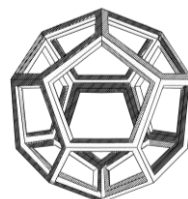


TEMPORAL MODEL OF LEGAL NORMS IN THE DIGITAL SPACE

Monica Palmirani

*CIRSFID-AlmaAI – Università di Bologna,
Dipartimento di Scienze Giuridiche*

*Co-chairs of LegalDocML and LegalRuleML TCs -
OASIS*



HyperModeLex



European Research Council
Established by the European Commission



Co-funded by
the European Union



eLegal evoluzione



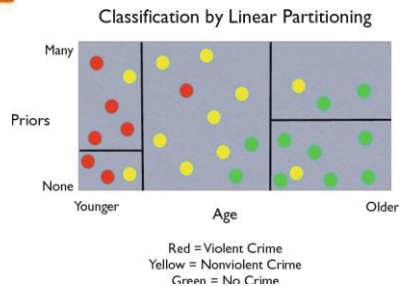
EUR-Lex

at4am

ELI/ECLI



EU Open Data Portal



```
pragma solidity ^0.4.17;  
  
contract SimpleStorage {  
    uint storedData;  
  
    function set(uint x) public {  
        storedData = x;  
    }  
  
    function get() public view returns (uint) {  
        return storedData;  
    }  
}
```



1990s

2000s

2010s

2020s

2030s

AI and Law

Logic programming – AI simbolica

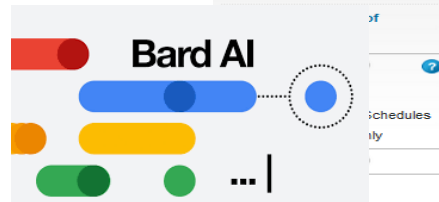
Semantic Web e Knowledge representation

ML, Classification, clustering, NLP, predict

Legal data analytics

Blockchain & Smart Contract

Digitalization of Legal System and Space-Temporal dimensions



A screenshot of the UK Public General Acts website. The page title is "Education Act 2011". Below the title, it says "UK Public General Acts > 2011 c. 21 > Whole Act". There are navigation tabs for "Table of Contents", "Content", "Explanatory Notes", and "More Resources". A "What Version" section has "Latest available (Revised)" selected. An "Advanced Features" section has "Show Geographical Extent" unchecked. A timeline titled "Changes over time for: Education Act 2011" shows dates: 15/11/2011, 17/11/2011, 15/01/2012, 01/02/2012, and 01/04/2012. A status message says "Status: This version of this Act contains provisions that are prospective." A green box at the bottom says "Changes to legislation: Education Act 2011 is up to date with all changes known to be in force on or before 25 May 2023. There are changes that may be brought into force at a future date. Changes that have been made appear in the content and are referenced with annotations."



Education Act 2011
2011 CHAPTER 21

- Is it possible to digitalize the legal system?
- Under which conditions? What we lose in the transformation?
- Which temporal model we should implement?
- Could artificial intelligence help find solutions or does it complicate the scenario? And in the Metaverse?

Guastini, Bobbio, Alchourrón, Bulygin, Hernández, Sartor, Rotolo, Palmirani, etc.



when does the GDPR enter into force?



The General Data Protection Regulation (GDPR) entered into force on May 25, 2018.



**Entry into force, into operation,
date of application**



when does the GDPR enter into operation?



The General Data Protection Regulation (GDPR) entered into operation on May 25, 2018. This means that from that date onwards, the GDPR became fully applicable and enforceable, and organizations were required to comply with its provisions regarding the processing and protection of personal data.



Timeless, flat dimension



When has the GDPR started to be applied?



The General Data Protection Regulation (GDPR) started to be applied and enforced on May 25, 2018. This means that from that date onwards, organizations were required to comply with the GDPR's provisions regarding the processing and protection of personal data. The GDPR replaced the previous data protection laws in the European Union and introduced new requirements and standards for data protection and privacy.



GDPR

E
X
T
R
E
M
E
S
A
L

Date of document: 27/04/2016

Date of entry into force: 24/05/2016

Date of effect: 25/05/2018

Date of application:

25/05/2023

27/04/2016

24/05/2016

25/05/2018

25/05/2023

I
N
T
E
R
N
A
L

Article 97

Commission reports

1. **By 25 May 2020** and every four years thereafter, the Commission shall submit a report on the evaluation and review of this Regulation to the European Parliament and to the Council. The reports shall be made public.

Knowledge graph as representation of the reality?



gdpr entered in force date



Tutti

Notizie

Video

Immagini

Libri

Altro

Strumenti

Circa 5.700.000 risultati (0,45 secondi)

25 May 2018

The General Data Protection Regulation (GDPR)

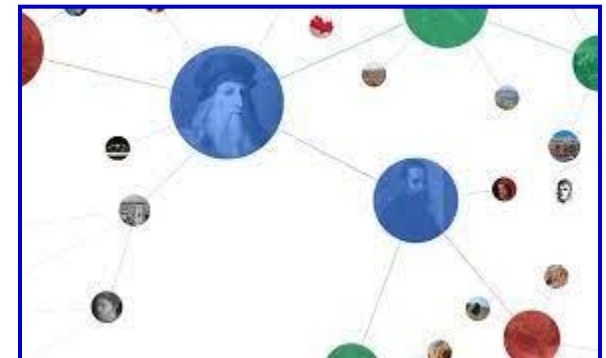
A single law will also do away with the current fragmentation in different national systems and unnecessary administrative burdens. The regulation entered into force on 24 May 2016 and applies since 25 May 2018.



europa.eu

<https://commission.europa.eu> > law > law-topic > data-pr...

Data protection in the EU - European Commission



Legal System Temporal model

- External temporal parameters

Provision (tx, ty, tz)

tx time of entry into force

ty time of operativity or efficacy

tz time of application



- Internal temporal parameters

Provision(Norm(t1,t2,..tn)) (tx, ty, tz)

COMMISSION REGULATION (EU) No 742/2010 of 17 August 2010

Date of delivery 17 August 2010

Publication date 18.8.2010

Article 2

Date of inforce 19 Aug. 2010

This Regulation shall enter into force on the day following its publication in the *Official Journal of the European Union*.

It shall apply from 1 July 2010.

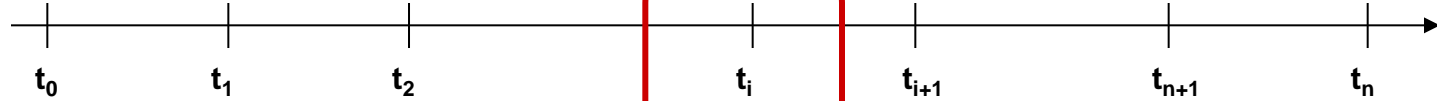
Date of efficacy 1 July 2010

However, Article 1(2), as regards point B of Part II, Part III, point (a) of Part IV and Part V of Annex I to Regulation (EU) No 1272/2009, shall apply from 1 July 2011.

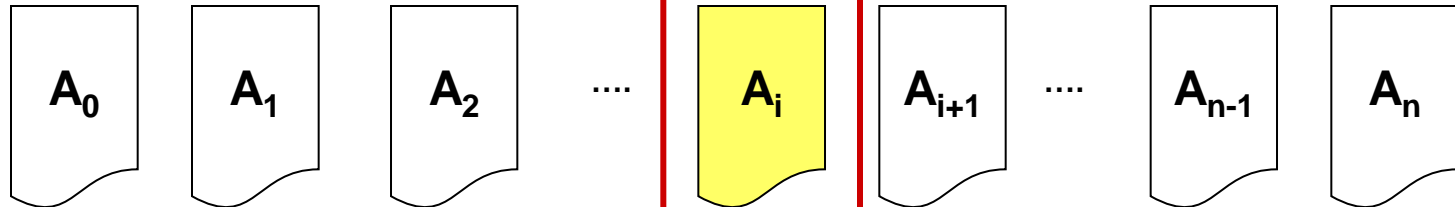
Derogation of Date of efficacy 1 July 2011

Legal system at the time t_j

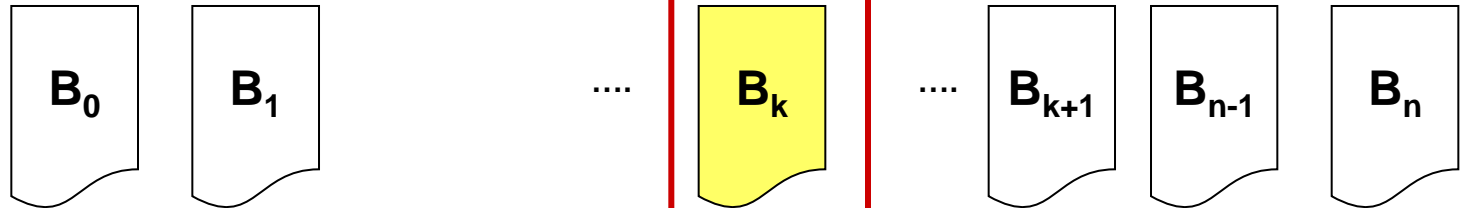
Time line



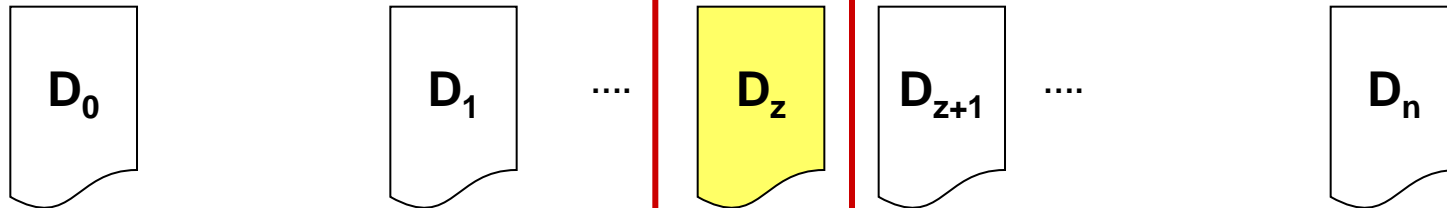
Document A



Document B

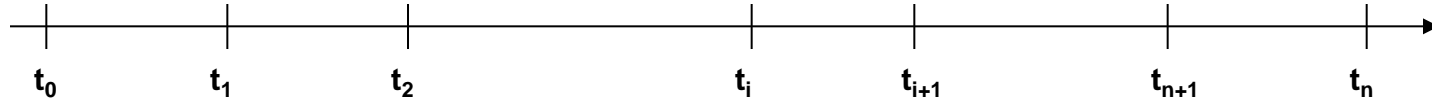


Document D

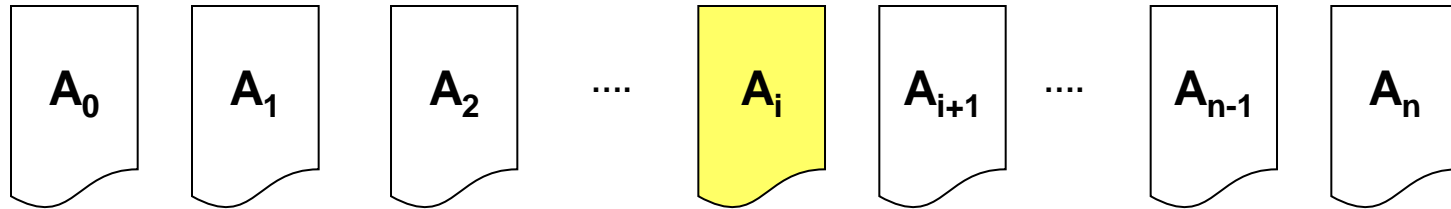


Versioning chain of document A

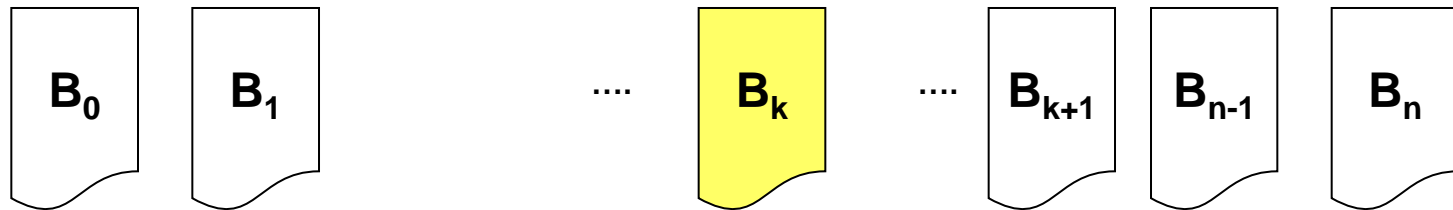
Time line



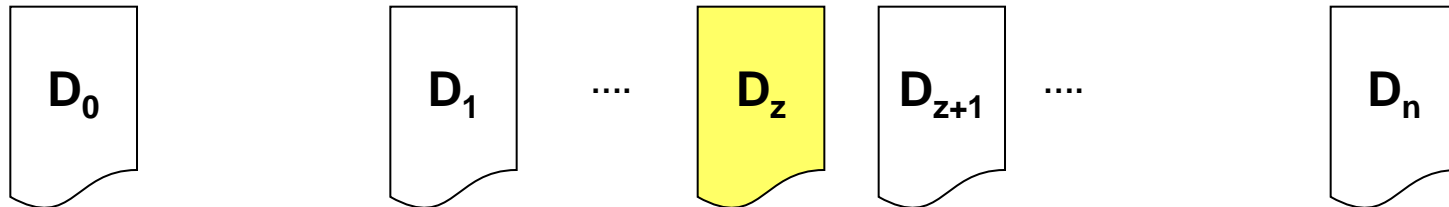
Document A



Document B

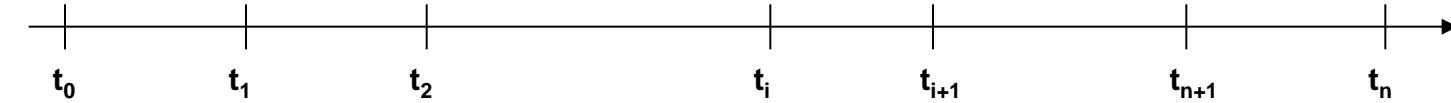


Document D



Dynamic Legal Information System

Temporal Axis



urn

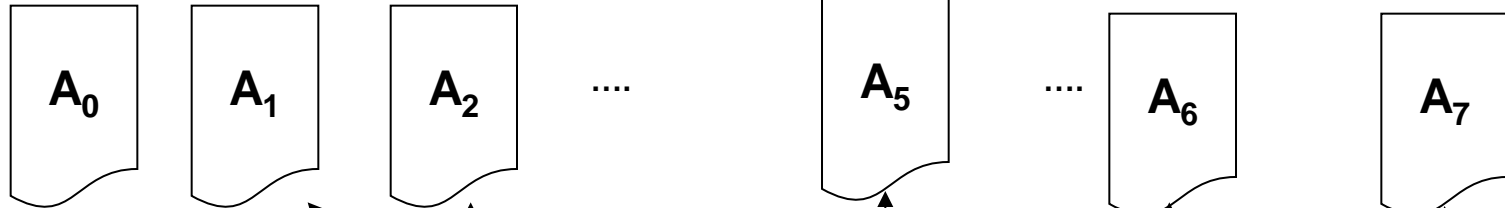
urn@t2

urn@t5

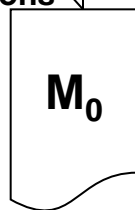
urn@t6

urn@t7

Versioning Chain

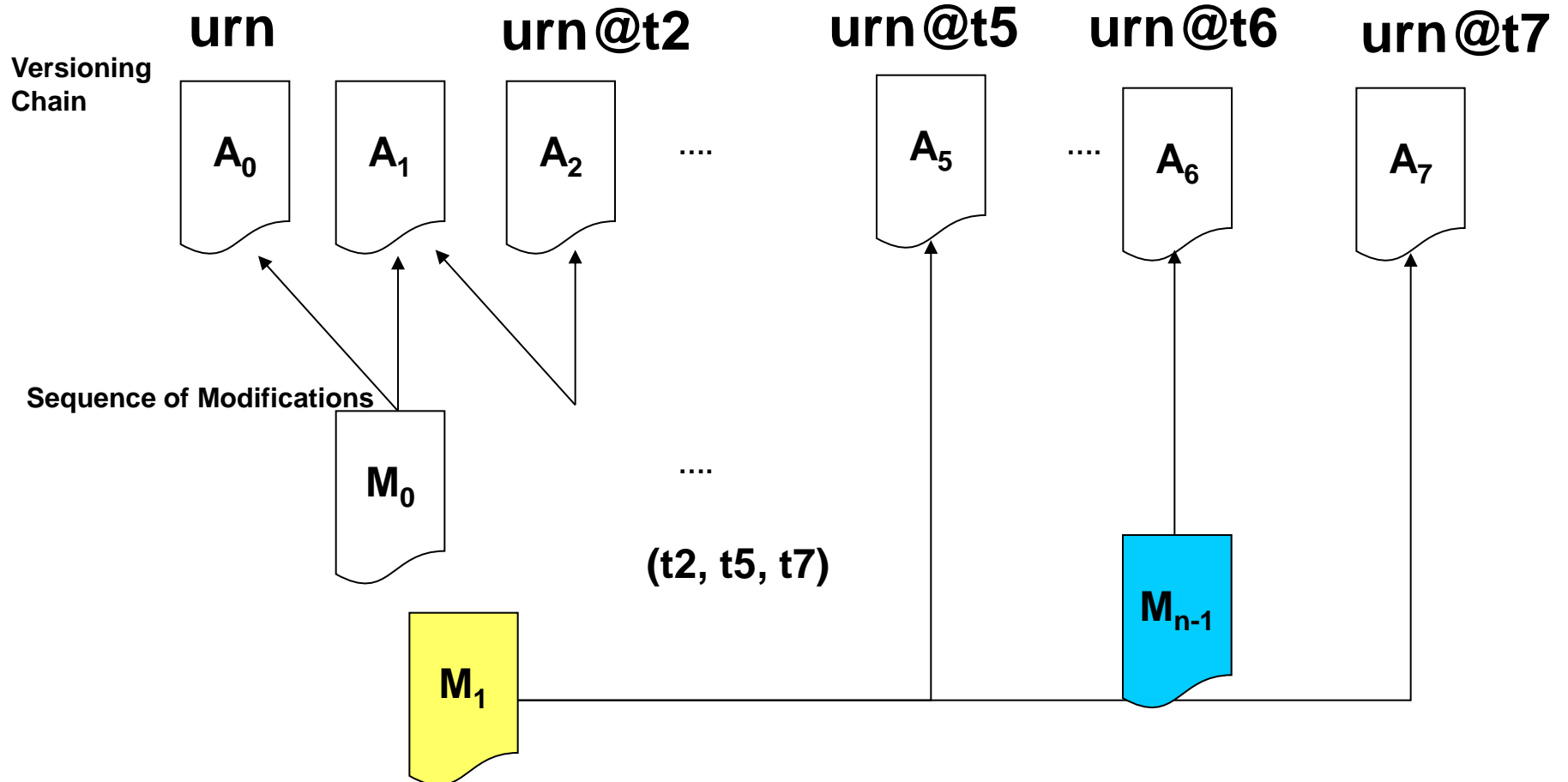
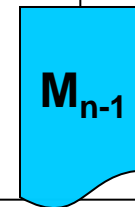
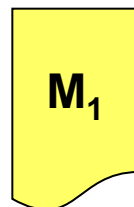


Sequence of Modifications



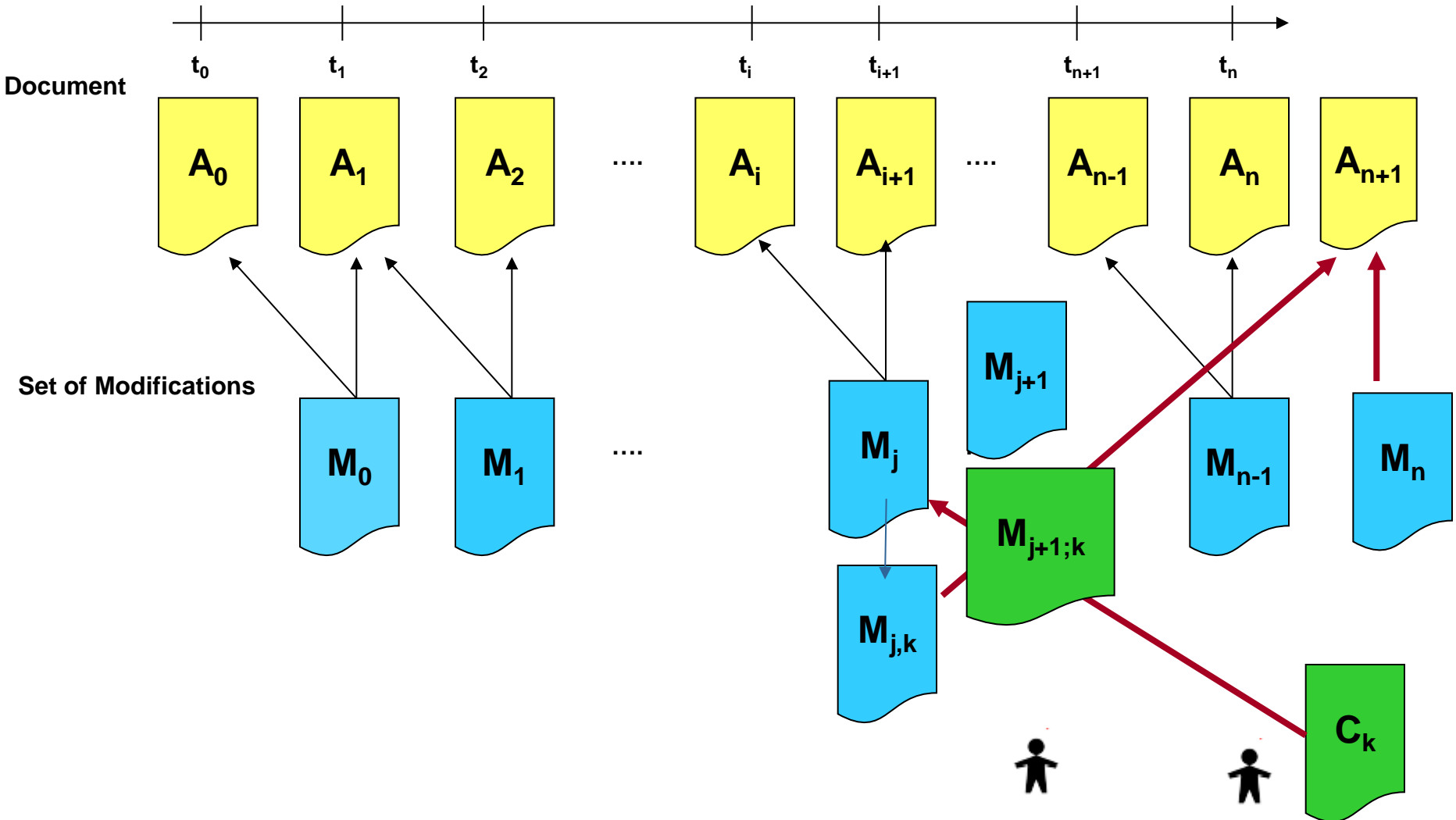
....

(t2, t5, t7)



Dynamic Legal Information System

Time line



Navigation of reference points-in-time

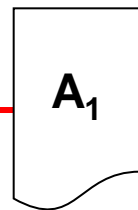
◀◀ iniziale | ◀ precedente modifica | ▶ successiva modifica | ▶▶ attuale

Versione in vigore dal 02/03/1999 al 14/02/2003
(consulta l'indice)

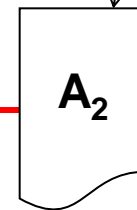
CAPO VI

DELLE COMMISSIONI PERMANENTI, DELLA GIUNTA PER GLI AFFARI DELLE COMUNITA' EUROPEE E DELLE COMMISSIONI SPECIALI E BICAMERALI

9. I disegni di legge, che contengano disposizioni nelle materie indicate dall' [articolo 117 della Costituzione](#) e in quelle previste dagli statuti speciali delle Regioni adottati con leggi costituzionali o che riguardino l'attività legislativa o amministrativa delle Regioni, sono trasmessi anche alla Commissione parlamentare per le questioni regionali. Ove quest'ultima, nei termini di cui all' [articolo 39](#), esprima il proprio parere, questo è allegato alla relazione che la Commissione competente presenta all'Assemblea.



1999

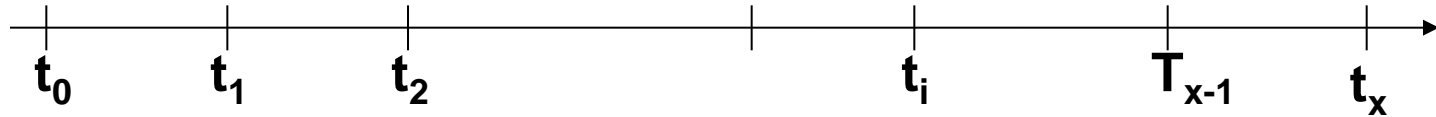


2001

The two versions are equally plausible and the resolver has to retrieve both

Ex-tunc modifications: Retroactive repeal

Time line

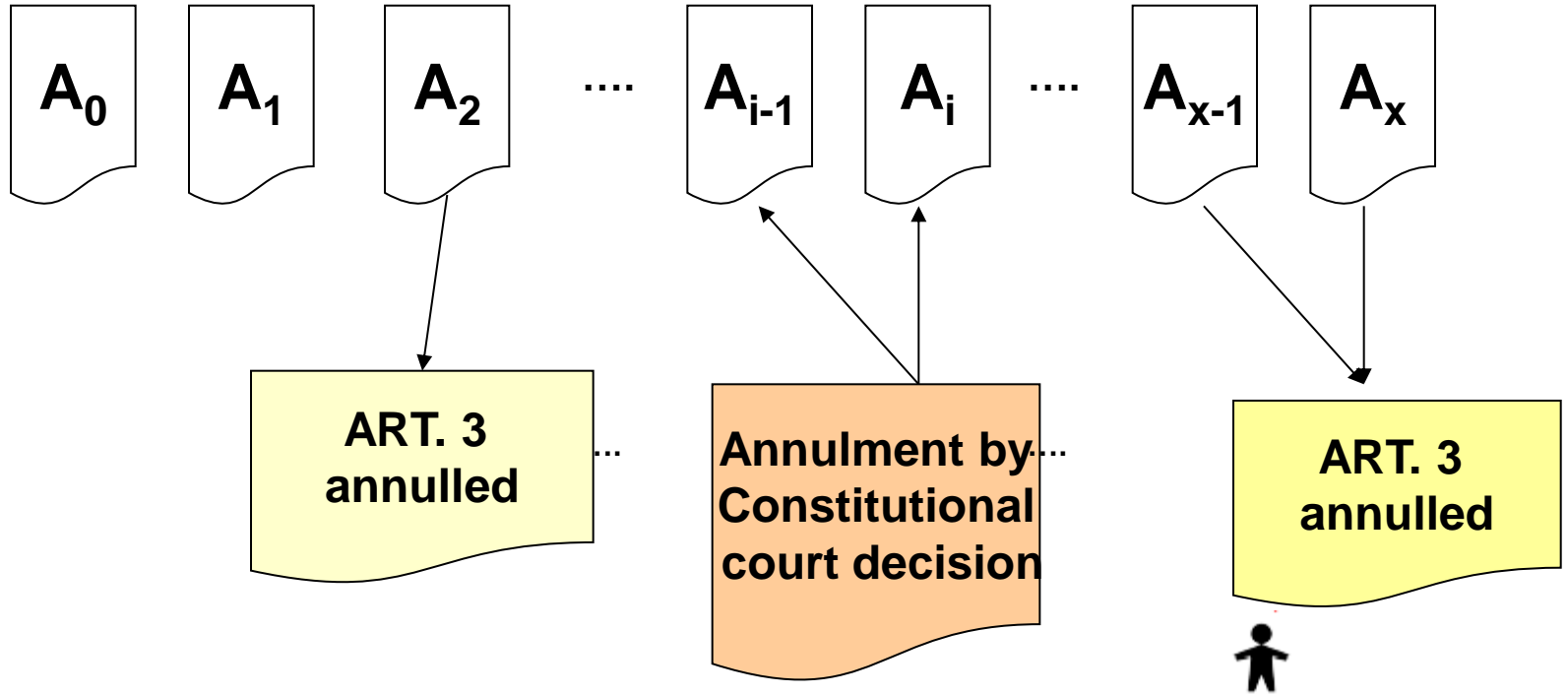


Normative system

yesterday

2010

tomorrow

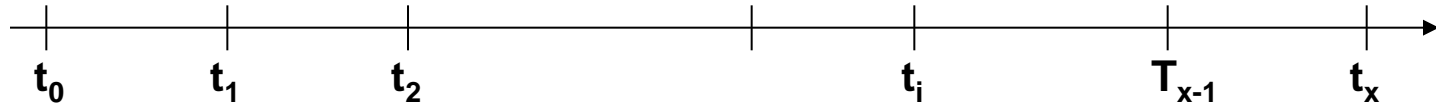


view of the Legal system in the time t_2 with the knowledge of t_j

view of the Legal system in the time t_x with the knowledge of t_j

Retroactive repeal

Time line

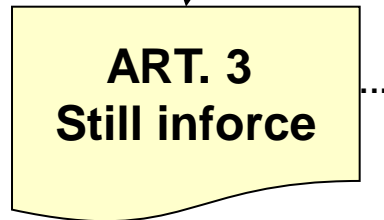
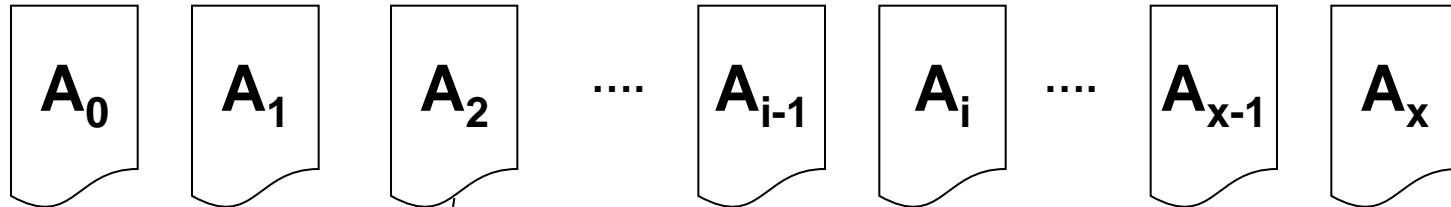


Normative system

yesterday

2010

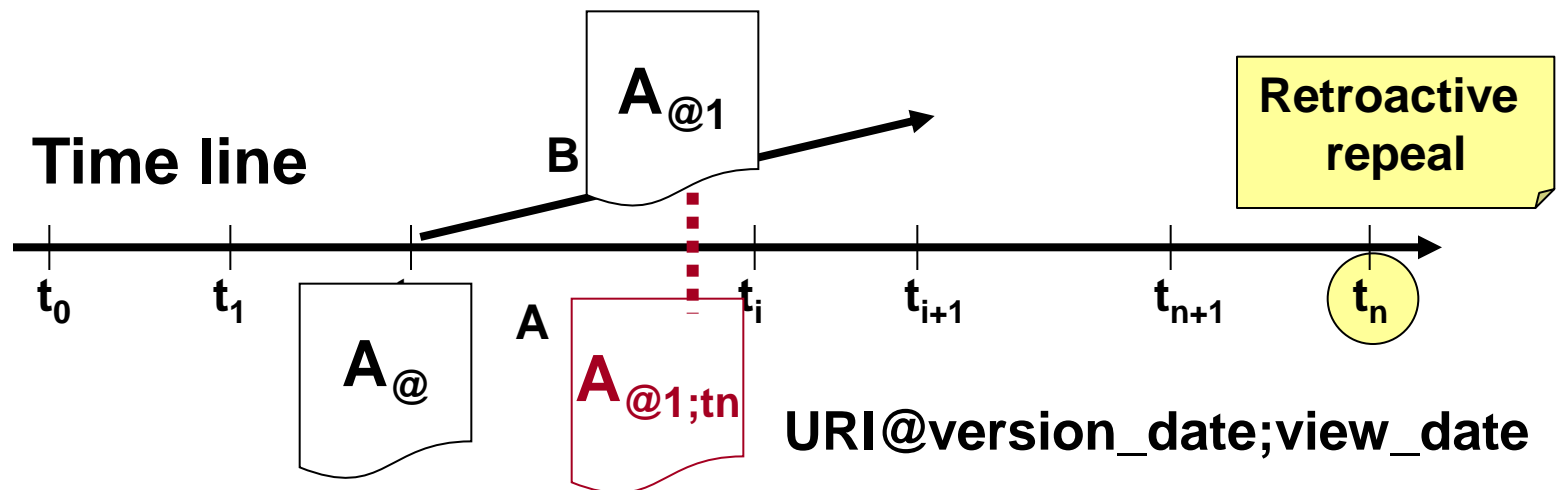
tomorrow



view of the Legal system in the
time t_2 without the knowledge of t_j

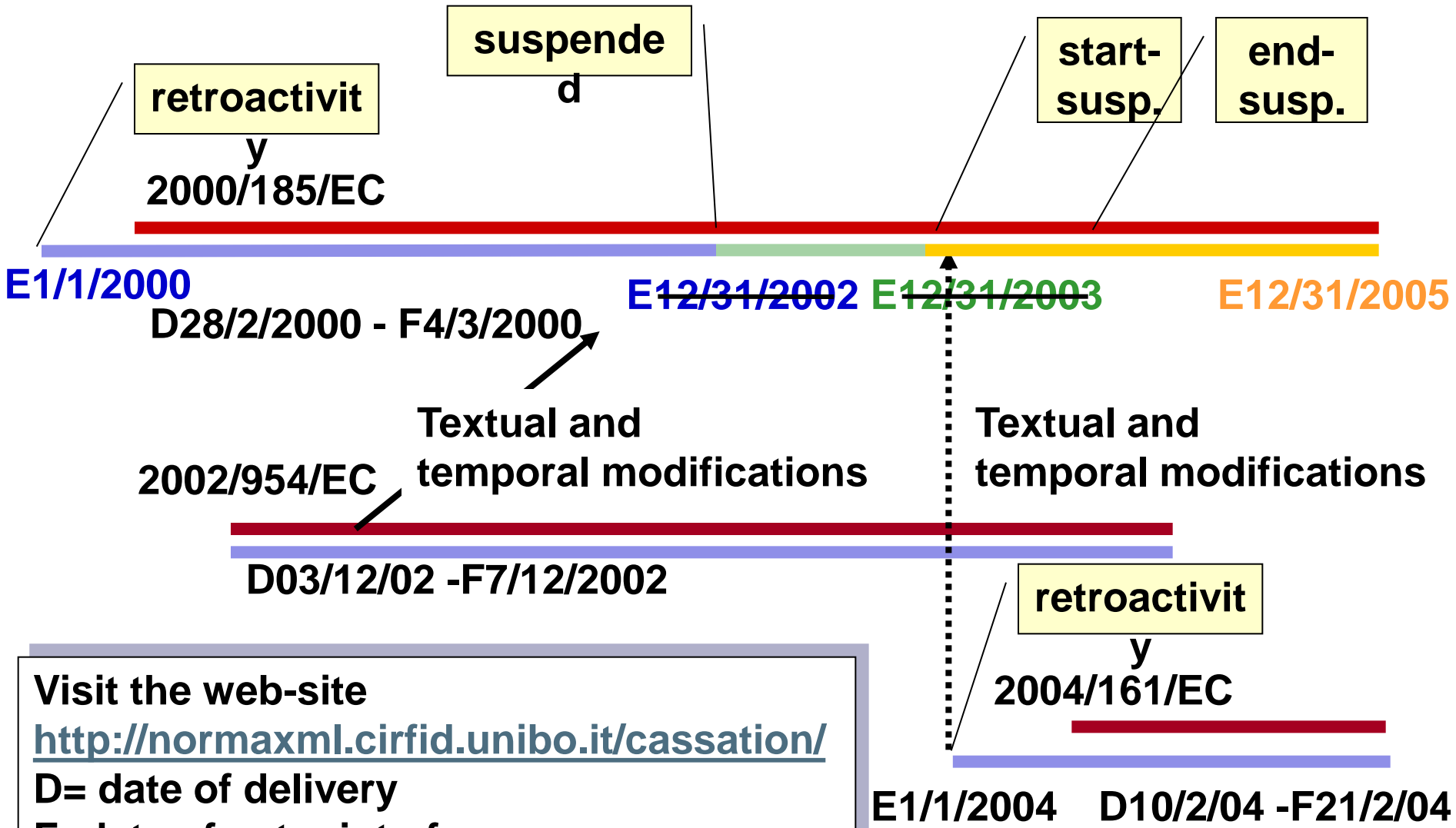
Multiple versions valid: date of view

- Multiple versions are possible that are valid at the same time
- **URI@version_date;view_date**



- eng@version_date;committee_delivery_date
- eng@version_date;committee_delivery_date;fra

Example – EU directive VAT special services



Visit the web-site

<http://normaxml.cirfid.unibo.it/cassation/>

D= date of delivery

F=date of enter into force

E=date of enter into operation

Multiple measurement of the time



רשומות

ספר החוקים

14 בדצמבר 2020

2877

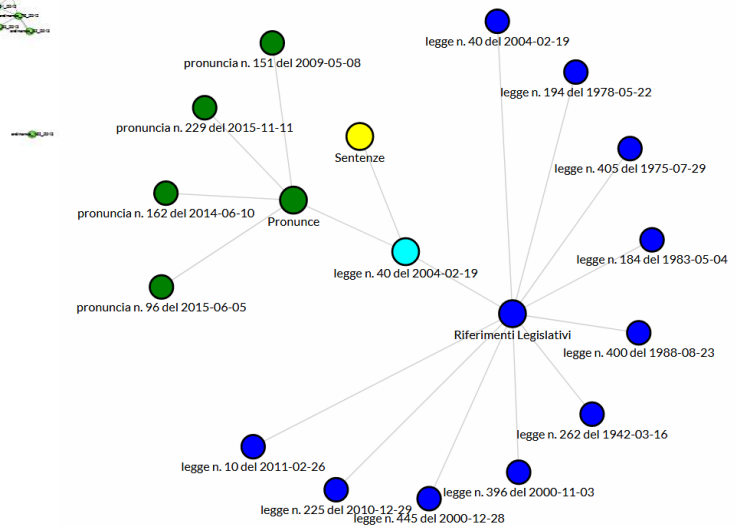
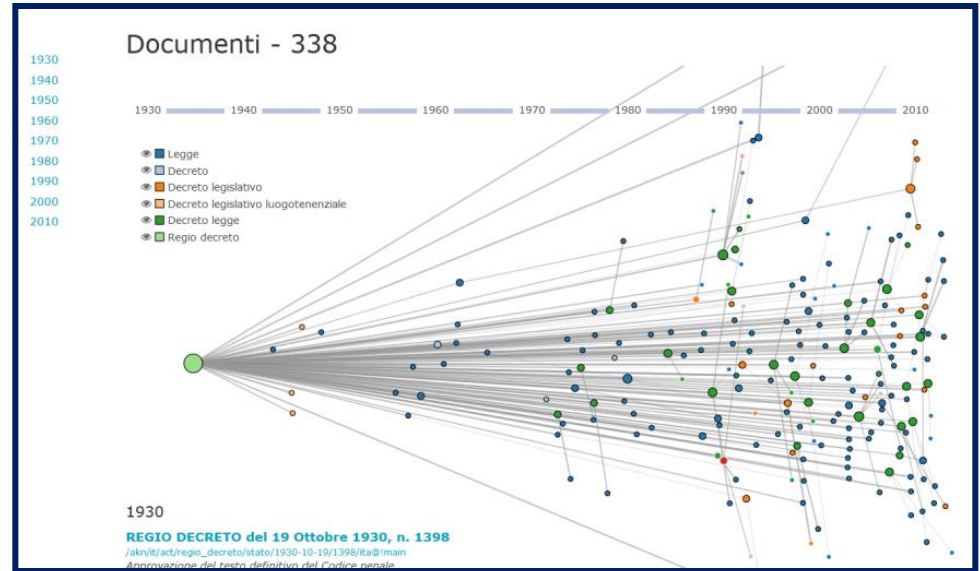
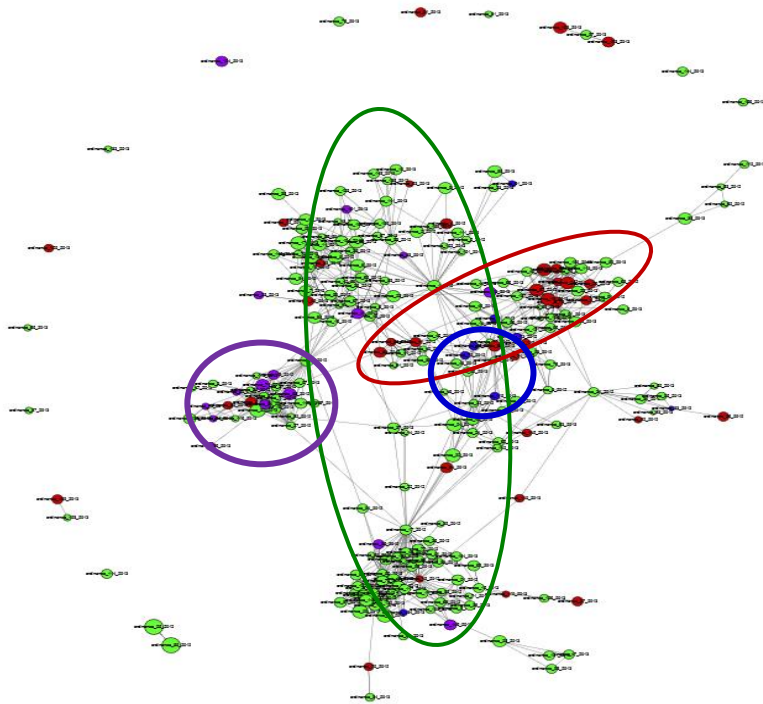
כ"ח בכסלו התשפ"א

עמוד

חוק שירותי תעופה (פיצוי וסיוע בשל ביטול טיסה או שינוי בתנאיה) (נגיף הקורונה החדש) –
הוראת שעה – תיקון) (תיקון מס' 2), התשפ"א–2020..... 138

Legal data analytics – Legal Design

Sisma 2012 Ordinanze e modifiche



Anatomy of a derogation

$R1_{t_1}$ derogated to $R2_{t_2}$

<action>

<normDerogated>

<jurisdiction>

<temporalParameter>

<scope>

By way of derogation from paragraphs 1 and 2, in Cyprus, Croatia, Malta and Slovenia, the amount referred to in those paragraphs may be set at a value lower than EUR 500, but not less than EUR 200 or, in the case of Malta, not less than EUR 50.

Network analysis

Analysis of the Derogations in EU Legislation using Network Analysis

This is a visualization map for AKN derogations of the EU legislation from 2010 to 2020

Eurovocs:

Places

Duration:

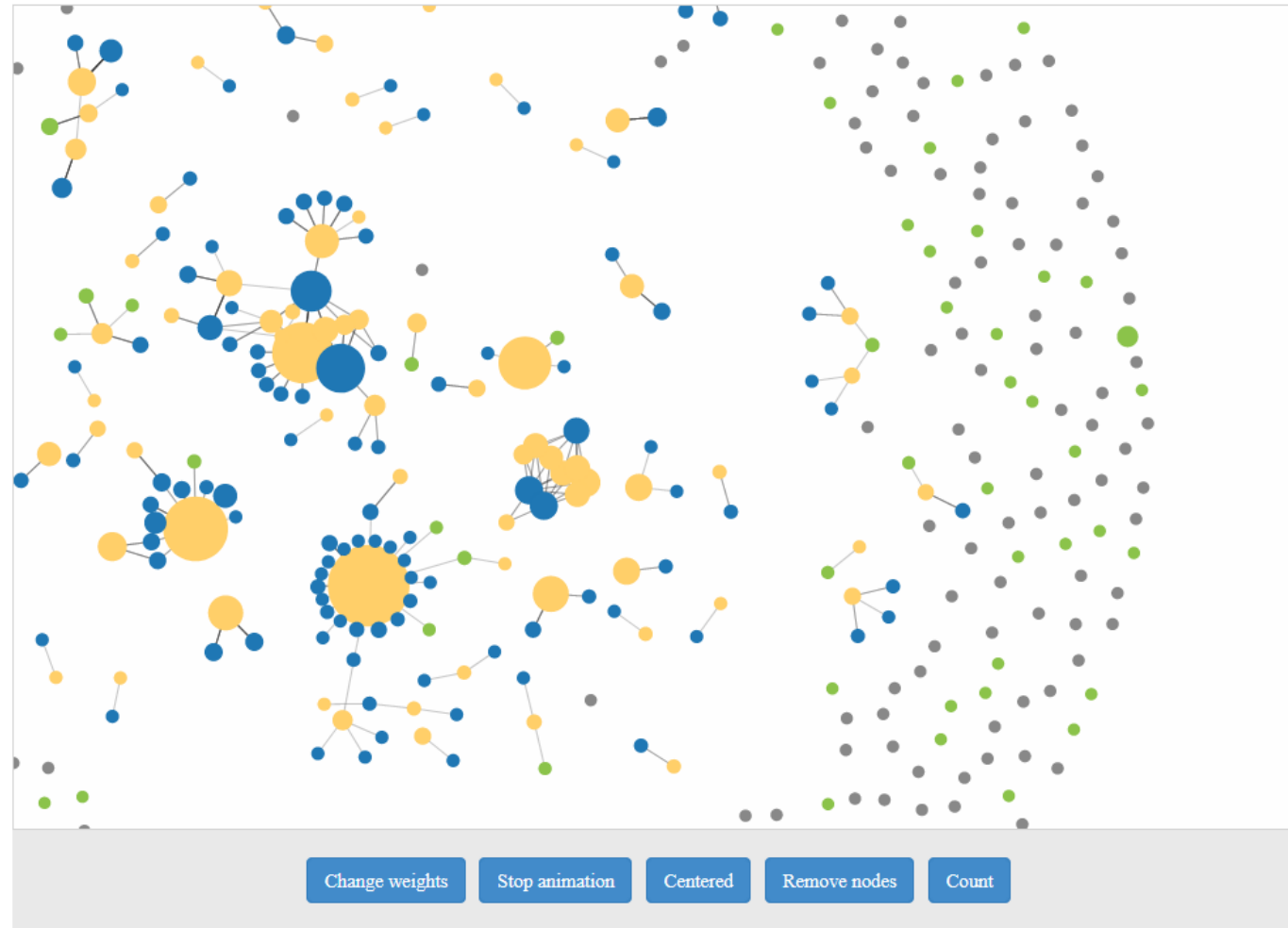


Conditions:

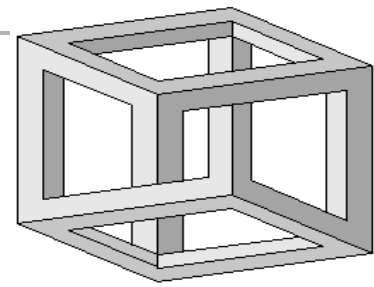
Domains:

Match all filters (narrow results)

Update

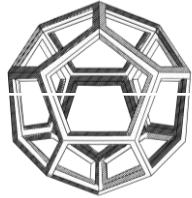


Conclusion



- Digitalization of the legal system requires a temporal model based on legal theory
- The *time* in Legal System is an artefact
- **AI** is trained in a flat dimension where the time is just a parameter
- **Metaverse** is hyper-spatial-temporal environment
- **HyperModeLex** is necessary for guaranteeing the respect of the legal theory, autonomy, correct interpretation





HyperModeLex



European Research Council
Established by the European Commission



**Co-funded by
the European Union**

**thank you
for your attention**

Monica Palmirani – monica.palmirani@unibo.it