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# OASIS LegalRuleML

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**OASIS**  LegalXML

# LegalRuleML TC



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# Outline

- Introduction to LegalRuleML
  - Motivations, Goals, Principles
  - Design principles
  - LegalRuleML main blocks: meta, context, rules
    - Legal Statements and References
    - Temporal Events and Temporal Situations
    - Deontic
    - Penalty and Reparation
    - Defeasible
    - Alternatives
  - Future work

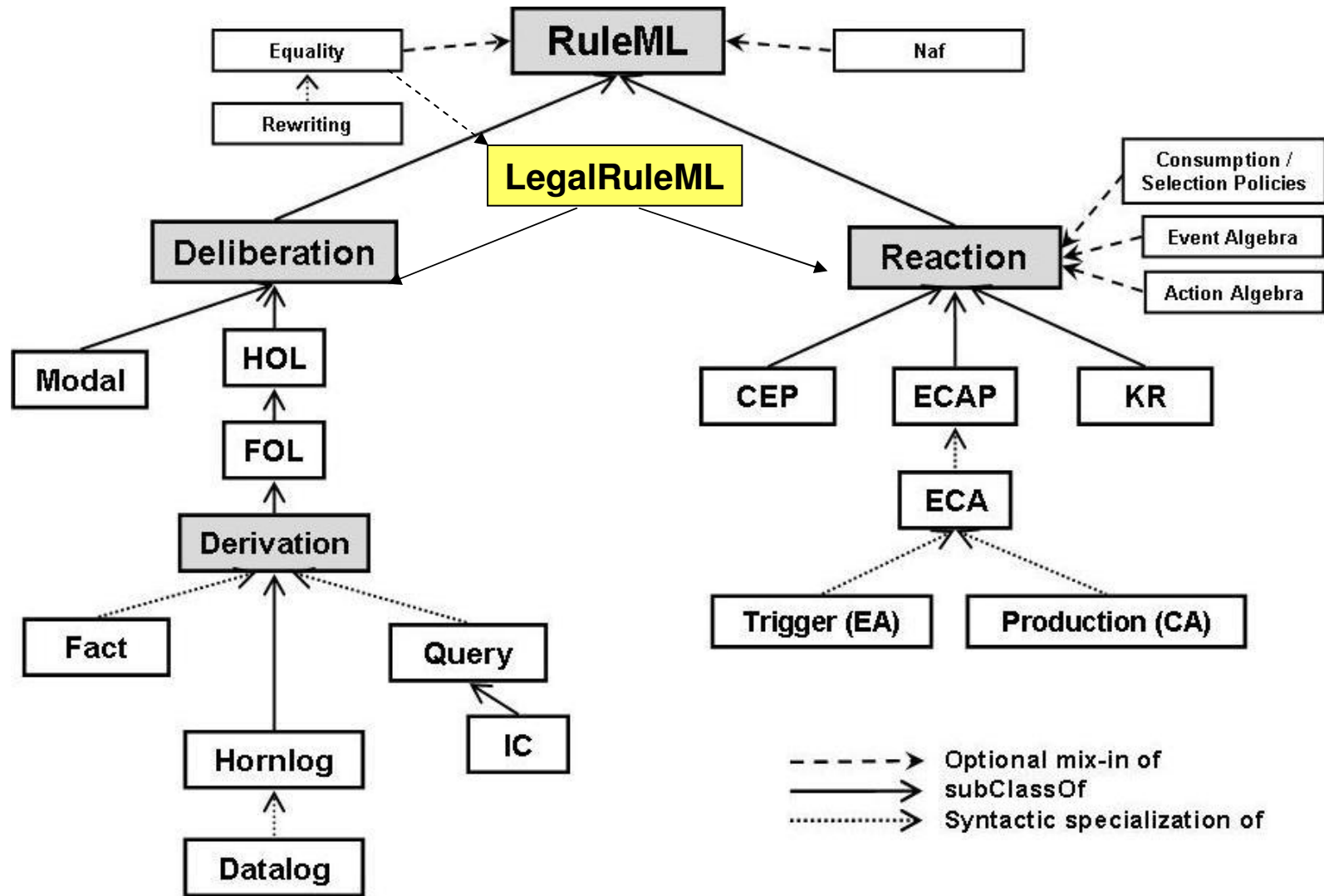
# Motivations

- **Legal texts** are the privileged sources for norms, guidelines and rules that often feed different concrete Web applications.
  - **Legislative documents, Contracts, Judgements**
  - **Guidelines** (Soft Law) in eGovernment, eJustice, eLegislation, eHealth, banks, assurances, credit card organizations, Cloud Computing, eCommerce, aviation and security domainm etc.
- The ability to have proper and expressive conceptual, machine readable models of the various and multifaceted aspects of norms, guidelines, and general legal knowledge is a key factor for the development and deployment of successful applications.

# Goal

- The LegalRuleML TC, set up inside of OASIS at Jan 12, 2012 ([www.oasis-open.org](http://www.oasis-open.org)) with 25 members, aims to produce a rule language for the legal domain:
  - Based on the legal textual norms
  - Oriented to legal people
  - Compact in the syntax annotation
  - Neutral respect any logic
  - Flexible and extensible

# RuleML Family of Sublanguages



# Requirements

- Support for modelling different types of rules:
  - Constitutive rules (e.g. definitions)
  - Prescriptive rules (e.g. obligation, permission, etc.)
- Implement isomorphism [Bench-Capon and Coenen, 1992]
- Implement defeasibility [Gordon, 1995, Prakken and Sartor, 1996, Sartor, 2005]
- Model legal procedural rules

# Design Principles (1/2)

## Multiple Semantic Annotations:

- A legal rule may have multiple semantic annotations where each annotation can represent a different legal interpretation.
- Each such annotation can appear in a separate annotation block as internal or external metadata.

## Tracking the LegalRuleML Creators:

- As part of the provenance information, a LegalRuleML document or any of its fragments can be associated with its creators.

## Linking Rules and Provisions:

- LegalRuleML includes a mechanism, based on IRI, that allows N:M relationships among the rules and the textual provisions
  - avoiding redundancy in the IRI definition and errors in the associations
  - LegalRuleML is independent respect any Legal Document XML standard, IRI naming convention



## Design Principles (2/2)

### **Temporal Management:**

- LegalRuleML must represent these temporal issues in unambiguous fashion

### **Formal Ontology Reference:**

- LegalRuleML is independent from any legal ontology and logic framework.

### **LegalRuleML is based on RuleML:**

- LegalRuleML reuses and extends concepts and syntax of RuleML.

### **Mapping:**

- Investigate the mapping of LegalRuleML metadata to RDF triples for favouring Linked Data reuse.

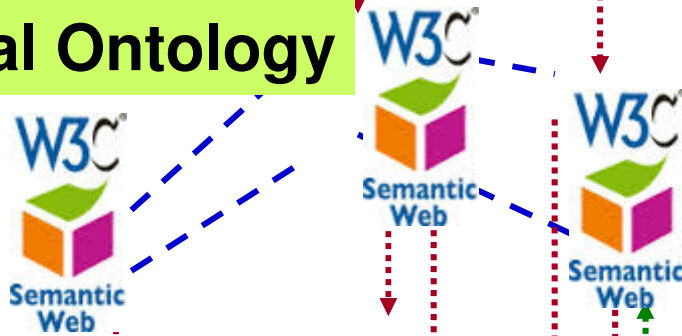
# Open Rules

## Legal document in XML



*Combine rules with other dataset  
Interoperability and interchange  
Retrieve rules and documents*

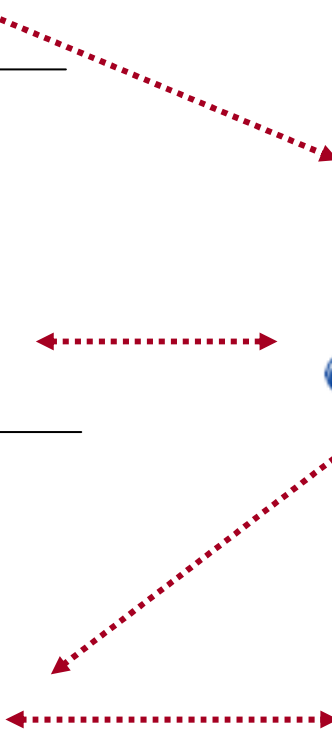
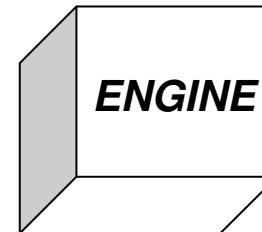
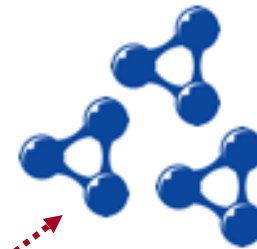
## Legal Ontology



## Logic Rules



## Linked Open Data



# LegalRuleML Approach

112 STAT. 2860 PUBLIC LAW 105-304—OCT. 28, 1998

112 STAT. 2860 PUBLIC LAW 105-304—OCT. 28, 1998

Public Law 105-304  
105th Congress

An Act

Oct. 28, 1998  
[H.R. 2281]

To amend title 17, United States Code, to implement the World Intellectual Property Organization Copyright Treaty and Performances and Phonograms Treaty, and for other purposes.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,*

**SECTION 1. SHORT TITLE.**  
This Act may be cited as the “Digital Millennium Copyright Act”.

**SEC. 2. TABLE OF CONTENTS.**  
Sec. 1. Short title.  
Sec. 2. Table of contents.

**TITLE I—WIPO TREATIES IMPLEMENTATION**  
Sec. 101. Short title.  
Sec. 102. Technical amendments.  
Sec. 103. Copyright protection systems and copyright management information.  
Sec. 104. Evaluation of impact of copyright law and amendments on electronic commerce and technological development.  
Sec. 105. Effective date.

**TITLE II—ONLINE COPYRIGHT INFRINGEMENT LIABILITY LIMITATION**  
Sec. 201. Short title.  
Sec. 202. Limitations on liability for copyright infringement.  
Sec. 203. Effective date.

**TITLE III—COMPUTER MAINTENANCE OR REPAIR COPYRIGHT EXEMPTION**  
Sec. 301. Short title.  
Sec. 302. Limitations on exclusive rights; computer programs.

**TITLE IV—MISCELLANEOUS PROVISIONS**  
Sec. 401. Provisions Relating to the Commissioner of Patents and Trademarks and the Register of Copyrights.  
Sec. 402. Ephemeral recordings.  
Sec. 403. Limitations on exclusive rights; distance education.  
Sec. 404. Exemption for libraries and archives.  
Sec. 405. Scope of exclusive rights in sound recordings; ephemeral recordings.  
Sec. 406. Assumption of contractual obligations related to transfers of rights in motion pictures.  
Sec. 407. Effective date.

**TITLE V—PROTECTION OF CERTAIN ORIGINAL DESIGNS**  
Sec. 501. Short title.  
Sec. 502. Protection of certain original designs.  
Sec. 503. Conforming amendments.  
Sec. 504. Joint study of the effect of this title.  
Sec. 505. Effective date.

Metadata of Context

```
<lrml:Rule key="rule1">  
  <lrml:Rule key="rule2">  
    <lrml:if> ...</lrml:if>  
    ....  
    <lrml:then>... </lrml:then>  
  </lrml:Rule>...  
</lrml:Rule>
```

of the text  
the same text

Metadata of Context

Metadata of Context

```
<lrml:Rule key="rule2-v1">  
  <lrml:if> ...</lrml:if>  
  ....  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```

Metadata of Context T2

```
<lrml:Rule key="rule2-v2">  
  <lrml:if> ...</lrml:if>  
  ....  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```

# LegalRuleML main blocks

## Metadata

Legal Sources

References

Agents

Authority

Time Instants

Temporal Characteristics

Jurisdiction

Role

Context

Context different author

Context different time and jurisdiction

## Context

association of alternative interpretations of the same text

```
<lrml:Rule key="rule1">  
  <lrml:if> ...</lrml:if>  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```

```
<lrml:Rule key="rule2">  
  <lrml:if> ...</lrml:if>  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```

# Document Structure: Metadata, Contexts, Rulebases

```
<lrml:LegalRuleML>
```

```
<lrml:References>  
  <Reference> ...  
</lrml:References>
```

*Textual References*

```
...  
<lrml:Context key="ruleInfo1-v2">
```

*Rule Context  
parameters like  
agents, times,  
sources*

```
  <lrml:Association>  
    <lrml:appliesSource keyref="#sec2.1-list1-itm31-  
par1-v2"/>  
    <lrml:toTarget keyref="#rulebase1-v2"/>  
  </lrml:Association>  
</lrml:Context>
```

*Association  
between Text and  
Rules  
N:M relationship*

```
<lrml:hasStatements key="rulebase-v2">  
  <lrml:ConstitutiveStatement key="rule1a-  
...>  
    <ruleml:if> ...</ruleml:if>  
    <ruleml:then>... </ruleml:then>  
  </lrml:ConstitutiveStatement>  
</lrml:hasStatements>...
```

*Rules*

```
</lrml:LegalRuleML>
```

# LegalRuleML main blocks

## Metadata

Legal Sources

References

Agents

Authority

Time Instants

Temporal Characteristics

Jurisdiction

Role

## Context

association of metadata with rules

```
<lrml:Rule key="rule1">  
  <lrml:if> ...</lrml:if>  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```

## Legal Statements and References (2/2)

```
<lrml:LegalSources>
```

***URI***

```
<lrml:LegalSource key="ref1"
```

```
  sameAs="http://www.law.cornell.edu/uscode/text/17/504#psection-1"/>
```

```
</lrml:LegalSources>
```

```
<lrml:References>
```

***Non-URI***

```
<lrml:Reference refersTo="ref2"
```

```
  refID="/us/USCode/eng@/main#title17-sec504-clsc-pnt1" refIDSystemName="AkomaNtoso2.0-2012-10"/>
```

```
</lrml:References>
```

# Temporal Events and Temporal Situations

```
<lrml:TimeInstants>
```

```
  <ruleml:Time key="t1">
```

```
    <ruleml:Data xsi:type="xs:date">1978-01-01</ruleml:Data>
```

```
  </ruleml:Time>
```

```
</lrml:TimeInstants>
```

*Event that define the  
validity of the rules*

```
<lrml:TemporalCharacteristic key="tblock1">
```

```
  <lrml:forRuleStatus iri="&lrmlv;#Efficacious"/>
```

```
  <lrml:hasStatusDevelopment iri="&lrmlv;#Starts"/>
```

```
  <lrml:atTimeInstant keyref="#t1"/>
```

```
  <lrml:hasStatusDevelopment iri="&lrmlv;#End"/>
```

```
  <lrml:atTimeInstant keyref="#t2"/>
```

```
</lrml:TemporalCharacteristic>
```

*Type of event:  
In force  
Efficacy*



# LegalRuleML main blocks: rules

## Metadata

Legal Sources

References

Agents

Authority

Time Instants

Temporal Characteristics

Jurisdiction

Role

## Context

association of metadata with rules

```
<lrml:Rule key="rule1">  
  <lrml:if> ...</lrml:if>  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```

## Example

National Consumer Credit Protection Act 2009:  
Section 29

(Prohibition on engaging in credit activities without a licence)

(1) A person must not engage in a credit activity if the person does not hold a licence authorising the person to engage in the credit activity.

Civil penalty: 2,000 penalty units.

*omissis*

Criminal penalty: 200 penalty units, or 2 years imprisonment, or both.

# Deontic operators

**Obligation +:** a Deontic Specification for a state, an act, or a course of action to which a Bearer is legally bound, and if it is not achieved or performed results in a Violation.

**Prohibition +:** a Deontic Specification for a state, an act, or a course of action to which a Bearer is legally bound, and if it is achieved or performed results in a Violation.

**Permission +:** a Deontic Specification for a state, an act, or a course of action where the Bearer has no Obligation or Prohibition to the contrary.

**Right +:** a Deontic Specification that gives a Permission to a party (the Bearer) and implies there are Obligations or Prohibitions on other parties (the AuxiliaryParty) such that the Bearer can (eventually) exercise the Right.

# Penalty and Reparation



**PenaltyStatement +:** a Legal Statement of a sanction (e.g. a punishment or a correction).

**Reparation +:** an indication that a PenaltyStatement is linked with a PrescriptiveStatement, meaning that a sanction may apply when the PrescriptiveStatement entails a Deontic Specification, and there is a Violation of the Deontic Specification.

A **penalty** of 200 criminal unit is a **reparation** for **violating** the **prohibition** on engaging in a credit activity without a financial license.

# Defeasibility

body always head	body $\rightarrow$ head	<i>strict</i>
body sometimes head	body $\Rightarrow$ head	<i>defeasible</i>
body not complement head	body $\sim\rightarrow$ head	<i>defeater</i>

R2 > R1

R1: A person must not engage in a credit activity.

R2: But if the person has a financial license they can engage in a credit activity.

```
<lrml:hasQualification>  
  <lrml:Overrides over="#R2" under="#R1"/>  
</lrml:hasQualification>
```

# Example

National Consumer Credit Protection Act 2009:  
Section 29

(Prohibition on engaging in credit activities without a licence) R1

(1) A person must not engage in a credit activity if the person does not hold a licence authorising the person to engage in the credit activity. R2

P1

Civil penalty: 2,000 penalty units.

*omissis*

P2

P3

Criminal penalty: 200 penalty units, or 2 years imprisonment, or both. P4

# LegalRuleML modelling

- In a given time  $t=2009$ , the author Guido, the authority “Consumer Credit Agency”, in the jurisdiction “Australia”, source text sec29
- ps1:  $\text{Person}(x) \Rightarrow [\text{FORB}] \text{EngageCreditActivity}(x)$
- ps2:  $\text{HasLicence}(x) \Rightarrow [\text{PERM}] \text{EngageCreditActivity}(x)$
- ps2 > ps1
- pen1:  $[\text{OBL}] \text{PayCivilUnits}(x, 2000)$
- pen2:
  - $[\text{OBL}] \text{PayPenalUnits}(x, 200)$ ,
  - $[\text{OBL}] \text{Imprisonment}(x, 2y)$ ,
  - $[\text{OBL}] \text{PayPenaltyUnitsPlusImprisonment}(x, 200, 2y)$
- rep1:  $[\text{Violation}] \text{ps1}, \text{pen1}$
- rep2:  $[\text{Violation}] \text{ps1}, \text{pen2}$

# LegalRuleML main blocks

## Metadata

Legal Sources

References

Agents

Authority

Time Instants

Temporal Characteristics

Jurisdiction

Role

## Context

bridge between metadata and rules

```
<lrml:Rule key="rule1">  
  <lrml:if> ...</lrml:if>  
  <lrml:then>... </lrml:then>  
</lrml:Rule>...
```



# Alternative interpretations of the same text

Criminal penalty: 200 penalty units, or 2 years imprisonment, or both.

**pen2a:**

**Guido**

```
SUBORDERLIST {  
  [OBL] PayPenalUnits(x,200),  
  [OBL] Imprisonment(x,2y),  
  [OBL]  
  PayPenaltyUnitsPlusImprisonm  
  ent(x,200,2y)  
}
```

**pen2b:**

**Monica**

```
OR {  
  [OBL] PayPenalUnits(x,200)  
  [OBL] Imprisonment(x,2y),  
  [OBL]  
  PayPenaltyUnitsPlusImprisonm  
  ent(x,200,2y)  
}
```

```
<lrml:Alternatives key="alt1">  
  <lrml:fromLegalSources>  
    <lrml:LegalSources>  
      <lrml:hasLegalSource keyref="#sec29-par3"/>  
    </lrml:LegalSources>  
  </lrml:fromLegalSources>  
  <lrml:hasAlternative keyref="#pen2a"/>  
  <lrml:hasAlternative keyref="#pen2b"/>  
</lrml:Alternatives>
```

# LegalRuleML modelling

- In a given time  $t=2009$ , the author Guido, the authority “Consumer Credit Agency”, in the jurisdiction “Australia”, source text sec29
- $ps1: \text{Person}(x) \Rightarrow [\text{FORB}]\text{EngageCreditActivity}(x)$
- $ps2: \text{HasLicence}(x) \Rightarrow [\text{PERM}]\text{EngageCreditActivity}(x)$
- $ps2 > ps1$
- $pen1: [\text{OBL}]\text{PayCivilUnits}(x,2000)$
- **pen2a:**  
SUBORDERLIST {
  - $[\text{OBL}]\text{PayPenalUnits}(x,200),$
  - $[\text{OBL}]\text{Imprisonment}(x,2y),$
  - $[\text{OBL}]\text{PayPenaltyUnitsPlusImprisonment}(x,200,2y)\}$

*Context\_Author: Guido*
- **pen2b:**  
OR {  $[\text{OBL}]\text{PayPenalUnits}(x,200)$   
     $[\text{OBL}]\text{Imprisonment}(x,2y),$   
     $[\text{OBL}]\text{PayPenaltyUnitsPlusImprisonment}(x,200,2y) \}$ 

*Context\_Author: Monica*
- $rep1: [\text{Violation}]ps1, pen1$ 

*Context\_Author: Guido*
- **rep2a: [Violation]ps1, pen2a**
- **rep2b: [Violation]ps1, pen2b**

*Context\_Author: Monica*

## Conclusion and Future plans

- LegalRuleML is an emerging XML standard for modelling legal rules oriented to the legal expert, that provides a compact and expressive syntax
- RDF approach helps to foster the Open Rules in Linked Data and in Semantic Web
- Future work:
  - integration with Reaction RuleML
  - meta-model for permitting export in RDF
  - extensibility mechanisms of the schema
  - case-law management
  - good documentation and pilot cases

# Where to find material of the tutorial

- Schemas and Examples SVN: [https://tools.oasis-open.org/version-control/browse/wsvn/legalruleml/trunk/examples/approved/?rev=117&sc=1# trunk examples approved](https://tools.oasis-open.org/version-control/browse/wsvn/legalruleml/trunk/examples/approved/?rev=117&sc=1#trunk%20examples%20approved)
- Zip file of the schemas: <https://lists.oasis-open.org/archives/legalruleml/201406/msg00013.html>
- Documentation of the LegalRuleML TC: [https://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=legalruleml](https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=legalruleml)
- Glossary: <https://lists.oasis-open.org/archives/legalruleml/201408/msg00011/Glossary-v20.odt>



Thank you for your attention!