

Human-centric AI challenges and opportunities



Sabrina Kirrane, 27.01.2020
AMLD – AI & Policy track

Setting the Scene

About me

Access Policies

Consent Policies

Licenses

Regulatory Constraints

Encryption

Privacy

Enforcement

Administration

Transparency

Compliance

Web Standards

**Normative Multi-Agent
Systems**

**Intelligent
Agents**

Cyber Physical Social Systems

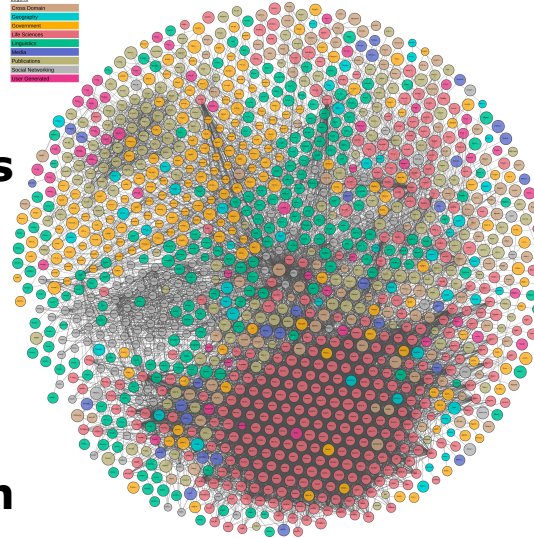
Blockchain

Decentralisation

**Data
Science**

**Artificial
Intelligence**

Big Data



Linked Open Data Cloud <https://lod-cloud.net/>

The World Wide Web



Information Management: A Proposal

Tim Berners-Lee, CERN

March 1989, May 1990

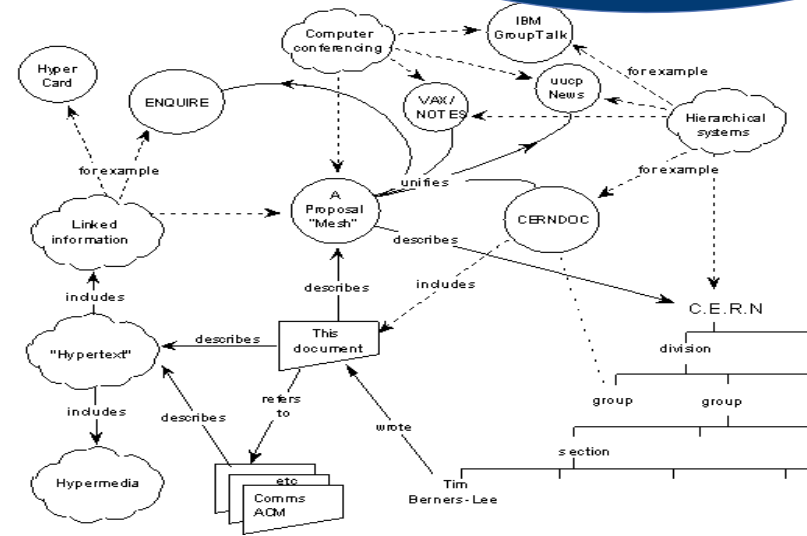
This proposal concerns the management of general information about accelerators and experiments at CERN. It discusses the problems of loss of information about complex evolving systems and derives a solution based on a distributed hypertext system.

Overview

Many of the discussions of the future at CERN and the LHC era end with the question - "Yes, but how will we ever keep track of such a large project?" This proposal provides an answer to such questions. Firstly, it discusses the problem of information access at CERN. Then, it introduces the idea of linked information systems, and compares them with less flexible ways of finding information.

It then summarises my short experience with non-linear text systems known as "hypertext", describes what CERN needs from such a system, and what industry may provide. Finally, it suggests steps we should take to involve ourselves with hypertext now, so that individually and collectively we may understand what we are creating.

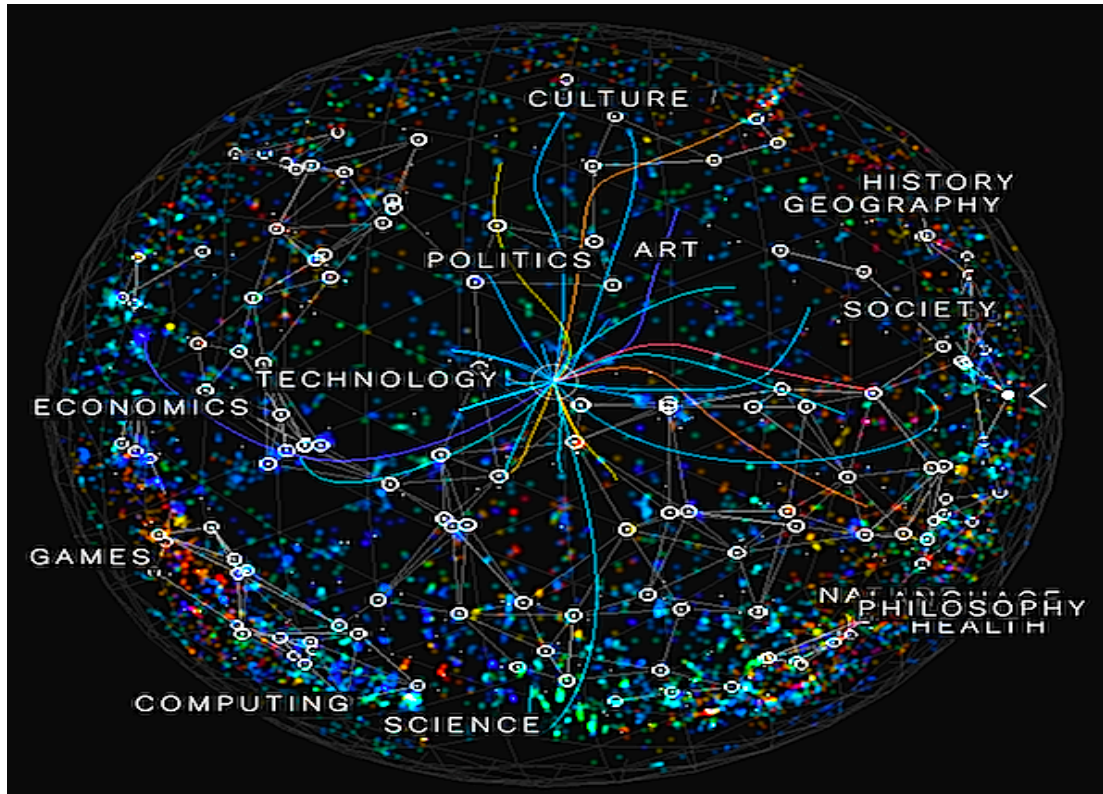
In 1989
Tim Berners Lee
invented the World
Wide Web



1989 The original proposal for the Web
<https://www.w3.org/History/1989/proposal.html>

The World Wide Web

As a disturbed data source

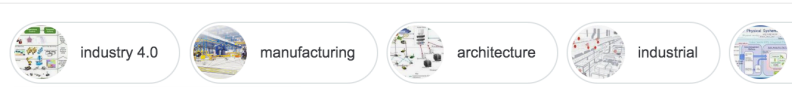
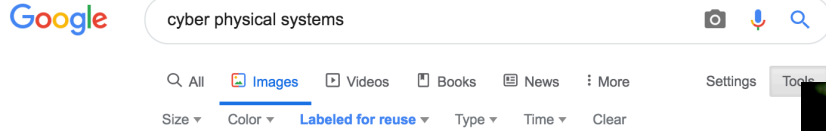


30 years later the Web has become indispensable!

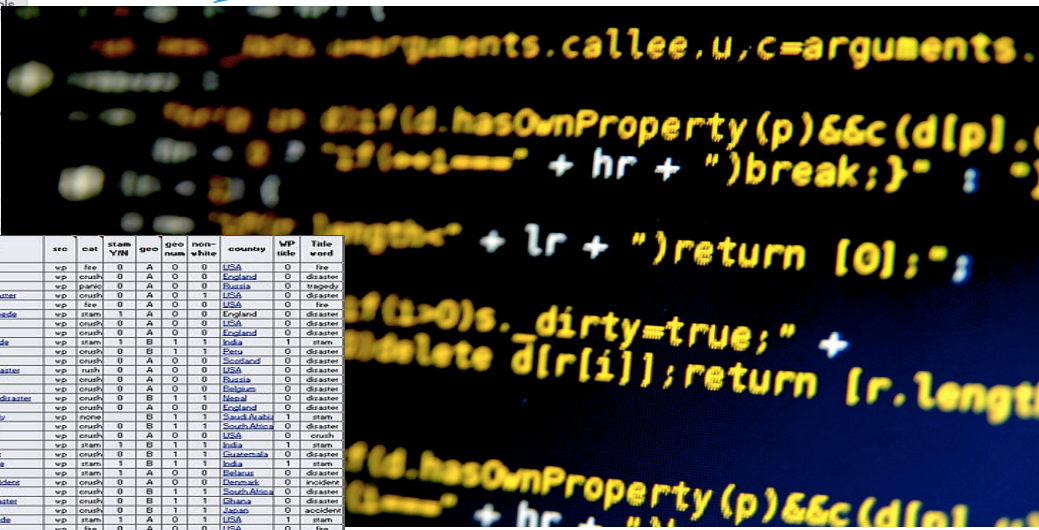
Contracts & Terms of Use

The compliance challenge

- ❖ There are many resources without any terms of us
- ❖ We need compliance tools



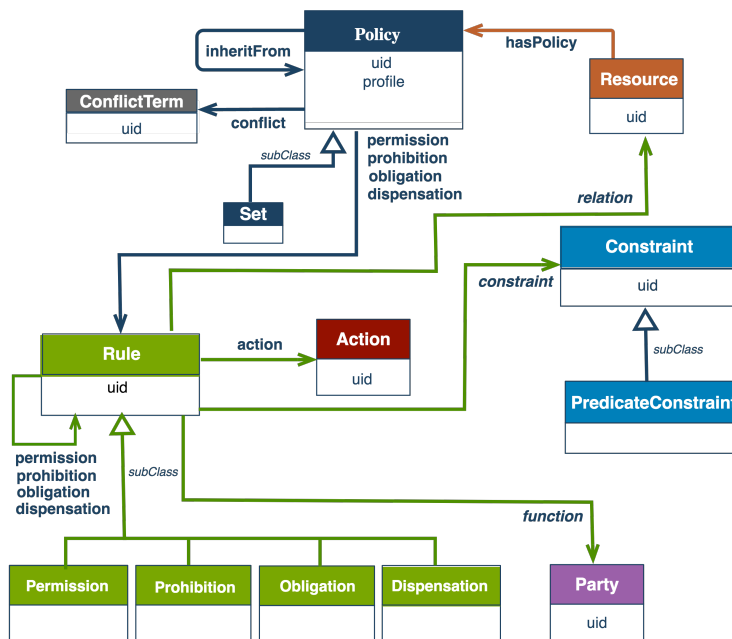
event	year	dead	injur ed	crowd size	event type	event type	event type	reg.	indoor	counterflow	bridge	populat on	specific on killed	specific trigger	crowd mgmt failure	escape panic	Event name	src	cat	stam Y/N	geo	non-white	country	WP title	Title word	
5	1976	278	1,000	1	0	Y	N	N	N	C	A	Y					Brooklyn Theatre fire	wp	free	0	A	0	USA	0	fire	
7	1883	183	1,800	1	0	Y	N	N	N	C	A	Y					Victoria Hall disaster	wp	crowd	0	A	0	England	0	disaster	
8	1898	1309	1300	6,000	P	3	0	N	N	N	G	G	Y				Shedden tragedy	wp	crowd	0	A	0	USA	0	tragedy	
3	1902	175	6,000	5	5	1	Y	N	N	A	A	Y					Shiloh Baptist Church disaster	wp	crowd	0	A	0	USA	0	disaster	
10	1903	602	2,600	2	0	F	1	1	0	N	N	G	G	Y			Wagon disaster fire	wp	fire	0	A	0	USA	0	fire	
11	1908	36	40	2	0	0	Y	N	N	C	C	Y					Barney's Public Hall stampede	wp	stam	1	A	0	England	0	disaster	
12	1913	73	480	7	0	0	Y	N	N	C	C	Y					Madison Square Garden stampede	wp	crowd	0	A	0	USA	0	disaster	
14	1948	33	400	65,000	S	7	7	0	N	N	N	G	G	N	Y		Bunden Park disaster	wp	crowd	0	A	0	England	0	disaster	
15	1954	800	2000	5,000,000	R	5	5	1	N	N	N	G	G	N	Y		1954 Kumbh Mela stampede	wp	stam	1	B	1	India	1	stam	
17	1964	309	51,000	5	7	0	Y	N	N	N	G	G	N	Y			Lanark National disaster	wp	crowd	0	B	1	Scotland	0	disaster	
19	1971	66	200	80,000	S	7	7	0	N	N	N	G	G	N	Y		1971 disaster	wp	stam	0	A	0	Scotland	0	disaster	
19	1979	11	26	16,700	M	2	2	0	N	N	N	G	G	Y			1979 The Whiston disaster	wp	rush	0	A	0	USA	0	disaster	
20	1982	66	61	16,643	S	7	7	0	N	N	N	G	C	N	Y		Luchyn disaster	wp	crowd	0	A	0	Russia	0	disaster	
21	1992	39	600	59,000	S	7	7	0	N	N	N	G	C	Y	Y		Hopewell Stadium disaster	wp	crowd	0	A	0	Belgium	0	disaster	
22	1998	93	100	3	7	0	N	N	N	N	G	G	Y				1998 Kachchhatra stadium disaster	wp	crowd	0	B	1	India	1	stam	
24	1999	36	768	55,000	S	7	7	0	N	N	N	G	C	N	Y		Hillsborough disaster	wp	crowd	0	A	0	England	0	disaster	
25	1998	192	713	5	5	1	0	N	N	A	A	N	Y				1998 Madras stadium tragedy	wp	crowd	0	A	0	India	1	stam	
26	1991	40	30,000	S	7	7	0	N	N	N	N	G	N	Y			Dhaka Stadium disaster	wp	crowd	0	B	1	South Africa	0	disaster	
32	1993	73	71,745	S	7	7	0	N	N	N	N	G	N	Y			The Centre Point Club	wp	crowd	0	A	0	USA	0	disaster	
34	1994	113	500	55,000	PCJ	4	4	0	N	N	N	G	WC	Y	Y		1994 Gujarat stampede	wp	stam	1	B	1	India	1	crowd	
35	1996	83	147	50,000	S	7	7	0	N	N	N	G	G	N	Y		1996 Sabarwal stadium	wp	crowd	0	B	1	Guatemala	0	disaster	
37	1999	53	100	5	5	1	0	N	N	N	N	G	N	Y			1999 Sabarwal stadium	wp	crowd	0	B	1	India	1	stam	
38	1999	53	100	5	5	1	0	N	N	N	N	G	N	Y			Namibia stampede	wp	stam	1	A	0	Belarus	0	disaster	
39	2000	0	2	2	2	0	N	N	N	N	N	G	N	Y			Shedden festival 2000 incident	wp	crowd	0	A	0	England	0	disaster	
40	2001	43	120,000	S	7	7	0	N	N	N	N	G	Y	Y			Ellis Park Stadium disaster	wp	crowd	0	B	1	South Africa	0	disaster	
42	2001	127	1	1	7	7	0	N	N	N	N	G	Y	Y			Accra Sports Stadium disaster	wp	crowd	0	B	1	Ghana	0	disaster	
43	2001	11	247	1	3	0	N	N	Y	G	C	N	Y	Y			1999 EPC rugby stadium	wp	crowd	0	B	1	Japan	0	accident	
45	2003	21	50	15,000	M	2	2	0	Y	Y	A	Y	Y	Y			2003 EPC rugby stadium	wp	stam	1	A	0	USA	1	stam	
47	2003	180	230	462	F	1	1	0	Y	Y	N	G	Y	Y			The Station rugby fire	wp	fire	0	A	0	USA	0	fire	
52	2005	241	300,000	F	1	1	1	N	Y	N	G	WC	N	Y			Mandera Demolition stampede	wp	stam	1	B	1	India	1	stam	
53	2005	953	1,000,000	R	5	5	1	N	N	N	G	G	Y	Y			2005 Alkhamrah bridge stampede	wp	stam	1	B	1	Iran	1	stam	
54	2006	345	250,500	R	5	5	1	N	N	N	N	G	N	Y			2006 Hajj stampede	wp	stam	1	B	1	Saudi Arabia	1	stam	
56	2006	73	400	30,000	S	7	7	0	N	N	N	G	Y	Y			PhilSports Stadium stampede	wp	stam	1	B	1	Philippines	1	stam	
58	2008	762	41	1,100	S	5	1	N	N	N	N	G	Y	Y			India stampede	wp	stam	1	B	1	India	1	stam	
66	2008	224	425	25,000	R	5	5	1	N	M	A	Y	Y	Y			2008 Jodhpur stampede	wp	stam	1	B	1	India	1	stam	
69	2008	18	18	36,000	S	7	7	0	N	N	N	G	N	Y			Hosegowest-Bogton arena stampede	file	crowd	0	A	0	Scotland	0	stam	
73	2010	31	500	250,000	M	2	2	0	N	Y	N	G	N	Y			2010 Hajj stampede	wp	crowd	0	A	0	Saudi Arabia	0	disaster	
74	2010	347	756	4,000,000	P	3	3	1	N	Y	G	G	N	Y			Binon Demol stampede	wp	stam	1	B	1	Laos	1	stam	
75	2011	182	100	1	1	1	0	N	N	N	R	N	Y				2011 Hajj stampede	wp	stam	1	B	1	India	1	stam	
79	2013	60	200	50,000	P	3	3	0	N	Y	N	G	WC	Y			2013 Hajj stampede	wp	stam	1	B	1	Cote d'Ivoire	1	stam	
81	2013	242	700	15,000	F	1	1	0	Y	Y	A	Y	Y	Y			2013 Hajj stampede	wp	fire	0	B	1	India	1	stam	
82	2013	36	39	1	1	1	0	N	Y	N	G	G	Y	Y			2013 Kumbh Mela stampede	wp	stam	1	B	1	India	1	stam	
83	2013	185	100	500,000	R	5	5	1	N	Y	N	G	WC	Y			2013 Hajj stampede	wp	stam	1	B	1	India	1	stam	
84	2014	20	24	1	1	1	0	N	N	N	N	G	WC	Y			2014 Hajj stampede	wp	stam	1	B	1	India	1	stam	
85	2014	71	40	1	1	1	0	N	Y	N	N	G	WC	Y			2014 Hajj stampede	wp	stam	1	B	1	Balistan	1	stam	
86	2014	11	40	30,000	R	5	5	1	N	N	G	A	N	Y			2014 Hajj stampede	wp	stam	1	B	1	Saudi Arabia	1	stam	
87	2014	36	49	300,000	P	3	3	0	N	Y	N	G	G	N	Y			2014 Hajj stampede	wp	stam	1	B	1	China	1	stam
89	2015	28	5,000	S	7	7	0	N	N	N	N	G	G	Y	Y			2015 Hajj stampede	wp	stam	1	B	1	Yemen	1	stam
90	2015	18	78	1	1	1	0	N	Y	N	N	G	WC	Y			2015 Hajj stampede	wp	stam	1	B	1	India	1	stam	
92	2015	954	934	2,000,000	R	5	5	1	N	Y	N	A	A	N	Y			2015 Hajj stampede	en	stam	1	B	1	Saudi Arabia	1	stam



liuwen/3260095534

Policies for constraint representation

The interoperability challenge



Draft
Specification

- Modeling regulatory obligations using an adaption of the Open Digital Rights Language
- Automated compliance checking for business policies

ODRL Regulatory Compliance Profile
version 0.1

Unofficial Draft 29 May 2019

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A third 'AI Winter'

The explainability challenge

Explainable AI should help us avoid a third 'AI winter'

AI researchers are worried that GDPR will limit availability of training data, but there's an upside too, says Gary Richardson



MOST READ



5 things women in tech want to see at an event



5 reasons we still need events for women in tech



Why self-care is especially important for women in tech



Huawei CEO Ren Zhengfei admits US sanctions will cut revenues by \$30bn



UK Government unveils security standard for surveillance cameras

Gary Richardson – MD of Emerging Tech at 6point6 a technology consultancy with strong expertise in digital transformation, emerging technology and cyber security

- The AI winters of the 1970s and 1990s, which saw research funding slashed and interest in AI wane, were the result of unrealistic expectations and a failure to scale.
- A third AI winter could be caused by **inadequacies and biases** in the AI algorithms leading to negative impacts on the whole of society.
- **Bias simply does not build value in business**, particularly with regards to important decisions like access to credit and healthcare or increasing diversity through recruitment.

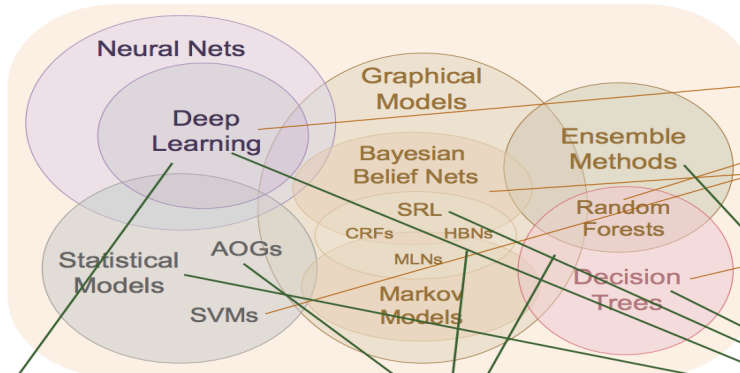
Explainable AI

The human centricity challenge

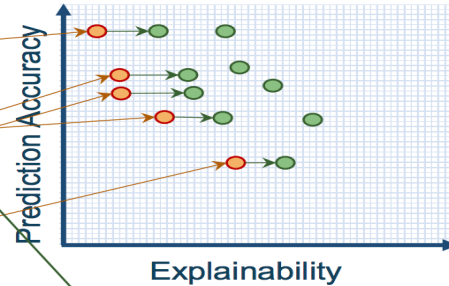
New Approach

Create a suite of machine learning techniques that produce more explainable models, while maintaining a high level of learning performance

Learning Techniques (today)



Explainability (notional)



Deep Explanation
 Modified deep learning techniques to learn explainable features

Interpretable Models
 Techniques to learn more structured, interpretable, causal models

Model Induction
 Techniques to infer an explainable model from any model as a black box

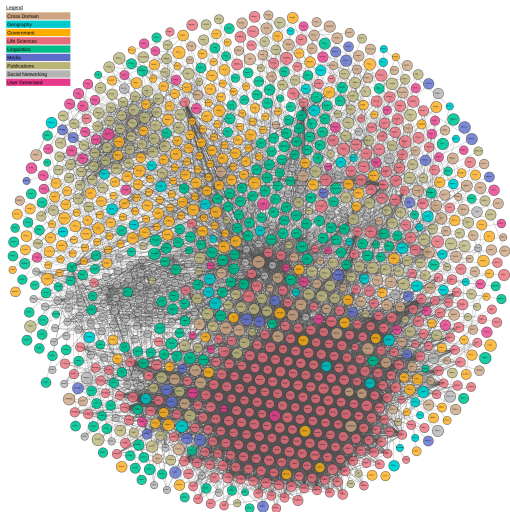
Policies & Knowledge Graphs

Towards Responsible & Explainable AI

Use cases: Industry 4.0, personalized medicine, open data, personal assistants, Web search, ...



Use cases: Industry 4.0, personalized medicine, open data, personal assistants, Web search, ...

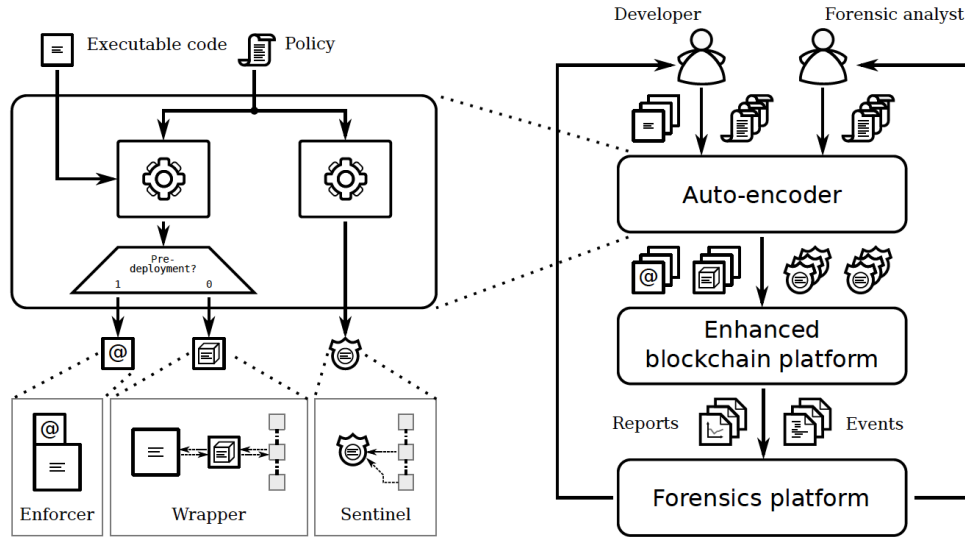


- Knowledge aware machine learning
- Constraint aware reasoning and querying
- Using Knowledge graphs for explainability

Linked Open Data Cloud <https://lod-cloud.net/>

Policies & Knowledge Graphs

Towards Responsible & Explainable AI



- Constraint representation
- Syntactic and semantic function annotation
- Enforcement and conformance checking
- Forensic architecture and protocols

Collaborators:

- Claudio Di Ciccio, Sapienza Università di Roma, Italy
- Ruben Verborgh & Anastasia Dimou UGent-imec, Belgium

Human-centric AI

Challenges & Opportunities

- Privacy is only the tip of the iceberg, from a usage control perspective we also need to consider other **regulations, licenses, social norms, cultural differences**
- There are **cognitive limitations** in terms of understanding how data is / will be used
- There is a need for standards, however **standardisation is difficult**
- Ensuring such systems are **comply with usage constraints** is a crucial to success (i.e., all usage policies are adhered to and the system as a whole works as expected)
- We need to embrace **distributed and decentralised systems**, which complicates things further

Thank you / contact details



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