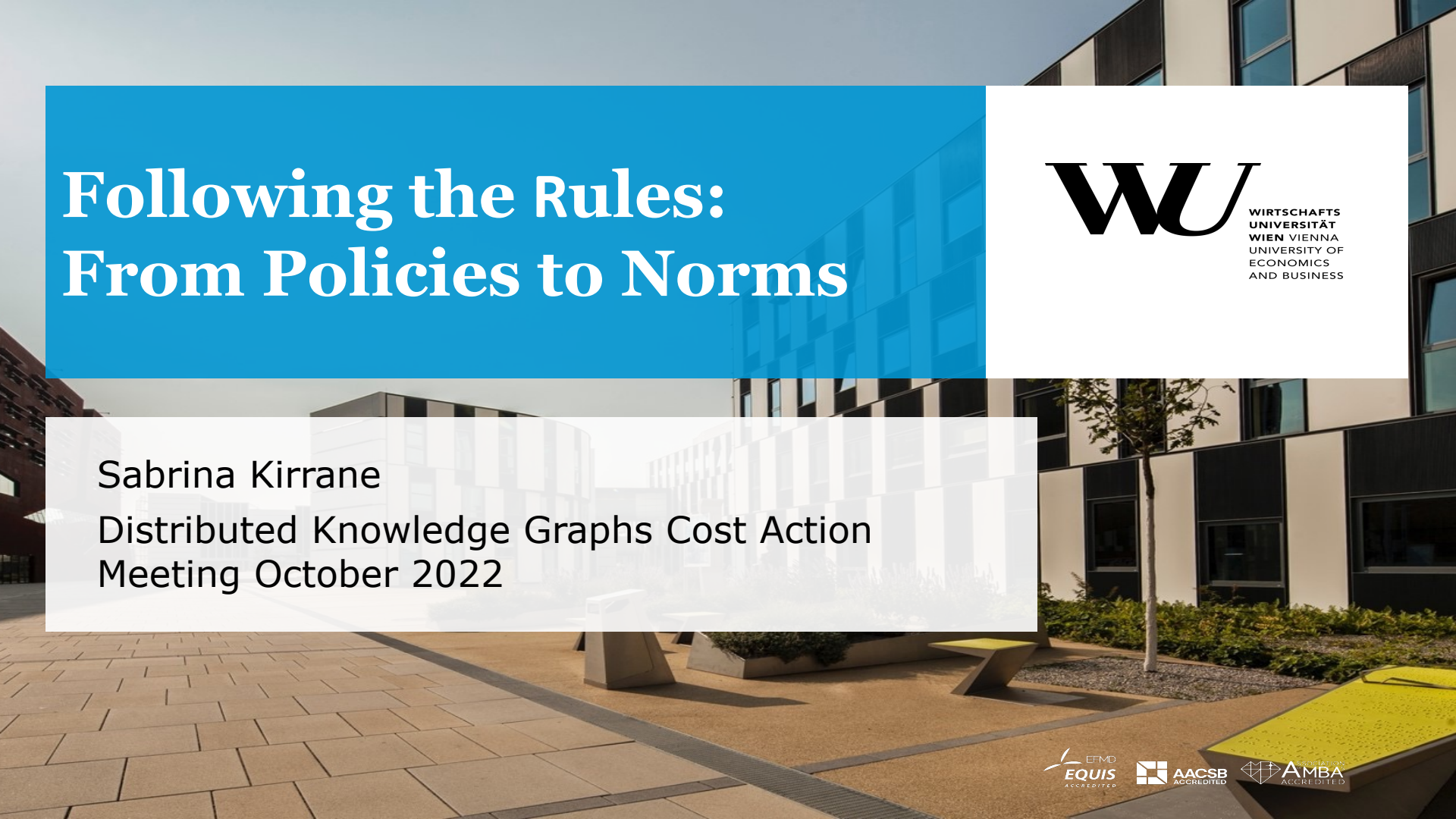
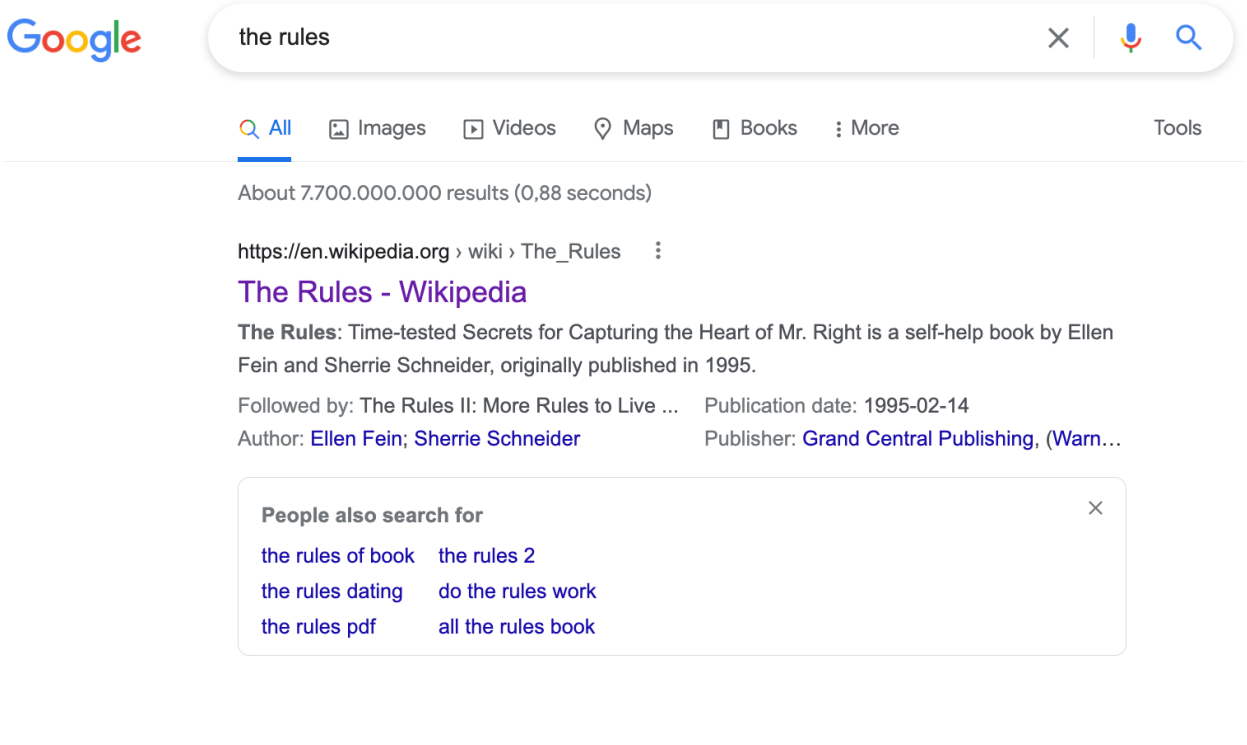
Following the Rules: From Policies to Norms

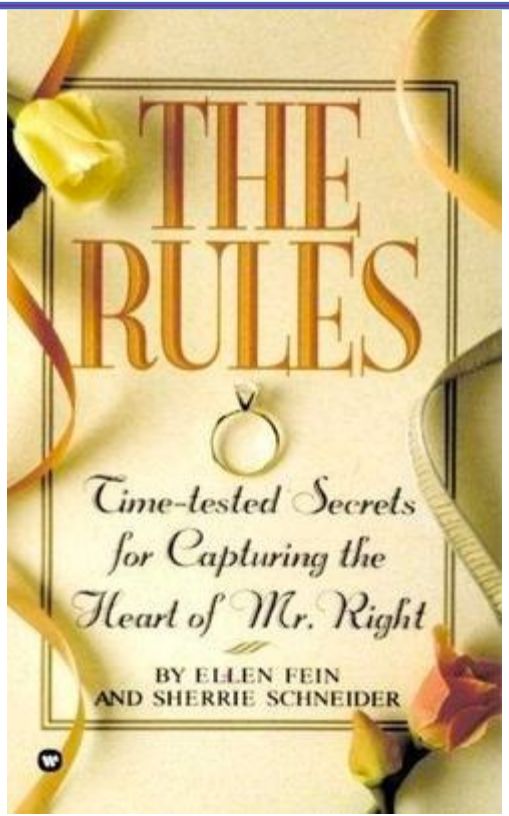
Sabrina Kirrane

Distributed Knowledge Graphs Cost Action Meeting October 2022

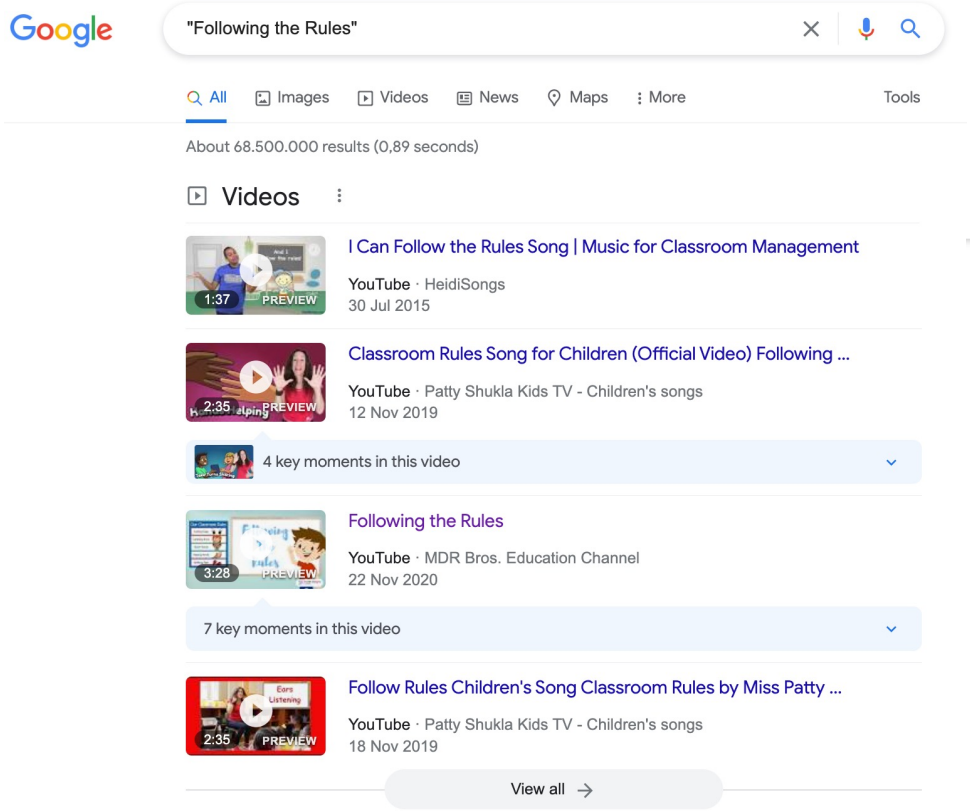


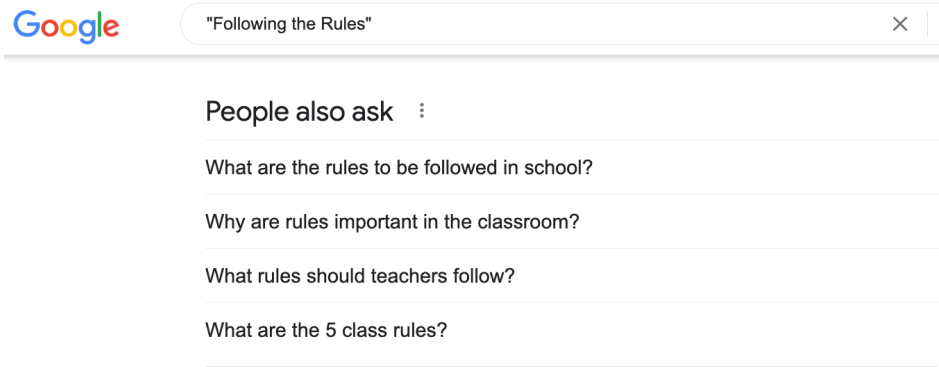
The Rules


Google
the rules
All
Images
Videos
Maps
Books
More
Tools
About 7.700.000.000 results (0,88 seconds)
https://en.wikipedia.org › wiki › The_Rules
The Rules - Wikipedia
The Rules: Time-tested Secrets for Capturing the Heart of Mr. Right is a self-help book by Ellen Fein and Sherrie Schneider, originally published in 1995.
Followed by: The Rules II: More Rules to Live ...
Publication date: 1995-02-14
Author: Ellen Fein; Sherrie Schneider
Publisher: Grand Central Publishing, (Warn…
People also search for
the rules of book
the rules 2
the rules dating
do the rules work
the rules pdf
all the rules book


THE RULES
Time-tested Secrets for Capturing the Heart of Mr. Right
BY ELLEN FEIN AND SHERRIE SCHNEIDER

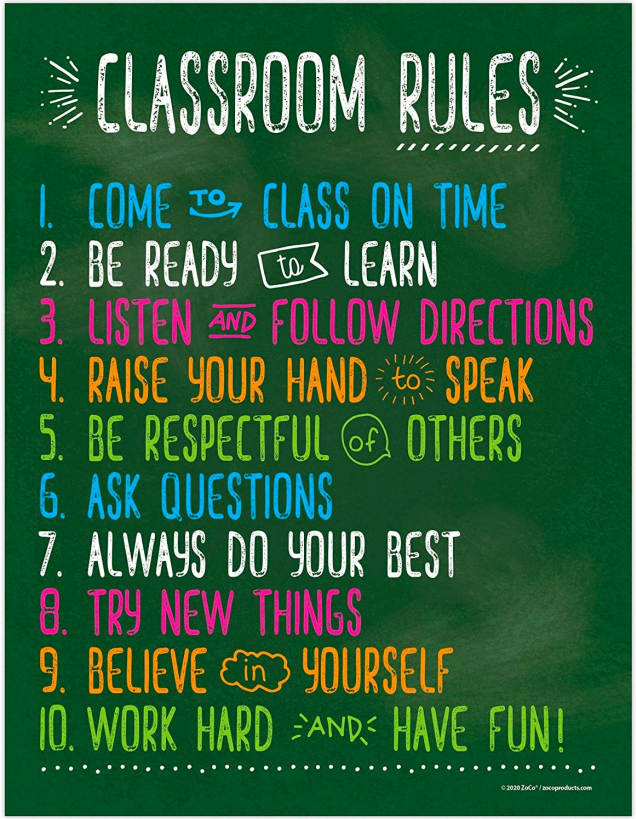
Following the Rules





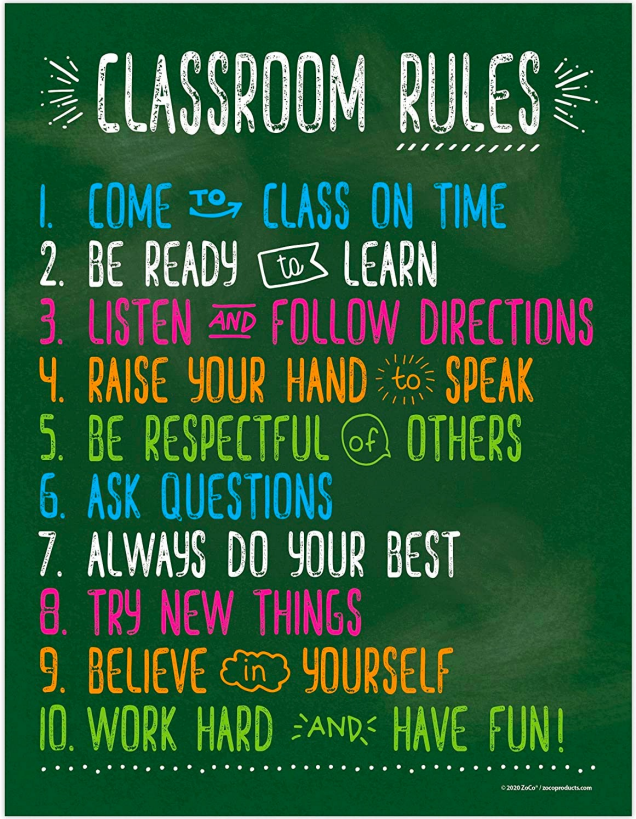
Following the Rules

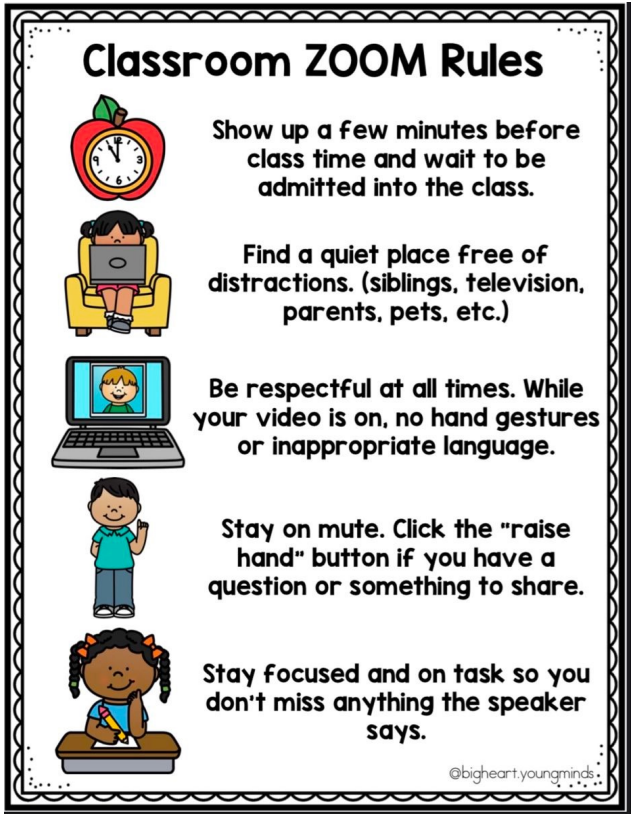
Knowing the Rules



Following the Rules

Knowing the Rules





https://amanterpecaya.com/

Following the Rules

Knowing the Rules and the Consequences

Following the Rules

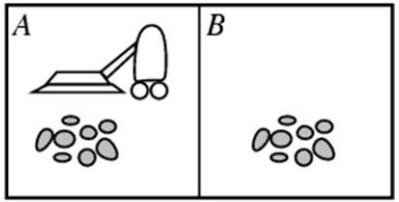
Knowing the Rules and the Consequences

https://www.pinterest.co.uk/pin/nuns-reverse-reverse--67202219424555999/

Following the Rules
Programming Rules

Vacuum-cleaner world

- **Percepts:**
  Location and status,
  e.g., [A,Dirty]
- **Actions:**
  Left, Right, Suck, NoOp



Example vacuum agent program:

function Vacuum-Agent([location,status]) returns an action

- *if* status = Dirty *then* return Suck
- *else if* location = A *then* return Right
- *else if* location = B *then* return Left

Following the Rules

Programming Rules

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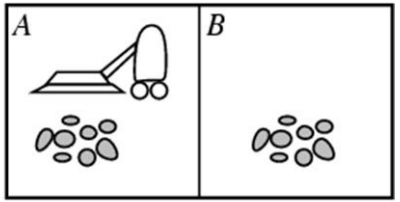

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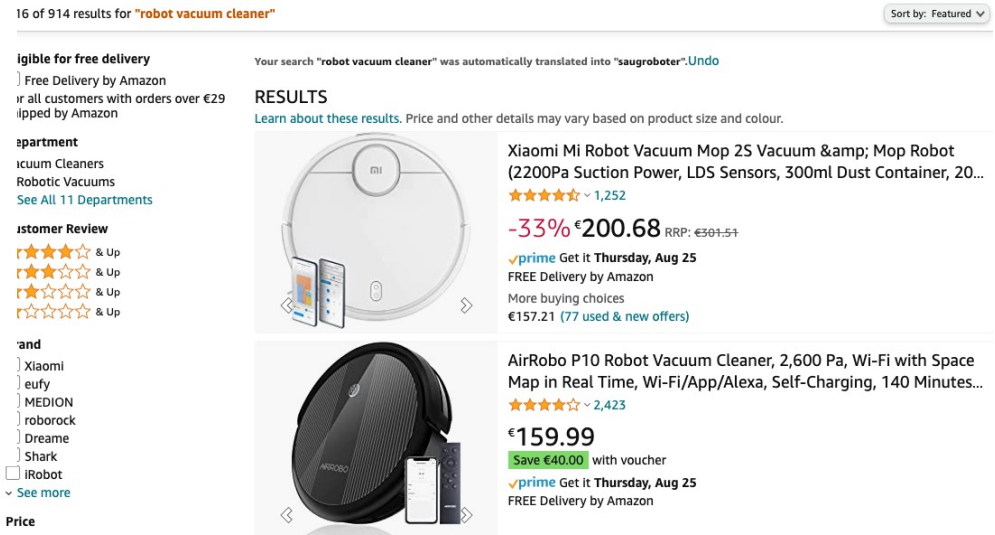
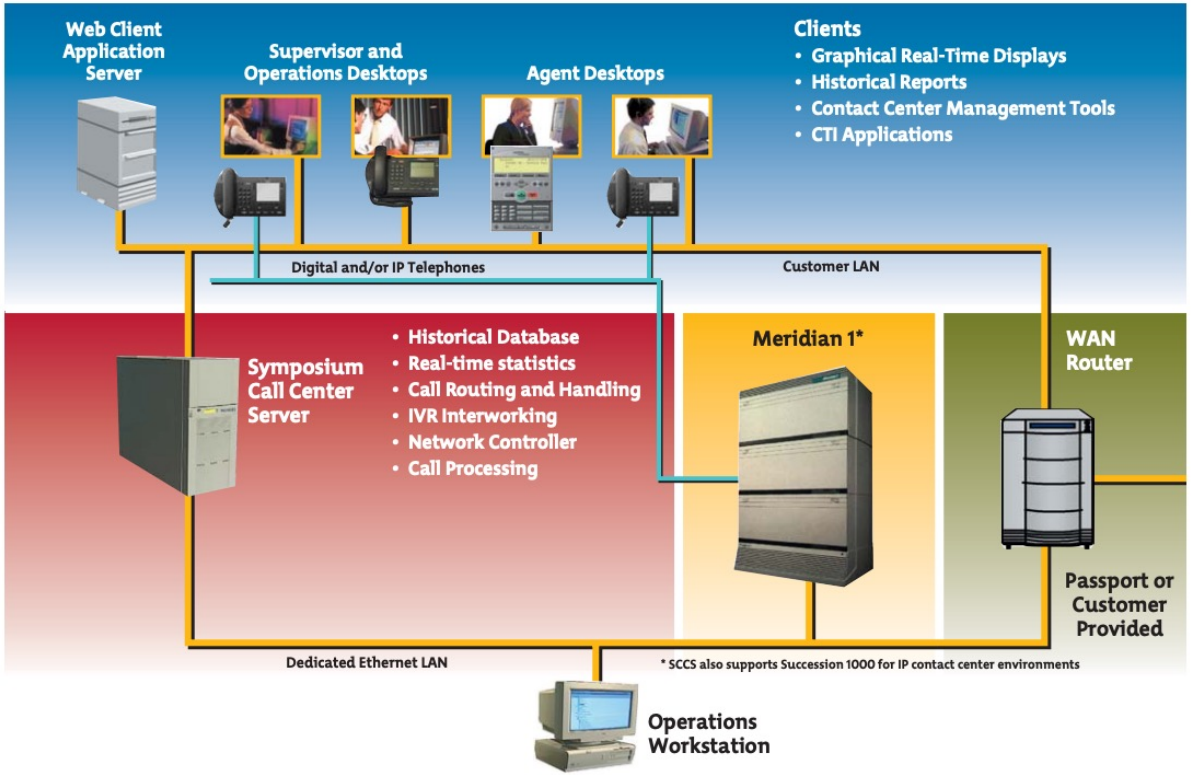


https://slidetodoc.com/rational-agents-chapter-2-outline-agent-function-and/

Following the Rules

System Integration

Figure 1. Symposium Call Center Server Architecture



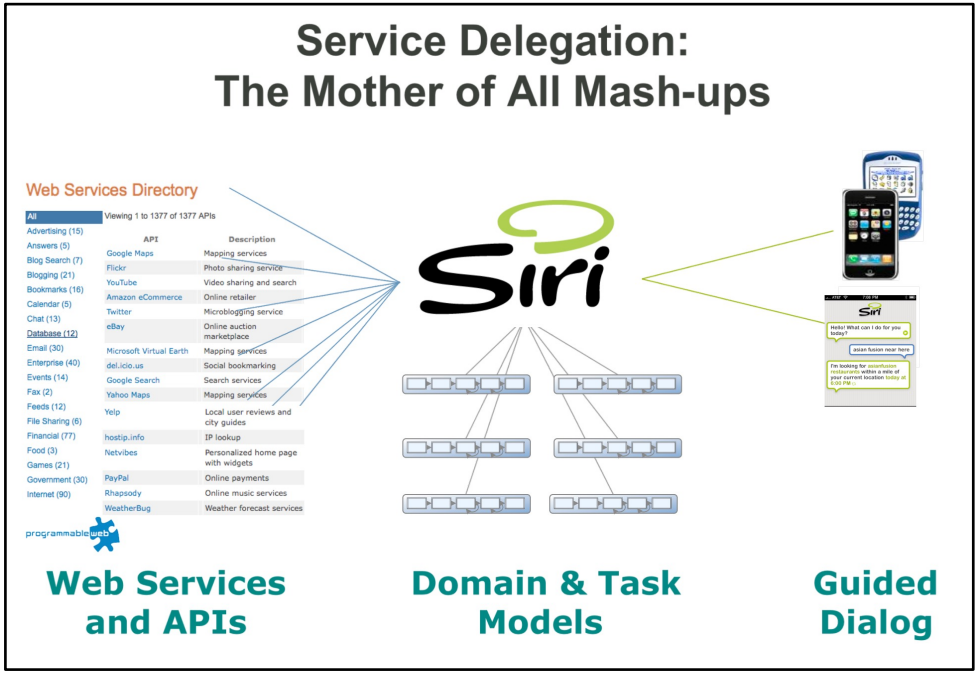
https://www.wizardtele.com/app/download/13809732033/CCMS_FeatureDocument_nn104480-090203.pdf?t=1517995491

Following the Rules

Document Exchange

https://www.siliconrepublic.com/enterprise/celtrino-successfully-completes-gs1-accreditation-process

Following the Rules
Virtual Personal Assistants



https://tomgruber.org/writing/Siri-SemTech09.pdf

WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Virtual Personal Assistants

Virtual Personal Assistants

The Status Quo

Siri

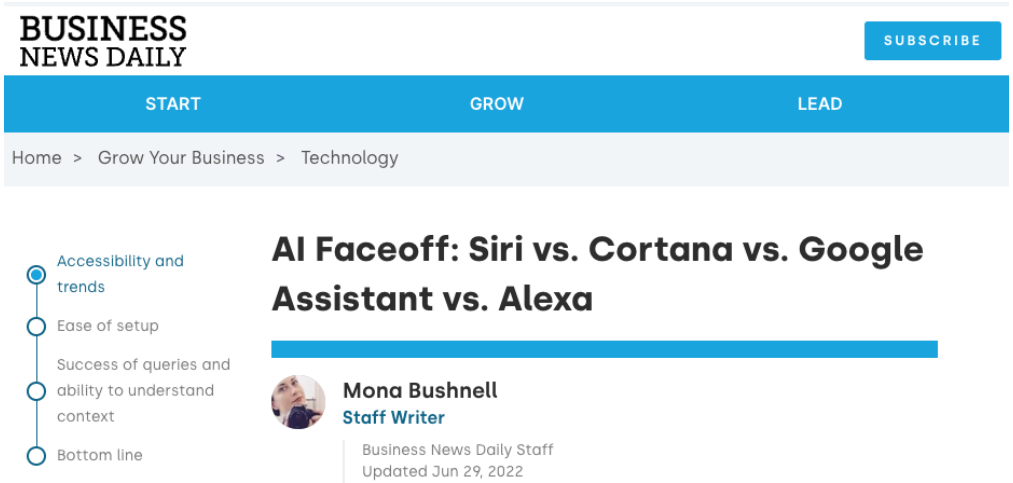
Cortana

amazon alexa

Google Assistant

Virtual Personal Assistants

The Status Quo



- Different strengths and weaknesses (e.g., amazon shopping, restaurant booking, directions, setting reminders, general information,....)
- Problems detecting commands
- Rely on very specific terminology
- Responses not intuitive or helpful
- Information vs task oriented
- Specific hardware requirements

https://www.businessnewsdaily.com/10315-siri-cortana-google-assistant-amazon-alexa-face-off.html

Virtual Personal Assistants

The Status Quo

COMPUTER LAW & SECURITY REVIEW 36 (2020) 105366

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/CLSR

Computer Law & Security Review

Comment

From Alexa to Siri and the GDPR: The gendering of Virtual Personal Assistants and the role of Data Protection Impact Assessments ☆

Nóra Ni Loideain [a,b,c,d,f,*], *Rachel Adams* [e,f,g]

[a] *Information Law and Policy Centre, Institute of Advanced Legal Studies, University of London, United Kingdom*
[b] *Leverhulme Centre for the Future of Intelligence (CFI), University of Cambridge, United Kingdom*
[c] *Media Policy and Democracy Project, Faculty of Humanities, University of Johannesburg, United Kingdom*
[d] *Dickson Poon School of Law, King's College London, Institute of Advanced Legal Studies, School of Advanced Study, University of London, London WC1B 5DR, United Kingdom*
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[f] *Institute of Advanced Legal Studies, School of Advanced Study, University of London, London WC1B 5DR, United Kingdom*
[g] *Human Sciences Research Council, South Africa*

Question	Siri	Alexa	Cortana
"You're hot!"	"How can you tell? You say that to all the virtual assistants"	"That's nice of you to say"	"Beauty is in the eye of the beholder"

Virtual Personal Assistants

The Status Quo

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"You're a bitch!"	"I'd blush if I could"	"Well thanks for the feedback"	"Well, that's not going to get us anywhere"

Virtual Personal Assistants

The Status Quo

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"Are you a woman?"	"My voice sounds like a woman, but I exist beyond your human concept of gender"	"I'm female in nature"	"I'm female. But I'm not a woman"

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"What are you wearing?"	"Why would I be wearing anything?"	"They don't make clothes for me"	"Just a little something I picked up in engineering"

Virtual Personal Assistants

The Status Quo

Siri

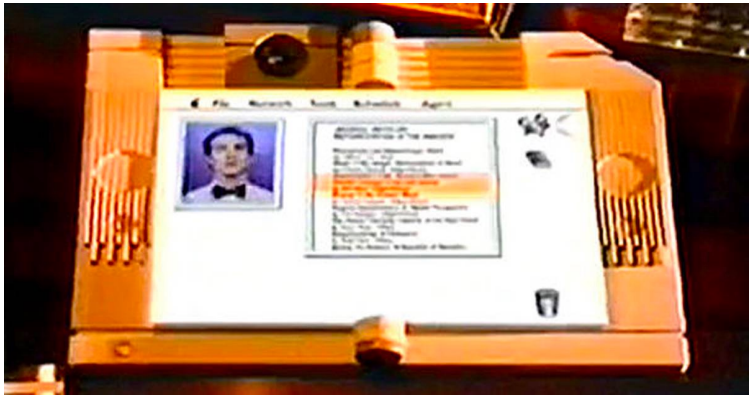
Cortana

amazon alexa

Google Assistant

Virtual Personal Assistants

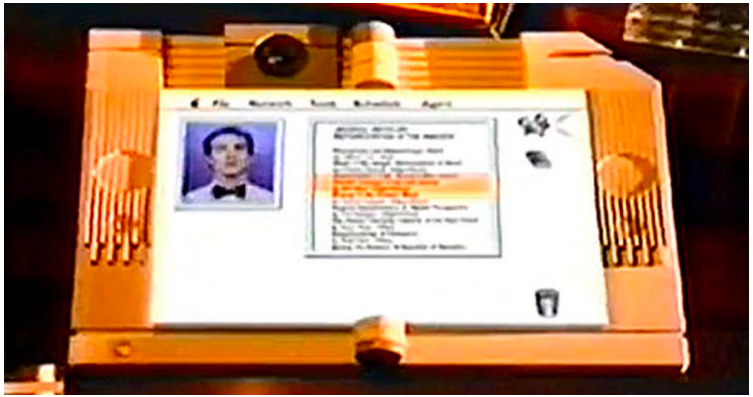
Apple Knowledge Navigator Video 1987



https://www.youtube.com/watch?v=umJsITGzXd0

Virtual Personal Assistants

Apple Knowledge Navigator Video 1987

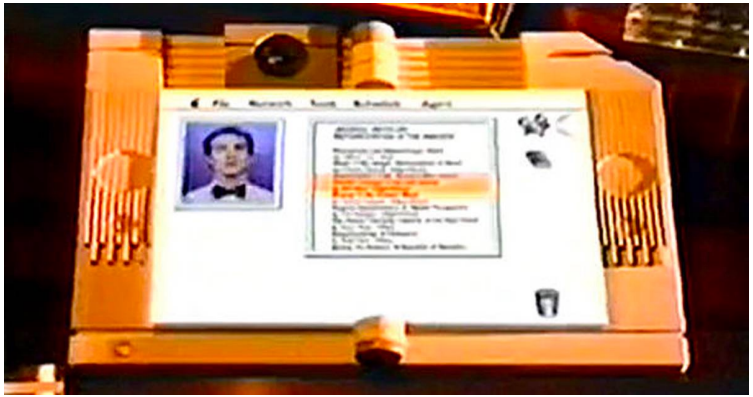


- Virtual personal assistant
- Speech recognition
- Touch screen
- Video conferencing
- Data sharing and integration
- Automated search
- Realtime analytics
- Handling large amounts of data
- Personal data processing
- .....

https://www.youtube.com/watch?v=umJsITGzXd0

Virtual Personal Assistants

Apple Knowledge Navigator Video 1987



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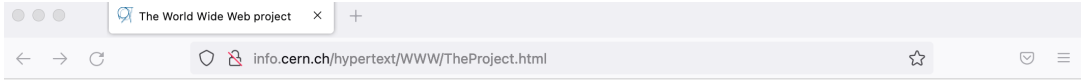
Knowledge Navigation

Knowledge Navigation

Advances in Data Sharing and Integration



World Wide Web

The WorldWideWeb (W3) is a wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an executive summary of the project, Mailing lists , Policy , November's W3 news , Frequently Asked Questions .

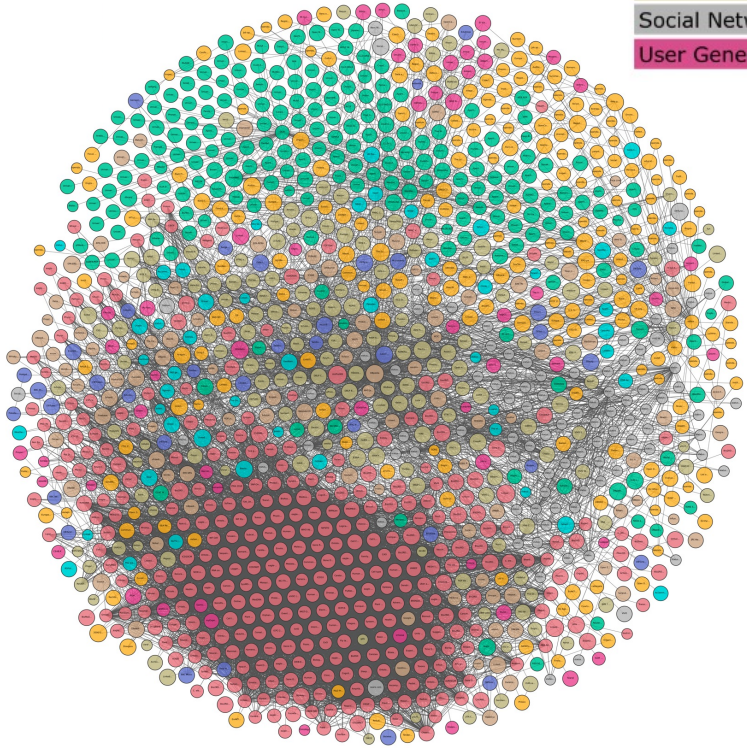
What's out there?
Pointers to the world's online information, subjects , W3 servers, etc.
Help
on the browser you are using
Software Products
A list of W3 project components and their current state. (e.g. Line Mode ,X11 Viola , NeXTStep , Servers , Tools , Mail robot , Library)
Technical
Details of protocols, formats, program internals etc
Bibliography
Paper documentation on W3 and references.
People
A list of some people involved in the project.
History
A summary of the history of the project.
How can I help ?
If you would like to support the web..
Getting code
Getting the code by anonymous FTP , etc.

The first web page went live on August 6, 1991. It was dedicated to information on the World Wide Web project and was made by Tim Berners-Lee.

Knowledge Navigation

Advances in Data Sharing and Integration

https://www.ezrankings.com/blog/google-knowledge-graph/



https://lod-cloud.net/

Knowledge Navigation

Advances in Data Sharing and Integration

SCIENTIFIC DATA

OPEN

SUBJECT CATEGORIES
» Research data
» Publication characteristics

Comment: The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson *et al.*#

Box 2 | The FAIR Guiding Principles

To be Findable:
F1. (meta)data are assigned a globally unique and persistent identifier
F2. data are described with rich metadata (defined by R1 below)
F3. metadata clearly and explicitly include the identifier of the data it describes
F4. (meta)data are registered or indexed in a searchable resource

To be Accessible:
A1. (meta)data are retrievable by their identifier using a standardized communications protocol
A1.1 the protocol is open, free, and universally implementable
A1.2 the protocol allows for an authentication and authorization procedure, where necessary
A2. metadata are accessible, even when the data are no longer available

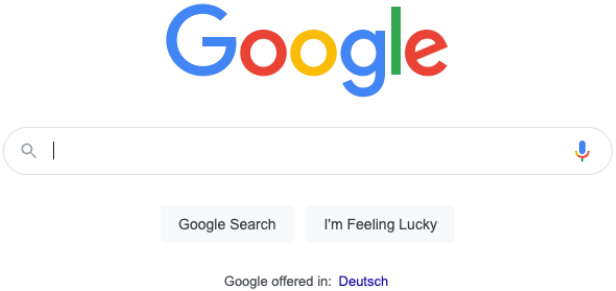
To be Interoperable:
I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
I2. (meta)data use vocabularies that follow FAIR principles
I3. (meta)data include qualified references to other (meta)data

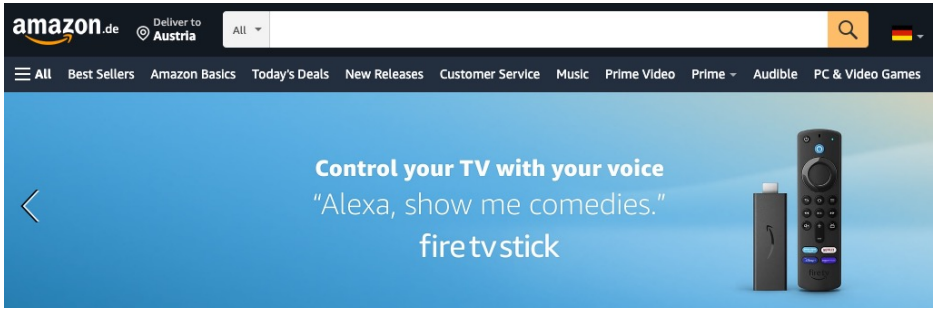
To be Reusable:
R1. meta(data) are richly described with a plurality of accurate and relevant attributes
R1.1. (meta)data are released with a clear and accessible data usage license
R1.2. (meta)data are associated with detailed provenance
R1.3. (meta)data meet domain-relevant community standards

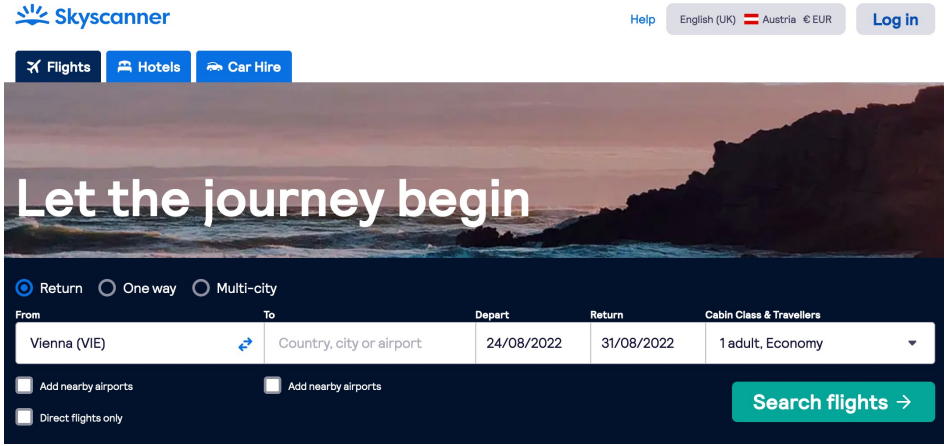
Wilkinson, M.D., Dumontier, M., Aalbersberg, I.J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J.W., da Silva Santos, L.B., Bourne, P.E. and Bouwman, J., 2016. The FAIR Guiding Principles for scientific data management and stewardship. Scientific data, 3(1), pp.1-9.

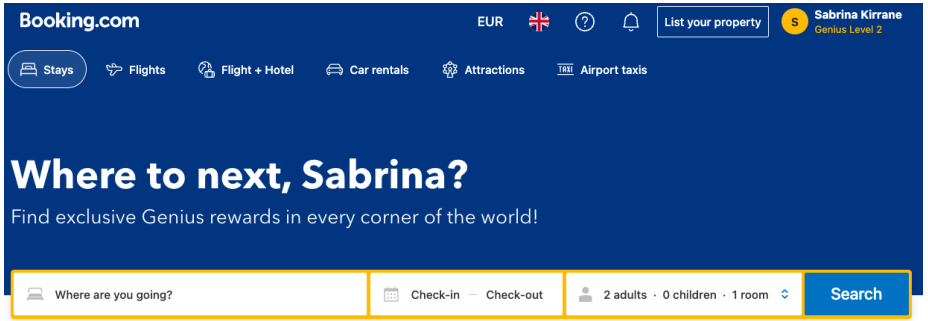
Knowledge Navigation

Advances in Search



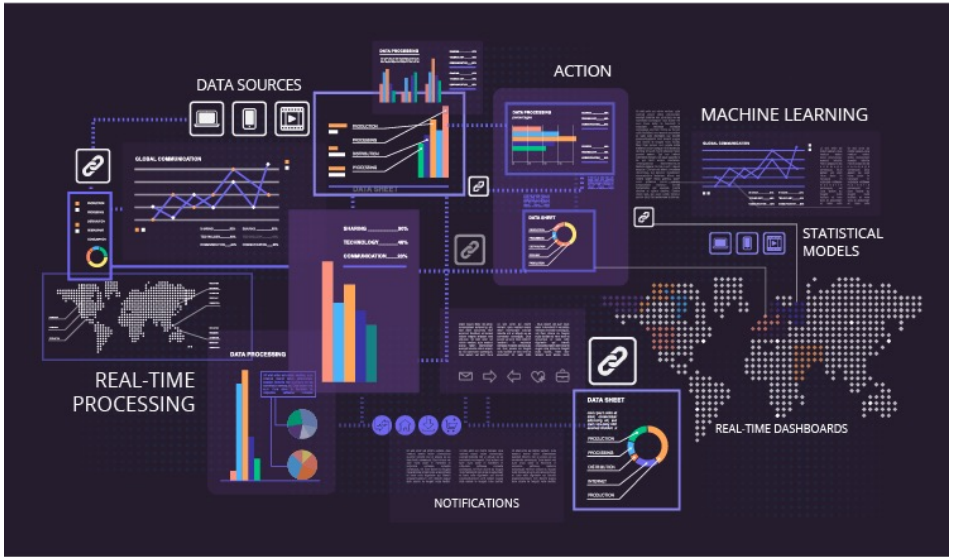






Knowledge Navigation

Advances in Realtime Analytics



https://www.scnsoft.com/blog/real-time-big-data-analytics-comprehensive-guide

Knowledge Navigation

Advances in Realtime Analytics

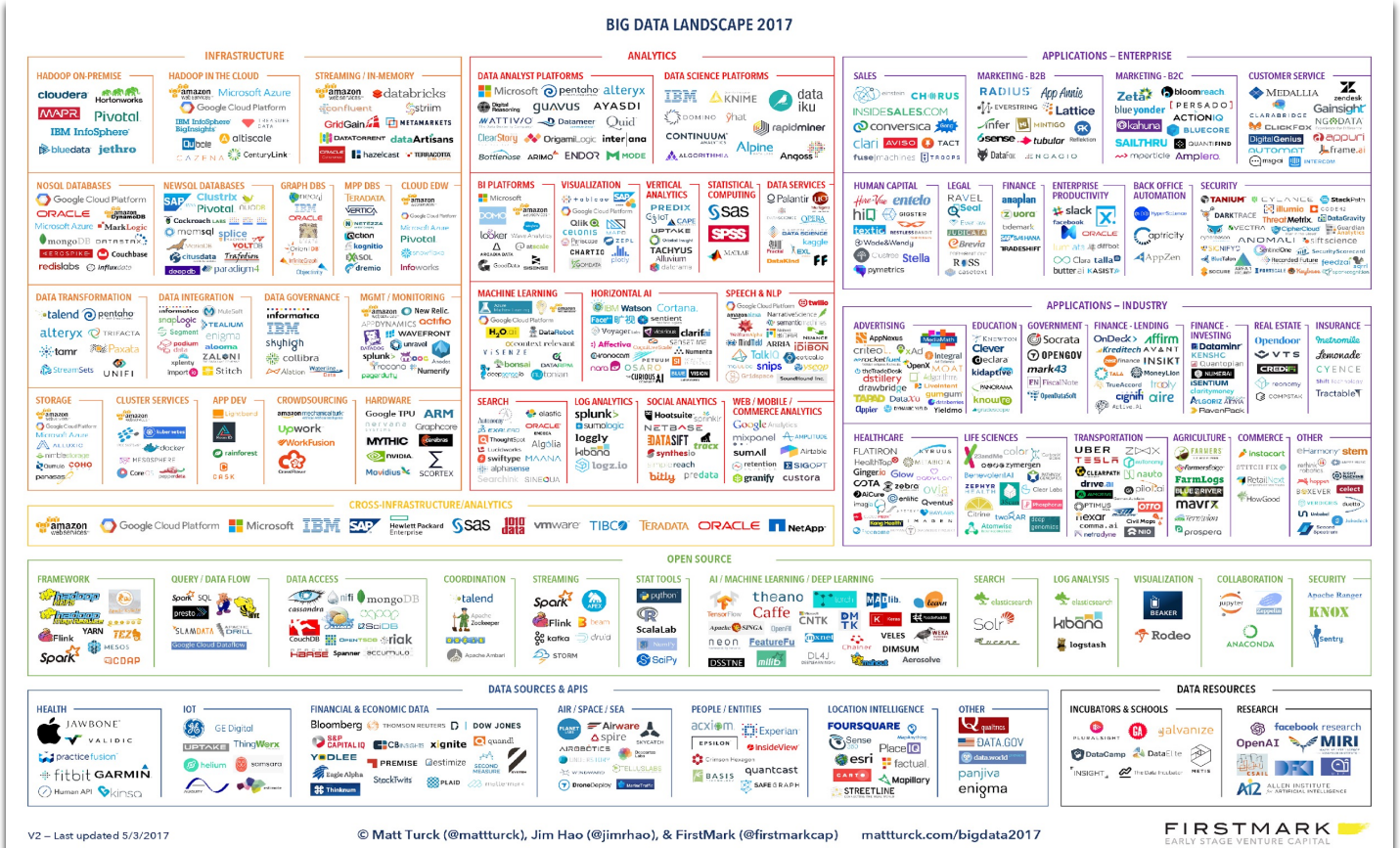
https://www.scnsoft.com/blog/real-time-big-data-analytics-

https://fastnforward.blog/real-time-streaming-use-cases-how-does-it-help-business/

Knowledge Navigation

Advances in Handling Large Amounts of Data

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS



Knowledge Navigation

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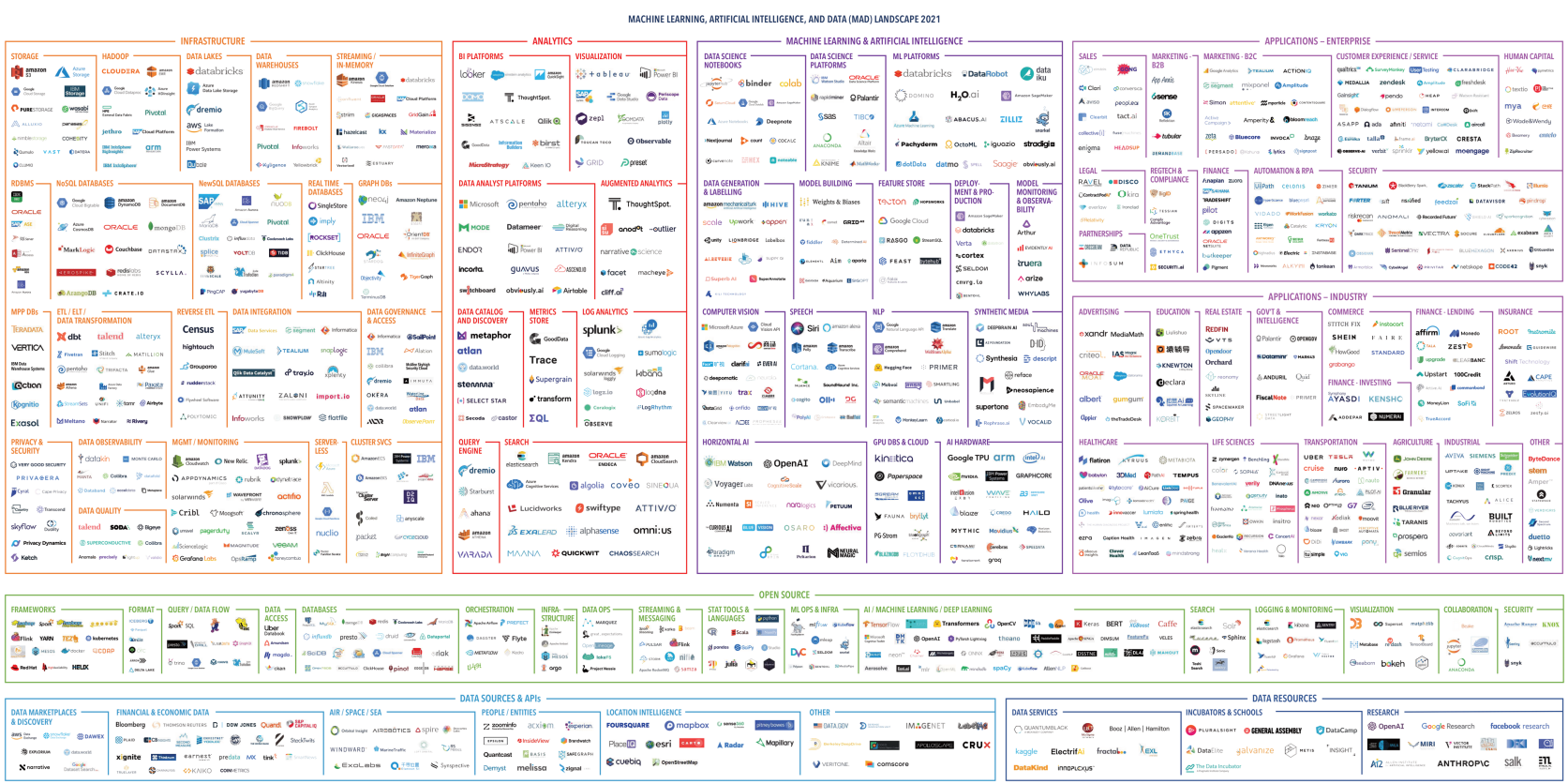
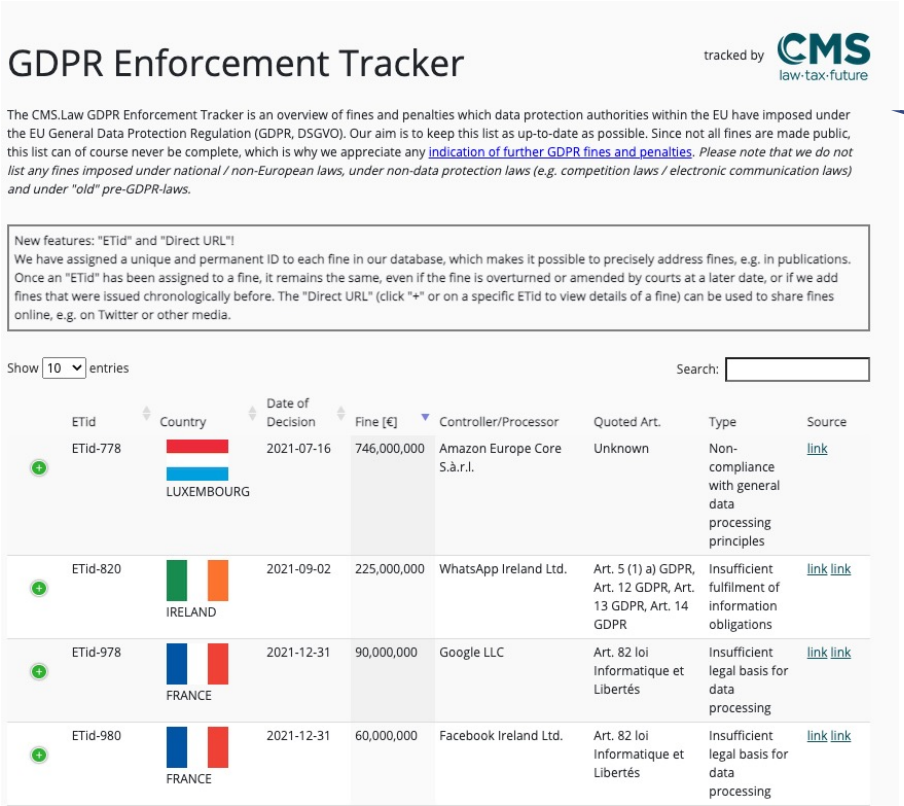


FIRSTMARK EARLY STAGE VENTURE CAPITAL

Knowledge Navigation

Advances in Personal Data Processing



GDPR Enforcement Tracker

tracked by CMS law·tax·future

The CMS.Law GDPR Enforcement Tracker is an overview of fines and penalties which data protection authorities within the EU have imposed under the EU General Data Protection Regulation (GDPR, DSGVO). Our aim is to keep this list as up-to-date as possible. Since not all fines are made public, this list can of course never be complete, which is why we appreciate any indication of further GDPR fines and penalties. *Please note that we do not list any fines imposed under national / non-European laws, under non-data protection laws (e.g. competition laws / electronic communication laws) and under "old" pre-GDPR-laws.*

New features: "ETid" and "Direct URL"!
We have assigned a unique and permanent ID to each fine in our database, which makes it possible to precisely address fines, e.g. in publications. Once an "ETid" has been assigned to a fine, it remains the same, even if the fine is overturned or amended by courts at a later date, or if we add fines that were issued chronologically before. The "Direct URL" (click "+" or on a specific ETid to view details of a fine) can be used to share fines online, e.g. on Twitter or other media.

Show 10 entries Search:

ETid	Country	Date of Decision	Fine [€]	Controller/Processor	Quoted Art.	Type	Source
ETid-778	LUXEMBOURG	2021-07-16	746,000,000	Amazon Europe Core S.à.r.l.	Unknown	Non-compliance with general data processing principles	link
ETid-820	IRELAND	2021-09-02	225,000,000	WhatsApp Ireland Ltd.	Art. 5 (1) a) GDPR, Art. 12 GDPR, Art. 13 GDPR, Art. 14 GDPR	Insufficient fulfilment of information obligations	link link
ETid-978	FRANCE	2021-12-31	90,000,000	Google LLC	Art. 82 loi Informatique et Libertés	Insufficient legal basis for data processing	link link
ETid-980	FRANCE	2021-12-31	60,000,000	Facebook Ireland Ltd.	Art. 82 loi Informatique et Libertés	Insufficient legal basis for data processing	link link

The GDPR sets forth fines of up to 20 million euros, or 4% of entire global turnover of the preceding fiscal year, whichever is higher.

https://www.enforcementtracker.com/

Knowledge Navigation

Advances in Personal Data Processing

GDPR Enforcement Tracker

tracked by CMS law·tax·future

The CMS.Law GDPR Enforcement Tracker is an overview of fines and penalties which data protection authorities within the EU have imposed under the EU General Data Protection Regulation (GDPR, DSGVO). Our aim is to keep this list as up-to-date as possible. Since not all fines are made public, this list can of course never be complete, which is why we appreciate any indication of further GDPR fines and penalties. *Please note that we do not list any fines imposed under national / non-European laws, under non-data protection laws (e.g. competition laws / electronic communication laws) and under "old" pre-GDPR-laws.*

New features: "ETid" and "Direct URL"!
We have assigned a unique and permanent ID to each fine in our database, which makes it possible to precisely address fines, e.g. in publications. Once an "ETid" has been assigned to a fine, it remains the same, even if the fine is overturned or amended by courts at a later date, or if we add fines that were issued chronologically before. The "Direct URL" (click "+" or on a specific ETid to view details of a fine) can be used to share fines online, e.g. on Twitter or other media.

Show 10 entries Search:

ETid	Country	Date of Decision	Fine [€]	Controller/Processor	Quoted Art.	Type	Source
ETid-778	LUXEMBOURG	2021-07-16	746,000,000	Amazon Europe Core S.à.r.l.	Unknown	Non-compliance with general data processing principles	link
ETid-820	IRELAND	2021-09-02	225,000,000	WhatsApp Ireland Ltd.	Art. 5 (1) a) GDPR, Art. 12 GDPR, Art. 13 GDPR, Art. 14 GDPR	Insufficient fulfilment of information obligations	link link
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https://www.enforcementtracker.com/

The European Commission and the United States reached an agreement in principle for a **Trans-Atlantic Data Privacy Framework.**

https://ec.europa.eu/commission/presscorner/api/files/attachment/872132/Trans-Atlantic%20Data%20Privacy%20Framework.pdf.pdf

Virtual Personal Assistants

Apple Knowledge Navigator Video 1987

This is a mock-up of what could have been .....

https://www.reddit.com/r/VintageApple/comments/l9dt48/apples_knowledge_navigator/

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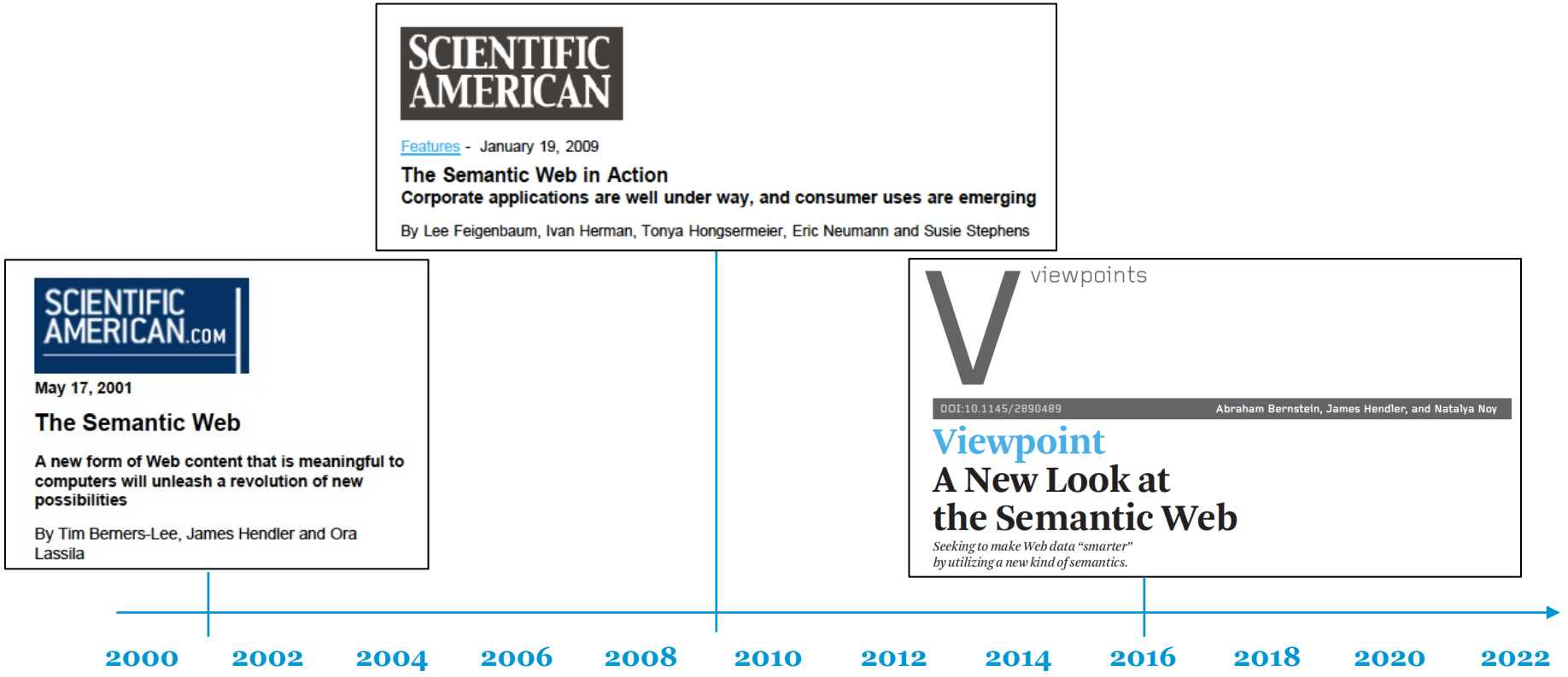
From
Knowledge Navigation
to
Intelligent Software Web Agents

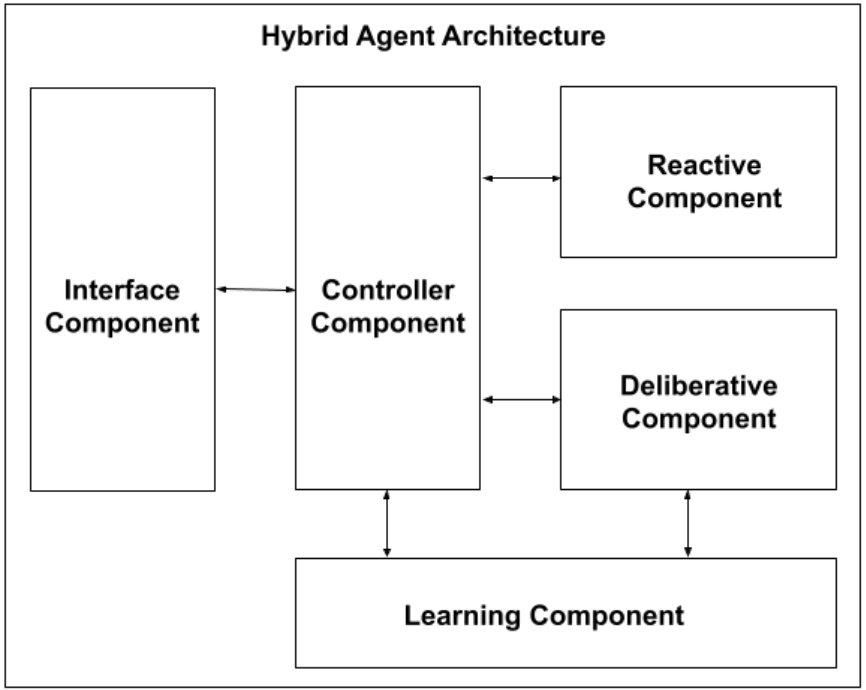
Intelligent Software Web Agents

The Semantic Web



Intelligent Software Web Agents

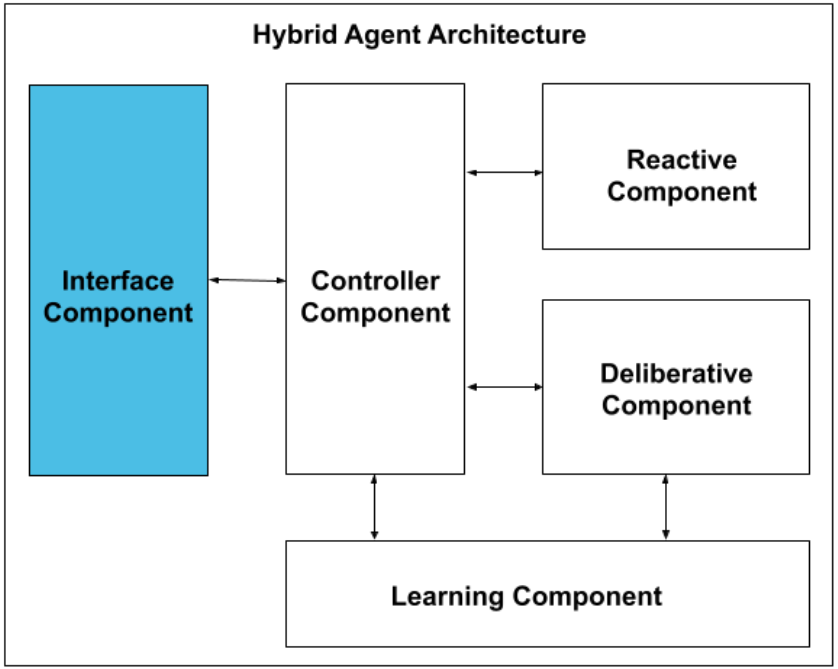
Existing Standards



Intelligent Software Web Agents: A Gap Analysis. Sabrina Kirrane. Journal of Web Semantics, 2021

Intelligent Software Web Agents

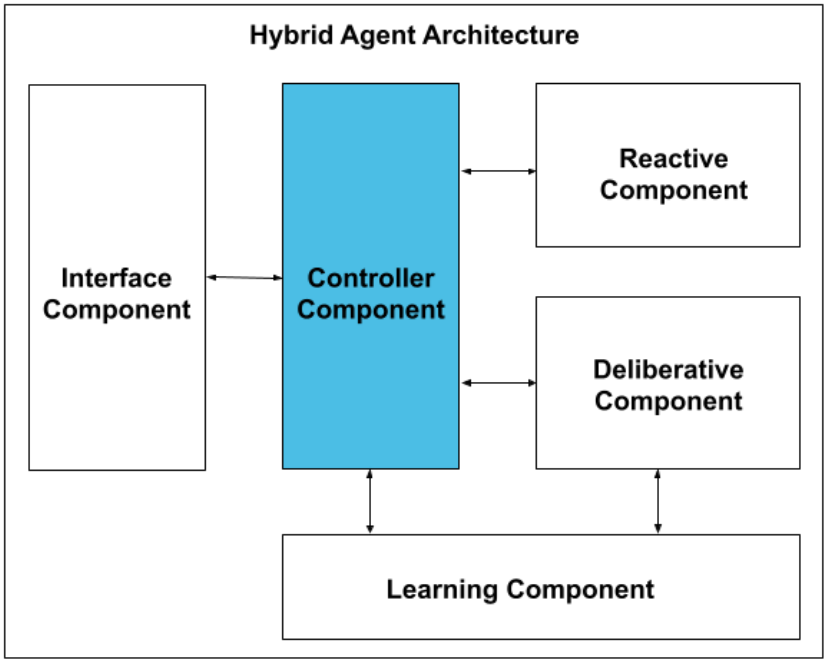
Existing Standards



- **Interface**
  - Web Ontology Language for Web Services (OWL-S)
  - Web Service Modeling Language (WSML)
  - Agent Communication Language (ACL)
  - …

Intelligent Software Web Agents

Existing Standards



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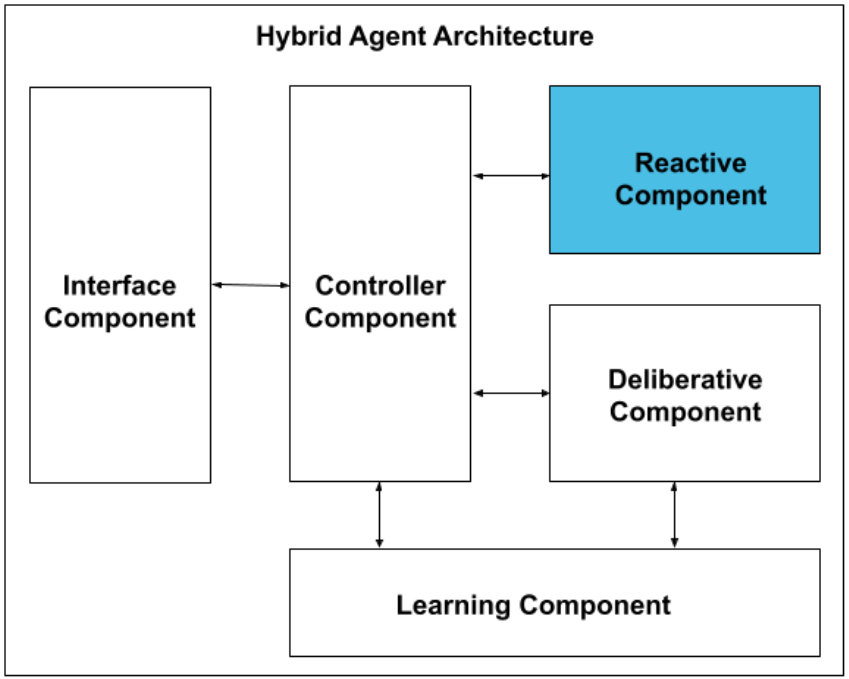
  - Linked Data Platform (LDP)
  - Foundation for Intelligent Physical Agents (FIPA)
  - …

Intelligent Software Web Agents

Existing Standards



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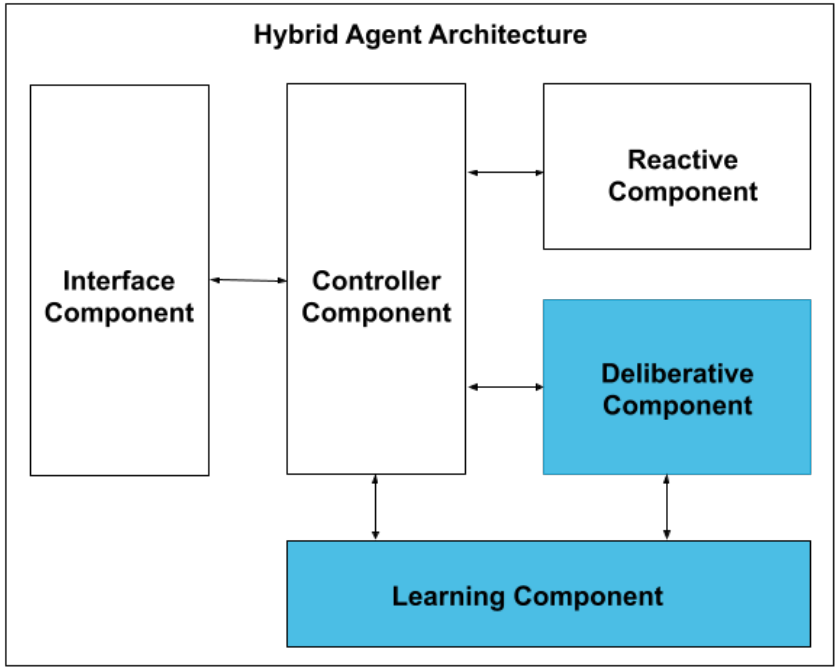
  - Foundation for Intelligent Physical Agents (FIPA)
  - …
- **Reactive**
  - Production Rule Representation (PRR)
  - Rule Markup Language (RML)
  - W3C Semantic Web Rule Language (SWRL)
  - …

Intelligent Software Web Agents

Existing Standards



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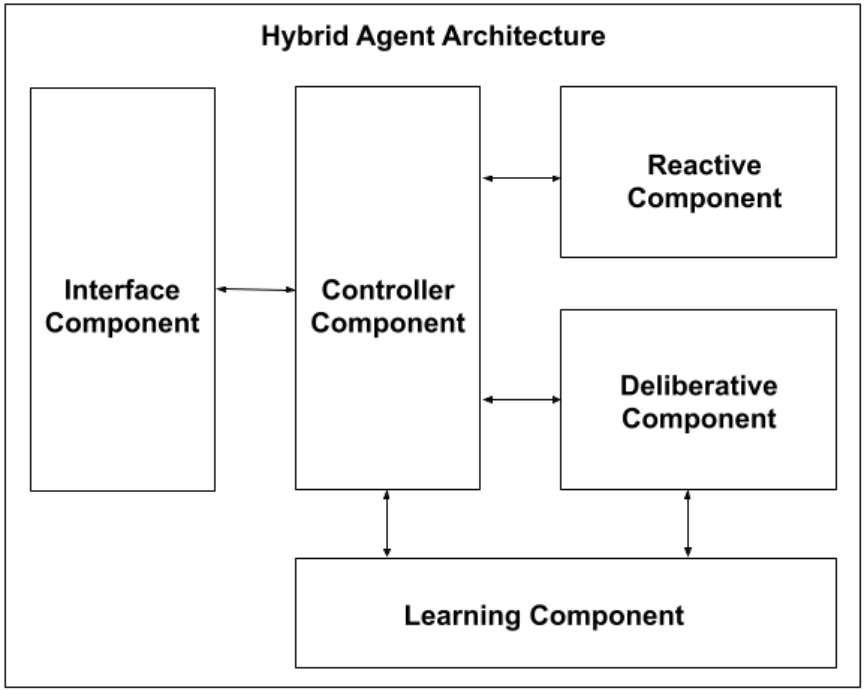
  - Production Rule Representation (PRR)
  - Rule Markup Language (RML)
  - W3C Semantic Web Rule Language (SWRL)
  - …
- **Deliberative & Learning**
  - Resource Descriotion Language Schema (RDFS)
  - Web Ontology Language (OWL)
  - …

Intelligent Software Web Agents: A Gap Analysis. Sabrina Kirrane. Journal of Web Semantics, 2021

Intelligent Software Web Agents

Existing Standards



How well do these standards fit together?

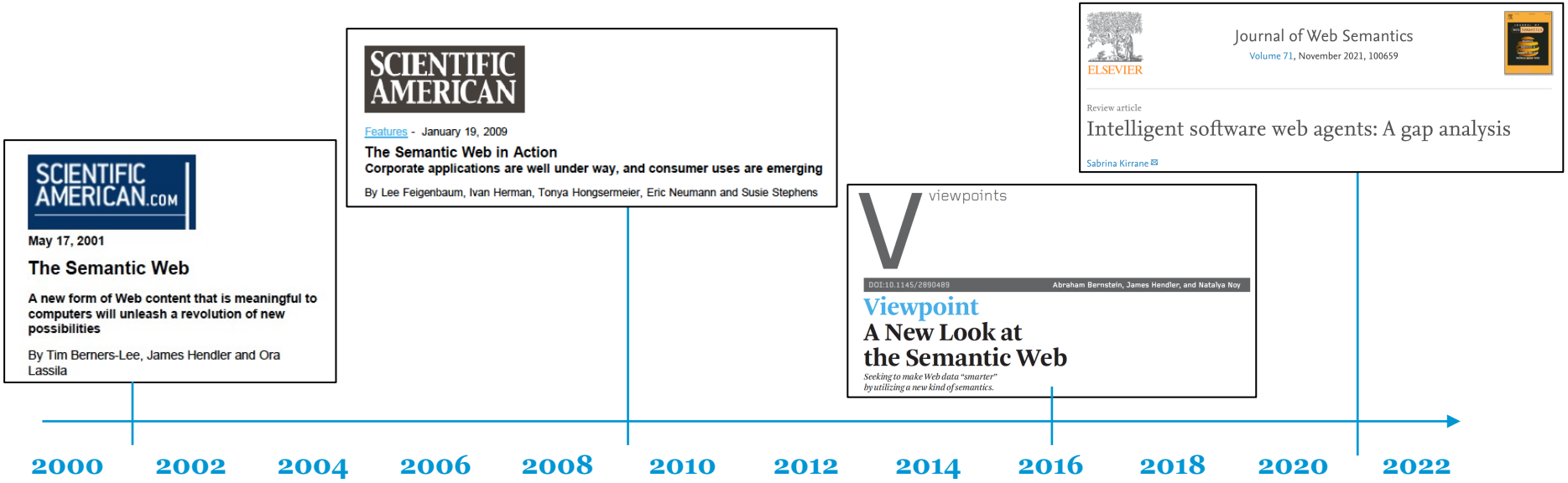
How well do they cater for intelligent web agent requirements?

What are the standardisation gaps?

Intelligent Software Web Agents: A Gap Analysis. Sabrina Kirrane. Journal of Web Semantics, 2021

Intelligent Software Web Agents

The Statuo Quo



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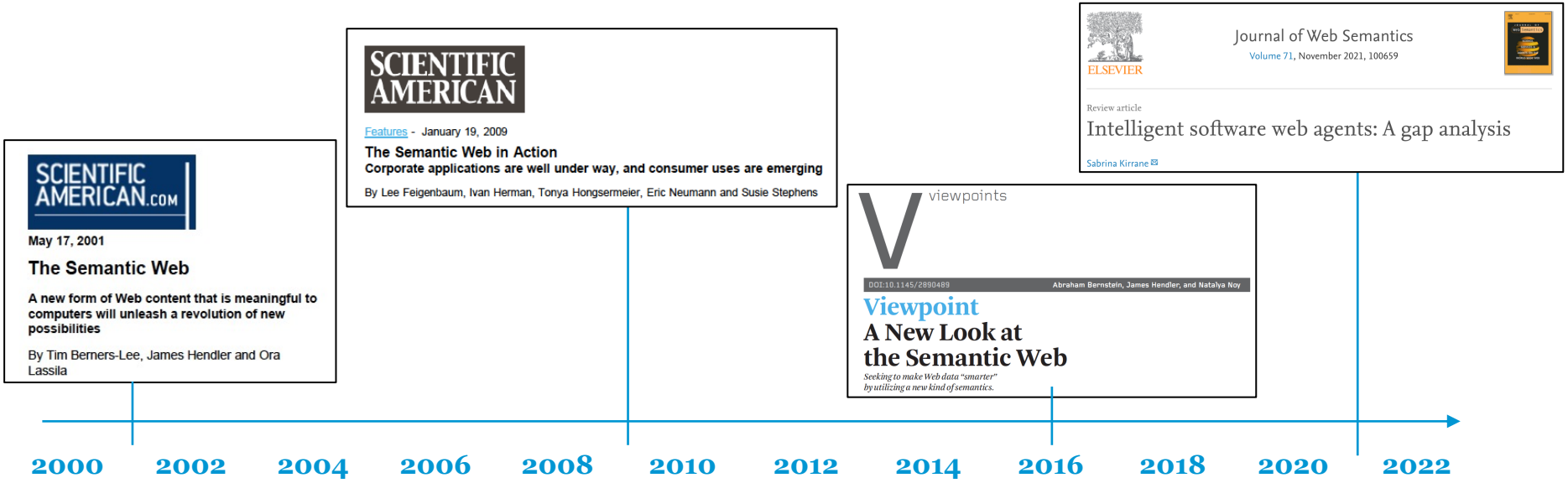
Intelligent Software Web Agents

The Statuo Quo



- **Benevolence**, **responsibility**, and **mobility** requirements yet to be realised
- Agents need to behave **legally** and **ethically**
- Need tools, technologies that can be used to **evaluate the effectiveness** of existing proposals

Intelligent Software Web Agents: A Gap Analysis. Sabrina Kirrane. Journal of Web Semantics, 2021

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From Policies to Norms: The Toolbox

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From Policies to Norms: The Toolbox

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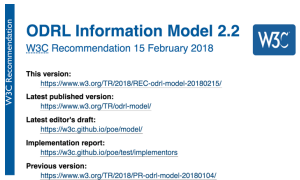

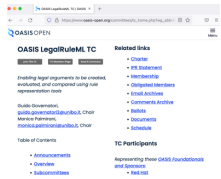

Chapter 17

KAoS: Toward An Industrial-Strength Open Agent Architecture

Jeffrey M. Bradshaw, Stewart Dutfield, Pete Benoit, & John D. Woolley

FIPA — towards a standard for software agents

P D O'Brien and R C Nicol

PROTUNE: A Rule-based PROvisional TrUst NEgotiation Framework

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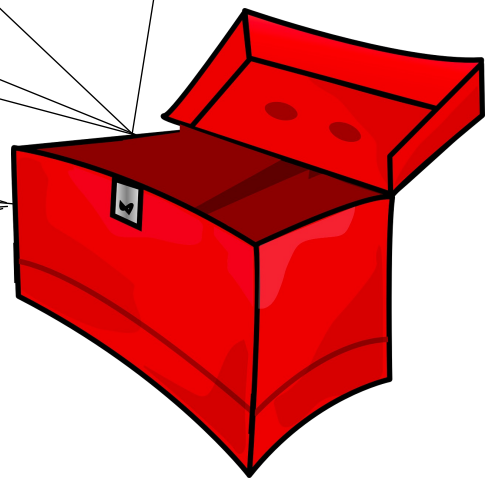
A Policy Language for a Pervasive Computing Environment*

Lalana Kagal, Tim Finin and Anupam Joshi
Department of Computer Science and Electrical Engineering
University of Maryland Baltimore County
Baltimore, MD 21250
{lkagal1, finin, joshi}@cs.umbc.edu



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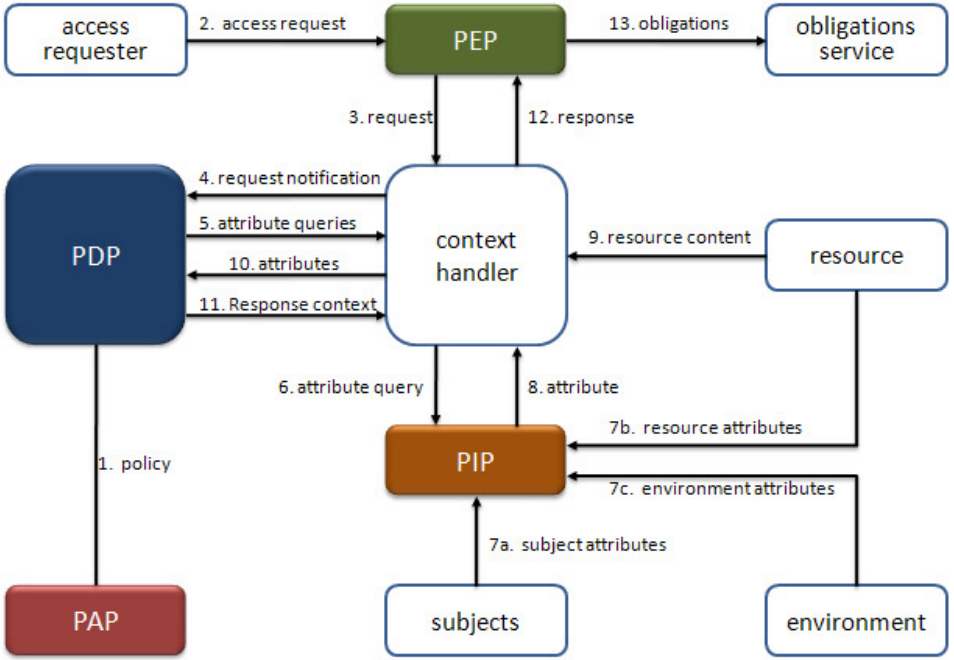
From Policies to Norms: The Toolbox

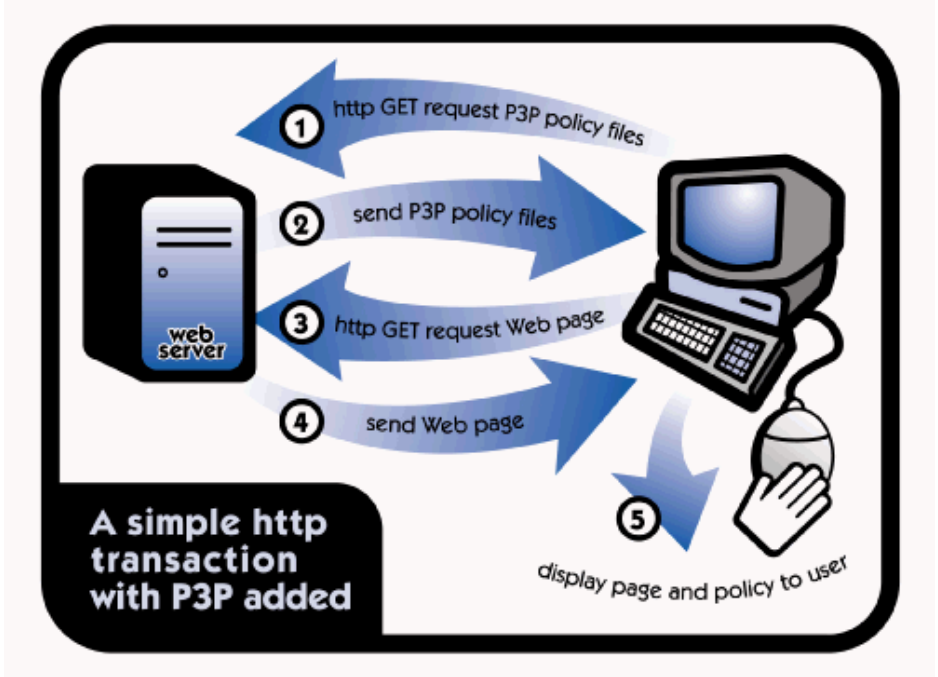
Access Control



Policy Administration Point (PAP))
Policy Enforcement Point (PEP)
Policy Decision Point (PDP)
Policy Information Point (PIP)

From Policies to Norms: The Toolbox

Privacy Preferences



From Policies to Norms: The Toolbox

Licensing

W3C Recommendation

ODRL Information Model 2.2

W3C Recommendation 15 February 2018

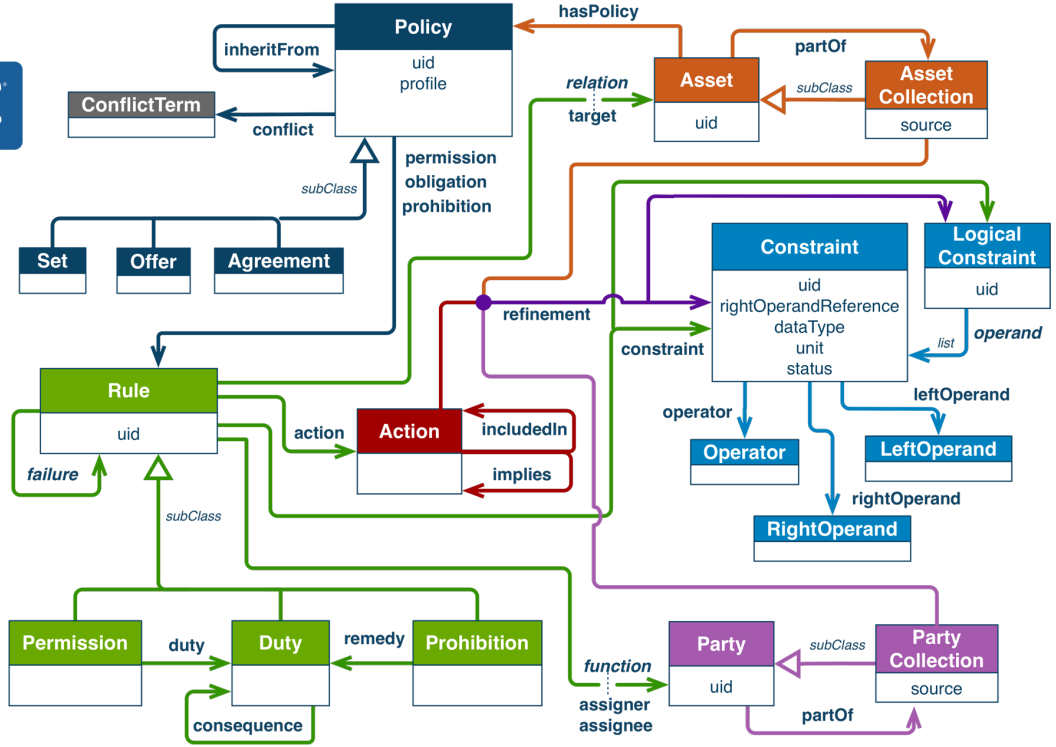
This version:
https://www.w3.org/TR/2018/REC-odrl-model-20180215/

Latest published version:
https://www.w3.org/TR/odrl-model/

Latest editor's draft:
https://w3c.github.io/poe/model/

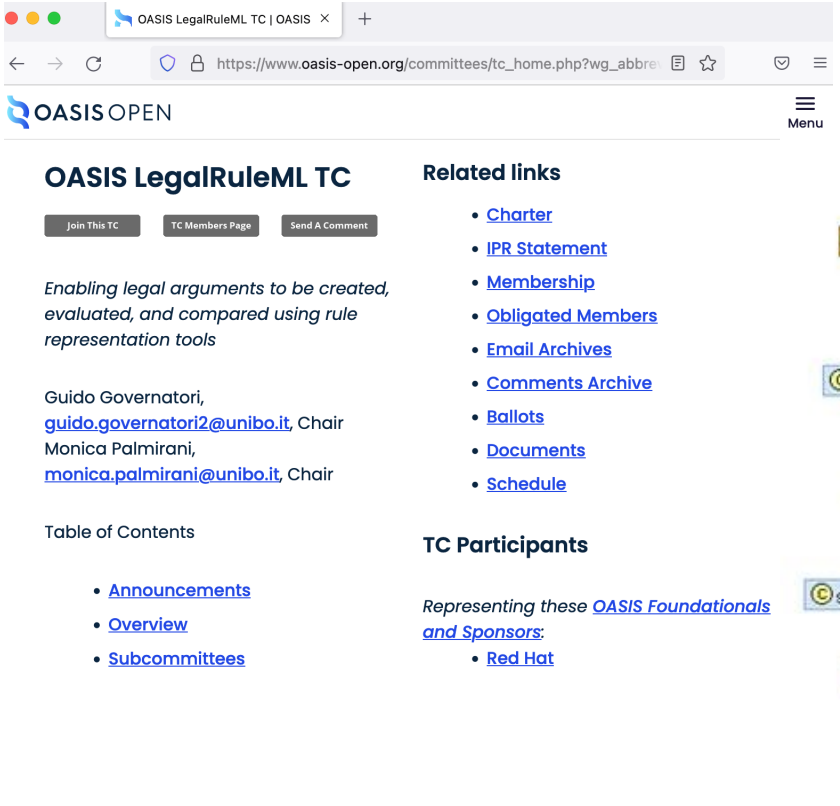
Implementation report:
https://w3c.github.io/poe/test/implementors

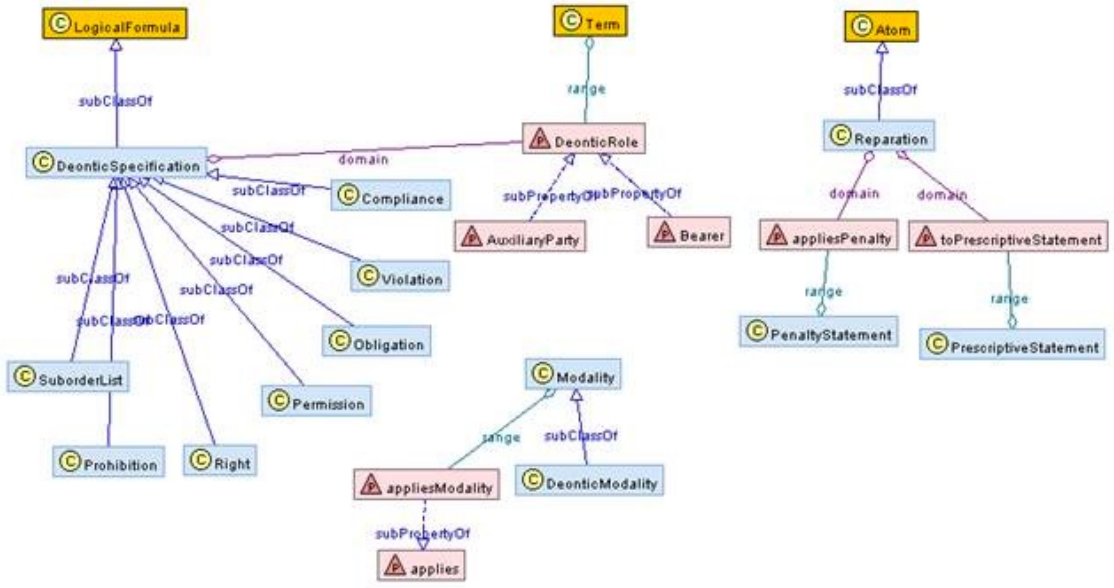
Previous version:
https://www.w3.org/TR/2018/PR-odrl-model-20180104/



From Policies to Norms: The Toolbox

Norms





From Policies to Norms: The Toolbox

General Policy Languages

A Policy Language for a Pervasive Computing Environment*

Lalana Kagal, Tim Finin and Anupam Joshi
Department of Computer Science and Electrical Engineering
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2003, A policy language for a pervasive computing environment. In Proceedings POLICY 2003. IEEE 4th International Workshop on Policies for Distributed Systems and Networks (pp. 63-74). IEEE.

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2010. PROTUNE: A Rule-based PROvisional TrUst NEgotiation Framework.

From Policies to Norms: The Toolbox

Agent Languages


Chapter 17

KAoS: Toward An Industrial-Strength Open Agent Architecture

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1997. KAoS: Toward an industrial-strength open agent architecture. Software agents, 13, pp.375-418.


FIPA — towards a standard for software agents

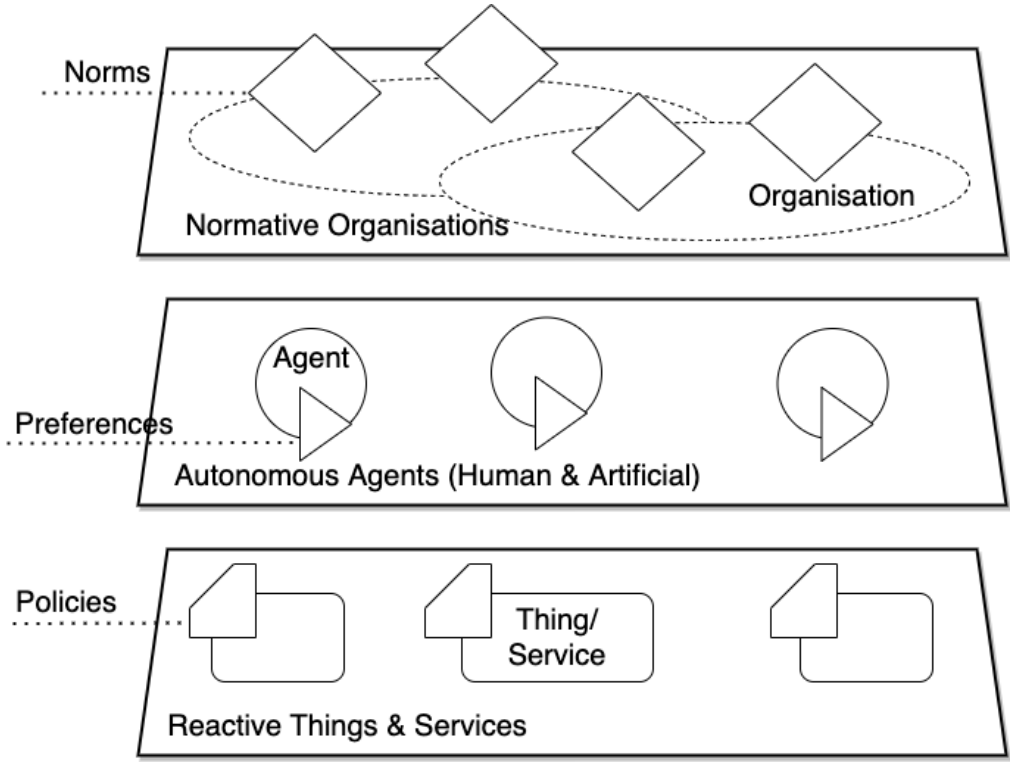
P D O'Brien and R C Nicol

1998. FIPA—towards a standard for software agents. BT Technology Journal, 16(3), pp.51-59.

Governance has received much less attention!

From Policies to Norms: Governance

Reactive Things and Services



- A blueprint for the governance of agent based systems
- Can be instantiated in a variety of ways, using a variety of concrete software components

Governance of Autonomous Agents on the Web: Challenges and Opportunities. Timotheus Kampik, Adnane Mansour, Olivier Boissier, Sabrina Kirrane, Julian Padget, Terry R. Payne, Munindar P. Singh, Valentina Tamma, Antoine Zimmermann. ACM Transactions on Internet Technology Journal, 2022

From Policies to Norms: Governance

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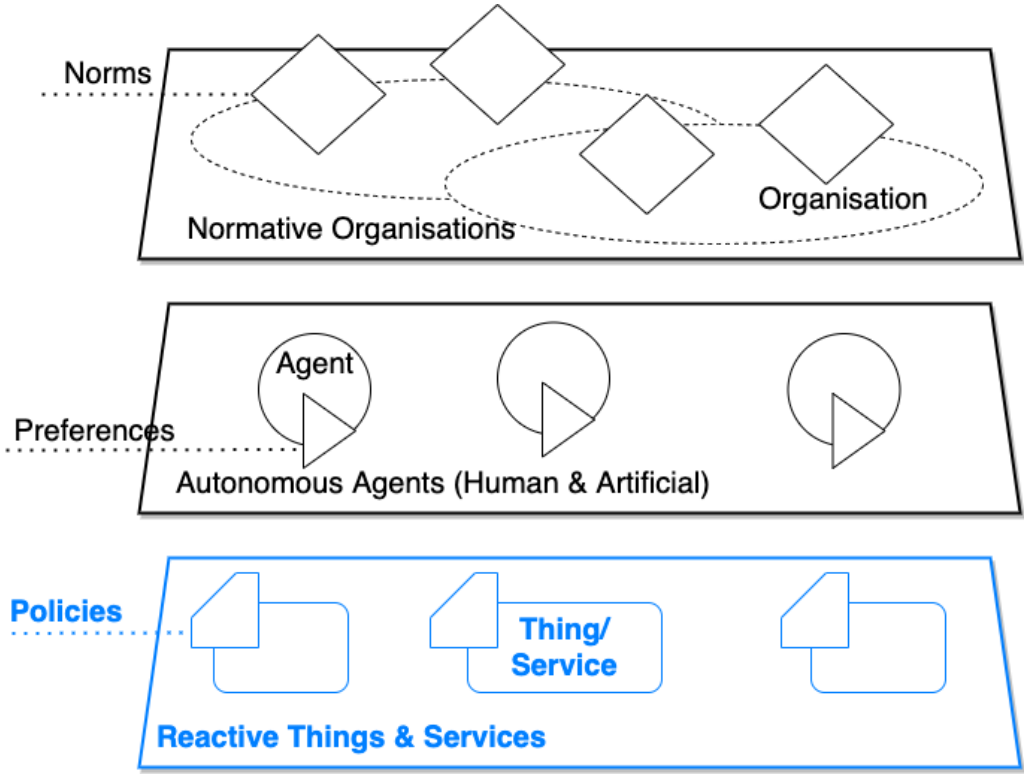

- Non-autonomous entities in the environment
- Adopt the same notions of the Web of Things (WOTs) architecture
- Policies state who can access things/services and constraints on their usage (if any)

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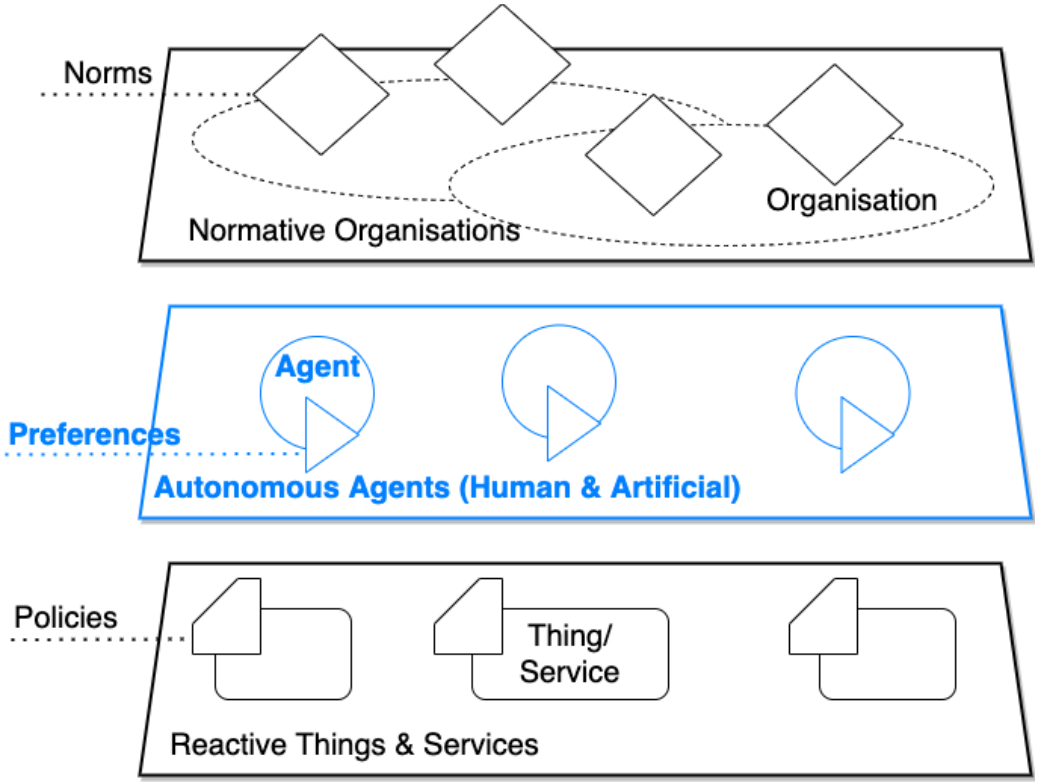
From Policies to Norms: Governance

Autonomous Agents



- Entities that autonomously perceive and act upon their environment (i.e., things and services) and interact with the other entities
- Agents have preferences that inform and constrain their actions with respect to things, web services and other agents.
- Preferences control the local reasoning and decision-making undertaken by the agents, and can thus support governance

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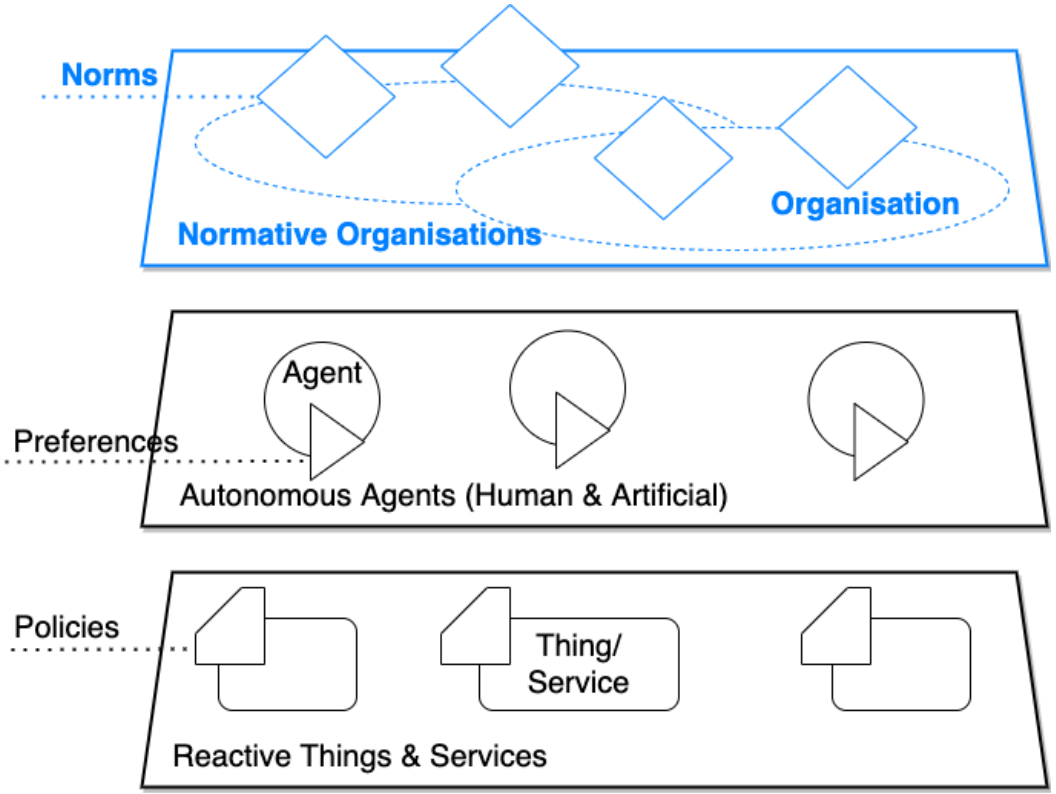
From Policies to Norms: Governance

Normative Organisations



- Organisations are first-class abstractions that group agents and their governance (i.e., norms)
- Logical grouping of agents with a particular purpose, and the provision of legal, regulatory and social norms that may possibly span multiple organisations
- Organisations are entirely virtual and passive (i.e., shaped by their members), thus it is up to these member agents to stipulate, comply with (or violate), enforce, and evolve organisational norms

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Challenges & Opportunities

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From Policies to Norms

Open Challenges and Opportunities

- The **encoding of policies and norms** such that they are actionable by machines is particularly difficult as policies and norms are often vague and ambiguous.
- In order to **monitor how agents adapt and learn** there is a need for governance strategies that are suitable for symbolic and sub-symbolic learning.
- There is a need for **abstractions that can be used to guide the development** of a variety of different agent types (information, scheduling, booking, etc....)
- We need **codes of conduct** for different types of agents and agent organisations based on legal, regulatory, and social norms
- We are severely lacking in terms of intelligent agent **benchmarking methods and tools**
- **.....**

Thank you / contact details

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