

DFKI Activities on: **EMMA** (**Extensible MultiModal Annotation** markup language)

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Overview

- EMMA
 - Origin
 - Architecture and Design
- SWEMMA (**SmartWeb EMMA**)
 - Extensions (Proposed to MMI WG, Subgroup EMMA)
 - Results
 - Status
 - Oov
 - Turn-id
 - Use in SmartWeb



EMMA Evolution



MultiModal Markup Language



EMMA Evolution



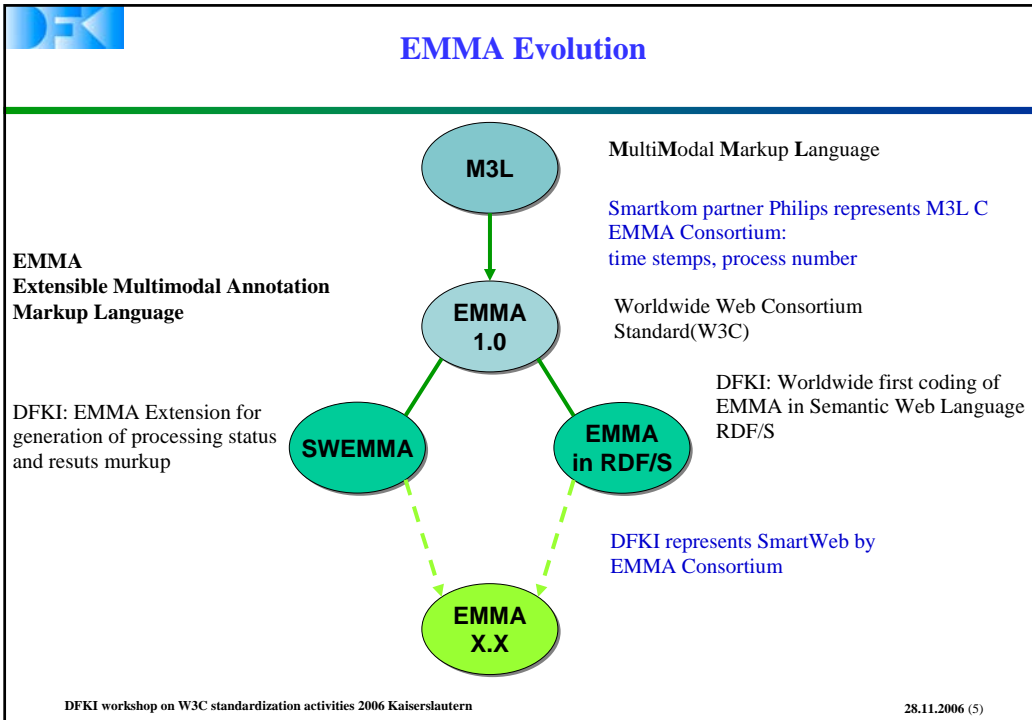
MultiModal Markup Language



Smartkom partner Philips represents
M3L Consortium at EMMA Consortium:
time stemp, process number

Worldwide Web Consortium
Standard(W3C)

EMMA
Extensible Multimodal Annotation
Markup Language



- ## EMMA – Some Keywords
- **EMMA (Extensible MultiModal Annotation markup language)**
 W3C Working Draft 16 September 2005 (work in progress)
 - produced as part of the W3C Multimodal Interaction Activity (MultiModal Interaction Working Group, subgroup EMMA)
 - The general purpose of EMMA is to represent information automatically extracted from a user's input by an interpretation component, where input is to be taken in the
 - general sense of a meaningful user input
 - in any modality supported by the platform.
 - Can be used for
 - Dialog Management.
 - Multimodal Interaction annotation
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```
<emma:emma version="1.0"
xmlns:emma="http://www.w3.org/2003/04/emma"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.w3.org/2003/04/emma
http://www.w3.org/TR/emma/emma10.xsd"
xmlns="http://www.example.com/example">
  <emma:interpretation id="r1">
    ...
  </emma:interpretation>
</emma:emma>
```

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- **emma:lattice**: (**emma:arc**, **emma:node**) compact representation of large lists of possible recognition results or interpretations for speech, pen, or multimodal inputs.

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EMMA – Container Elements

- **emma:one-of** (disjunction): a container for a collection of one or more interpretation or container elements (mutually exclusive).
- **emma:group** (conjunction): used to indicate that the contained interpretations are from distinct user inputs that are related in some manner.
- **emma:sequence** (enumeration): groups of inputs in temporal order.



EMMA – Processing History

Instances of interpretations are in general derived from other instances of interpretation in a process that goes from raw data to increasingly refined representations of the input.

- **emma:derivation**: used to link any two interpretations that are related by representing the source and the outcome of an interpretation process.
- **emma:derived-from**: provides a reference to the interpretation which the element it appears on was derived from.

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xsi:schemaLocation="http://www.w3.org/2003/04/emma
http://www.w3.org/TR/emma/emma10.xsd"
xmlns="http://www.example.com/example">
<emma:derivation>
<emma:interpretation id="raw">
<answer>From Boston to Denver tomorrow</answer>
</emma:interpretation>

<emma:interpretation id="better">
<emma:derived-from resource="#raw" composite="false"/>
<origin>Boston</origin>
<destination>Denver</destination>
<date>tomorrow</date>
</emma:interpretation>
</emma:derivation>

<emma:interpretation id="best">
<emma:derived-from resource="#better" composite="false"/>
<origin>Boston</origin>
<destination>Denver</destination>
<date>20030315</date>
</emma:interpretation>
</emma:emma>
```

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EMMA - Attributes

- **Reference to processing**
 - **emma:process**
 - **emma:no-input**
 - **emma:signal**
 - **emma:uninterpreted**
 - **emma:lang**
 - **emma:tokens**
- **Multimodality**
 - **emma:media-type**
 - **emma:medium**
 - **emma:mode**
- **Time stamps**
 - **emma:start**
 - **emma:end**
 - **emma:time-ref-uri**
 - **emma:time-ref-anchor-point**
 - **emma:offset-to-start**
 - **emma:duration**
- **Metadata**
 - **emma:endpoint-role**
 - **emma:endpoint-address**
 - **emma:port-type**
 - **emma:port-num**
 - **emma:message-id**
 - **emma:service-name**
 - **emma:endpoint-pair-ref**

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SWEMMA - Extentions

- **swemma:result**: acts as a wrapper for application instance data or lattices representing results of processed interpretations.
 - contains data for the output.
 - can also contain an **syn:speak** element, see[[SSML](#) **S**peech **S**ynthesis **M**arkup **L**anguage], to provide synthesizable content to the result for speech output.



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- **swemma:status**:element provides process monitoring annotation.
 - The **swemma:expectedAnswerTime** and **swemma:actualAnswerTime** attributes specify the expected answer time of a component and how long the processing of an answer really took, respectively.
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- **swemma:oov**: element holds annotation for out of vocabulary words by speech recognition.
 - **Required**: annotation attributes: **swemma:phoneme**, **swemma:grapheme**.
 - **Optional**: annotation attribute: **swemma:class**.



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- **swemma:turn-id**: an attribute of type **xs:nonNegativeInteger** that specifies the turn ID associated with an element.

Using EMMA in SmartWeb

- Inform Ann
 - F n
 - G
 - V
 - S
- Ext
 - r
 - s
 - p
 - o
- RDF

SWEMMA encoded output for the speech synthesizer:

```

<emma:emma version="1.0">
  <swemma:result emma:id="DIA123"
    emma:process="DIA#42"
    emma:turn-id="42"
    emma:lang="de"
    emma:start="1087995961542"
    emma:end="1087995963542"
    emma:mode="speech">
    <swemma:result emma:confidence="1.0">
      <emma:derived-from emma:resource="#spin1"/>
      <speak version="1.0" xsi:schemaLocation="www.w3c.org/...xsd"
        xml:lang="de">
        1990 war Deutschland Fussballweltmeister.
      </speak>
    </swemma:result>
  </swemma:result>
</emma:emma>
  
```

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Managing QA Concepts

```

graph TD
    emma_Container([emma:Container])
    emma_Interpretation([emma:Interpretation])
    swemma_Result([swemma:Result])
    discourse_Query([discourse:Query])
    discourse_Result([discourse:Result])
    discourse_AnswerType([discourse:AnswerType])
    smartmedia_ContentAnswer([smartmedia:ContentAnswer])

    emma_Container -- isa --> emma_Interpretation
    emma_Container -- isa --> swemma_Result
    emma_Interpretation -- isa --> discourse_Query
    swemma_Result -- isa --> discourse_Result
    discourse_Query -.- answer --> discourse_AnswerType
    discourse_Result -.- answer --> discourse_AnswerType
    discourse_AnswerType -.- mediaType --> smartmedia_ContentAnswer
  
```

- **discourse:Query**
 - models the user query to the system.
 - *partially filled* ontology instances
- **discourse:Result**
 - references information the user is asking for
 - *fills* partially filled ontology instance
- **discourse:AnswerType**
 - expectation (in Query)
 - answer realized as a Smartmedia object

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Grazie per l'attenzione!

