Towards runtime support for norm change from a monitoring perspective

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SUPER HUB
INNOVATION FOR INTEGRATED AND ECO-SUSTAINABLE MOBILITY

Motivation

Apply social abstractions to distributed systems in order to tame their complexity.
Requirement: Asses, at **run-time** the state of the normative Environment.

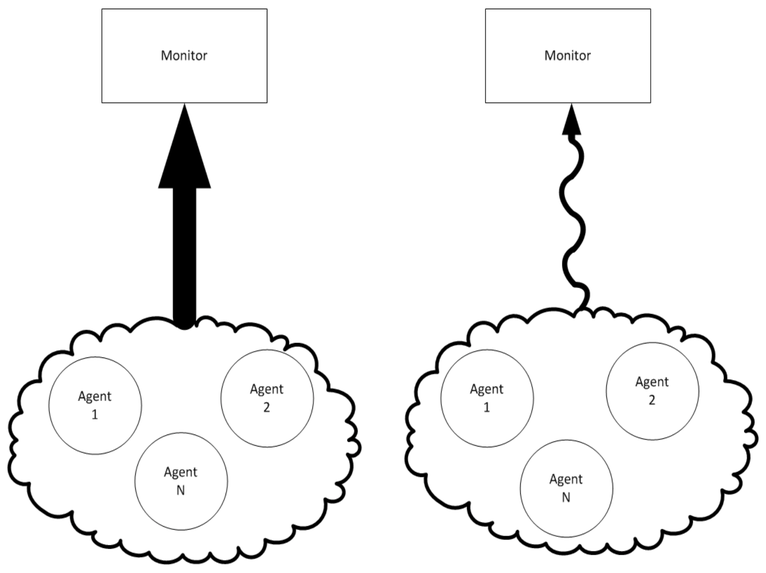
Regulative Norm

$$Win\_Auction(isangi, P) \rightarrow O_{isangi}(Pay\_Product(P) < leave\_auction(isangi))$$
$$In\_progress(P) \rightarrow F_{attendee}(ask\_question < \neg In\_progress(P))$$

Constitutive Norm

$$Raise\_hand \Rightarrow_{Sotherby's} Bid$$
$$Raise\_hand \Rightarrow_{Osaka\_Fish\_Market} Leave$$

Governance on Electronic Institutions



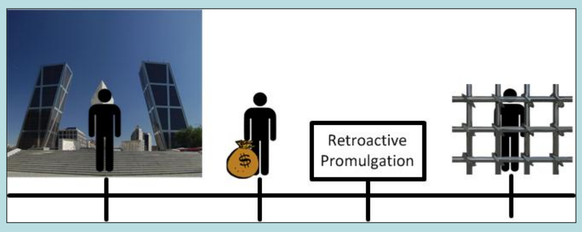
Basic Concepts:

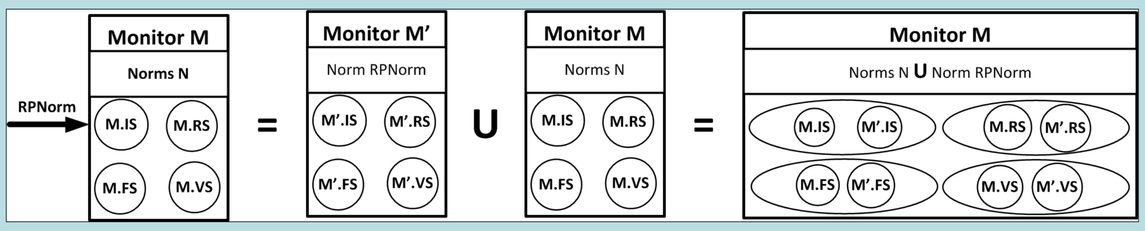
- Language: $\mathcal{L}_O$
- Ontology: O
- Logic connectives $\{\neg, \vee, \wedge\}$
- Set of all possible well-formed formulas: $wff(\mathcal{L}_O)$ (DNF)
- A *norm* n is a tuple $n = \langle f_A, f_M, f_D, f_w, w \rangle$
- A norm is considered fulfilled if, and only if: $f_A \rightarrow [O_w(E_w f_w \leq \neg f_M) \mathcal{U} f_D]$
- Event: $\langle \alpha, t, p \rangle$
- Normative Monitor: $M_N = \langle N, S, IS, VS, FS, RS, E \rangle$

Support for dynamic normative contexts

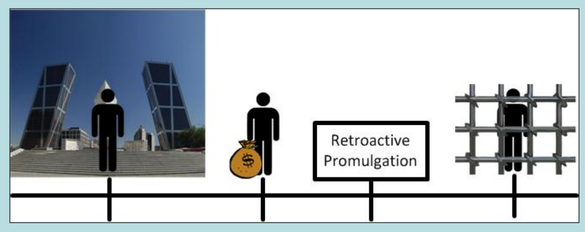
Non-static **normative environments**, evolving through time as regulations change **adapting to new situations** and behaviors
Dynamic **normative contexts**, changing as new **norms** are **added** to the institution and **removed** from it. Under this conditions, it desirable to continue computing the state of the normative context at **run-time**, and computing states that are **consistent** with the **modifications performed** to the institution.

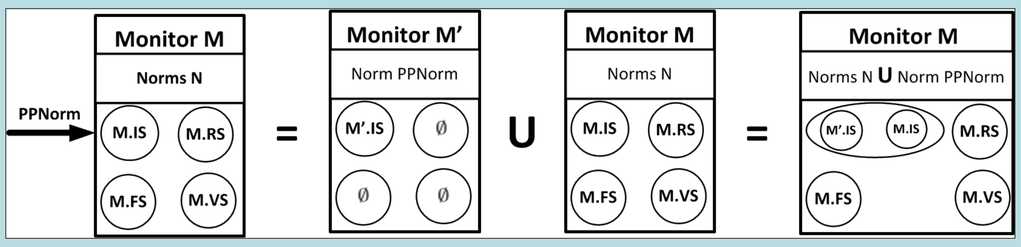
Retroactive Promulgation



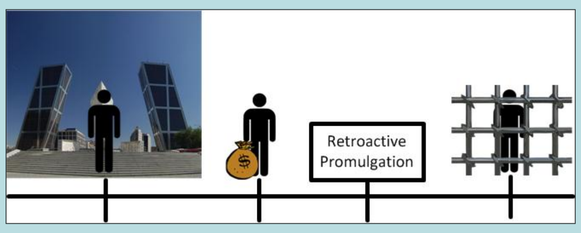


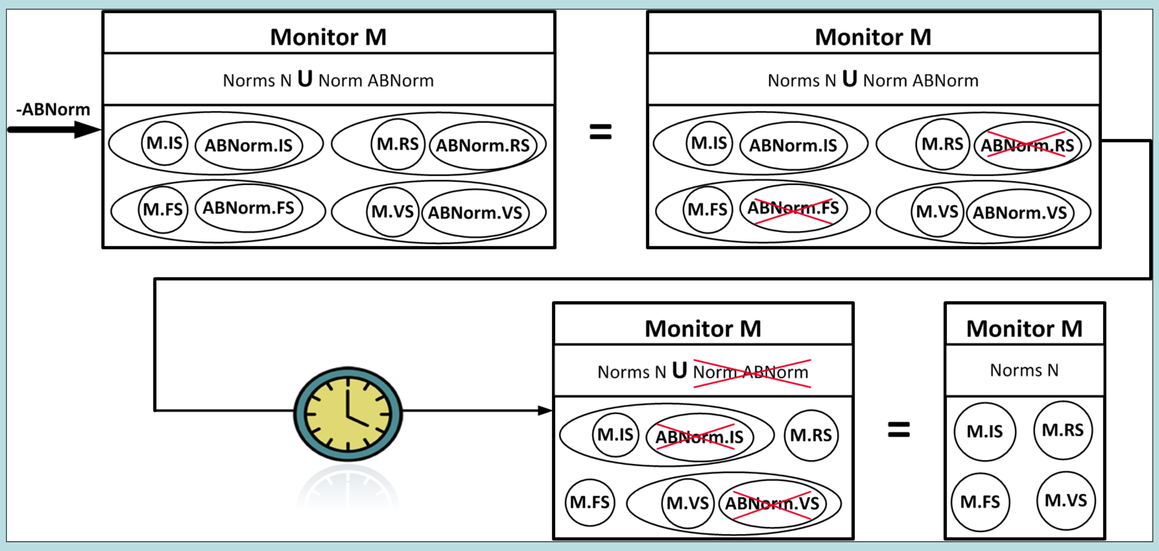
Prospective Promulgation



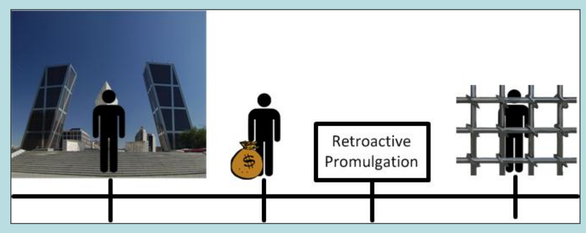


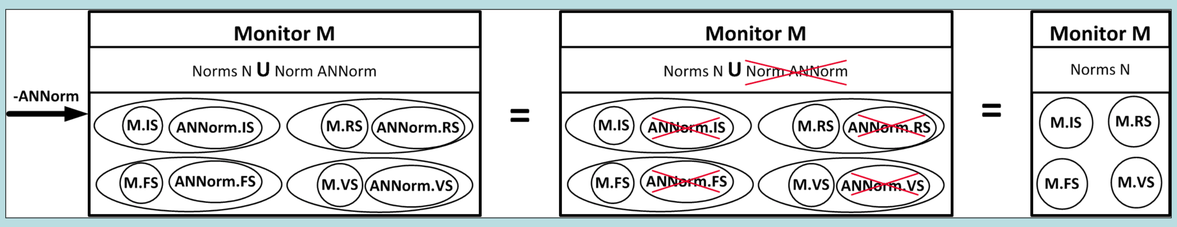
Abrogation



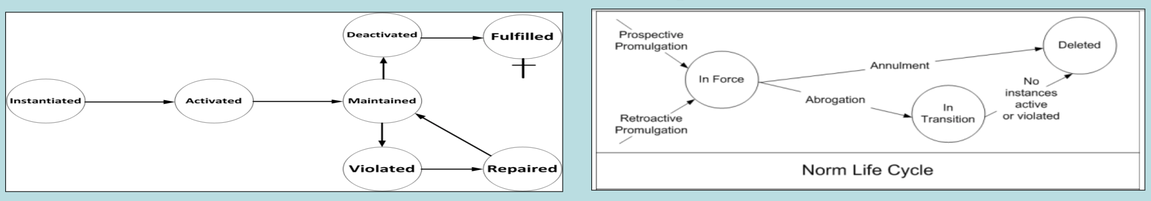


Annulment





Norm Life Cycle



Conclusions

Formal generic method for expanding and contracting institutions at run-time

Formalisation of the four operations to be supported

Norm life-cycle extension

Algorithms

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