



# The Text Encoding Initiative as an Infrastructure

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Digital Research Infrastructure  
for the Arts and Humanities

# **THE TEXT ENCODING INITIATIVE AS AN INFRASTRUCTURE**

**LAURENT ROMARY, INRIA & DARIAH**

**28 FEBRUARY 2017**

[www.dariah.eu](http://www.dariah.eu)

# A brief history of time

- DARIAH: a 10+ year story
  - The central role of data, expertise and standards
- TEI: 30 years of building standards and gathering competence
  - Integrated in the DH landscape
- Picture for the future
  - Complementarity: sustaining and reaching out

# Sources: evidence based research in the humanities

Documenting:  
origin, date,  
material

Qualifying:  
authorship, research  
value, authenticity

16) Berlin, d. 16. (14) X. 41.  
Wollen das Datum richtig genau hinschreiben (es ist  
der 16. - d. h. die Nacht vom 16. zum 14. Oktober des so-  
glorreichen Jahres 1941 - n. heute Nacht werden wahr-  
scheinlich die ersten von den Berliner „Juden“ nach Polen  
abtransportiert): damit diese Ironie chronik auch

Analyzing:  
layout, transcription,  
names, dates

Communicating:  
corpus, rights,  
contextualization

# Sources in the digital world

- Increased number of digitized and born-digital sources
- Dealing with the digital life cycle
  - Creation, curation, enrichment, communication, archiving... and certification
- Consequence for DARIAH
  - Building on the **Long-established tradition of digital arts and humanities** research in Europe
  - Contributing to sustaining **data, technical services** and above all **expertise**
  - The central role of researchers: DARIAH as **collective intelligence**
  - **Sharing with outsiders:** DARIAH as a platform









# Building up an infrastructure








- **2006:** DARIAH @ ESFRI Roadmap
- **2008 – 2011:** Preparatory Phase project — *Preparing DARIAH*
- **2011 – 2013:** Transition Phase establishing the DARIAH-ERIC
- **2014:** DARIAH-ERIC





# DARIAH as an ERIC

Founding Members	
Austria	
Belgium	
Croatia	
Cyprus	
Denmark	
France	
Germany	
Greece	

Founding Members	
Ireland	
Italy	
Luxembourg	
Malta	
Netherlands	
Serbia	
Slovenia	

Recent members	
Poland	
Portugal	

Cooperating partners in:

- Switzerland
- Sweden
- UK

# Virtual Competence Centers

## VCC 1 – e-Infrastructure

1. A+H Infrastructure Services
2. A+H Research Environment demonstrators
3. A+H Service Environment
4. Data Federation and interoperability
5. Developer community
6. Preservation Infrastructure
7. Reference Software Packages

## VCC 2 - Research & Education

1. Community engagement
2. Training and Education Programme
3. Understanding research practices
4. Virtual Research Environment

## VCC 3 – Scholarly Content Management

1. Best Practices and Open Access
2. Curation
3. Dissemination and Digital Publishing
4. Enrich digital scholarly content
5. Reference Data Registries

## VCC 4 – Advocacy, Impact & Outreach

1. Ensuring capacity in DARIAH
2. Ensuring Participation in DARIAH
3. High-level Advocacy
4. Impact and value
5. Outreach



# Working Groups – going bottom-up



[DARIAH-EU](#) / [Home](#) / [Working Groups](#)

## List of DARIAH Working Groups

Erstellt und zuletzt geändert von Lisa de Leeuw vor 42 Minuten

Bearbeiten Beobachten Teilen Extras ▾

### Working groups:

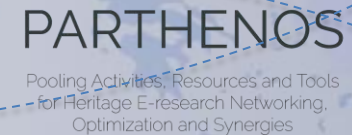
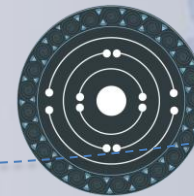
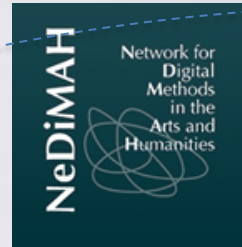
Name	Contact person(s)	main VCC	submitted	approved by JRC	approved by SMT
Natural Language Processing	<a href="#">@Alex O'Connor</a> , <a href="#">@Fotis Jannidis</a>	1 and 2	22/2/2015	3/3/2015	13/3/2015
<a href="#">WG Meta-Registry - An Integrated Registry Service</a>	<a href="#">@Dimitris Gavrilis</a>	1	13/3/2015	30/3/2015	7/5/2015
Visual Media for Digital Humanities	<a href="#">@Roberto Scopigno</a> , <a href="#">@Lars Wieneke</a>	1	17/3/2015	30/3/2015	7/5/2015
Training and Education	<a href="#">@Claire Clivaz</a> , <a href="#">@Toma Tasovac</a> , <a href="#">@Walter Scholger</a>	2	22/2/2015	3/3/2015	13/3/2015
WG Digital Methods and Practices Observatory (DIMPO)	<a href="#">@Costis Dallas</a>	2	23/3/2015	4/5/2015	7/5/2015
WG Analyzing and linking biographical data	<a href="#">@Antske Fokkens</a> , <a href="#">@Eveline Wandl-Vogt</a>	2	22/2/2015	4/3/2015	13/3/2015
Lexical Resources	<a href="#">@Laurent Romary</a> , <a href="#">@Toma Tasovac</a> , <a href="#">@Eveline Wandl-Vogt</a>	2	22/2/2015	3/3/2015	13/3/2015
WG Community Engagement	<a href="#">@Agiatis Benardou</a> , <a href="#">@Aurélien Berra</a>	2	22/2/2015	3/3/2015	13/3/2015
Digital Annotation	<a href="#">@Ruth Reiche</a> , <a href="#">@Harald Lordick</a> , <a href="#">@Nils-Oliver Walkowski</a>	2	1/6/2015	12/6/2015	26/6/2015



# Services



# Communities within and around DARIAH



**E-RHIS**



- ✿ Horizon 2020 funded project
- ✿ Call: H2020-INFRADEV-2016-2017  
(Development and long-term sustainability of new pan-European research infrastructures)
- ✿ Starting date: January 2017
- ✿ Duration: 36 months
- ✿ Consortium: 15 partners from all over Europe

## WP3: GROWTH

- New Countries: UK, Czech Republic, Spain, Switzerland, Finland, Israel.
- Prepare DH RI Country Reports and Develop Specific Accession Strategy and Action Plans
- Coordinate, Monitor and Support Enlargement

# Data fluidity

- Progress so far in several directions
  - Improvement of digital competence: #DARIATeach, DARIAH course registry
  - Development and maintenance of reference standards: TEI, ISO TC 37, archival standards
  - Progress in tooling and data hosting: Nakala, Ortolang
- One main issue: using and re-using content

# The loneliness of the researcher

- Conditions of access, re-use and communication of primary sources
  - How much can I take and re-use from a Cultural Heritage Institution ?
    - Illustration, citation, scans
  - How much am I allowed to disseminate?
    - Transcriptions, annotations, collations, mash-ups
  - Which recognition will I gain from this work?
    - From traditional publishing to online digital editions



# What am I allowed to do?

Documenting:  
origin, date,  
material

Qualifying:  
authorship, research  
value, authenticity

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Wollen das Datum richtig genau hinschreiben (es ist  
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glorreichen Jahres 1941 - n. heute Nacht werden wahr-  
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Analyzing:  
layout, transcription,  
names, dates

Communicating:  
corpus, rights,  
contextualization

# Data Re-use Charter

- Framing the conditions of collaboration between Cultural Heritage Institutions and Researchers
- Defines the key elements each of the parties commits to in terms of data access, use and re-use
- Online commitment to guaranty immediate reciprocal awareness, and thus create a trusted network of stakeholders

# Stakeholders

- Cultural Heritage Institutions (big or small)
  - Main source of primary information for research in the humanities (physical and/or digital)
- Equipments (big and small...)
  - Data production by researchers on CH objects
- Data hosting institutions
  - Warrant the stability, the visibility and the long time availability of the primary data
- Researchers
  - Compile, analyse, enrich and disseminate CH content
  - Engaging in person or via their HER institution

# Common commitments

- Access
  - Metadata, primary surrogates, transcriptions
- Licensing
  - May depend on types of data and specific collections
- Dissemination
  - Technical requirements, citation rules, associated publications
- Enrichments
  - Re-use, hosting and visibility of scholarly work
  - Aiming jointly at improving quality of digital resources

# Perspectives

- Timeline
  - Charter outline
  - Setting up a round table with representatives of all types of stakeholders
  - Online prototype with first participants
  - Official kick-off in conjunction with the IFLA conference in 2017
- Making the charter a reference communication tool for CHI's and scholars
  - Strong collaboration needed with: Europeana, Clarin and E-RIHS
  - Support from the Parthenos and Iperion project

# **STANDARDISATION IN DARIAH AND PARTHENOS**

[www.dariah.eu](http://www.dariah.eu)



# Standards, standards, everywhere...

- Standards: non legally binding documents produced by organisation ensuring
  - International **consensus** building (not a one person's/one group's work)
  - **Communication** (standards cannot be internal to an organisation)
  - **Maintenance** (evolution according to users' needs, technology change etc.)
- ISO, W3C, TEI comply to this principles
- Important distinction:
  - Horizontal standards (cross-domain: ex. XML)
  - vs. Vertical standards (specific to one domain: ex. ISO 24611 for morpho-syntactic annotations, EAD for archival collections)

# Standards in the Arts and Humanities

- Well established practices (examples)
  - Text Encoding Initiative
    - Comprehensive XML vocabulary for textual documents
  - ISO TC 37/SC 4 portfolio
    - Mature set of standards for linguistic annotation
- Niches to be secured
  - MEI (Music Encoding Initiatives)
- Lacunae (or fragmentations) to overcome
  - E.g. Descriptive metadata for audio-visual data
- Library and archival standards to interoperate with
  - METS, MODS, FRBR descriptive framework
  - EAD, EAG, EAC

# Standards and scholarly communities

- Informing
  - Minimal knowledge to express requirements towards implementers
  - Being able to design community data models in terms of existing standards
- Participating
  - Keeping standards as close as possible to the need of communities
  - Training of standards experts within scholarly communities
- Looking ahead
  - Standards should anticipate on future needs and use cases
    - E.g. Provision of generic and customisation mechanisms
      - E.g. Unicode, TEI

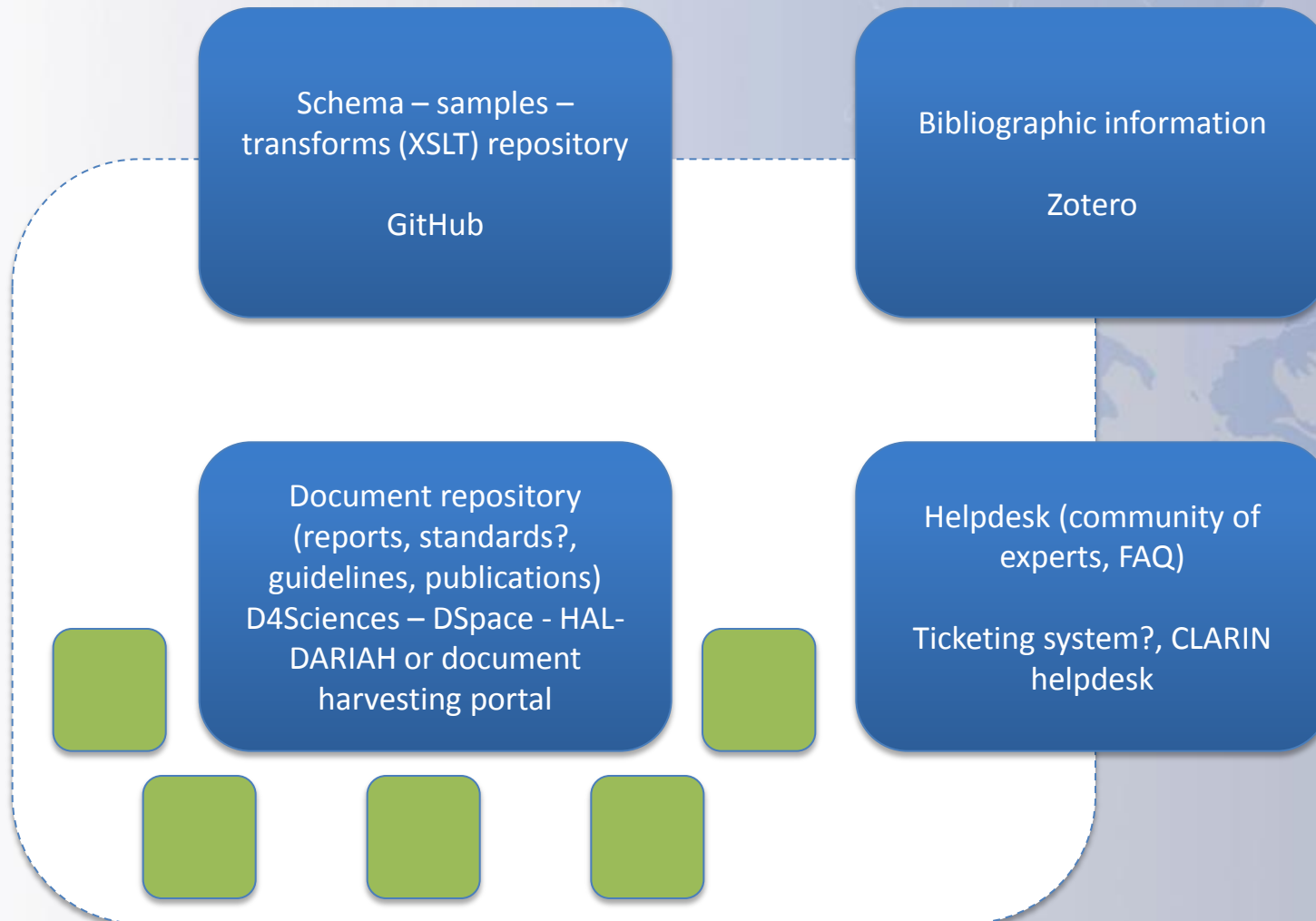
# Striving for impact

- The variety of document types in the humanities provide a wealth of rich data models
  - Potential impact on other communities with similar needs
- A typical example: the European Patent Office
  - Some figures
    - Several thousands of examiners
    - 200 million documents
    - 2 billion annotations...
  - A TEI based model for their back-office document platform
    - Families, Applications, Documents
- Importance of a real standardisation strategy and high-quality data models

# Implementing the vision through Parthenos

- H2020 Infrastructure project
  - WP4: dedicated to standards
- How to proceed?
  - Documenting, recommending and disseminating information about well-established standards (SSK)
  - Fostering the stabilisation of stable community initiatives
  - Launching standardisation think-tanks for under-covered domains

# Organising knowledge about standards





# Issues

- Limiting new developments
  - Existing infrastructures
- Ensuring genericity
  - Expert network
- Agile deployment
  - No big plan
- Thinking sustainable right from the onset
  - Our role as infrastructure

# **THE TEXT ENCODING INITIATIVE: 30 YEARS OF ACCUMULATED WISDOM AND ITS POTENTIAL FOR A BRIGHT FUTURE**

# In the beginning



Text archives  
Humanities  
Standards  
SGML

*Not intended  
(immediately)  
for individual  
scholars*

1. Novembre 1987:  
Vassar College,  
Poughkeepsie

# A quick historical overview

- 1960's — GML (Generalized Markup Language) by IBM
- 1970's & 1980's — ANSI initiates project to develop a Standard text-description language based on GML
- 1983 — SGML became an industry standard
- 1986 — SGML (Standard Generalized Markup Language) becomes an ISO standard: ISO 8879:1986
- 1987 — TEI (Text Encoding Initiative)
- 1990 — HTML 1.0 (HyperText Markup Language)
- 1992 — TEI edition P3 (Michael Sperberg-McQueen and Lou Burnard, eds)
- 1997/1998 — XML 1.0 (eXtensible Markup Language) (Tim Bray, Jean Paoli and Michael Sperberg-McQueen, eds)

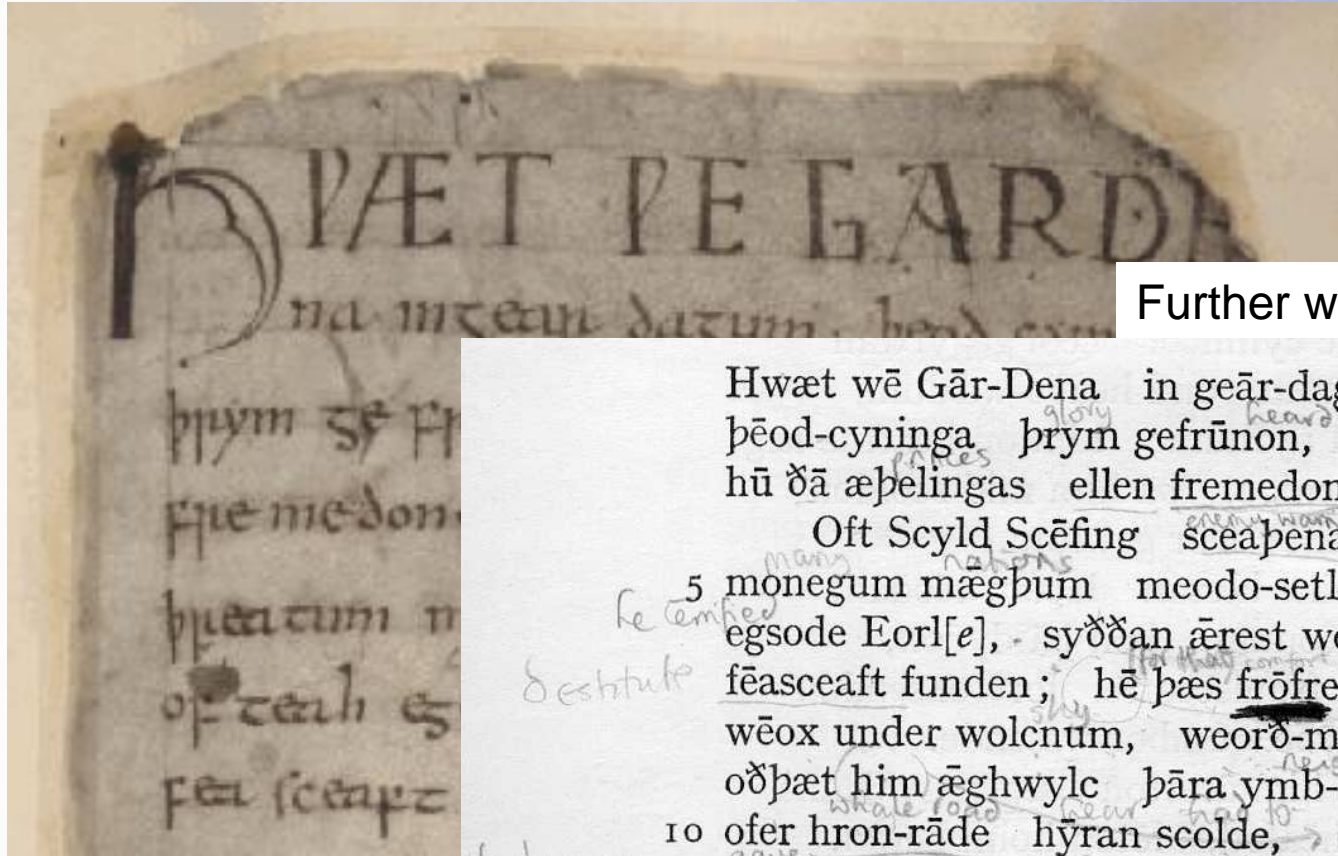


# TEI for digital scholarly work

- A trend towards digital curatorship
  - Describing digital sources: meta-data
  - Understanding and representing the structure of digital sources: content
  - Enriching (annotations, links), versioning, disseminating
- A wide user community
  - From individual scholars to large digitization [projects](#)

# The standard scenario?

Digitizing source documents



Further work on documents

Hwæt wē Gār-Dena in geār-dagum

þeod-cyninga þrym gefrūnon,

hū ðā æþelingas ellen fremedon.

Oft Scyld Scēfing sceapena brēatum,

5 monegum mægþum meodo-setla oftēah;

egsode Eorl[e], syððan ārest wearð

fēasceaft funden; hē þæs frōfre gebād:

wēox under wolcnum, weorð-myndum þāh,

oðþæt him āghwylc þāra ymb-sittendra

10 ofer hron-rāde hyran scolde,



# TEI –core principles (1)

- The TEI document as a digital surrogate of a physical source
  - A TEI document is always part of a digital library workflow
    - Source – surrogate – enrichment – publication
    - Recorded in the header; encoded in the content
  - Born digital documents may as well encounter a succession of changes/versions
- The TEI document as an autonomous object in a DL workflow
  - Embedded meta-data + content
  - Multiple “hands”: annotation

# TEI –core principles (2)

- Favoring the semantics rather than the layout
  - (quasi) No presentational construct
  - Publication requires a transformation stage (XSLT; ePub, pdf, HTML, etc.)
- Document structure
  - Macro-structure: front-body-back
  - Meso-structure: divisions, paragraphs/lists/figures/etc.
  - Micro-structure: in-line annotation mechanisms
    - Dates, names, notes, references, foreign expressions, etc.



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# **ALL YOU CAN ENCODE...**

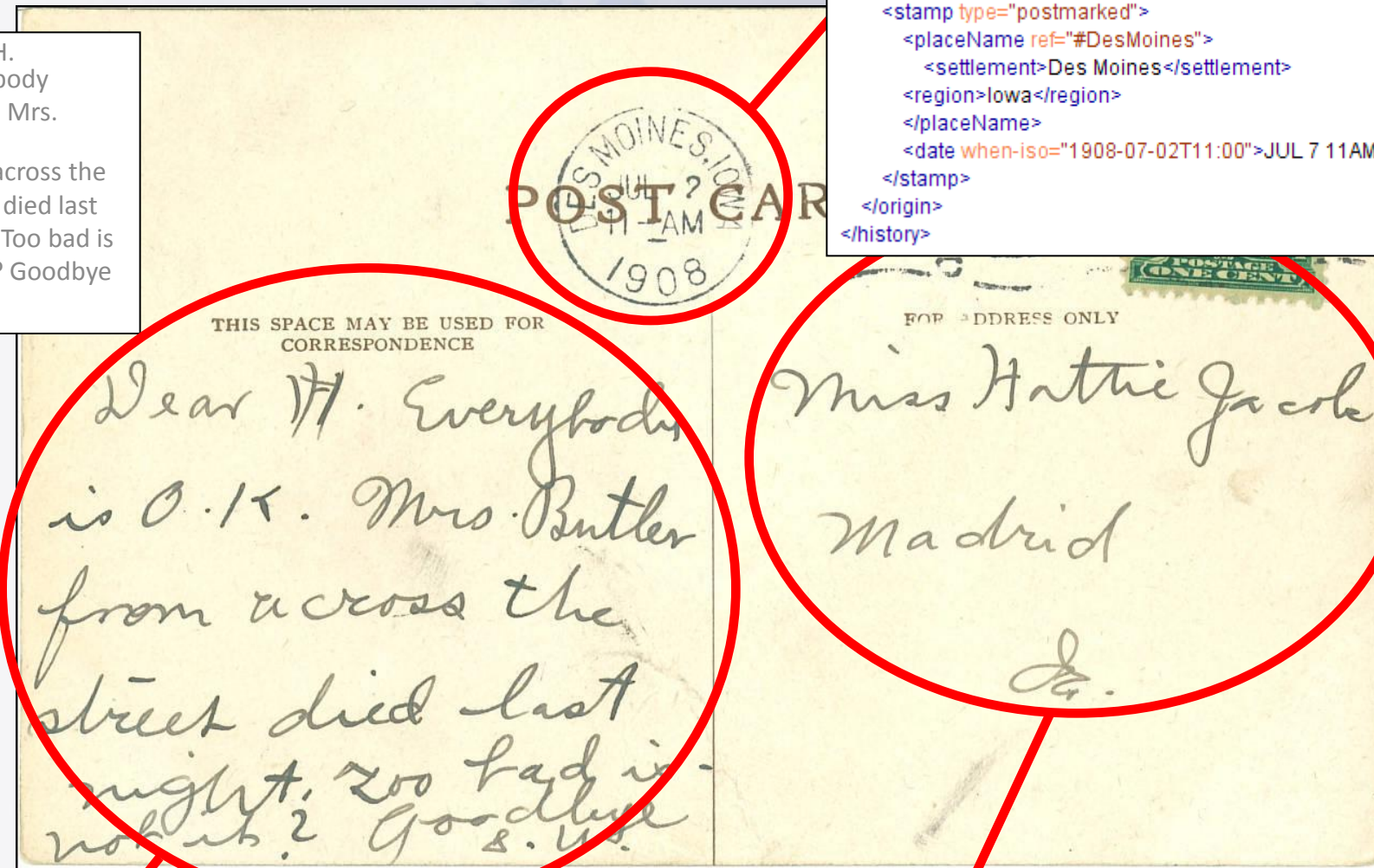
[www.dariah.eu](http://www.dariah.eu)

# Examples

- Simple encoded text
  - [The Little Riding Hood](#)
- Scholarly paper
  - [Towards Higher Ground](#)
- Dictionaries
  - [Larousse](#)

- Dear H.
- Everybody
- is O.K. Mrs.
- Butler
- from across the
- street died last
- night. Too bad is
- not it? Goodbye
- S. W.

```
<history>
  <origin>
    <stamp type="postmarked">
      <placeName ref="#DesMoines">
        <settlement>Des Moines</settlement>
        <region>Iowa</region>
      </placeName>
      <date when-iso="1908-07-02T11:00">JUL 7 11AM 1908</date>
    </stamp>
  </origin>
</history>
```



```
<div type="back" facs="#noble0337b">
  <div type="left">
    <salute>Dear <persName ref="#HJ">H</persName>. </salute>
    <p>Everybody <lb/>is O.K. Mrs. Butler <lb/>from across the <lb/>street died
      last <lb/>night. Too bad is <lb/>not it? </p>
    <signed>Goodbye <lb/><persName>S. W.</persName></signed>
  </div>
```

```
<div type="right">
  <p>
    <address>
      <addrLine>Miss <persName ref="#HJ">Hattie Jacobs</persName></addrLine><lb/>
      <placeName ref="#Madrid"><settlement>Madrid</settlement><lb/>
      <region>Ia</region></placeName>
    </address>.
  </p>
</div>
```





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# HOW DO YOU MANAGE THIS?

[www.dariah.eu](http://www.dariah.eu)



# TEI in a nutshell

- TEI namespace:
  - `xmlns="http://www.tei-c.org/ns/1.0"`
- TEI documentation:
  - <http://www.tei-c.org/release/doc/tei-p5-doc/en/html/>
- TEI processor, Roma:
  - <http://www.tei-c.org/Roma/>
- TEI document model
  - Read: <http://www.tei-c.org/release/doc/tei-p5-doc/en/html/DS.html>
- TEI architecture: modules, classes
- TEI vocabulary: more than 500 elements...
  - Read: <http://www.tei-c.org/release/doc/tei-p5-doc/en/html/CO.html>

# TEI as a standardization body (1)

- Consensus building
  - Community based decision process
- Maintenance
  - Two releases per year
- Publication
  - All TEI contents are available under the double CC-BY+BSD 2 clause license.

# TEI as a standardization body (2)

- Organization
  - Consortium of institutional and individual members
  - Conference, journal (jTEI)
- The TEI at work
  - Board: administrative aspects
  - Technical council: coordinates the evolution of the TEI guidelines

# Standardization work

- Community based workflow
  - Mailing list
  - GitHub – bugs and features
    - Recording all issues and decisions
  - Cf. ODD as a specification platform
- Deliverables
  - Documentation — [TEI guidelines](#) (more than 500 elements)
  - Schemas — DTD, RelaxNG, W3C
- Additional resources
  - Tools
    - Online customization: Roma
    - Online processing: OxGarage
    - Stylesheets (included in Oxygen)
  - Examples — [TEI by Example](#)

# Special Interest Groups (SIGs)

- Computer-Mediated Communication (Michael Beißwenger)
- Correspondence. (Peter Stadler and Joachim Veit)
- Education (TBA)
- Libraries (Stefanie Gehrke and Kevin Hawkins)
- Manuscripts (Dot Porter and Gerrit Brüning)
- Music (Raffaele Viglianti)
- Ontologies (Oyvind Eide and Christian-Emil Ore)
- Scholarly Publishing (Daniel O'Donnell)
- TEI for Linguists (Piotr Bański and Andreas Witt)
- Text and Graphics (John Walsh and Martin de la Iglesia)
- Tools (Serge Heiden)

# Varieties of TEI Conformance

- Pure *TEI-all* subset
  - Most TEI projects
- TEI subset with extensions
  - E.g. adding TBX terminologies in TEI
- Non TEI document with TEI constructs (defined as an ODD)
  - EAG extensions in the EU Cendari project
- Non TEI document defined by means of an ODD document
  - E.g. ISO 24616:2012 Language resources management -- Multilingual information framework



# The central role of customization

- Each TEI project starts with the definition of a customisation
  - Module selection
  - Sub-setting elements
  - Reducing possible values or content models
  - Adding, when necessary, new descriptive object
- ODD as the technical platform for customization

# Consequences

- Family of formats
  - Comparison of two TEI-based projects through their ODDs
- Support for third-party projects
  - In-house maintenance of customization and documentation
    - E.g. DTA bF at the Berlin Brandenburg Academy of Sciences
  - Even non TEI application!
    - E.g. EAD n ODD
- Does not prevent one from knowing the TEI components...
  - Most projects can live with just a subset of the TEI ontology
    - With the strong possibility to impact on the guidelines themselves
      - E.g. <abstract>



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# **TEI: RETURN TO THE FUTURE**

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# TEI: you're not alone...

- The hidden TEI: scientific information at the European Patent Office
- New components in the TEI: <standOff>
- Working with others: ISO LMF



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# SCIENTIFIC INFORMATION?

[www.dariah.eu](http://www.dariah.eu)

# Characterising scientific documents

- Expert documents describing a specific scientific and technical progress with respect to the state of the art
- Three main domains
  - Scholarly publications
  - Standardisation documents
  - Patents
- Some common characteristics
  - Authorship: the basis of scientific attribution
  - Structure: usually a formal internal organisation
  - Vocabulary: technical terms are essential to convey (or hide) meaning
  - Network of references: relating to the state of the art
  - Certification: workflow, responsibilities, metadata



# Authorship

## **Publications** - *The essence of publishing*

- Importance of attribution
- Reflects the context and time of the research (project, affiliation, biography)
- The hidden hand of reviewers

## **Standards** - *Priority to the institution*

- Consensus building => large expert group
- ISO: no authors but project leaders
- W3C: editors

## **Patents** - *A variety of roles*

- Applicant/inventor/representative
- Opponents
- ... and *examiners*

# Workflow

## **Publications - *Semi-formal***

- Traditional (vestigial?) concept of peer-review
- From author's initial manuscript to publisher's version
- Evolution in the role of each version (e.g. prior art)

## **Standards - *Very formal***

- Decision process reflecting membership structure
- ISO: WD, CD, DIS, FDIS, IS
- One single reference document

## **Patents - *Very formal***

- Review by patent examiners
- Coordination of multiple submissions: national, US, Europe, etc.
- Importance of initial submission date

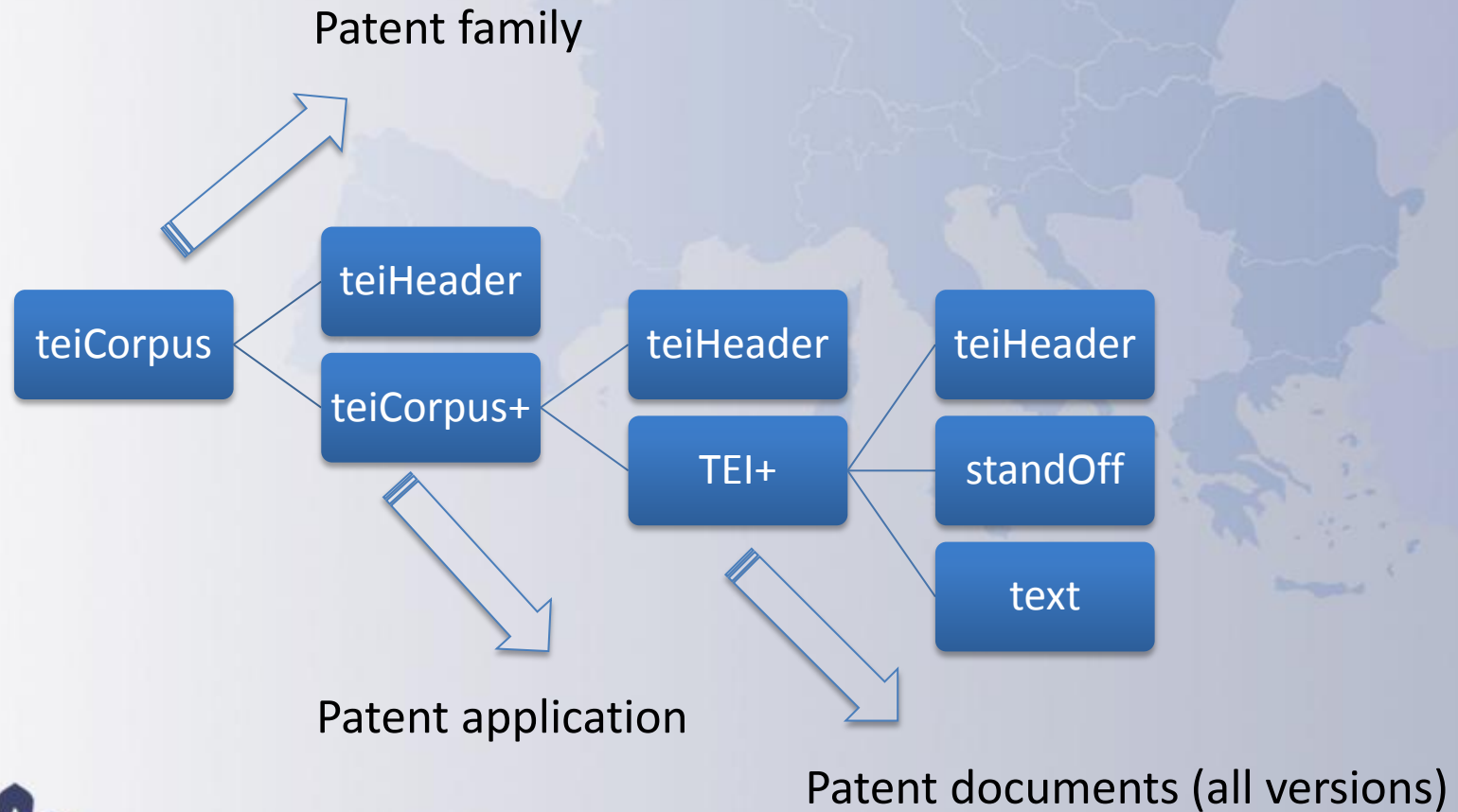
# The European Patent Office

- The European one-stop shop for patent applications
- Examination of each application by experts from the field (examiners)
  - Based on existing patents as well as scholarly publications (aka *Non Patent Literature*)
- Some figures
  - Several thousands of examiners
  - 200 million documents
  - 2 billion annotations...

# The (simplified) patent life-cycle

- Patent application in one or several patent offices
  - USPTO, Japan, EPO (directly or initiated in a specific country)
  - First application: reference date for the patent (“coming into force”)
  - Form a “Patent family”
- Examination process for one application
  - Search report, communications, decision, appeal, opposition
  - Patent documents may be revised at each stage
- Necessity to have a single model for dealing with all stages and versions
- The TEI appeared to be the optimal choice

# The Patent Document Model







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# WAKE UP STAND-OFF!

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# The simple picture



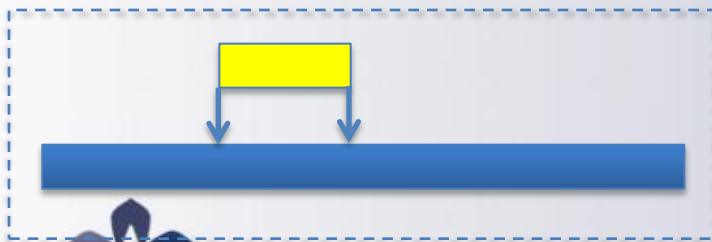
*Inline annotation:*

Intertwined with the source text



*Stand off annotation:*

Source text is referenced from outside



*Embedded stand off annotation:*

Stand off annotations attached to the same document as the source

# Why embedded stand-off annotation?

- In line (!) with the TEI philosophy
- Each time the source document is seen as the reference organisational unit
  - Corpus management
  - Transmission workflow
  - Multiple annotation layers
  - Competing annotations
    - E.g. Manual vs. automatic annotation

# Standoff: A long-standing issue

- The idea of standoff annotation is not new in general
  - Thompson & McKelvie, 1997
- Standoff annotation has been a core concept in the TEI guidelines since the beginning
  - Cf. Chapter: Linking, Segmentation, and Alignment
  - Availability of <anchor>, <span>, <interp>, <link>, @ana
- But: not integrated in the TEI architecture
  - Stand-off elements can appear anywhere in a TEI document
  - Usual trade-off between on-site vs. grouping (<back>)
- The NLP community has also developed its own means
  - GraF (Ide & Suderman 2007) , Paula (Zeldes et al. 2009), etc.
- Need for a proper, and inclusive, treatment of standoff annotations in the TEI
  - Better integration, more guidance

# Embedded standoff: Basic concept

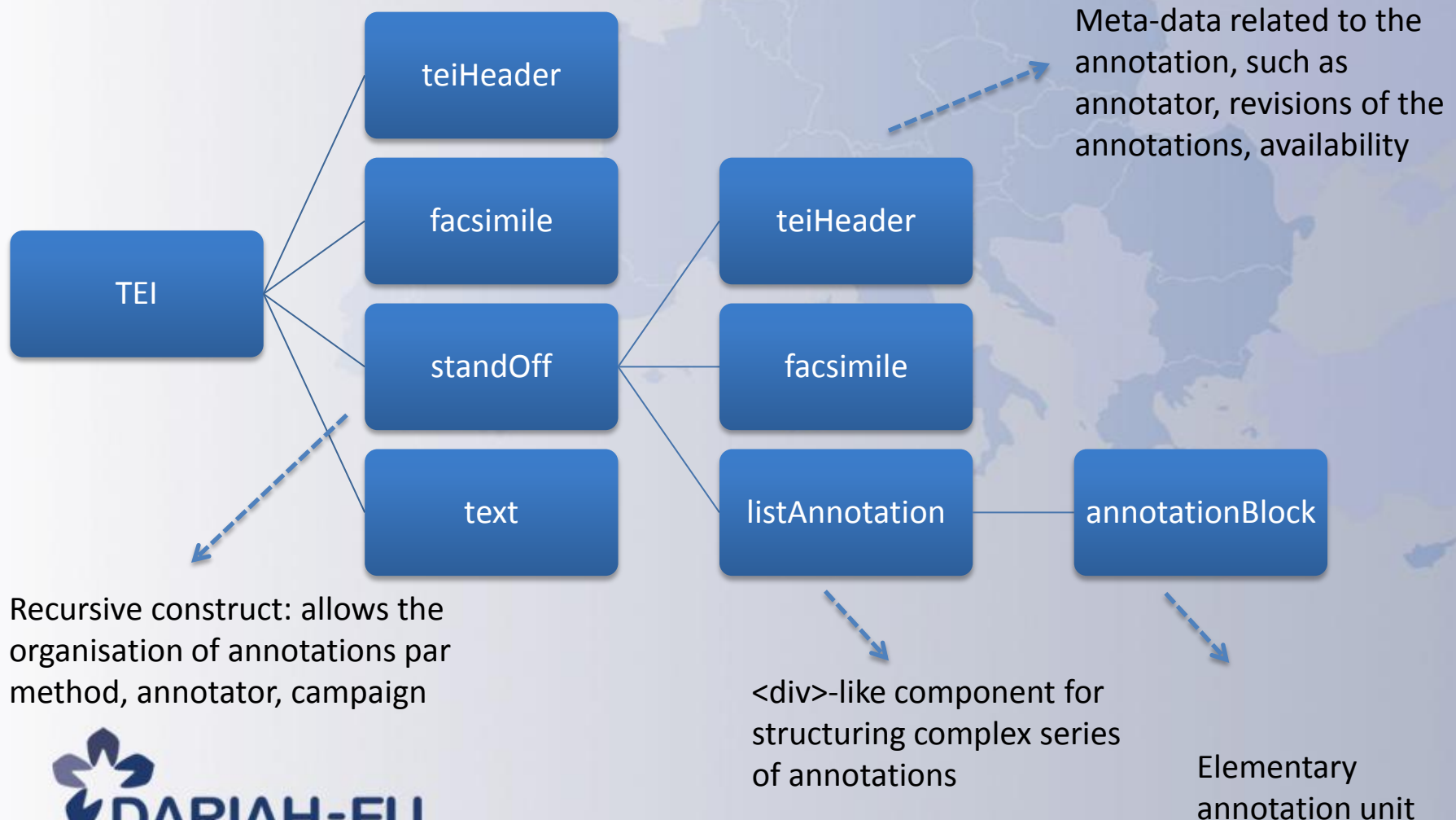
- Building up an autonomous document containing primary source and additional annotations
  - Annotations are conveyed with their specific meta-data
  - Annotations have their specific place in the TEI document architecture
  - Standoff annotations may be recursively organized
  - Standoff annotations may point to textual as well as facsimile content
  - Well-defined elementary annotation units
  - Coherence with existing models (Open Annotation, ISO TC 37) should be ensured
- Typical use-cases
  - Annotated corpora
    - Treebanks
  - Text mining
    - Named entity recognition, keyword/terms extraction
  - Human annotations on a document
    - critical editions, patent examination, peer review...
- Strong relation with interlinear annotation

# Timeline

- 2011: Paper by Thomas Schmidt in jTEI (<https://jtei.revues.org/142>)
- August 2012: new tickets by Javier Pose (EPO)
- January 2014: Workshop in Berlin
  - Draft of a first proposal
  - Setting-up a github environment
- 2012-2016: ISO 24624 project (Editor: Thomas Schmidt)
  - Need for a annotation grouping component (<annotationBlock>)
- May 2015: Council meeting in Ann Arbor
  - Several updates to the proposal
  - Stabilisation of element names
- March 2016: TEI release 6.0.0
  - New element <annotationBlock> for interlinear annotation
- August 2016: publication of ISO 24624 Transcription of Spoken Language



# Annotations in TEI: <standOff>



# Application: interlinear annotation

- Encoding interlinear annotation as inline content (in <text>)

```
<annotationBlock who="#SPK0" start="#T9" end="#T12" xml:id="au1">
  <u xml:id="u1">
    <seg xml:id="seg45" type="utterance" subtype="declarative">
      <w xml:id="w43">Nee</w> <pc xml:id="pc3">,</pc> <w xml:id="w44">hab</w> <w
xml:id="w45">kein</w> <w xml:id="w46">Führerschein</w>
    </seg>
  </u>
  <spanGrp type="en">
    <span from="#T9" to="#T12">No, I don't have a driver's license.</span>
  </spanGrp>
  <spanGrp type="pos">
    <span from="#w43" to="#w43">NE</span>
    <span from="#pc3" to="#pc3">$,</span>
    <span from="#w44" to="#w44">VAIMP</span>
    <span from="#w45" to="#w45">PIAT</span>
    <span from="#w46" to="#w46">NN</span>
  </spanGrp>
</annotationBlock>
```

# Standoff interlinear annotation

- Encoding interlinear annotation as stand-off markup

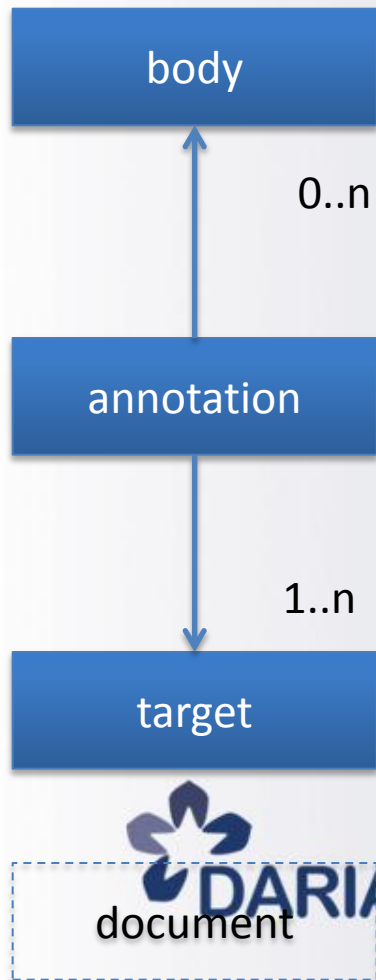
- In <standOff>

```
<annotationBlock inst="#u1">
  <spanGrp xmlns="http://www.tei-c.org/ns/1.0" type="en">
    <span from="#T9" to="#T12">No, I don't have a driver's license.</span>
  </spanGrp>
  <spanGrp xmlns="http://www.tei-c.org/ns/1.0" type="pos">
    <span from="#w43" to="#w43">NE</span>
    <span from="#pc3" to="#pc3">$,</span>
    <span from="#w44" to="#w44">VAIMP</span>
    <span from="#w45" to="#w45">PIAT</span>
    <span from="#w46" to="#w46">NN</span>
  </spanGrp>
</annotationBlock>
```

- In <body>

```
<u xml:id="u1" who="#SPK0" start="#T9" end="#T12">
  <seg xml:id="seg45" type="utterance" subtype="declarative">
    <w xml:id="w43">Nee</w><pc xml:id="pc3">,</pc>
    <w xml:id="w44">hab</w> <w xml:id="w45">kein</w> <w
xml:id="w46">Führerschein</w>
  </seg></u>
```

# Going further: mapping the Open Annotation model



<bibl>, <person>, <place>, <fs>, <note>,  
<body>, MAF, SynAF

<interp type="" inst="" ana="">

<span type="" from="" to="">

<zone type="" corresp="#\_theSurface"  
ulx="1253" uly="802" lrx="22" lry="29"/>

Any TEI object (with @xml:id) or <surface>

# Prototypical example

Dates in a named entity recognition context

```
<annotationBlock>  
  <date xml:id="E4N1" from="1944-08-17" to="1944-08-25">  
    17 - 25 août 1944</date>  
  <interp ana="#E4N1" inst="#d1e173"/>  
  <span xml:id="d1e173" from="#E4T6" to="#E4T10" />  
</annotationBlock>
```

Great advantage on readiness and programmatic treatment

# Issues (many)

- Which header do we need?
  - Standoff annotation usually requires very restricted meta-data
  - If we adopt the TEI header, we need to make it more flexible...
    - Should we have a convergence with biblFull (where profileDesc is missed, BTW, SF:533, deeply ambered)
  - Stand-off annotations may be generated by humans and machines
    - how to put <author> (editionStmt) and <appInfo> (encodingDesc) at the same place?
- How do we provide guidance concerning annotations?
  - Mapping the OA model to precise TEI constructs?
  - Allowing a wide variety of possible vocabularies depending on the use case?
    - TBX entries, MathML, full-text annotation (<body>?)
  - Aligning with the various ISO standards: MAF, SynAF and SemAF series



# Next steps

- Finalising the content model of <annotationBlock>
  - Completely open model?
  - Constrained with specific model classes? (OA)
  - Alternation between the two (or more) options
- Gathering reference example from existing implementations
  - Istex, Termith, EPO, IDS
- Finalising the graft in the guidelines
  - Section in chapter 16 Linking, Segmentation, and Alignment?
- Don't give up the fight...

# **JOINING EFFORTS WITH OTHERS: TEI AND LMF**

[www.dariah.eu](http://www.dariah.eu)

# A divided landscape

- The TEI print dictionary chapter
  - Available since more than 20 years
    - See <http://www.tei-c.org/Vault/Vault-GL.html>
  - Used in a wide variety of dictionary projects
    - 6 entries just in <http://www.tei-c.org/Activities/Projects/>
    - Disseminated at quick pace within the COS E-NEL network (credits: Toma Tasovac)
- ISO 24613:2008 Language resource management - Lexical markup framework (LMF)
  - Shorter life span
  - Mostly implemented in NLP related activities
- Is it worth reconciling the 2?
  - Yes: for the sake of combining a well-defined model with a rich XML infrastructure
  - A need for the TEI to have a terser model
    - Curation, interchange, tools, automatic generation of TEI constructs
- Is it just possible.

# The need for a revision

- Main assets of ISO 24613 LMF
  - Comprehensive core model + series of annexes for additional modules
  - Perfectible XML serialisation...
- Going towards a multi-part standard
  - Simplifying the editorial process (drafting, decision making, revising; various tempi)
  - Reflecting the needs of specific communities (modules, serialisation)

# Overview of the current plans

- Resolution 2016-04.2 (WG 4) Multi-part development of LMF
  - Part 1: Core model
  - Part 2: MRDs
  - Part 3: Diachrony-Etymology
  - Part 4: TEI serialisation
  - Part 5: LBX serialisation

# (Part 4) A TEI serialisation for LMF

- Objective
  - Preventing re-inventing element that already exist
  - Eliciting constraints on the TEI model
- Method
  - Covering core model and a selected number of extensions
    - Remaining in the scope of the Print dictionary chapter
    - Extending scope if we feel there is a need from the potential TEI applications (e.g. syntax)
  - Sub-setting the TEI guidelines
    - Associating a definite TEI construct for each component of the LMF Meta-model
    - Adding constraints when necessary
      - (e.g. @xml:lang mandatory on <entry>?)
  - Complementing the TEI
    - Defining new constructs (or elements?) if necessary
      - We are not bound to the existing chapter, even if we have to abide to the Birnbaum principle



# Gathering mapping proposals

Component	TEI construct
Lexical Entry	<entry>...</entry>
Form	<form>...</form>
Lemma	<form type="lemma">...</form>
Word Form	<form type="inflected">...</form>
Syntactic Behaviour	??
??	<etym>

Data category	TEI construct
/PartOfSpeech/	<pos>
/Gender/	<gen>
...	

How far should we go here?

# Once upon a time, the clergyman...

```
<entry xml:lang="en">
  <form type="lemma">
    <orth>clergyman</orth>
    <gramGrp>
      <pos>commonNoun</pos>
    </gramGrp>
  </form>
  <form type="inflected">
    <orth>clergyman</orth>
    <gramGrp>
      <number>singular</number>
    </gramGrp>
  </form>
  <form type="inflected">
    <orth>clergymen</orth>
    <gramGrp>
      <number>plural</number>
    </gramGrp>
  </form>
</entry>
```

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# (Part 3) The case of etymology

- A flat model in the current TEI chapter
  - No sense of etymon: <mentioned>
  - No sense of etymological process
    - Typed and recursive <etym>
  - No grouping of etymon related information
    - Usage, grammatical constraints, source, date, language, etc.
- A need for revision
- Pushing a fully fledged model

# Before-after example

## Old school

```
<etym>  
  <lang>Ahd.</lang>  
<mentioned>âband</mentioned>,  
<lang>mhd.</lang>  
<mentioned>âbent</mentioned>;  
<bibl>zur Etym. s. Kluge Mitzka 18. Aufl.  
unter „Abend“, ferner Schwäb. Wb. 1,  
11ff. Schweizdt. Wb. 1,34ff.</bibl>  
</etym>
```

## Structured

```
<etym type="inheritance">  
  <cit type="etymon" xml:lang="goh">  
    <oRef>âband</oRef>  
    <lang>Ahd.</lang>  
  </cit>  
  <etym type="inheritance">  
    <cit type="etymon" xml:lang="gmh">  
      <oRef>âbent</oRef>  
      <lang>mhd.</lang>  
    </cit>  
  </etym>  
  <bibl>zur Etym. s. Kluge Mitzka 18.  
Aufl. unter „Abend“, ferner Schwäb. Wb.  
1, 11ff. Schweizdt. Wb. 1,34ff.</bibl>  
</etym>
```

# An interesting moment

- Time to complement and consolidate the existing practices
  - TEI as reference framework
  - ISO as a precise standardisation background
- Various ongoing projects and groups
  - Clarin Standards committee, DARIAH WG Lexical Resources, TEI LingSIG
  - COST E-NEL WG2, EU Parthenos
- Joining efforts
  - Towards a single information space
    - Basecamp, GitHub, Blog
    - Exchanging information
  - Increasing participation as experts
    - ISO-TEI in particular



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# WHITHER TEI?

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# The TEI is doing well – the hidden TEI

- Antonio Zampolli price by ADHO
  - Reflects that the TEI is pervading all fields in the (digital?) humanities
- TEI has become a natural component of a humanities project based on textual sources
  - Many small editions are flourishing everywhere
  - Now recommended or requested by funding organisations
  - Numerous training events (cf. DiXiT)
- Taken up by larger organisations
  - Academies, Dictionary projects, EPO... especially in Europe

# Consolidating our conceptual model

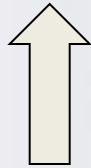
- TEI as a rich space of elementary constructs
- Multifarious document types for various communities
  - From scholarly editions to dictionaries, including computer mediated communication, scientific information, etc.
  - More precise guidelines for specific applications
    - Collaboration with ISO (standards), DARIAH (recommendations)
    - Reducing syntactic freedom in specific application domains, not in TEI as a whole
  - Complementing our stock: onomasiological constructs, standOff
- TEI as a data modelling infrastructure

# Focusing, enlarging?

- Enlarging our expert basis
  - Stronger role for SIGs
  - Close coordination with council
  - Bringing in more technical experts from outside
- Institutional partnership
  - Archives, Clarin, DARIAH, MEI, Europeana
    - Further enforcement of the TEI guidelines
    - Sharing our technical platform
      - E.g. EAD maintenance
  - Thinking together the sustainability of TEI material
    - Repositories (Tapas)
    - The TEI already offers a strong basis for sustainability
- A basis for data publications?
  - Code name: *Living sources*

# *Living sources*

**Publication**



Quotation  
Secondary usage  
Annotations  
Commentaries

**Annotations**

**Commentary**

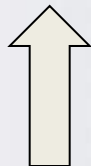
**Sources**

**Peer review**



Sampling  
PR as commentary

**Submission**



Correction/Additions  
Additional sources  
Author identification  
and affiliation





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**MERCI !**

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# Automatic dictionary structure recognition

PhD theses by Mohamed Khemakhem (Inria, projet H2020 Parthenos)

**pacotille** [pakɔtij] n. f. (esp. *pacotilla*). Autref., petit lot de marchandises que pouvaient embarquer les gens de l'équipage ou les passagers d'un navire. ● De *pacotille*, de peu de valeur, de qualité médiocre.

*CRF (Conditional Random Fields) based data mining*

```
<entry>
  <form type="lemma">
    <orth>pacotille</orth>
    <pron><pc>[</pc>pakɔtij<pc>]</pc></pron>
    <gramGrp><pos>n.</pos><gen>f.</gen></gramGrp>
  </form>
  <etym><pc>(</pc><lang norm="es">esp.</lang>
    <oRef>pacotilla</oRef><pc>)</pc></etym>
  <sense>
    <usg type="time">Autref.</usg> <pc>,</pc>
    <def>petit lot de marchandises que pouvaient embarquer les gens de
l'équipage ou les passagers d'un navire</def>
    <pc>.</pc>
  </sense>
  <re>
    <form type="compound">
      <orth>De pacotille</orth>
    </form><pc>,</pc>
    <sense><def>de peu de valeur, de qualité médiocre.</def></sense>
  </re>
</entry>
```

*Fine grained recognition of the various component of an entry in a legacy dictionary*

*Using the TEI as reference output format (coordination with ENEL recommendations)*

**Perspectives:** Creating step by step a large-scale network (diachronic and synchronic) of our lexical patrimony



- LAURENT ROMARY, MIKE MERTENS, ANNE BAILLOT,  
„DATA FLUIDITY IN DARIAH – PUSHING THE AGENDA FORWARD“, MARCH  
2016 ([HTTPS://HAL.INRIA.FR/HAL-01285917/](https://hal.inria.fr/hal-01285917/))



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Data “journals”

**CODE NAME: *LIVING SOURCES***

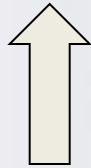
[www.dariah.eu](http://www.dariah.eu)

# Exploring new scholarly communication models

- Open Access
  - Open access to scholarly papers is on its way (nearly!)
  - Encouraging scholars to disseminate their research data in the same conditions
    - Despite fears (plagiarism?) or unstable technical settings
- Scholarly recognition
  - Ensuring acknowledgement for the work carried out on digital sources
- A necessity to anticipate an evolving landscape
  - Imagining what the certification of research data could be
  - Building upon what other research fields have achieved (e.g. genomics)

# *Living sources*

**Publication**



Quotation  
Secondary usage  
Annotations  
Commentaries

**Annotations**

**Sources**

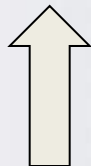
**Commentary**

**Peer review**



Sampling  
PR as commentary

**Submission**



Correction/Additions  
Additional sources  
Author identification  
and affiliation



# Thought experiment: living sources in lexicography

- A wide variety
  - Of domains
    - Psycholinguistics, Field linguistics, Comparative linguistics, Lexicography, Natural Language Processing, Dialectology
  - ... and forms
    - Frequency lexica, association lexica, word lists, full form lexica, pronunciation, morphosyntactic lexica, semantic lexica (e.g. Wordnet, Framenet)
  - and sources
    - Hand designed, corpus based, automatic extraction, compilation of sources, etc.

# Submissions: we need more than data

- (Lexical) Data cannot be evaluated in isolation
  - A certain scientific perspective on the material, whether observed or compiled
- A preface will be requested with all submissions
  - Scientific background
    - Research field, role of the data proper in the research activity
    - Scientific theories and hypotheses at stake
  - Editorial background
    - Rationale for compiling the data
    - Selection criteria (data sampling, descriptive features)
  - Underlying lexicographic model
    - Onomasiological/Semasiological, Data categories, specification of orthography
  - Links to other databases/sources
    - Full context



# Reviewing lexical content

- Methodology
  - Characterizing the scientific contribution
    - Data model, accuracy of descriptors, data gathering methodology
- Technology
  - Conformance to existing standards
    - LMF-TEI, TMF-TBX, SKOS (?)
- Usefulness
  - Exhaustivity of the resources vs. sampling
  - Licences, rights to re-use



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A multi-stage process

# PEER-REVIEW

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# Stage 1 - Technical check

- (Closed) submission to editors
- Validation of technical issues (data structure, preface)
- Possible retraction for scientific check at this stage
- Editorial/technical support provided to authors
- Outcome:
  - Technical publication

# Stage 2 - Content check

- Open peer-review submission (time-restricted)
  - Cf. Copernicus model
- Critical submission about the submission as a whole decide on acceptance
  - Vs. On individual entries
  - Issue: sampling strategy (randomized, left to reviewer, entry or feature based)
- Separate commentaries on individual entries
- Outcome
  - Publication=“scientifically relevant database”
- Various publication status:
  - word list, wordform collection, word field, language particular dictionary, comparative dictionary, etc.
  - Correspond to various quality levels

# Stage 3 - Living commentary and growth of data

- Addition of more data, corrections, versions by the author
  - Acceleration validation (consistency check)
- (Identified) third party contributions
  - Commentaries
  - Additional entries or features?
    - Issue: validation by authors and editorial board?

# ISSUES RELATED TO IMPLEMENTATION

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# Repository and services

- Building-up of a technical infrastructure which enhances the usability of datasets (one stop shop, comparability, searchability, persistence, etc.)
  - Envisioned user group: scientists who look for a hosting environment
  - Example: Tapas initiative for TEI documents
- Standards of interoperability of data portals/journals/archives with a common search engine/browser-like tool
  - Envisioned user group: scientists who want to keep a strong hold on their data
- Persistence of data is secured for data submitted to the system (grid-like backup)

# Certification as overlay

- Cf. Overlay journal model
  - Publication (“making public”) in a publication repository
  - Certification by an overlay editorial committee
  - Ex. Episciences.org – a public infrastructure
- Implementing data journals as overly journals
  - Stabilizing the data repository infrastructures
  - Allowing a variety of certifications (cf. technical vs. Scientific)

# Interoperability and Standards

- Through Living Sources, data is offered a second-life
  - Data will be searched, modified, crossed with other sources
    - Interoperability is thus a central issue => standards
- Scientific freedom vs. Limitation provided by standards
  - Need of flexible representation formats or models
- Documenting one's own practices and data semantics is essential
  - Cf. ODD mechanisms with TEI resources
  - Importance of helping scholars to retrieve legacy data

# Citability of data

- Various levels of granularity
  - Complete submission seen as a scientific contribution
  - Preface, or any of its components
  - Full lexical resources, or any entry thereof, down to specific feature
- Various types of usage
  - Referencing
  - Further processing (cross dictionary search, sub-selection of data, etc.)
- Technical answers
  - Unique identifier for the full submission
  - Selection recipes (à la XQuery) also stored in the repository
    - E.g. all intransitive verbs

# Accessibility - copyright

- Main assumption
  - Data must be fully and freely available for access but also re-use
    - Cf. current debates on TDM
- Distribution under a simple licence
  - Recommendation: Creative commons with attribution. CC-BY
  - (Limited) Right for Living Sources (to store) and distribute the data

# Versioning

- During the review process
  - Cf. editorial validation, peer review
- After publication
  - « living »
- A major sub-issue: granularity
  - Versioning full submission, down to elementary entries and/or fields
    - E.g. correcting a word qualifier



# Long term business model

- Archiving and access
  - Needed anyhow for the research community
- Certification
  - Should this be taken up by professional stakeholders ?
- Outreaching
  - Easy to achieve through powerful academic dissemination forums (e.g. linguist List)
- Importance of a community-based (public) infrastructure

# A feasible endeavour

- Science driven
  - Long standing expectation from various communities
- Technologically mature
  - Standards and tools
  - Emergence of data repositories
  - Overlay journal platforms
- Politically timely
  - Cf. Riding the wave report, RDA initiative... and DARIAH
  - Understanding the ecology of research data publishing
- Setting up things as a portfolio of initiatives
  - Scholarly communities/domains or communities of practice (working on similar objects) should now be creative in moving ahead...