

CHOOSING COMPLIANCE SOLUTIONS THROUGH STAKEHOLDER PREFERENCES

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FUNDP
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Software quality & Regulatory compliance
Variability of law

MODELING LAW: NOMOS2

THE PREFERRED COMPLIANCE PROBLEM

Definition
Example
Finding a solution

AUTOMATED REASONING

NRTool
Example

CONCLUSIONS

Introduction

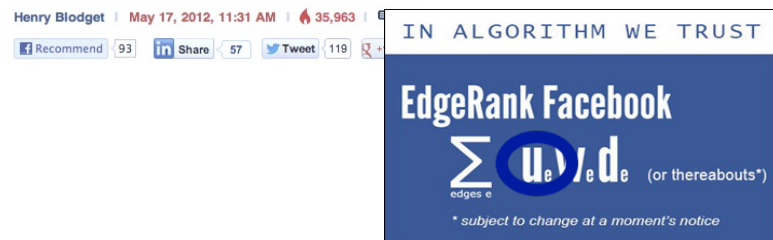
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SOFTWARE QUALITY & REGULATORY COMPLIANCE



Software quality: FITNESS-FOR-PURPOSE & FITNESS-TO-NORMS

The 13 Secrets To Facebook's Success



privacy & security

Yet Another Shift In Facebook Policies Raises Privacy Concerns



News > Technology > Facebook

Facebook users raise privacy concerns as company tweaks security settings

Reports – and myths – about user privacy abound on Facebook. Is it time for the social network to be more open with users?

Growing number of **regulations impacting software/IS**

Challenge: DESIGN SOFTWARE MEETING BOTH STAKEHOLDERS REQUIREMENTS AND APPLYING LAW

Introduction

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VARIABILITY OF LAW



Legal texts: prescriptions, exceptions, derogations, cross-references, alternatives,

Variability on complying: space of compliant alternatives

some fits better stakeholder requirements, some cost less to implement, ...

FIND THE
BEST WAY
TO COMPLY:

PREFERRED COMPLIANCE PROBLEM:

problem of finding the best compliance solution,
given a law and a set of stakeholder preferences

Idea: Stakeholder preferences drive the search in a space of compliant alternatives

Norms are modeled with **Nòmos 2 + preferences**

Modeling Law

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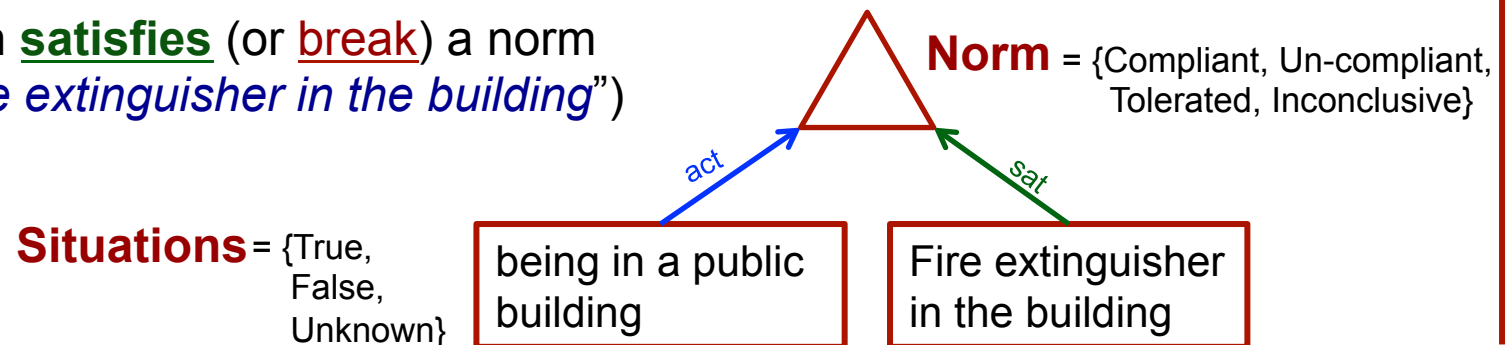
Nòmos 2



Applicability and Satisfiability of a Norm depends on the situations that hold

4 Relations between Situation and Norms (act as label propagation mechanism)

- Situation activates (or block) a norm
(e.g. “every *public building* must have fire extinguisher”)
- Situation satisfies (or break) a norm
(e.g. “*fire extinguisher in the building*”)

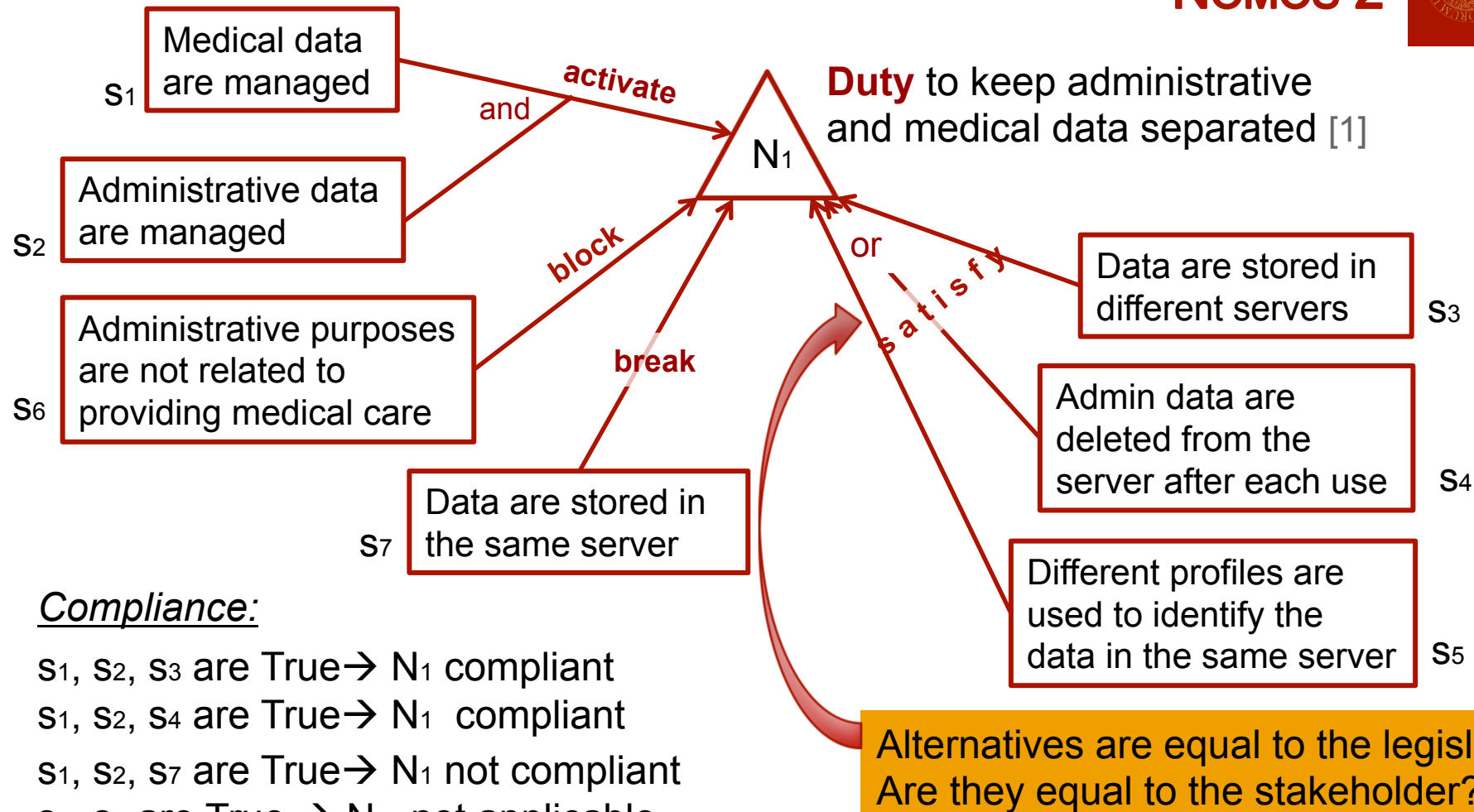


Modeling Law

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Nòmos 2



The Preferred Compliance Problem

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DEFINITION

Preferred Compliance Problem (PCP):

Identify alternative ways to comply with applicable Norms, and comparing these alternatives on the basis of stakeholder preferences.

X_i is a set of Situations

$<_c$: relation defining partial order on Situations

Candidate Compliance Solution (CCS):

a pair (X_i, N_i) , where X_i satisfies all norms in N_i

Solution to PCP:

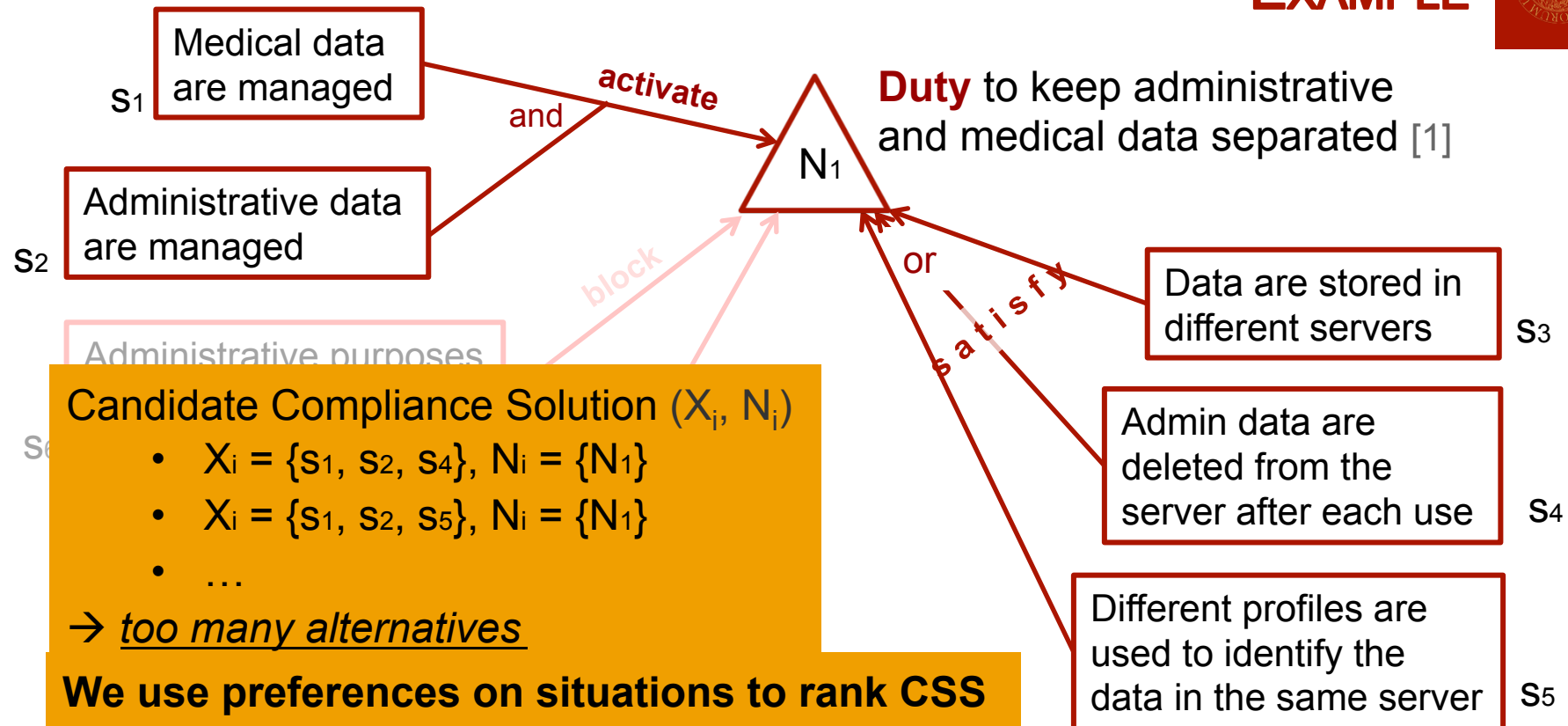
find a CCS that ranks better according to the relation $<_c$

The Preferred Compliance Problem

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EXAMPLE



The Preferred Compliance Problem

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FINDING A SOLUTION

CCS help the analyst: suggestions on design, provide info (e.g., applicable norms), compliance info, ...

Solution to PCP: find a CCS that ranks better according to the relation $<_c$

NEED
AUTOMATED
REASONING

Find all \rightarrow rank?

Space of situations in
intractable ($3^{\# \text{ of situations}}$)



Assumptions: value of some situations that are
known or hypothesized to be true or false

Generate and prune solutions \rightarrow rank



Automated Reasoning

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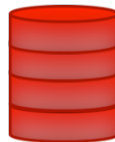


NRTool

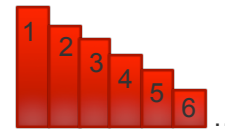
NRTool to support solving the PCP [search for CCS and rank]



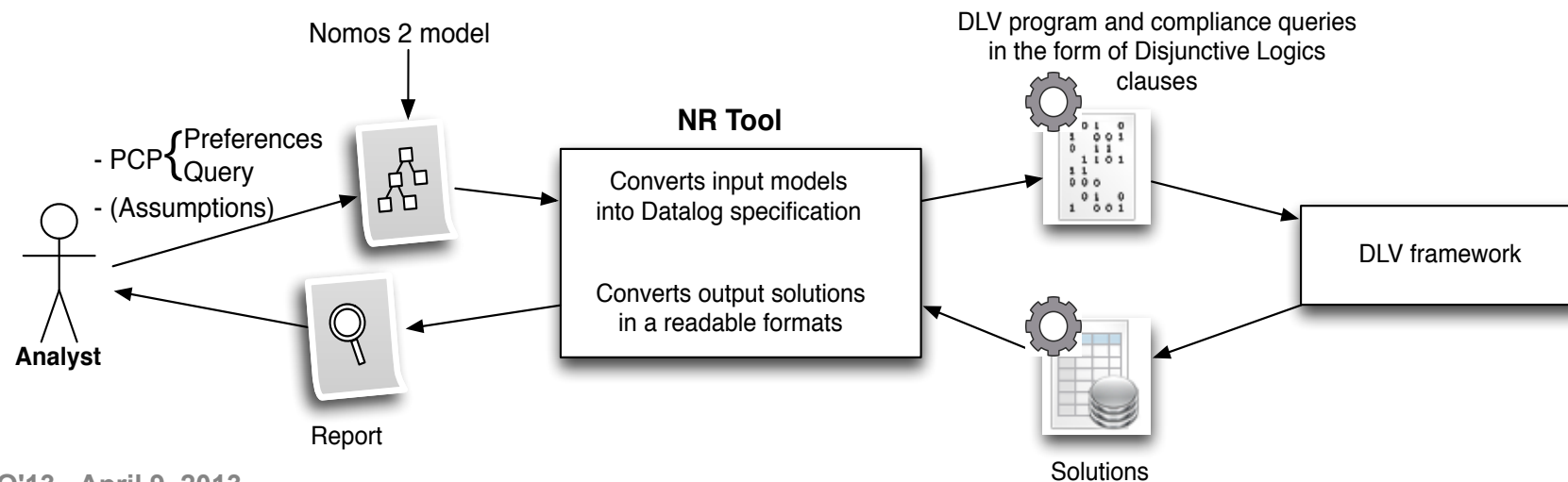
Translates a
Nòmos 2 model
in a DB
of facts



Described by
preferences
and
queries



Exploit DLV
framework as
reasoning engine



Automated Reasoning

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EXAMPLE



Extract from a Use Case: Italian Law on Electronic Health Record [§3.10-3.11]

Nòmos 2 model: 2 right, 1 duty, 11 situations

Space of alternatives:
 $3^{11} = 177147$

+ Assumptions from domain
→ 619 possible alternatives

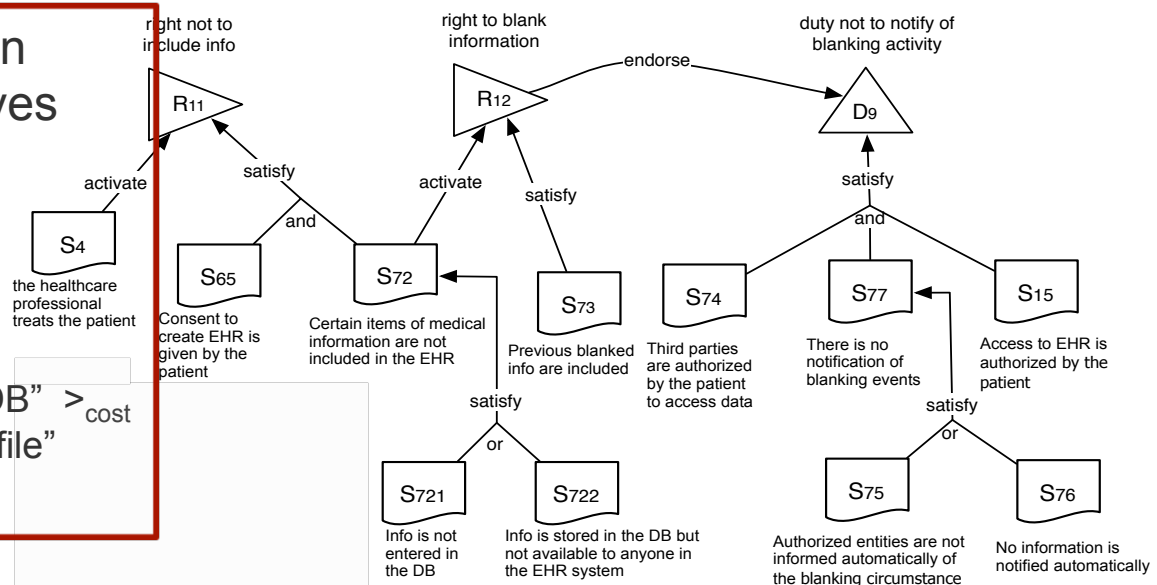
Query: comply with
all 3 norms

Preferences:

- “Not entering information in the DB” $>_{\text{cost}}$ “Info in DB with authorization profile”
- $S_{76} >_{\text{cost}} S_{75}$

NRTTool

4 alternatives ranked best



Conclusions

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CONTRIBUTIONS

- Definition of the Preferred Compliance Problem
 - Extension of Nòmos 2 with preferences
 - Automated tool to solve the PCP and analyze Nòmos2 models
-
- + compare compliance solution in terms of their desirability
 - + manage the space of alternatives of these models
 - + support automated reasoning to check for important properties

LIMITATIONS/FUTURE WORK

- Challenge to collect these preferences (in bigger models)
- Exploit these models in the Requirement Engineering Process
- Evaluation of scalability

Conclusions

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(FUTURE) FUTURE WORK

Preferences@DesignTime → Preferences@RunTime

Design of a generic system supporting different compliant alternatives →
Runtime system is an adaptation depending on user preferences and
situations

Compliant software as *Adaptive*

→ Generic design supporting different situations/preferences

Questions?

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