



COMPULAW Computable Law

http://site.unibo.it/compulaw

Overview of Subproject 2

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European Research Council Gra Established by the European Commission

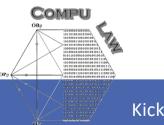
Council Grant Agreement n. 833647

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January 27th, 2020 Bologna

Subproject 2: Logical-Computational methods and technologies **OBJECTIVES**:

- computable models of rules, principles, and cases
- formal specifications (normative concepts, socio-cognitive notions, social relations, rules, values and goals, defeasible argumentation, dialectical interactions, institutional structures, norm-related cognitive processes)
- regulations and guidelines directed to designers of computable laws and ALAs, to support the correct specification of computable laws and their effective implementation



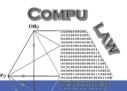
Subproject 2: Logical-Computational methods and technologies

Multidisciplinary approach

- software engineering
- artificial intelligence
- multiagent systems and electronic institutions
- deontic logic and computational argumentation

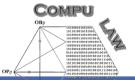


advisory commitee: progress of the project



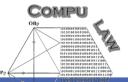
Kick-off meeting

Main tasks	2020	2021	2022	2023	2024
survey of existing formal methods and technologies for the legal governance of computations					
existing artifical legal agents in MAS: survey					
extraction of abstraction and fundamental concepts					
definition of guidelines for the comparison					
survey of existing ML methods for legal governance and compuations	← →				
integration of ML concept in logical models		<>			
definition of a methodology for design computable law and Artificial Legal Agents		←			
model definition: refinement and integration of methods and tools for computable law and ALAs		← →			
implementation of the model into running prototypes			<		
validation through interviews with experts					



Kick-off meeting

State of the art analysis2020survey of existing formal methods and technologies for the legal governance of
computationsImage: Computation of
existing artifical legal agents in MAS: surveyexisting artifical legal agents in MAS: surveyImage: Computation of abstraction and fundamental conceptsdefinition of guidelines for the comparisonImage: Computation ofsurvey of existing ML methods for legal governance and computationsImage: Computation of ML concept in logical modelsintegration of ML concept in logical modelsImage: Computable law and ArtificialLegal AgentsImage: Computable law and ArtificialImage: model definition: refinement and integration of methods and tools for
computable law and ALAsImage: Computable law and AlasImage: model interviews with expertsImage: Computable law and tools for
computable law and ALAs

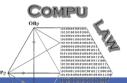


DELIVERABLE:

- Article/survey: existing formal methods and technologies for the legal governance of computations
- Article/survey: artifical legal agents in MAS
- Article/Survey: existing ML methods for legal governance and computions
- Live Report: abstraction and fundamental concepts
- Article/Live Report: guidelines

Kick-off meeting

	2020	20	21	2022	2023	2024
DELIVERABLE:						
 Article/report: model definition → refine and ALAs Draft methodology: design ALA (input for 		C	tion of	methods and	tools for com	putable law
integration of ML concept in logical models		-	\rightarrow			
definition of a methodology for design computable law and Artificial Legal Agents						
model definition: refinement and integration of methods and tools for computable law and ALAs						
implementation of the model into running prototypes Model defini	tion					
validation through interviews with experts						



Kick-off meeting

	20	20	2022	1	20	22	20	23	2024	
survey of existing formal methods and technologies for the legal governance of computations	\longleftrightarrow									
existing artifical legal agents in MAS: survey	← →									
extraction of abstraction and fundamental concepts		DEL	IVERA	BLE:						_
definition of guidelines for the comparison			A	/						_
survey of existing ML methods for legal governance and compuations		•	Article	repo	ort: m	oder	mpie	menta	ation	-
integration of ML concept in logical models			Tool							_
definition of a methodology for design computable law and Artificial Legal Agents		•	1001							
model definition: refinement and integration of methods and tools for computable law and ALAs					St	table F	Protot	уре		
implementation of the model into running prototypes				• • • • • • • • • • • • • • • • • • •						->
validation through interviews with experts			-							

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Tool implementation

Kick-off meeting

Subproject 2: Current Status

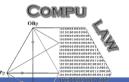
	2020	202	21	2022	202	23	2024
survey of existing formal methods and technologies for the legal governance of computations existing artifical legal agents in MAS: survey extraction of abstraction and fundamental concepts definition of guidelines for the comparison survey of existing ML methods for legal governance and computations integration of ML concept in logical models definition of a methodology for design computable law and Artificial Legal Agents		reasoning Programr (ABA+, AS Defeasible	g: Defe ning, a SPIC+, le Syst	based appro easible Logic and structur and DeLP) <u>ems in Lego</u> <u>ssessment</u>	c, Answer : red argum al Reasoni	Set entation Ing: A	
model definition: refinement and integration of methods and tools for computable law and ALAs						_	
implementation of the model into running prototypes							
validation through interviews with experts							



Kick-off meeting

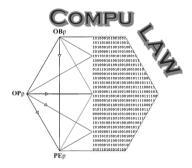
Subproject 2: Current Status

	2020	2021	2022	2023	2024
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definition of a methodology for design computable law and Artificial Legal Agents		→			
model definition: refinement and integration of methods and tools for computable law and ALAs					
implementation of the model into running prototypes					
validation through interviews with experts					



Kick-off meeting

• • • tuProlog 4.1 IDE							tuProlog 4.1 IDE
Line: 10				3	* 2		
<pre> *untitled 1 rule([f0,[],[patient('John')]]). 2 rule([f1,[],[doctor('Mary')]]).</pre>		Line: 10					
<pre>3 rule([f2,[],[expert('Mark')]]). 4 rule([f3,[],[expert('Edward')]]). 5 rule([f4,[],[say('Mark',harmed('Mary','John'))]]). 6 rule([f5,[],[say('Edward',followedGuidelines('Mary'))]]). 7 rule([r1,[[barmed('Mary','John']]]). 7 rule([r1,[[barmed('Mary',Jule)]]).</pre>							× *untitled
<pre>7 rule([r1,[[harmed('Mary','John')],[doctor('Mary')]],[liable('Mary')]]). 8 rule([r2,[[followedGuideLines('Mary')],[doctor('Mary')]],[neg,Liable('Mary')]]). 9 rule([r3,[[say('Mark',harmed('Mary','John'))],[expert('Mark')]],[harmed('Mary','John')]]) 10 rule([r4,[[say('Edward',followedGuideLines('Mary')],[expert('Edward')]],[followedGuideLines('Mary')]])</pre>		2 rule	<pre>([f0,[],[pat: ([f1,[],[doc1 ([f2,[],[expendent)</pre>	tor <mark>('Ma</mark>	ry')]]).		
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yes. In / [[followedGuidelines('Mary')],[harmed('Mary','John')],[say('Edward',followedGuidelines('Mary'))],[say('Mark',harmed('I No / [] Und / [[neg,liable('Mary')],[liable('Mary')]] Solution:	Mary','John'))],[expert('Ed\			•)],[expert('Mark 'Mary'))],[exper
buildLabelSets([[[followedGuidelines('Mary')],[harmed('Mary','John')],[say('Edward',followedGuidelines('Mary'))],[say('Mar	k',harmed('Mary','John'))]						
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Next V Accept Stop Stop Export CSV		UndResu	lt / [liable('Mary answerQuery(li		y'),[],[],[lial	ole('Mary')])	
Ready.							







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