

# Copyright law: temporal versions

- **Requirements:** associate rules to their sources over time and to assign temporal dimensions to the rules
- US “Digital Millenium Act” and modifications
- **Specific goal:** in  $t_x$  calculate the proper *statutory damage* in case of violation of the copyright taking in consideration all the exceptions and the modifications respect an fact.

## 17 USC Sec. 504

### Remedies for infringement: Damages and profits

Interval of efficacy of the norm	Statutory Damages
[Jan. 1, 1978, March 1, 1989 [	<b>\$250</b> <= statutoryDamages <= <b>\$10,000</b>
[March 1, 1989, Dec. 9, 1999 [	<b>\$500</b> <= statutoryDamages <= <b>\$20,000</b>
[Dec. 9, 1999, $\infty$	<b>\$750</b> <= statutoryDamages <= <b>\$30,000</b>

USC\_17\_504@1976-10-19#title17-chp5-sec504-clsc-  
lst1-pnt2-subpar2

Efficacy period  
[Jan. 1, 1978, March 1, 1989 [

**(c) Statutory Damages. -**

The copyright owner may elect an award of statutory damages for infringements in a sum of not less than **\$250** or more than **\$10,000** as the court considers just.

USC\_17\_504@1989-03-01#title17-chp5-sec504-clsc-  
lst1-pnt2-subpar2

Efficacy period  
[March 1, 1989, Dec. 9, 1999 [

**(c) Statutory Damages. -**

The copyright owner may elect an award of statutory damages for infringements in a sum of not less than **\$500** or more than **\$20,000** as the court considers just.

USC\_17\_504@1999-12-09#title17-chp5-sec504-clsc-lst1-  
pnt2-subpar2

Efficacy period  
[Dec. 9, 1999, ∞

**(c) Statutory Damages. -**

The copyright owner may elect an award of statutory damages for infringements in a sum of not less than **\$750** or more than **\$30,000** as the court considers just.

# Prova 3 Representation with @metadata

## @scopes and guards[]

(<http://prova.ws>)

@src(USC\_17\_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2)

@label(StatutoryDamage Statute1)

@efficacyDamageStatute([date(1978,1,1), date(1989,2,28)])

statute([250,10000]).

@src(USC\_17\_504@1999-12-08#title17-chp5-sec504-clsc-lst1-pnt2-subpar2)

@label(StatutoryDamage Statute2)

@efficacyDamageStatute([date(1989,3,1), date(1999,12,8)])

statute([500,20000]).

@src(USC\_17\_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2)

@label(StatutoryDamage Statute3)

@efficacyDamageStatute([date(1999,12,9), \_])

statute([750,30000]).

@label(“StatutoryDamagesRule”)

payFee(Infringer, CopyrightOwner, [MinAmount, MaxAmount]) :-

infringes(Infringer, copyright),

electStatutoryDamages(CopyrightOwner, ElectTime),

@efficacyDamageStatute(ValidityInterval)

statute([MinAmount, MaxAmount]) [**during(ElecTime, ValidityInterval)**].

# Reaction RuleML Representation

## Statutory Damage Statute (1)

```

<Atom key="#StatutoryDamage Statute1"> <!-- statute 1-->
  <!-- descriptive metadata -->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1976-10-19#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
</meta>
  <!-- qualification metadata -->
  <qualification>

    <!-- note: simplified version of efficacy; could be also modeled in Reaction RuleML as a
    fluent situation (a changeable truth property of the world) -->
    <Atom>
      <Rel iri="lrml:efficacy">efficacyDamageStatute</Rel>
      <Interval>
        < Time type="ruleml:TimeInstant"><Data>1978-01-01</Data></Time>
        < Time type="ruleml:TimeInstant"><Data>1989-02-28</Data></Time>
      </Interval>
    </Atom>

  </qualification>
  <!-- instance -->
  <Rel>statute</Rel>
  <Interval>
    <Ind type="lkif:fee">$250</Ind><Ind type="lkif:fee">$10,000</Ind>
  </Interval>
</Atom>
  
```

# RRML: Statutory Damage Statute (2,3)

```
<Atom key="#StatutoryDamage Statute2"> <!-- statute 2-->
  <qualification>
    <Atom><Rel> efficacyDamageStatute </Rel>
      <Interval type="ruleml:LeftClosedInterval"> >
        <Time ><Data> 1989-03-01 </Data></Time>
        <Time><Data>1999-12-08</Data></Time>
      </Interval>
    </Atom>
  </qualification>
  <Rel>statute</Rel>
  <Interval>
    <Ind type="lkif:fee">$500</Ind><Ind type="lkif:fee">$20,000</Ind>
  </Interval>
</Atom>
<Atom key="#StatutoryDamage Statute3"> <!-- statute 3-->
  <qualification>
    <Atom><Rel> efficacyDamageStatute </Rel>
      <Interval type="ruleml:LeftClosedInterval">
        <Time ><Data> 1999-12-09 </Data></Time>
      </Interval>
    </Atom>
  </qualification>
  <Rel>statute</Rel>
  <Interval>
    <Ind type="lkif:fee">$750</Ind><Ind type="lkif:fee">$30,000</Ind>
  </Interval></Atom>
```

# RRML: Statutory Damage Rule ...


```

<Rule style="reasoning" key="#StatutoryDamagesRule" >
  <if> <And>
    <Atom><Rel iri="lkif:Infringement">infringes</Rel>
      <Var type="lkif:infringer">Infringer</Var> <Ind>copyright</Ind>
    </Atom>
    <Atom> <!-- note: could be also modeled as an event-->
      <Rel iri="lkif:electStatutoryDamages">electStatutoryDamages </Rel>
      <Var type="lkif:copyrightOwner">CopyrightOwner</Var>
      <Var type="ruleml:TimeInstant">ElectTime</Var>
    </Atom>
    <Atom>
      <scope> <!-- scope definition: select knowledge with metadata efficacyDamageStatute-->
        <Atom>
          <Rel iri="lrml:efficacy"> efficacyDamageStatute </Rel>
          <Var type="ruleml:TimeInterval">ValidityInterval</Var> <!-- binds validity -->
        </Atom>
      </scope>
      <guard><!--check if election time of award is during validity time interval of efficacy -->
        <Operator type="ruleml:During">
          <Var>ElectTime</Var> <Var>ValidityInterval</Var>
        </Operator>
      </guard>
      <Rel>statute</Rel><!-- apply scoped literal only on selected scope which fulfills guard -->
      <Interval><Var >MinAmount</Var><Var >MaxAmount</Var> </Interval>
    </Atom>
  </And></if> ....

```

# RRML: ... Statutory Damage Rule

```
<then>  
  <Atom>  
    <Rel iri="lkif:payFee">pay Fee</Rel>  
    <Var type="lkif:infringer">Infringer</Var>  
    <Var type="lkif:copyrightOwner">CopyrightOwner</Var>  
    <Interval><Var >MinAmount</Var><Var >MaxAmount</Var> </Interval>  
  </Atom>  
</then>  
</Rules>
```

 Reaction RuleML Translator Framework

```
@src(USC_17_504@1989-03-01#title17-chp5-sec504-clsc-1st1-pnt2-subpar2)  
@label(StatutoryDamage Statute1)  
@efficacyDamageStatute([date(1978,1,1), date(1989,2,28)]) statute([250,10000]).  
@src(USC_17_504@1999-12-08#title17-chp5-sec504-clsc-1st1-pnt2-subpar2)  
@label(StatutoryDamage Statute2)  
@efficacyDamageStatute([date(1989,3,1), date(1999,12,8)]) statute([500,20000]).  
@src(USC_17_504@1999-12-09#title17-chp5-sec504-clsc-1st1-pnt2-subpar2)  
@label(StatutoryDamage Statute3)  
@efficacyDamageStatute([date(1999,12,9), _]) statute([750,30000]).
```

```
@label("StatutoryDamagesRule")  
payFee(Infringer, CopyrightOwner, [MinAmount, MaxAmount]) :-  
  infringes(Infringer, copyright),  
  electStatutoryDamages(CopyrightOwner, ElectTime), ...
```

```
@efficacyDamageStatute(ValidityInterval)
```

# Prova 3 Representation with Fluents

(<http://prova.ws>)

% efficacy fluents which are initiated and terminated by the start and end events

@src("USC\_17\_504@1976-10-19#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

@label("EfficacyStatutoryDamageStatute1")

initiates(**startDamageStatute1**), statute([**250,10000**]), T).

terminates(**endDamageStatute1**), statute([**250,10000**]), T).

@src("USC\_17\_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

@label("EfficacyStatutoryDamageStatute2")

initiates(**startDamageStatute2**), statute([**500,20000**]), T).

terminates(**endDamageStatute2**), statute([**500,20000**]), T).

@src("USC\_17\_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

@label("EfficacyStatutoryDamageStatute3")

initiates(**startDamageStatute3**), statute([**750,30000**]), T).

terminates(**endDamageStatute3**), statute([**750,30000**]), T).

% the events which occur due to modifications of the law

@src("USC\_17\_504@1976-10-19#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

happens(**startDamageStatute1**, **date(1978,1,1)**).

@src("USC\_17\_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

happens(**endDamageStatute1**, **date(1989,2,28)**).

@src("USC\_17\_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

happens(**startDamageStatute2**, **date(1989,3,1)**).

@src("USC\_17\_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

happens(**endDamageStatute2**, **date(1999,12,8)**).

@src("USC\_17\_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2")

happens(**startDamageStatute3**, **date(1999,12,9)**).



# Prova 3 Representation with Fluents

## Statutory Damages Rule

(<http://prova.ws>)

*@label("StatutoryDamagesRule")*

```
payFee(Infringer, CopyrightOwner, [MinAmount, MaxAmount]) :-  
    infringes(Infringer, copyright),  
    electStatutoryDamages(CopyrightOwner, ElectTime),  
    holdsAt(statute([MinAmount, MaxAmount]), ElectTime).
```

# Reaction RuleML Representation

## Efficacy of Statutory Damage Statute (1)

```
<Initiates key="#EfficacyStatutoryDamage Statute1"> <!-- initiates efficacy fluent damage statute 1-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1976-10-19#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
</meta>
  <on> <Event><Ind>startDamageStatute1</Ind></Event></on>
  <fluent>
    <Situation><Interval>
      <Ind type="lkif:fee">$250</Ind><Ind type="lkif:fee">$10,000</Ind>
    </Interval></Situation>
  </fluent>
  <at><Time><Var>T</Var></Time></at>
</Initiates>
```

```
<Terminates key="#EfficacyStatutoryDamage Statute1"> <!--terminates efficacy fluent damage statute 1-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1976-10-19#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
</meta>
  <on> <Event><Ind>endDamageStatute1</Ind></Event></on>
  <fluent>
    <Situation><Interval>
      <Ind type="lkif:fee">$250</Ind><Ind type="lkif:fee">$10,000</Ind>
    </Interval></Situation>
  </fluent>
  <at><Time><Var>T</Var></Time></at>
</Terminates>
```

# Reaction RuleML Representation

## Efficacy Statutory Damage Statute (2)

```
<Initiates key="#EfficacyStatutoryDamage Statute2"> <!-- initiates efficacy fluent damage statute 2-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>startDamageStatute2</Ind></Event></on>
  <fluent>
    <Situation><Interval>
      <Ind type="lkif:fee">$500</Ind><Ind type="lkif:fee">$20,000</Ind>
    </Interval></Situation>
  </fluent>
  <at><Time><Var>T</Var></Time></at>
</Initiates>
```

```
<Terminates key="#EfficacyStatutoryDamage Statute1"> <!--terminates efficacy fluent damage statute 2-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>endDamageStatute2</Ind></Event></on>
  <fluent>
    <Situation><Interval>
      <Ind type="lkif:fee">$500</Ind><Ind type="lkif:fee">$20,000</Ind>
    </Interval></Situation>
  </fluent>
  <at><Time><Var>T</Var></Time></at>
</Terminates>
```

# Reaction RuleML Representation

## Efficacy Statutory Damage Statute (3)

```
<Initiates key="#EfficacyStatutoryDamage Statute3"> <!-- initiates efficacy fluent damage statute 3-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>startDamageStatute3</Ind></Event></on>
  <fluent>
    <Situation><Interval>
      <Ind type="lkif:fee">$750</Ind><Ind type="lkif:fee">$30,000</Ind>
    </Interval></Situation>
  </fluent>
  <at><Time><Var>T</Var></Time></at>
</Initiates>
```

```
<Terminates key="#EfficacyStatutoryDamage Statute1"> <!--terminates efficacy fluent damage statute 3-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>endDamageStatute3</Ind></Event></on>
  <fluent>
    <Situation><Interval>
      <Ind type="lkif:fee">$750</Ind><Ind type="lkif:fee">$30,000</Ind>
    </Interval></Situation>
  </fluent>
  <at><Time><Var>T</Var></Time></at>
</Terminates>
```

# Reaction RuleML Representation

## Start/End Statutory Damage Statute (1,2)

```
<Happens key="#StartDamage Statute1"> <!-- event start damage statute 1-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1976-10-19#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>startDamageStatute1</Ind></Event></on>
  <at>< Time type="ruleml:TimeInstant"><Data>1978-01-01</Data></Time></at>
</Happens>
```

<!-- note: this «end» event could be also modeled as a derived event which happens whenever the start event of damage statute 2 happens - -->

```
<Happens key="#EndDamage Statute1"> <!-- event end damage statute 1-->
  <meta> <Atom><Rel>src</Rel><Ind>USC_17_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>endDamageStatute1</Ind></Event></on>
  <at>< Time ><Data> 1989-03-01 </Data></Time></at>
</Happens>
```

```
<Happens key="#StartDamage Statute2"> <!-- event start damage statute 2-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1989-03-01#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>startDamageStatute2</Ind></Event></on>
  <at>< Time ><Data> 1989-03-01 </Data></Time></at>
</Happens>
```

# Reaction RuleML Representation

## Start/End Statutory Damage Statute (2,3)

```
<!-- note: this «end» event could be also modeled as a derived event which happens whenever the
start event of damage statute 3 happens - -->
<Happens key="#EndDamage Statute2"> <!-- event end damage statute 2-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>endDamageStatute2</Ind></Event></on>
  <at>< Time ><Data> 1999-12-09 </Data></Time></at>
</Happens>

<Happens key="#StartDamage Statute3"> <!-- event start damage statute 3-->
  <meta> <Atom> <Rel>src</Rel><Ind>USC_17_504@1999-12-09#title17-chp5-sec504-clsc-lst1-pnt2-subpar2</Ind>
  </meta>
  <on> <Event><Ind>startDamageStatute3</Ind></Event></on>
  <at>< Time ><Data> 1999-12-09 </Data></Time></at>
</Happens>
```

# RRML: Statutory Damage Rule

```

<Rule style="reasoning" key="#StatutoryDamagesRule" >
  <if> <And>
    <Atom><Rel iri="lkif:Infringement">infringes</Rel>
      <Var type="lkif:infringer">Infringer</Var> <Ind>copyright</Ind>
    </Atom>
    <Atom> <!-- note: could be also modeled as an event-->
      <Rel iri="lkif:electStatutoryDamages">electStatutoryDamages </Rel>
      <Var type="lkif:copyrightOwner">CopyrightOwner</Var>
      <Var type="ruleml:TimeInstant">ElectTime</Var>
    </Atom>
    <Holds> <!-- holds efficacy of statutory damages at time ElectTime-->
      <fluent>
        <Interval><Var >MinAmount</Var><Var >MaxAmount</Var> </Interval>
      </fluent>
      <at>< Time ><Var>ElectTime</Var></Time></at>
    </Holds>
  </if>
  <then>
    <Atom>
      <Rel iri="lkif:payFee">pay Fee</Rel>
      <Var type="lkif:infringer">Infringer</Var>
      <Var type="lkif:copyrightOwner">CopyrightOwner</Var>
      <Interval><Var >MinAmount</Var><Var >MaxAmount</Var> </Interval>
    </Atom>
  </then>
</Rules>

```

# Reaction RuleML – Key Message from this Copyright Law example

- Support for **Life Cycle Management**
  - descriptive metadata <meta>
  - qualifying metadata <qualification>
- Support for Knowledge Representation **Temporal Event/Action Reasoning**
  - Fluents (changeable Situations) <fluent>
- Support for **Modularization** and highly efficient **Dynamic Views** on the Knowledge Base
  - **scoped reasoning** <scope>
    - global knowledge in the KB becomes closed **local knowledge** in a scope on which reasoning and processing can be done efficiently
    - scopes are at the heart of Reaction RuleML's features for modularization, windowing techniques, transactions, selection and consumption policies, life cycle management, ... it is all about **dynamic knowledge**