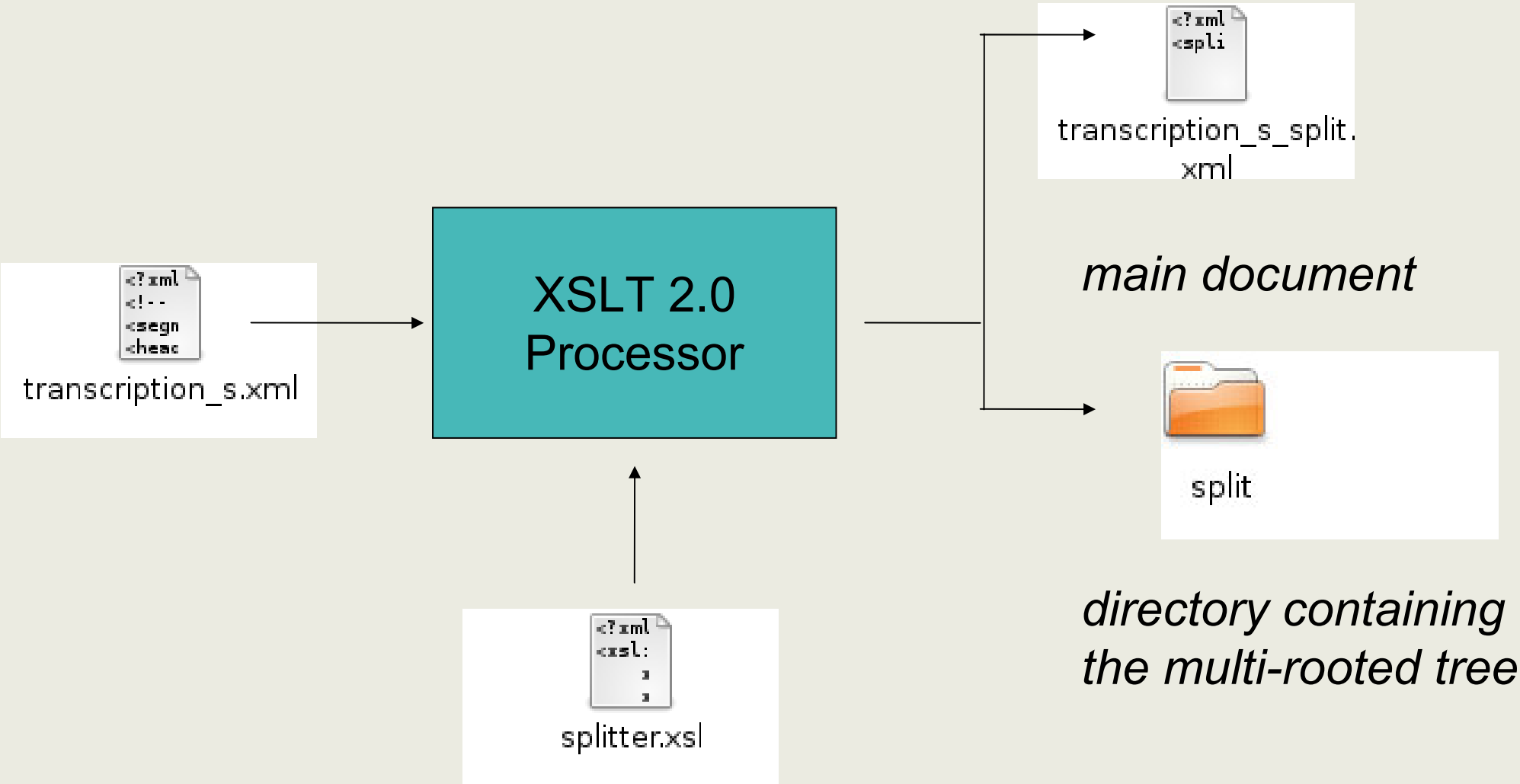
time-based format

hierarchy-based format

A hierarchy-based data model



Splitter Usage



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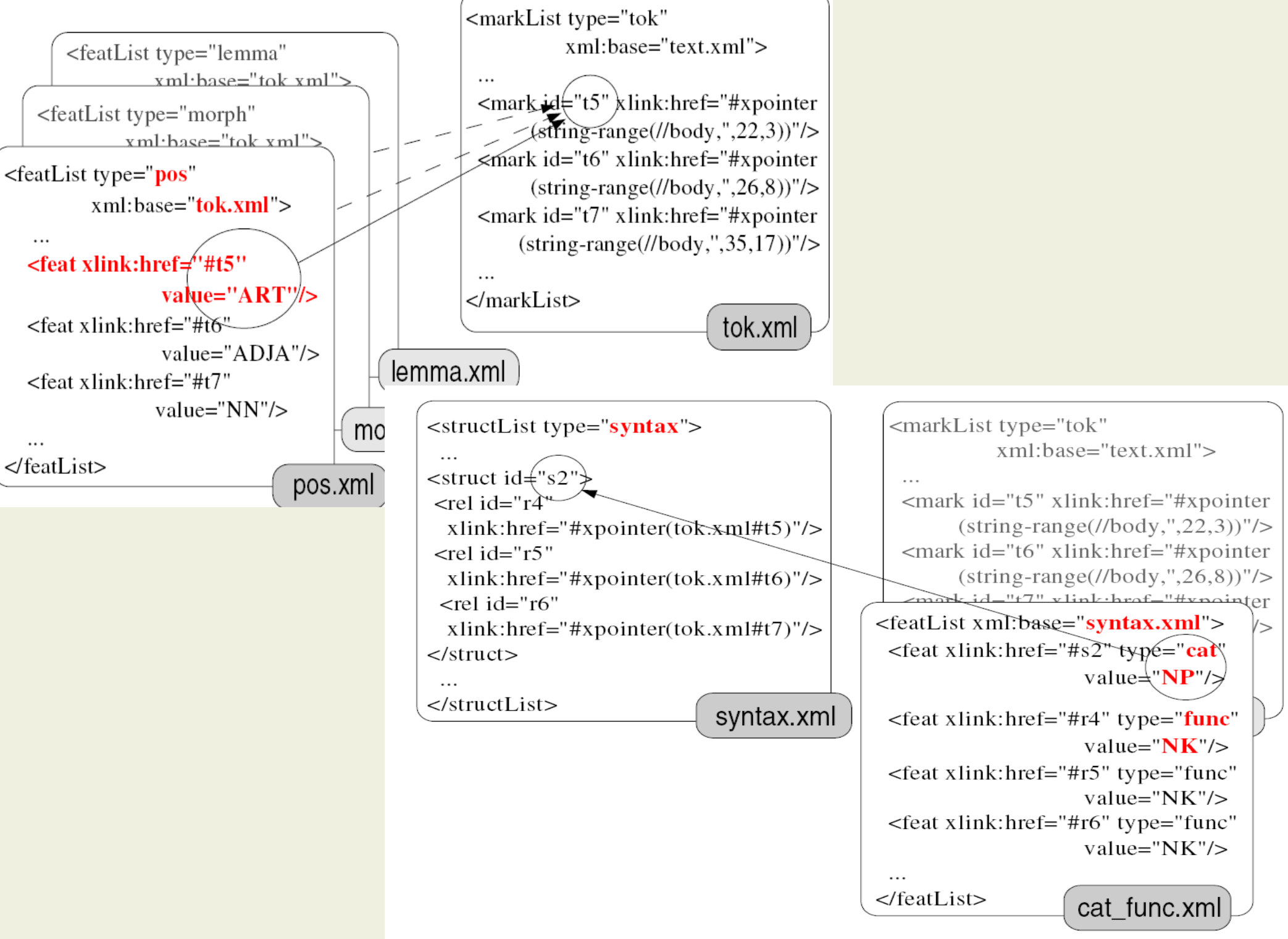
Transformation approach

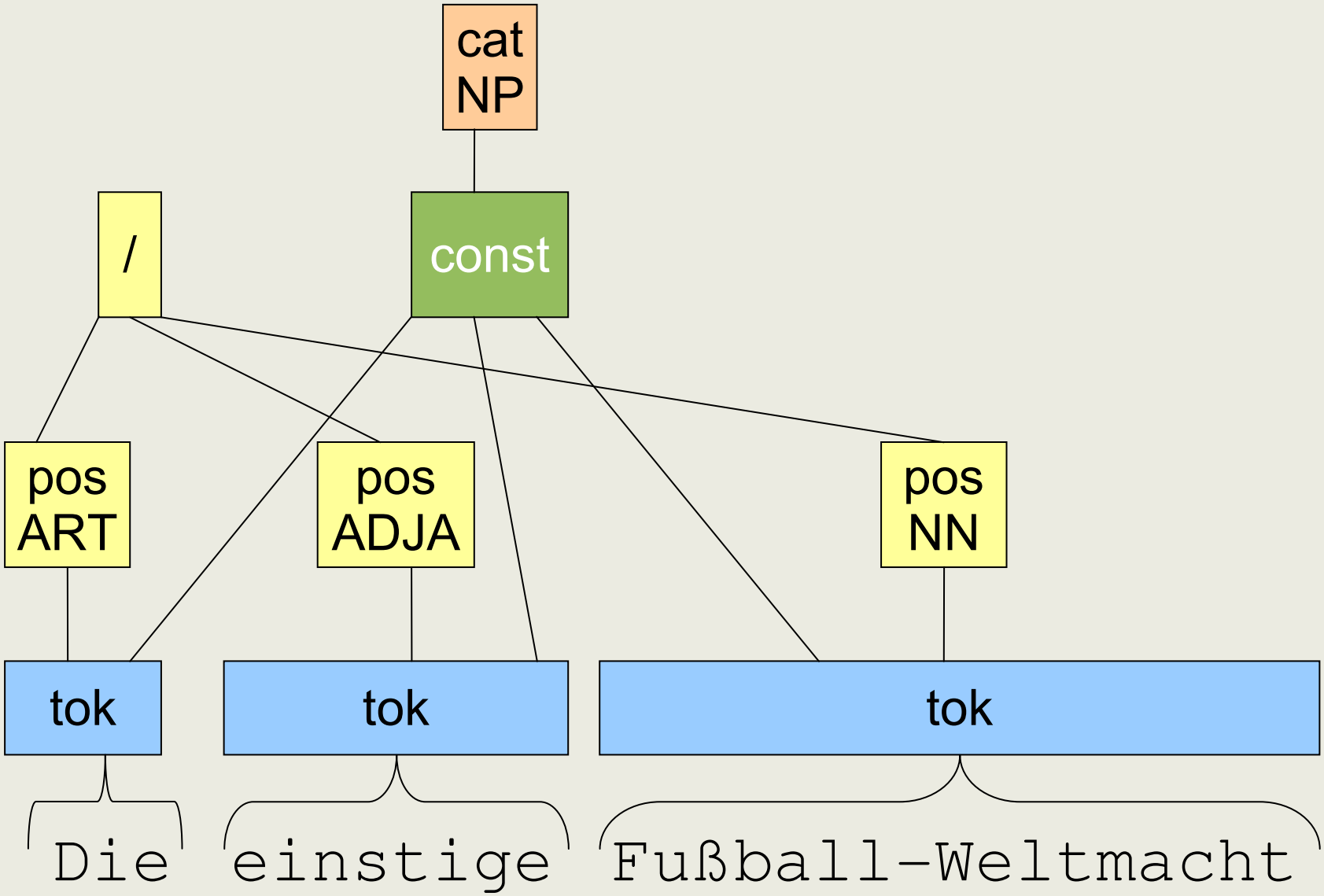
- Convert as much of the hierarchies as possible to a leaf-ordered multi-rooted tree.


<featList type="lemma"
xml:base="tok.xml">
<featList type="morph"
xml:base="tok.xml">
<featList type="pos"
xml:base="tok.xml">
...
<feat xlink:href="#t5"
value="ART"/>
<feat xlink:href="#t6"
value="ADJA"/>
<feat xlink:href="#t7"
value="NN"/>
...
</featList>
pos.xml
lemma.xml
mo
<markList type="tok"
xml:base="text.xml">
...
<mark id="t5" xlink:href="#xpointer
(string-range(//body,",22,3))"/>
<mark id="t6" xlink:href="#xpointer
(string-range(//body,",26,8))"/>
<mark id="t7" xlink:href="#xpointer
(string-range(//body,",35,17))"/>
...
</markList>
tok.xml
<structList type="syntax">
...
<struct id="s2">
<rel id="r4"
xlink:href="#xpointer(tok.xml#t5)"/>
<rel id="r5"
xlink:href="#xpointer(tok.xml#t6)"/>
<rel id="r6"
xlink:href="#xpointer(tok.xml#t7)"/>
</struct>
...
</structList>
syntax.xml
<markList type="tok"
xml:base="text.xml">
...
<mark id="t5" xlink:href="#xpointer
(string-range(//body,",22,3))"/>
<mark id="t6" xlink:href="#xpointer
(string-range(//body,",26,8))"/>
<featList xml:base="syntax.xml">
<feat xlink:href="#s2" type="cat"
value="NP"/>
<feat xlink:href="#r4" type="func"
value="NK"/>
<feat xlink:href="#r5" type="func"
value="NK"/>
<feat xlink:href="#r6" type="func"
value="NK"/>
...
</featList>
cat_func.xml

Transformation approach

- Convert as much of the hierarchies as possible to a leaf-ordered multi-rooted tree.
- Where this is not possible due to crossing branches, encode relations using XLink
- Use XSLT

The GENAU data model: A multi-rooted tree (MRT)



Example Data in the Format “Genau”

```
<genau>
  <pos value=“ART“><tok id=“t5“>Die</tok></pos>
  <pos value=“ADJA“>
     <tok id=“t6“>einstige</tok></pos>
     <pos value=“NN“>
        <tok id=“7“>Fußball-Weltmacht</tok></pos>
</genau>
```

pos.tok.xml

```
<genau>
  <cat value=“NP“>
    <const id=“s2“>
      <tok id=“t5“>Die</tok>
      <tok id=“t6“>einstige</tok>
      <tok id=“t7“>Fußball-Weltmacht</tok>
    </const>
  </cat>
</genau>
```

cat.const.tok.xml

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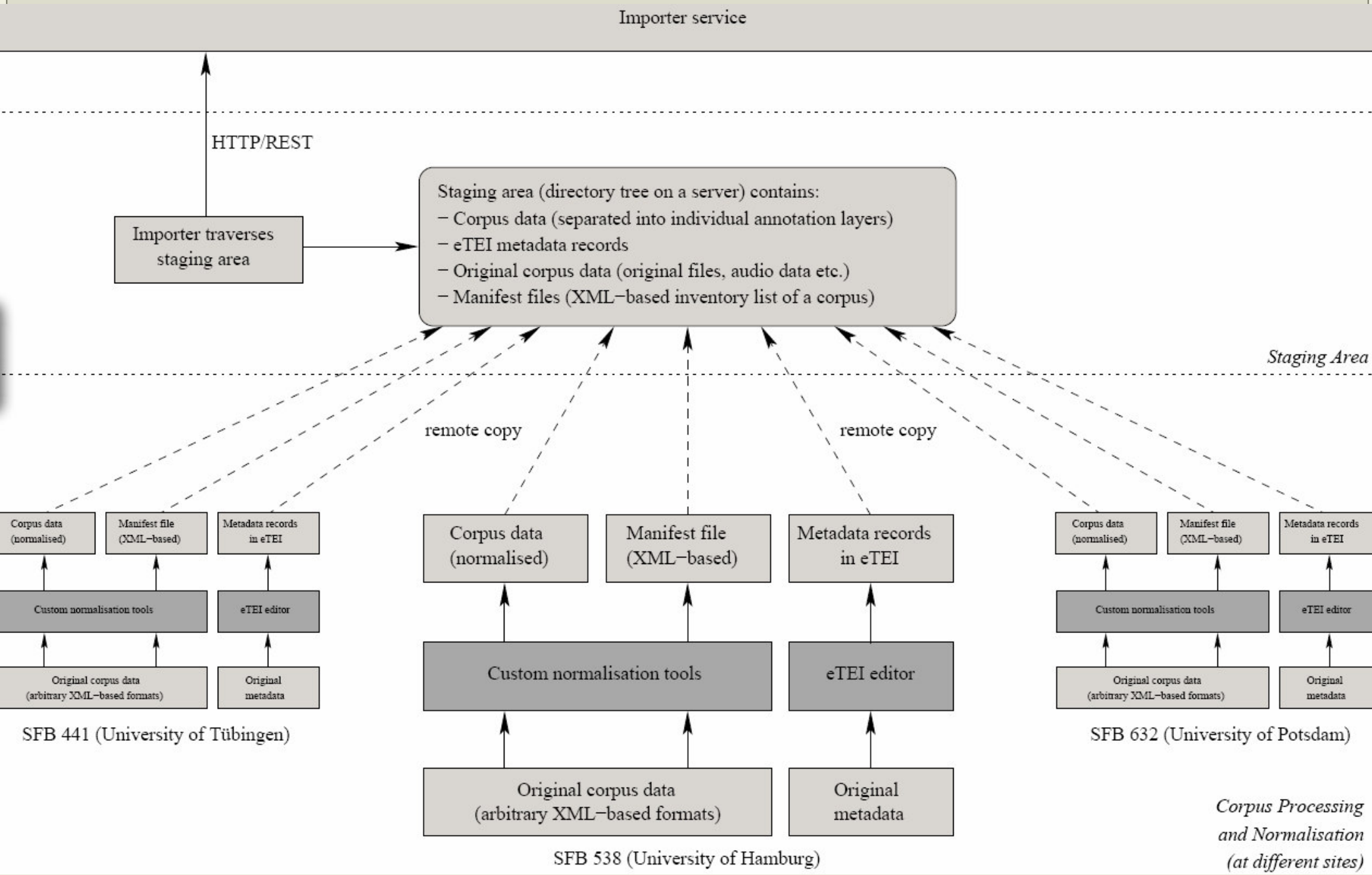
SPLICR: An overview

- SPLICR: Sustainability Platform for Linguistic Corpora and Resources
- The sustainability platform consists of a front-end and a back-end
- The front-end
  - is the user visible part and is realized using Java Server Pages (JSP), JavaScript and Ajax technologies
  - runs in the user's browser
  - provides functions for searching and exploring metadata records and corpus data
- The back-end is a web application that runs on top of the Tomcat application server
- In addition, a staging area (the data repository) contains the normalized corpora

The staging area

- All corpora and metadata are converted in a normalized form
- A manifest file is generated for each corpus
- The manifest is a simple XML format and acts as a corpus inventory list
- Manifest files are generated semi-automatically
- Each corpus consists of five parts:
  - the manifest file,
  - multiple files that contain the processed corpus data,
  - multiple files that contain the metadata record
  - the original and unchanged corpus files, and
  - stylesheets, logfiles etc.

Resources in the staging area

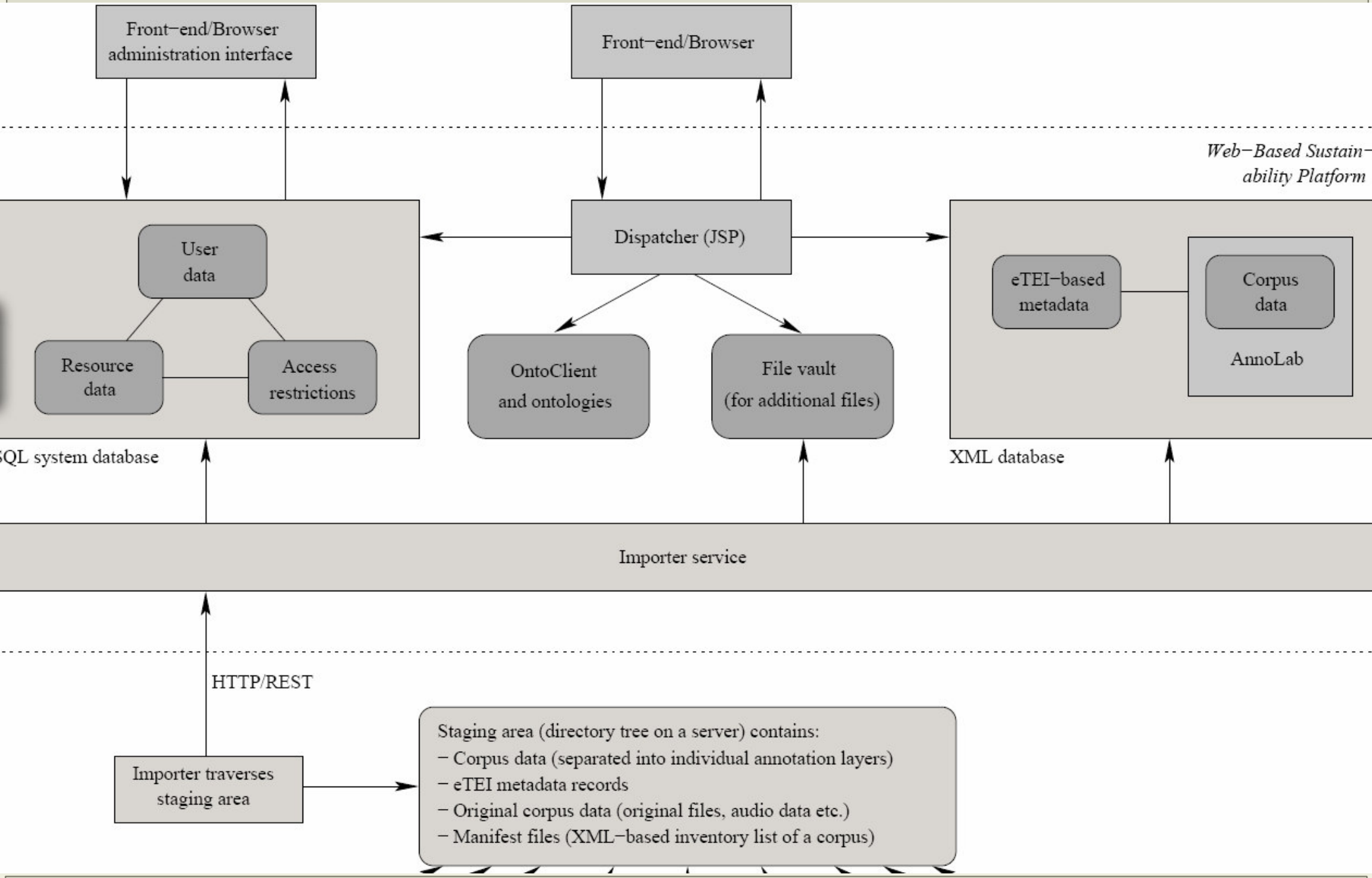


The directory structure of the staging area (excerpt)

```
/corpora/SustainabilityPlatform/LanguageResources
├── name-mapping.xml ..... contains mapping of directory names to display names
├── UniversityOfHamburg
│   ├── name-mapping.xml
│   └── SFB538 .... subtree of the staging area maintained by SFB 538 (University of Hamburg)
│       └── ...
├── UniversityOfPotsdam
│   ├── name-mapping.xml
│   └── SFB632 ..... subtree of the staging area maintained by SFB 632 (University of Potsdam)
│       └── ...
└── UniversityOfTübingen
    ├── name-mapping.xml
    └── SFB441 .... subtree of the staging area maintained by SFB 441 (University of Tübingen)
        ├── name-mapping.xml
        ├── A01 ..... directory for corpora created by the SFB 441 project A01
        │   ├── TüPP-DZ
        │   │   └── ...
        │   └── TüBA-DZ
        │       ├── 2003-08-31T16-47+01-00_R1 ..... different versions of a corpus
        │       │   └── ...
        │       └── 2005-08-31T16-47+01-00_R2
        │           ├── manifest.xml ..... contents of a corpus directory
        │           ├── Corpus-* ..... corpus data processed by our sustainability project
        │           ├── Metadata-* ..... metadata processed by our sustainability project
        │           ├── Original ..... the original files associated to a corpus
        │           │   └── ...
        │           └── Transformation ..... transformation stylesheets and logfiles
```

The web-based Platform: Front-end and back-end

The web-based Platform: Front-end and back-end



The Back-end

- The back-end hosts the JSP files and related data.
- It accesses two different databases,
  - the corpus database and
  - the system database.
- Furthermore, all additional files (e.g. original corpus data files, documentation, transformation scripts) are stored in the file system
- Several servlets provide means for exchanging information between the front-end and the back-end.
- The back-end is implemented as a web application that runs on top of Apache's Tomcat servlet container.
- The corpus database is an eXist XML database, extended by the AnnoLab system (Richard Eckart and ElkeTeich)
- A System database

System database

- Uses a relational database (MySQL)
- Contains data about user accounts and acts as a catalogue for corpus data
- Stores information about
  - single files in a corpus,
  - resource groups (i.e., corpora) and
  - access rights.
- A specific user can only access a specific resource if the permissions for this user/resource pair allow this operation

Carrying out a query

- The front-end sends a JSON representation of the query and a list of the corpora currently selected by the user to the query dispatcher servlet
- A servlet transforms the query into XQuery by generating, for every single file of all selected corpora, a dedicated XQuery expression
- This set of XQuery expressions is linked to a query job which is executed using a worker-thread of the query service component
- At the same time, a unique query ID is returned to the front-end, which will start polling results
- The XQuery expressions are run sequentially against the corpus database
- Results are buffered within the back-end until the front-end fetches them

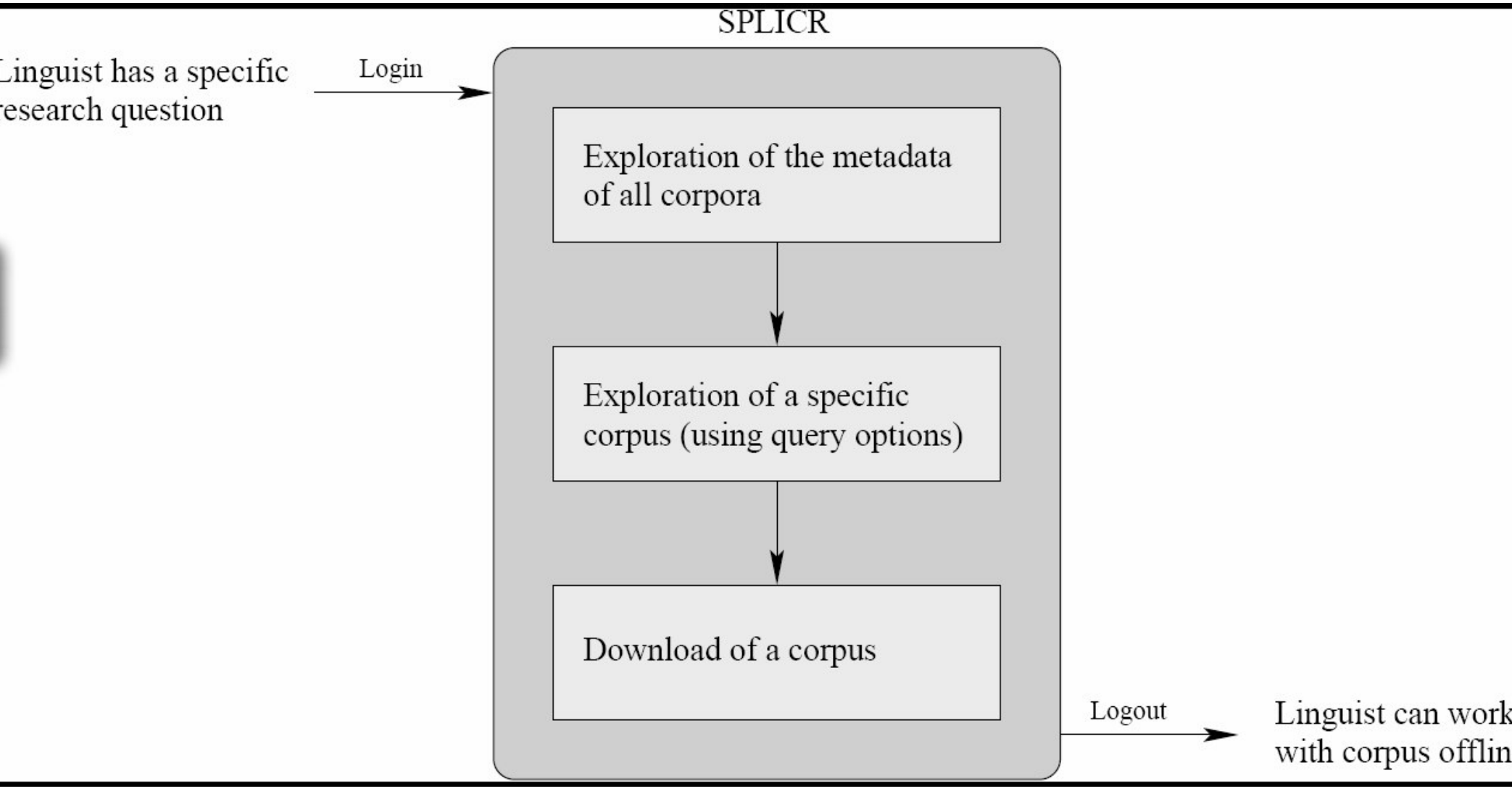
Advantages of this query process implementation

- The user can already start exploring the first result even though the system is still running queries on the remaining files
- A query monitor exists in the administration area of the front-end.
- It allows the administrator to display all currently running query jobs with additional details such as average query runtime per file and estimated remaining total runtime
- The administrator can cancel query jobs

The Front-end supports answering the questions

- Which linguistic resources are stored in the platform?
- Can one or more of these corpora be used as empirical data bases for a specific research question one is working on?
- What is the extent of the annotations of these resources and do they cover what is needed for one's research endeavor?

A typical usage scenario



Front end functionalities

- As soon as one or more corpora are selected the user can access the query interface which is based on two main concepts.
- Three different kinds of search widgets
  - full-text search,
  - concept search, and
  - tree fragment search.
- The query interface supports multiple tabs that can be added and deleted at will

Metadata Exploration

- As soon as a user logs onto the system a complete list of resources currently stored in SPLICR is presented
- Drop-down menus can be used to filter the list
- A click on the “information” icon expands the row that contains the name of the resource and its affiliation
- This expanded view shows
  - a brief description of the corpus,
  - its version,
  - the annotation layers, and
  - The number of files associated with this resource.

Listing of available resources – Selecting esources

Sustainability Platform for Linguistic Corpora and Resources – Resources available in SPLICR

SPLICR
Sustainability Platform for Linguistic Corpora and Resources

Logged in as Georg Rehm (root) [Imprint] [Logout]

Corpora & Resources
- List and Filter
- Selected
- Query

Documentation
- Ontologies
- Publications

Administration
- Create User
- Edit Users
- Query Monitor

General
- Imprint
- Change Password
- Logout

Resource Type | Organisation | Organisational Unit | Project

DiK	Corpus	Universität Hamburg, SFB 538 Project K02: Interpreting in Hospitals
SkanSem	Corpus	Universität Hamburg, SFB 538 Project K05: Semi-Communication and Receptive Multilingualism in Scandinavia

Audio recordings and annotated transcriptions of semi-communication and receptive multilingualism in present-day Scandinavian languages (Danish, Norwegian, Swedish). The audio recordings have been collected at several classes and from radio transmissions. They have been transcribed and annotated according to the HIAT-standard.

Version:	12th June, 2008
Annotation layers:	Contribution of Events, Contribution of Utterances, Comments I, Events, English Translation, Code Switching, German Translation, Phononological Comments
Number of associated resource files:	468

select | data sample | contents and download

KonSim	Corpus	Universität Hamburg, SFB 538 Project K06: Coherence in Interpreter-Mediated Discourse
Potsdam Commentary Corpus, public subsection	Corpus	Universität Potsdam, SFB 632: Information Structure Project D01: Linguistic Database for Information Structurally Annotated Corpora
Tatian corpus	Corpus	Universität Potsdam, SFB 632: Information Structure Project B04: The role of information structure in the development of word order regularities in Germanic
TüPoDia-Korpus	Corpus	Universität Tübingen, SFB 441: Linguistic Data Structures Project B09: Local and Temporal Deixis in the Romance Languages: History and Variation
	Super Corpus	Universität Tübingen, SFB 441: Linguistic Data Structures

Resource Type | Organisation | Organisational Unit | Project

DiK	Corpus	Universität Hamburg, SFB 538 Project K02: Interpreting in Hospitals	
SkanSem	Corpus	Universität Hamburg, SFB 538 Project K05: Semi-Communication and Receptive Multilingualism in Scandinavia	

Audio recordings and annotated transcriptions of semi-communication and receptive multilingualism in present-day Scandinavian languages (Dani Norwegian, Swedish). The audio recordings have been collected at several classes and from radio transmissions. They have been transcribed and anr according to the HIAT-standard.

Version:	12th June, 2008
Annotation layers:	Contribution of Events, Contribution of Utterances, Comments I, Events, English Translation, Coc German Translation, Phononological Comments
Number of associated resource files:	468

select	data sample	contents and download

KonSim	Corpus	Universität Hamburg, SFB 538 Project K06: Coherence in Interpreter-Mediated Discourse	
Potsdam Commentary Corpus, public subsection	Corpus	Universität Potsdam, SFB 632: Information Structure Project D01: Linguistic Database for Information Structurally Annotated Corpora	
Tatian corpus	Corpus	Universität Potsdam, SFB 632: Information Structure Project B04: The role of information structure in the development of word order regularities	
TüPoDia-Korpus	Corpus	Universität Tübingen, SFB 441: Linguistic Data Structures Project B09: Local and Temporal Deixis in the Romance Languages: History and Variation	
	Super Corpus	Universität Tübingen, SFB 441: Linguistic Data Structures	

Metadata Exploration

- If the user wants to know more, the hyperlink “contents and download” switches to a view that lists all files that belong to a corpus

Contents and download

http://localhost:8080 - Sustainability Platform for Linguistic Corpora and Resources - Resource Contents

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Bosnische Interviews — Corpus — Universität Tübingen, SFB 441: Linguistic Data Structures
Project B08: Corpusbased Analysis of Local and Temporal Deictics in (Spontaneously) Spoken and (Reflected) Written Language — show five files per group

Processed Data – size: 2001948 bytes – number of files: 38

Annotation Layer: Editorial Notes – size: 583444 bytes – number of files: 12 — leave layer as is (default)

Annotation Layer: Deictics – size: 623679 bytes – number of files: 13 — leave layer as is (default)

1	Corpus-Deictics-Dataset_01_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	44218
2	Corpus-Deictics-Dataset_02_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	35178
3	Corpus-Deictics-Dataset_03_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	39738
4	Corpus-Deictics-Dataset_04_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	40857
5	Corpus-Deictics-Dataset_05_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	40235

Annotation Layer: Conversation – size: 794825 bytes – number of files: 13 — leave layer as is (default)

Metadata – size: 20157 bytes – number of files: 6 — metadata export

1	Metadata-Annotation-Conversation-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	3216
2	Metadata-Annotation-Deictics-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	2909
3	Metadata-Annotation-EditorialNotes-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	2921
4	Metadata-Corpus-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	5028
5	Metadata-PrimaryData-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	2817

Original data – size: 1339494 bytes – number of files: 44

1	b8-interviewheader-metadaten.xml (source file)	Metadata	text/xml	3127
2	b8-interviews-BG1-metadaten.xml (source file)	Metadata	text/xml	1382
3	b8-interviews-BG2-metadaten.xml (source file)	Metadata	text/xml	1382
4	b8-interviews-BH-metadaten.xml (source file)	Metadata	text/xml	1273
5	b8-interviews-BJ-metadaten.xml (source file)	Metadata	text/xml	1334

Transformation data – size: 52082 bytes – number of files: 26

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terviews | Corpus | Universität Tübingen, SFB 441: Linguistic Data Structures
Project B08: Corpusbased Analysis of Local and Temporal Deictics in (Spontaneously) Spoken and (Reflected) Written Language | show five file

Processed Data – size: 2001948 bytes – number of files: 38

Annotation Layer: Editorial Notes – size: 583444 bytes – number of files: 12 | leave layer as is (default)

Annotation Layer: Deictics – size: 623679 bytes – number of files: 13 | leave layer as is (default)

1	Corpus-Deictics-Dataset_01_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	442
2	Corpus-Deictics-Dataset_02_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	351
3	Corpus-Deictics-Dataset_03_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	397
4	Corpus-Deictics-Dataset_04_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	408
5	Corpus-Deictics-Dataset_05_of_13-File_1_of_1.xml (source file)	Corpus	text/x-genau-corpusdata	402

Annotation Layer: Conversation – size: 794825 bytes – number of files: 13 | leave layer as is (default)

Metadata – size: 20157 bytes – number of files: 6 | me

Metadata-Annotation-Conversation-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	32
Metadata-Annotation-Deictics-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	29
Metadata-Annotation-EditorialNotes-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	29
Metadata-Corpus-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	50
Metadata-PrimaryData-File_1_of_1.xml (source file, HTML)	Metadata	text/x-genau-metadata	28

Original data – size: 1339494 bytes – number of files: 44

b8-interviewheader-metadaten.xml (source file)	Metadata	text/xml	31
b8-interviews-BG1-metadaten.xml (source file)	Metadata	text/xml	13
b8-interviews-BG2-metadaten.xml (source file)	Metadata	text/xml	13
b8-interviews-BH-metadaten.xml (source file)	Metadata	text/xml	12
b8-interviews-BJ-metadaten.xml (source file)	Metadata	text/xml	13

Transformation data – size: 52082 bytes – number of files: 26

Multiple Methods of Querying Corpora

- The target users (i. e., linguists) are (in general) not proficient in XML query languages such as XPath and XQuery,
- Therefore, intuitive query interfaces that generalize from the underlying data structures and querying methods are presented:
  - Full-Text Search: The full-text search query widget can be used to find certain words or simple patterns in corpora. Matches are highlighted in the result browser.
  - Concept Search: The concept search query widget presents a list of linguistic concepts that are contained in the individual annotation layers that make up a corpus.
  - Tree-Fragment Search: an interactive editor for constructing linguistic tree fragments that can be queried against the currently selected corpus

Example 1: The concept-search

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Query | Constraint 1 | Constraint 2

Query Type & Layer

Query Type
- Concept Search
- Fulltext Search
- Tree Search

Annotation Layer
Grammatical Function

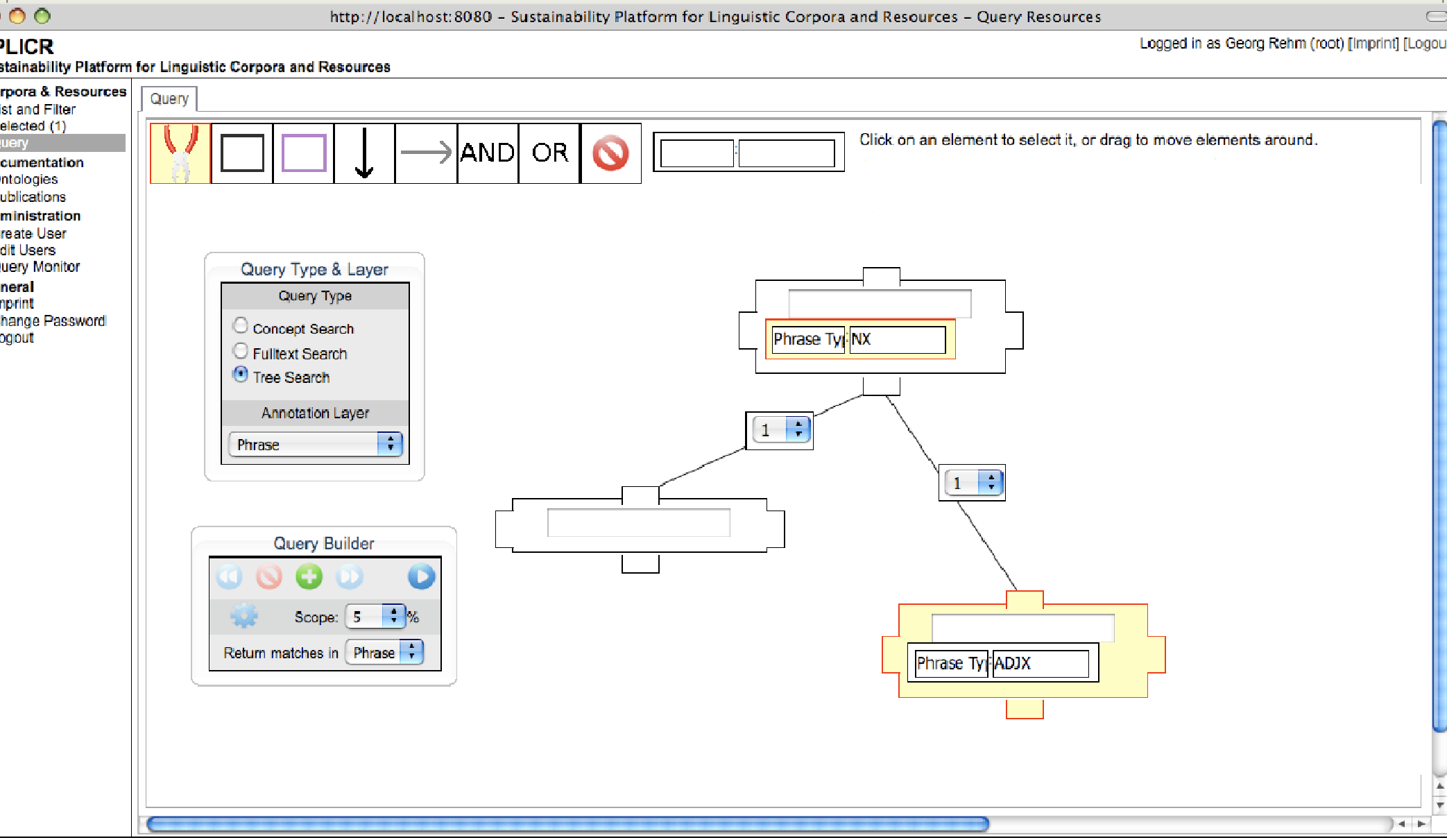
Search Part of Speech $,

Query Builder

Scope: 5 %

Return matches in Phrase

Example 2: The tree-editor for constructing queries



Presentation of the search results

- We provide three different query widgets that can be used to search and query corpora.
- The results of these queries are visualized by the result browser that offers four different display modes:
  - plain text view
  - XML view
  - box view
  - tree view

Results view: tree view

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Query | Results

20 of 685 | Tree View | edges | attributes

Query Builder
Scope: 5 %
Return matches in Phrase

ntNode
id: s_25546_n_533
leveler:category: NX
leveler:function: HD

ntNode
id: s_25546_n_528
leveler:category: NX
leveler:function: -

ntNode
id: s_25546_n_513
leveler:category: NX
leveler:function: HD

ntNode
id: s_25546_n_514
leveler:category: ADJX
leveler:function: -

orth | desc | orth | desc | orth | desc | orth | desc

die | Abhaltung | regelmäßiger | Treffen

2%

Results view: XML view

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Query | Results

20 of 692 XML View

```
<ntNode xmlns:leveler="urn:xmlns:sfb441:leveler" xmlns:exist="http://exist.sourceforge.net/NS/exist" id="s_25546_n_533" leveler:category="NX" leveler:function="HD">
    <ntNode id="s_25546_n_513" leveler:category="NX" leveler:function="HD">
        <orth> die </orth>
        <desc/>
        <orth> Abhaltung </orth>
        <desc/>
    </ntNode>
        <ntNode id="s_25546_n_528" leveler:category="NX" leveler:function="-">
            <ntNode id="s_25546_n_514" leveler:category="ADJX" leveler:function="-">
                <orth> regelmäßiger </orth>
                <desc/>
            </ntNode>
            <orth> Treffen </orth>
            <desc/>
        </ntNode>
</ntNode>
```

Query Builder
Scope: 5 %
Return matches in Phrase

2%

Results view: box view

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Sustainability Platform for Linguistic Corpora and Resources

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Query | Results

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ntNode
- ntNode
  - orth: die
  - desc
  - orth: Abhaltung
  - desc
- ntNode
  - ntNode
    - orth: regelmäßiger
    - desc
  - orth: Treffen
  - desc

Query Builder

Scope: 5 %

Return matches in Phrase

2%

Summery:

- **Project Background: Aim of the Project**
- **Different Annotation Strategies**
- **Generalised Architecture for Sustainability of Linguistic Data (GENAU)**
- **Merging differently annotated corpora**
  - **Transforming Single Rooted Trees**
  - **Transforming Annotation Graphs**
  - **Transforming Stand-off Annotations**
- **The Platform SPLICR**

Publication:

Lit Linguist Computing -- Table of Contents (June 2009, 24 [2]) - Mozilla Firefox

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Oxford Journals › Humanities › Literary and Linguistic Computing › Volume 24, Number 2

Georg Rehm, Oliver Schonefeld, Andreas Witt, Erhard Hinrichs, and Marga Reis: *Sustainability of annotated resources in linguistics: A web-platform for exploring, querying, and distributing linguistic corpora and other resources* LLC 2009 24: 193-210

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Fertig