Inscriptions, Hieroglyphs, Linguistics… and Beyond! The Corpus of Classic Mayan as an Ontological Information Resource

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mayadictionary.de
Text Database and Dictionary of Classic Mayan

Drawing by Linda Schele

https://tinyurl.com/y29b8l6c

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Project "Text Database and Dictionary of Classic Mayan"

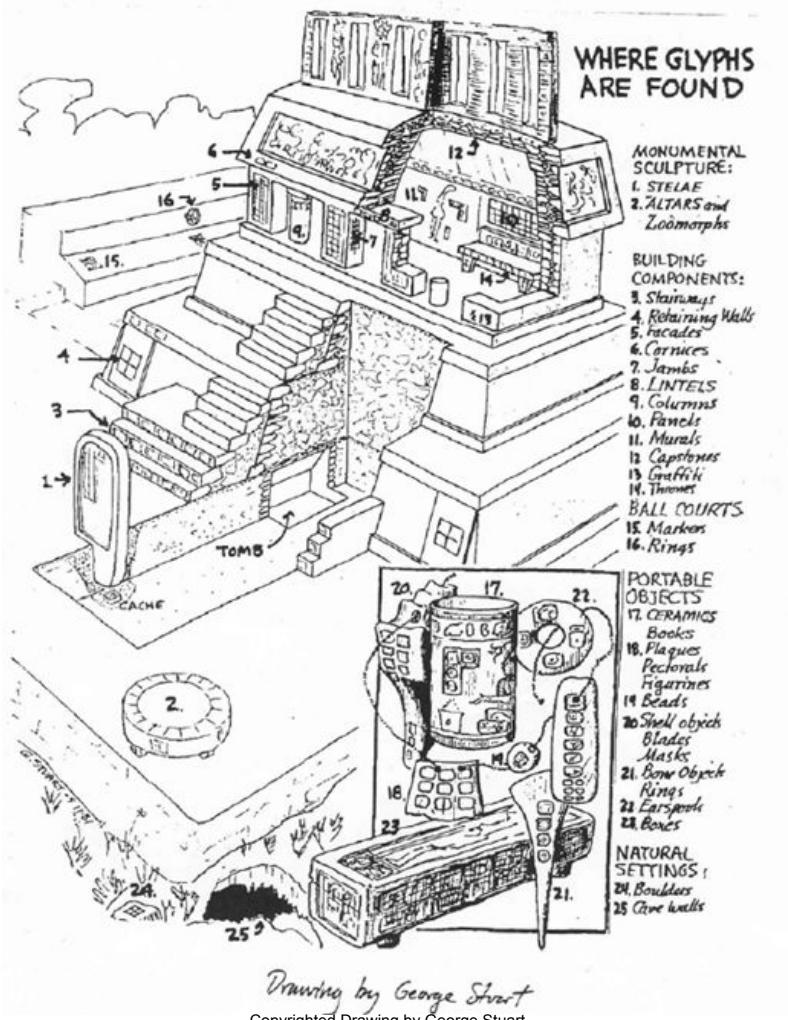
2014 - 2029
North Rhine-Westphalian Academy of Sciences, Humanities and the Arts

University of Bonn / Göttingen State and University Library

Compilation of a text database and dictionary of Classic Mayan, the language of the approx. 10,000 ancient Maya hieroglyphic texts, dating between 500 BC and 1500 AD, found in more than 500 archaeological sites in Southern Mexico, Guatemala, Belize and Honduras

mayadictionary.de

K3245



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Life cycle, identity, origin (birth, death, role, status)

kinship and lineage (dynastic record, family ties)

political organization (power and authority)

Constituting social and political order (warfare, alliances, expansion)

Creating and designing the built environment and objects within it (constructing, dedicating, erecting etc.)

religion (calender rituals, blood offerings, ancestor veneration)

Varia (mythologies, origins of dynasties, astronomy)

Missing: daily life, trade records, book keeping

Preliminaries to consider before TEI-encoding Maya Hieroglyphic texts

A B

C1
C2

PLATE 86. Carved panel

D-J

K1
K2
K3
K4

L-M

N-O

Laxtunich, Lintel 2

Provenance:	Laxtunich
Finding spot:	?
Discovery:	looting < 1970
Custody:	John A. Stokes Gallery (1970)
Custody:	Kimbell Art Museum, Dallas (acquired 1971), exhibited in Piano Pavilion (as of 2019)
Date:	c. A.D. 785
Artist:	Ancient American
Period:	Late Classic period (A.D. 600–900)
Medium:	Limestone with traces of paint
Classification:	Sculpture, lintel
Dimensions:	115.3 x 88.9 cm
Accession no:	AP 1971.07
Photograph:	Kimbell Art Museum, 2019
Online:	https://www.kimbellart.org/collection/ap-197107
Publication:	Karl Herbert Mayer 1984, p. 17; 1987, p. 17; Houston, Stuart 2019
Drawing:	Marc Zender, 2016 (Zender and Beliaev 2016, p. 17)
References:	Mayer 1988, p. 17; Stuart 1999, p. 343

Copyrighted Image by Kimbell Art Museum

PLATE 86. Carved panel

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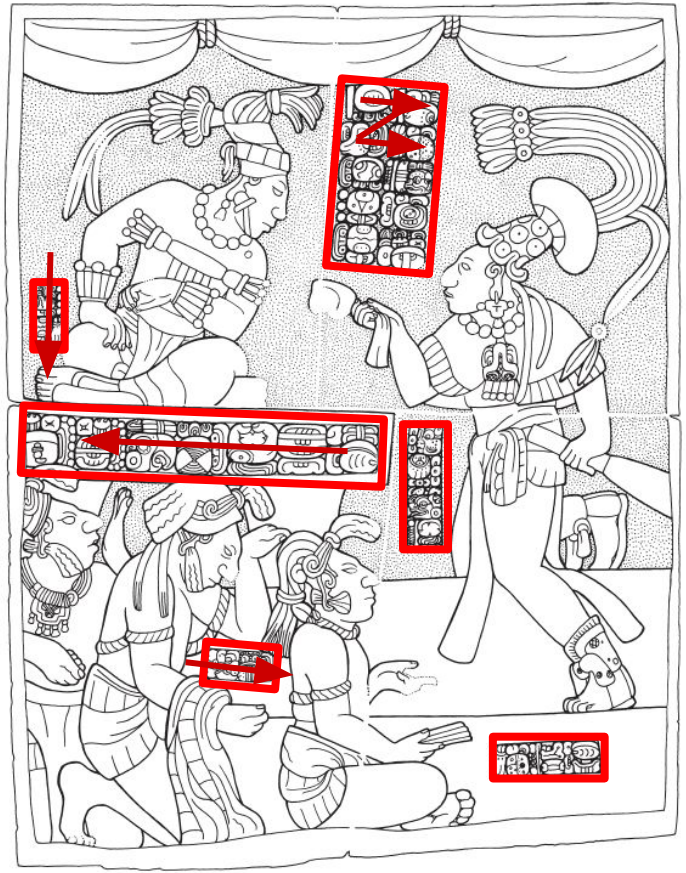

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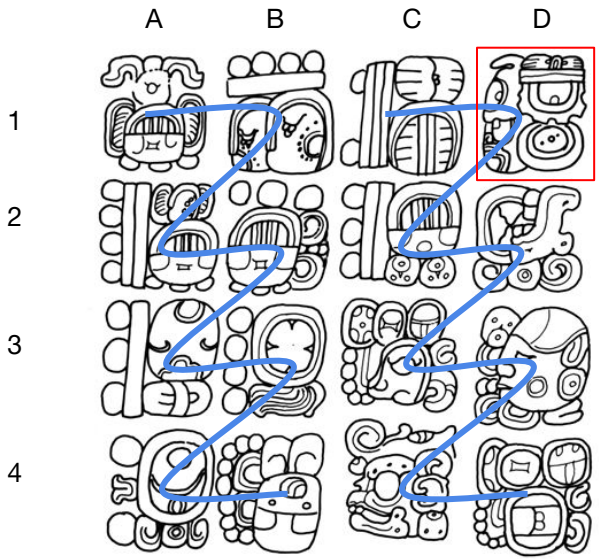
Text field



left-to-right, top-to-bottom, double column,
a matrix of blocks constituting a text

Hieroglyphic Block
Hieroglyph

tzu

Glyphs
Signs

tza

ja

"it was terminated"
(syllabic signs)

stacked, nested, overlapping and intersected arrangement of glyphs

370hc . [699st : 181bh]

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Horror repetitionis: Allography and violations of reading order

u-ti-ya > *uhtiiy*

"it happened"

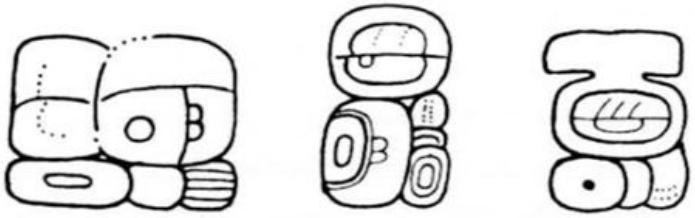
u-ti-ya

u-ya-ti

UH-ya-ti

u-ya-ti

Copyrighted Images by Marc Zender



i’ u-ti “then it happened”

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A selection of signs for the syllable /u/

Drawings by Alexandre Tokovinine (copyrighted) and Christian Prager (CC-BY)

A1	6 AJAW	6 Ajaw [day]
B1	13 "K'ayab" [K'AN-'a-si-ya]	13 K'ayab [month]
	(9.17.)5.0.0	Dec. 25, AD 775
A2	NAAH-5-TUUN-ni	*naah 5 tuun*, "first five stones"
B2	?-OOK-ki	*? ook*, "? foot"
A3	?-K'UHUL-OOK-tzi?	*? k'uhul ook tzi?*, "? holy foot"
B3	u-K'AL-wa TUUN-ni	*u k'alaw tuun*, "he wraps the stone"
A4	ch'a-JOOM-ma	*ch'ajoom*, "incenser"
B4	TAHN-TE'-K'INICH	Tahn Te' K'inich, Ruler of Aguateca
A5	AJ-3-BAAK-ki	*aj 3 baak*, "he of the 3 captives"
B5	a-9-HA'B?-*la-ta	*a 9 ha'b *lat*, "he of the 9 years past?"

from: Houston, Stephen D. 2014. Monuments. In *Life and Politics at the Royal Court of Aguateca: Artifacts, Analytical Data, and Synthesis*, edited by Takeshi Inomata and Daniela Triadan, pp. 233–255. Monographs of the Aguateca Archaeological Project First Phase 3. The University of Utah Press, Salt Lake City, UT.

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"WP" and Spreadsheet Epigraphy: Transliteration, Transcription, and Translation

A B

1
2
3
4
5

D E F G H I J

A1	**5-HIX**	*ho hix*	On the day 5 Hix
B1	**8-SAK-SIHOM**	*waxak sak sihoom*	8 "Sac"
A2	**chu-ka-ja**	*chu[h]kaj*	was captured
B2	**BAH-wa-WAY-bi**	*baah wayaab*	the head priest
A3	**u-KAB-ji-ya**	*ukabjiiy*	by
B3	**AJ-CHAK-ma-xi**	*Aj Chak Maax*	the lord of Chak Maax
A4	**3-la-ta**	*uxlat*	three days later
B4	**na-wa-ja**	*na[h]waj*	were presented
A5	**u-BAK-ki**	*ubaak*	his captives
B5	**TI-ya-AJAW**	*ti yajaw*	to his lord

J	**che-le-wa**	*chelew*	Chelew
I	**CHAN-na**	*chan*	Chan
H	**K'IN-ni-chi**	*K'inich*	K'inich
G	**u-cha-nu**	*ucha'an*	Captor of
F	**TAJ MO'**	*tajal mo'*	Tajal Mo'
E	**K'UH PA' CHAN AJAW**	*k'uh pa'chan ajaw*	Divine king of Yaxchilan
D	**K'UH ? AJAW**	*k'uh ? ajaw*	Divine king of ?

I. A transliteration, transcription, morphological analysis and translation of an ancient text cannot fully represent its original renderings, spellings and formalities. Size of blocks, style of carving and placement of text fields reflect social hierarchies, indicate artists or schools and are indicators for time and space

II. The original glyph arrangement within the text and block matrix must be encoded in DE as reading orders are often violated, 30% of all known signs are still undeciphered, thus the **visual** and the **spoken** word differs

III. Questions marks are used ambiguously indicating unknown readings, undeciphered passages, eroded text portions, problematic sign readings must not be used in digital epigraphy to replace e.g. graphs, signs, blocks, passages etc. in a database

Maya Epigraphy using TEI
… and beyond!

Encoding Maya Texts

- project-specific TEI-schemes:
  - base, inscriptions, codex
  - TEI-all conform, using odd-chaining mechanism
- stand-off markup used for:
  - referring to Sign Catalogue (for graph variants and transliteration values)
  - referring to artefact documentation and context information (supported by ontology and vocabularies)
  - linking areas of the facsimile to corresponding text
- encoding workflow supported by parser
  - transforming numerical transliteration to according TEI document structure
- Exist-App tg:schemaSync
  - updates RelaxNG schema in TextGrid Lab automatically

Textual Elements

Textfield

```
<div
type="textfield">
```

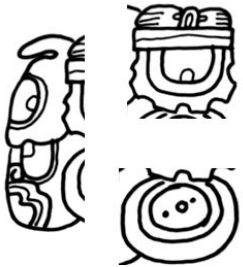
Copyrighted Drawing by Linda Schele

Hieroglyphic Block

```
<ab
type="glyph-block">
```

Glyph Signs

```
<g
ref="textgrid:84zsd"
n="370hc"/>
```

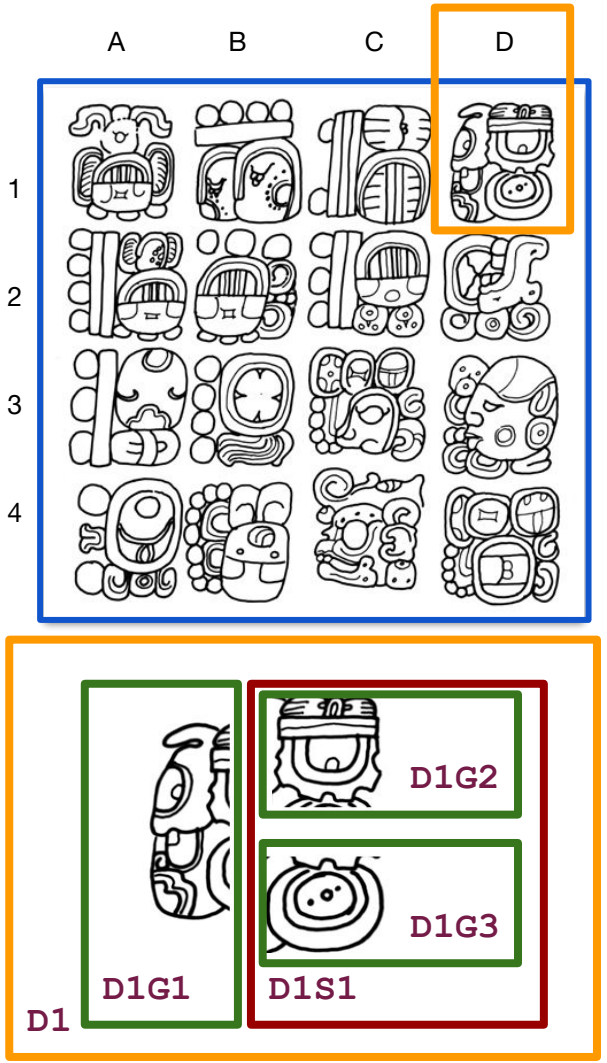


`ref=` URI of Graph in Sign Catalogue

`n=` Catalogue Nr. of Graph

Text Structure

```
<div xml:id="textfield1" type="textfield">
    <ab xml:id="A1">...
    <ab xml:id="D1" type="glyph-block">
        <g xml:id="D1G1"/>
        <seg xml:id="D1S1" type="glyph-group">
            <g xml:id="D1G2"/>
            <g xml:id="D1G3"/>
        </seg>
    </ab>
    <ab xml:id="D4">...
</div>
```



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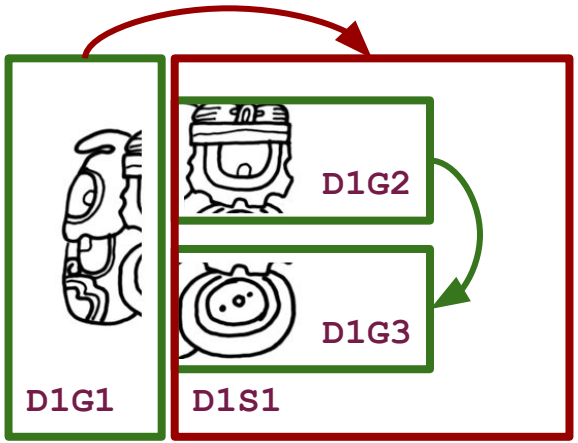
Glyph Positioning in Glyph Block

```
<ab xml:id="D1">
    <g xml:id="D1G1" rend="left_beside" corresp="#D1S1"/>
    <seg xml:id="D1S1" rend="right_beside" corresp="#D1G1"/>
        <g xml:id="D1G2" rend="above" corresp="#D1G3"/>
        <g xml:id="D1G3" rend="beneath" corresp="#D1G2"/>
    </seg>
</ab>
```



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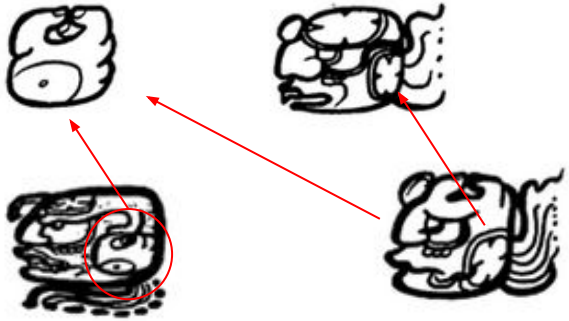
… and even more Glyph Positions!

@rend	@xml:id			@rend
left_beside	G1	.	G2	right_beside
above	G1	:	G2	beneath
infixed_in	G1	°	G2	encloses
conflated	G1	+	G2	conflated
attached_at_ top_left*	G1	┌	G2	is_adjoined_to
interferes_with	G1	^	G2	is_interfered_by

…

*top_right, bottom_left, bottom_right



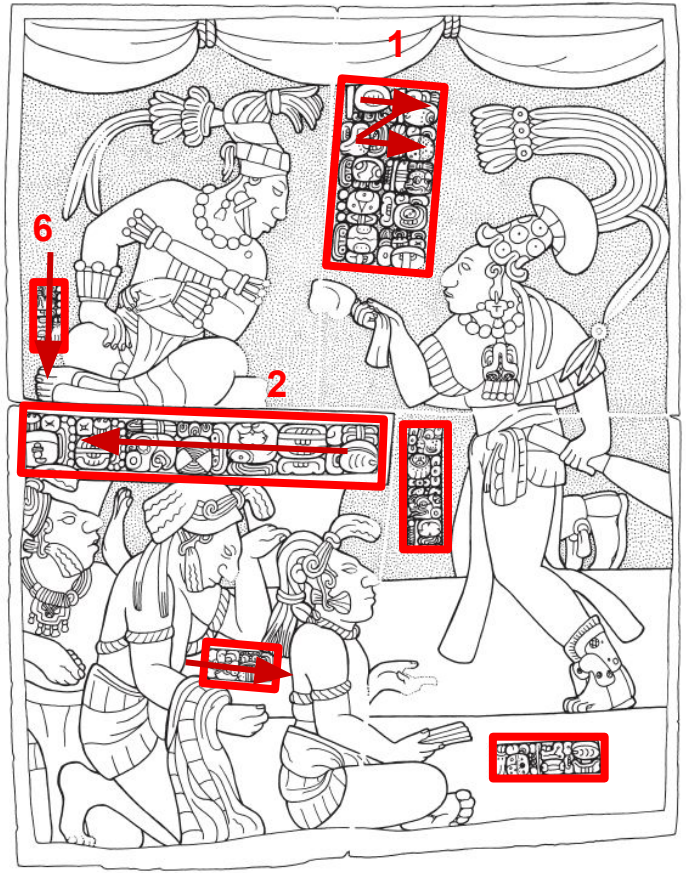
infixed_in/encloses conflated

attached at top left

interferes

Reading Direction

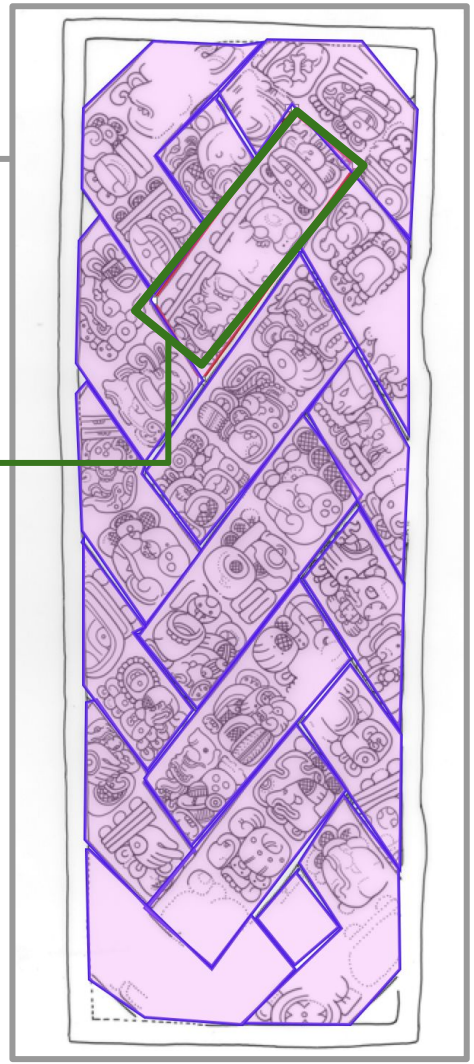
```
<div type=”textfield” n=”1”
style=”-idiom-writing-mode:ltr”>

<div type=”textfield” n=”2”
style=”-idiom-writing-mode:rtl”>

<div type=”textfield” n=”6”
style=”-idiom-writing-mode:tb”>
```



Copyrighted Drawing by Simon Martin

Text Arrangement

```
<sourceDoc>
    <surface facs="textgrid:327kc.0" type="front">
        <zone corresp="#S1" rotate="45"/>
    </surface>
    ...
</sourceDoc>
...
<body>
    <div type="textfield">
        <div xml:id="S1" type="section"
        style="-idiom-writing-mode:tb">
        ...
    </div>
</body>
```



Copan Stela J, copyrighted drawing by Linda Schele

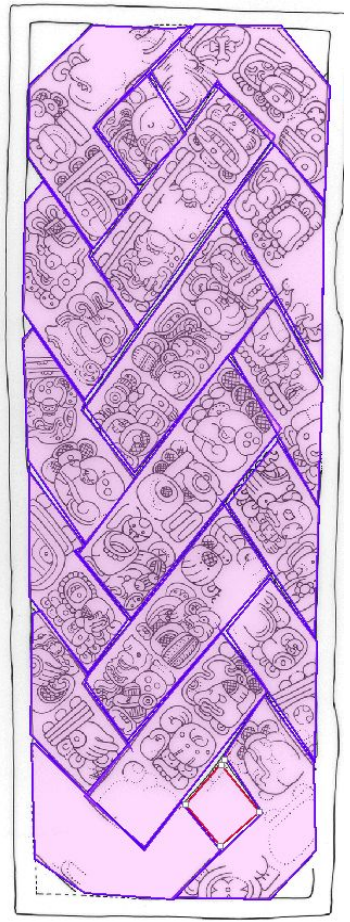
Text-Image-Link-Editor of TextGrid Lab

```
<sourceDoc>
  <surface facs="textgrid:d1sc0" type="east_side">
    <svg:rect xml:id="sh1" x="10" y="98" width="20" height="67"/>
    <svg:rect xml:id="sh2" x="35" y="57" width="10" height="23"/>
    <svg:rect xml:id="sh3" x="71" y="44" width="53" height="44"/>
    <!-- ... -->
    <tei:link target="#sh1 textgrid:2cds6#a1"/>
    <tei:link target="#sh2 textgrid:2cds6#a2"/>
  </surface>
</sourceDoc>
```

text-image-link object
(textgrid:1sd4f)

```
<sourceDoc>
  <surface type="east_side" facs="textgrid:d1sc0">
    <zone xml:id="a1" corresp="#east_band1" style="-idiom-textfi.."/>
    <zone xml:id="a2" corresp="#east_band2" style="-idiom-textfi.."/>
    <zone xml:id="a3" corresp="#east_band3" style="-idiom-textfi.."/>
    <zone xml:id="a4" corresp="#east_band4" style="-idiom-textfi.."/>
    <!-- ... -->
  </surface>
</sourceDoc>
```

text topographic layer
(textgrid:2cds6)



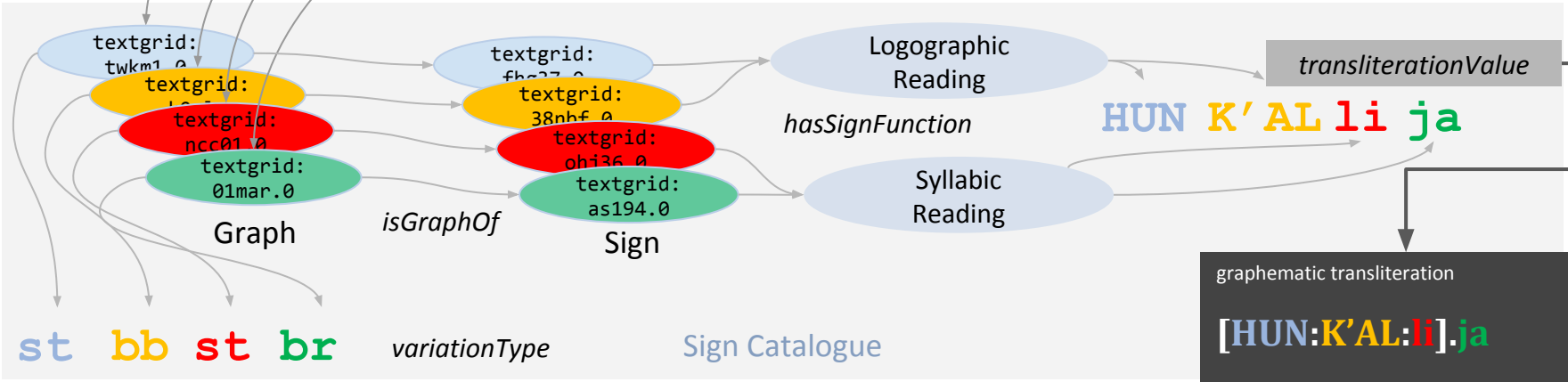
Copan Stela J, copyrighted drawing by Linda Schele

TEI… and beyond! - Sign Catalogue

```
<ab xml:id="C1" type="glyph-block">
   <seg xml:id="C1S1" type="glyph-group" rend="left_beside" corresp="#C1G4"/>
      <g xml:id="C1G1" n="60st" ref="textgrid:twkm1.0" rend="above" corresp="#C1G2"/>
      <g xml:id="C1G2" n="713bb" ref="textgrid:k0ala.0" rend="above" corresp="#C1G3"/>
      <g xml:id="C1G3" n="24st" ref="textgrid:ncc01.0" rend="beneath" corresp="#C1G2"/>
   </seg>
   <g xml:id="C1G4" n="181br" ref="textgrid:01mar.0" rend="right_beside" corresp="#C1S1"/>
</ab>
```

TEI Document

text structure



graphematic transliteration

[HUN:K'AL:li].ja

Linguistic Analysis

TEI… and beyond! - Artefact Documentation

Río Michol,
Miscellaneous Text 1

idiom:Artefact

preferredTitle Río Michol, Miscellaneous Text 1
crm:P102_has_title
idiom:titleType Alternative
idiom:title RMC: Msc. 1
crm:P41i_was_classified_by
crm:P42_assigned belt celt http://idiom-pr
crm:P43_has_dimension
idiom:height 14.5
idiom:width 5.5
idiom:thickness 0.3
idiom:hasUnit cm
idiom:hasMaterialAssignment
idiom:assignedMaterial green stone http:/
dct:isReferencedBy
dct:bibliographicCitation Berlin, H. (1955)
schema:pagination fig.7
idiom:wasFoundAt
rdf:resource URI → crm:E53_Place

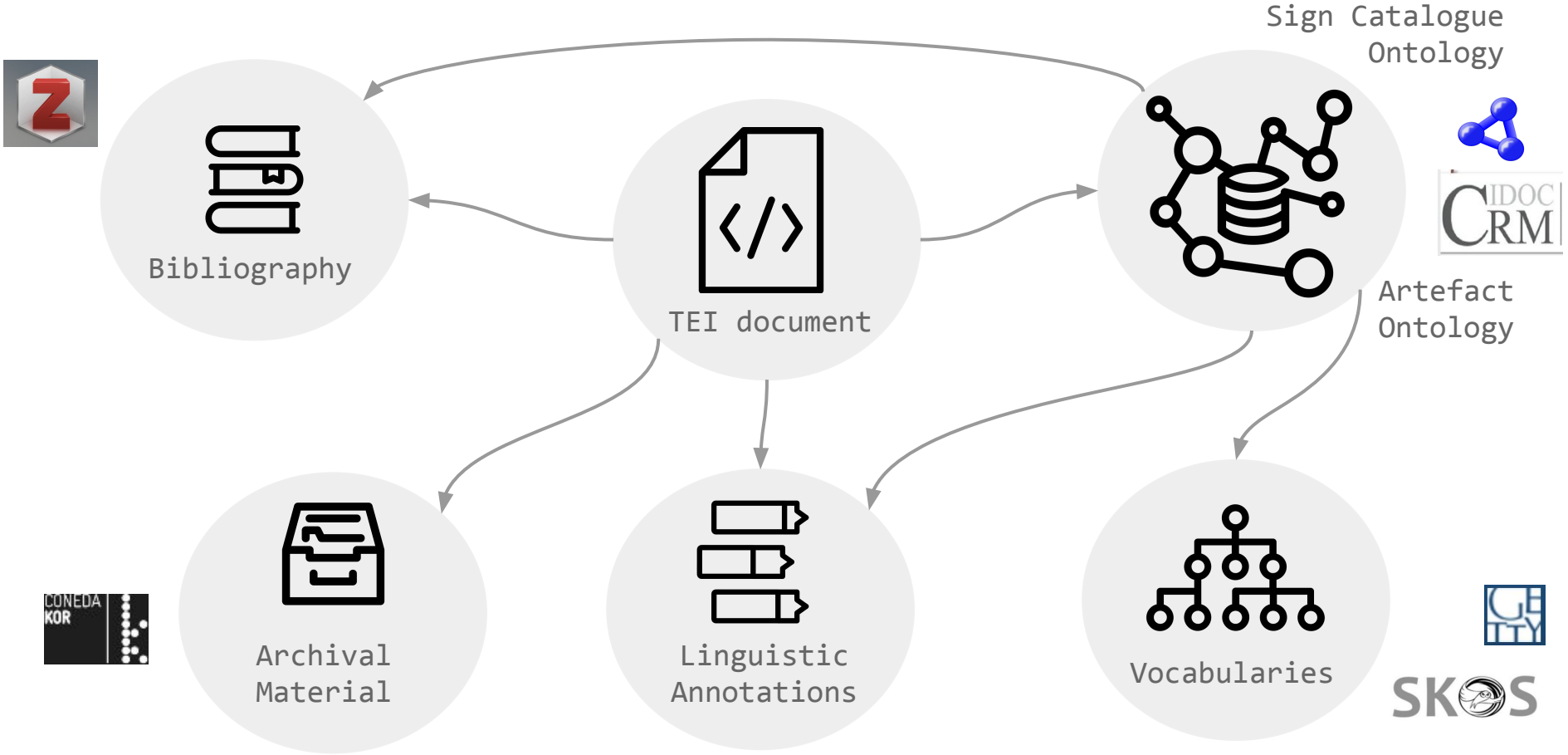
crm:E53_Place

crm:P87_is_identified_by
idiom:PlaceName Río Michol
idiom:hasGeoreferencePoint

textgrid:285rd.0

```
<msDesc>
   <msIdentifier>
      <msName>Río Michol,
              Miscellaneous Text 1
      </msName>
      <altIdentifier>
       <idno type="URI"
        xml:base="http://textgrid.de/">
        285rd.0
       </idno>
      </altIdentifier>
   </msIdentifier>
</msDesc>
```

The Ontological Corpus



Little Helpers

Supporting the Encoding Workflow

`370hc . [ 699st : 181bh ]`

transliteration code according to TWKM rules*

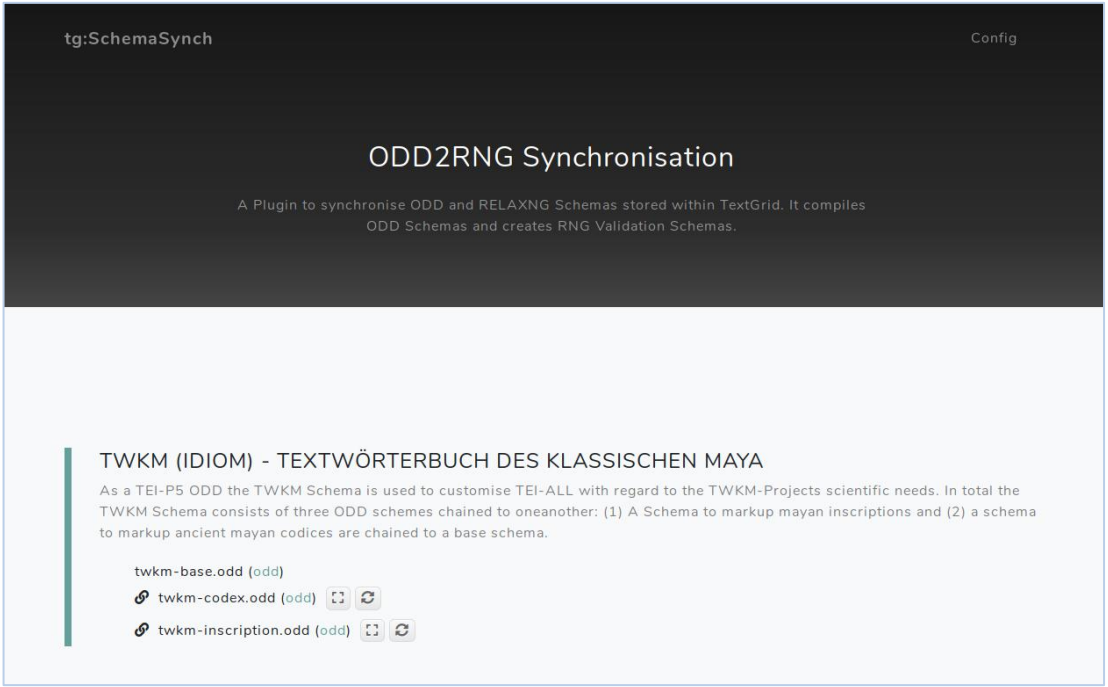
*similar to MDC from Egyptology

TEI Parser

1. transforms numerical transliteration into TEI encoding
2. enables text structure according to schema
3. automatically assigns values for `@xml:id`, `@n` and `@ref`
4. structure and information for `<tei:teiHeader>` and references to artefact ontology

```
<ab xml:id="n1"  type="glyph-block">
     <g xml:id="n1G1" n="370hc" ref=”textgrid:84zsd”  rend="left_beside" corresp="#n1S1"/>
     <seg xml:id="n1S1" type="glyph-group" rend="right_beside" corresp="#n1G1">
          <g xml:id="n1G2" n="699st" ref=”textgrid:ls8d2” rend="above" corresp="#n1G3"/>
          <g xml:id="n1G3" n="181bh" ref=”textgrid:gh249” rend="beneath" corresp="#n1G2"/>
     </seg>
</ab>
```

tg:schemaSynch - Synchronising ODDs and RNGs

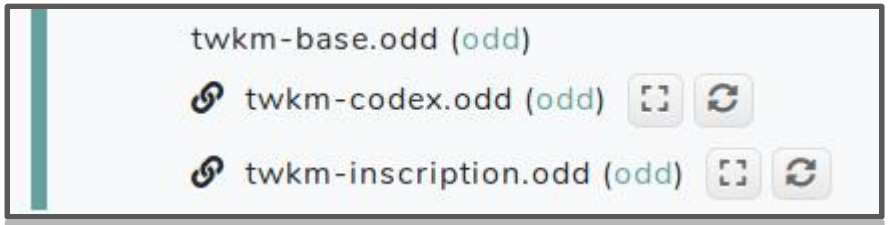


- eXist-db app
- Using TEIC Stylesheets
- Synchronise ODD and derived RNG Schemes

ODD Chaining, RNG Validation and TextGrid

- 3 ODDs as customisations of TEI P5-ALL using ODD Chaining*
  - **base-schema**: Main modules, element restrictions and custom tei:dataSpecs
  - **inscription-schema**: Customisation with regard to the encoding of carved mayan inscriptions
  - **codex-schema**: Customisation with regard to the encoding of mayan codices
- Synchronisation of modified ODDs with RNG validation Schema in VRE TextGrid

*) https://teic.github.io/TCW/howtoChain.html



1. ODD Modeling
   (Declaration of Modules, Customisations, ...)
2. ODD Compilation
   (Expanding the ODD with declarations, examples etc. from tei-p5.odd or custom source)
3. RNG Creation
   (Converting the compiled ODD)
4. RNG Update in TextGrid

Text Database and Dictionary of Classic Mayan - Information Resources

Website
http://mayadictionary.de

Image Database
https://classicmayan.kor.de.dariah.eu/

Schemes & Scripts
https://projects.gwdg.de/projects/documentations/repository

This Presentation
https://tinyurl.com/y29b8l6c

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