

# Following the Rules: From Policies to Norms



Sabrina Kirrane  
DEXA 2022



# The Rules



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](https://en.wikipedia.org/wiki/The_Rules)

## The Rules - Wikipedia

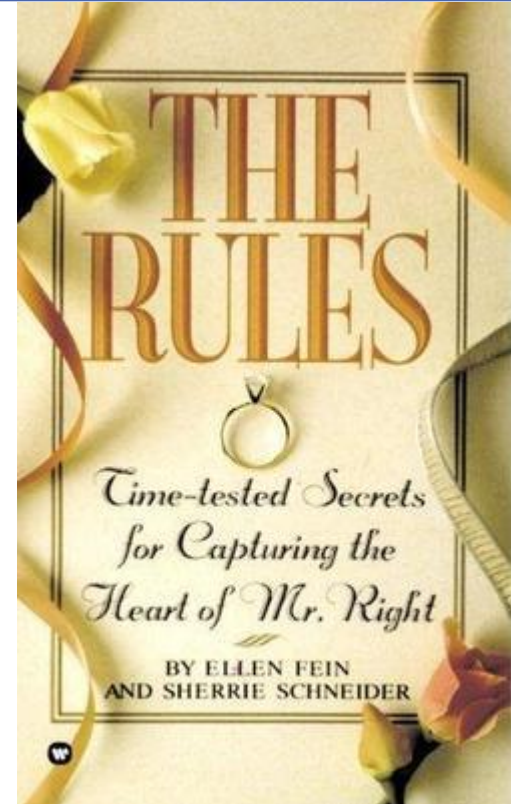
**The Rules:** Time-tested Secrets for Capturing the Heart of Mr. Right is a self-help book by Ellen Fein and Sherrie Schneider, originally published in 1995.

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](#)



# Following the Rules



"Following the Rules"



[All](#) [Images](#) [Videos](#) [News](#) [Maps](#) [More](#) [Tools](#)

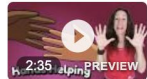
About 68.500.000 results (0,89 seconds)

**Videos**



**I Can Follow the Rules Song | Music for Classroom Management**

YouTube · HeidiSongs  
30 Jul 2015



**Classroom Rules Song for Children (Official Video) Following ...**

YouTube · Patty Shukla Kids TV - Children's songs  
12 Nov 2019

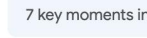


4 key moments in this video



**Following the Rules**

YouTube · MDR Bros. Education Channel  
22 Nov 2020



7 key moments in this video



**Follow Rules Children's Song Classroom Rules by Miss Patty ...**

YouTube · Patty Shukla Kids TV - Children's songs  
18 Nov 2019

[View all](#) →



"Following the Rules"



**People also ask**

What are the rules to be followed in school?

Why are rules important in the classroom?

What rules should teachers follow?

What are the 5 class rules?

# Following the Rules

## Knowing the Rules


### CLASSROOM RULES

1. COME  CLASS ON TIME
2. BE READY  LEARN
3. LISTEN  FOLLOW DIRECTIONS
4. RAISE YOUR HAND  SPEAK
5. BE RESPECTFUL  OTHERS
6. ASK QUESTIONS
7. ALWAYS DO YOUR BEST
8. TRY NEW THINGS
9. BELIEVE  YOURSELF
10. WORK HARD  HAVE FUN!

# Following the Rules


## Knowing the Rules


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## Classroom ZOOM Rules

- 

Show up a few minutes before class time and wait to be admitted into the class.
- 

Find a quiet place free of distractions. (siblings, television, parents, pets, etc.)
- 

Be respectful at all times. While your video is on, no hand gestures or inappropriate language.
- 

Stay on mute. Click the "raise hand" button if you have a question or something to share.
- 

Stay focused and on task so you don't miss anything the speaker says.

@bigheart.youngminds

<https://amanterpecaya.com/>

# Following the Rules

## Knowing the Rules and the Consequences



# Following the Rules

## Knowing the Rules and the Consequences



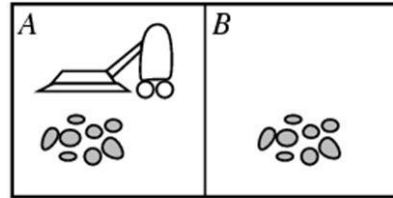
<https://www.pinterest.co.uk/pin/nuns-reverse-reverse--67202219424555999/>

# 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*

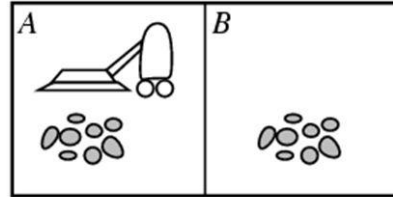


# Following the Rules

## Programming Rules

### Vacuum-cleaner world

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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**

16 of 914 results for "robot vacuum cleaner"

Sort by: Featured

Eligible for free delivery

Free Delivery by Amazon  
for all customers with orders over €29  
shipped by Amazon

Your search "robot vacuum cleaner" was automatically translated into "saugroboter".Undo

RESULTS

Learn about these results. Price and other details may vary based on product size and colour.

Department  
Vacuum Cleaners  
Robotic Vacuums  
See All 11 Departments

Customer Review

★★★★☆ & Up  
★★★★☆ & Up  
★★★★☆ & Up  
★★★★☆ & Up

and

Xiaomi  
eufy  
MEDION  
roborock  
Dreame  
Shark  
iRobot

See more

Price



Xiaomi Mi Robot Vacuum Mop 2S Vacuum & Mop Robot  
(2200Pa Suction Power, LDS Sensors, 300ml Dust Container, 20..

★★★★☆ ~ 1,252

-33% €200.68 RRP: €301.51

prime Get it Thursday, Aug 25

FREE Delivery by Amazon

More buying choices

€157.21 (77 used & new offers)



AirRobo P10 Robot Vacuum Cleaner, 2,600 Pa, Wi-Fi with Space  
Map in Real Time, Wi-Fi/App/Alexa, Self-Charging, 140 Minutes...

★★★★☆ ~ 2,423

€159.99

Save €40.00 with voucher

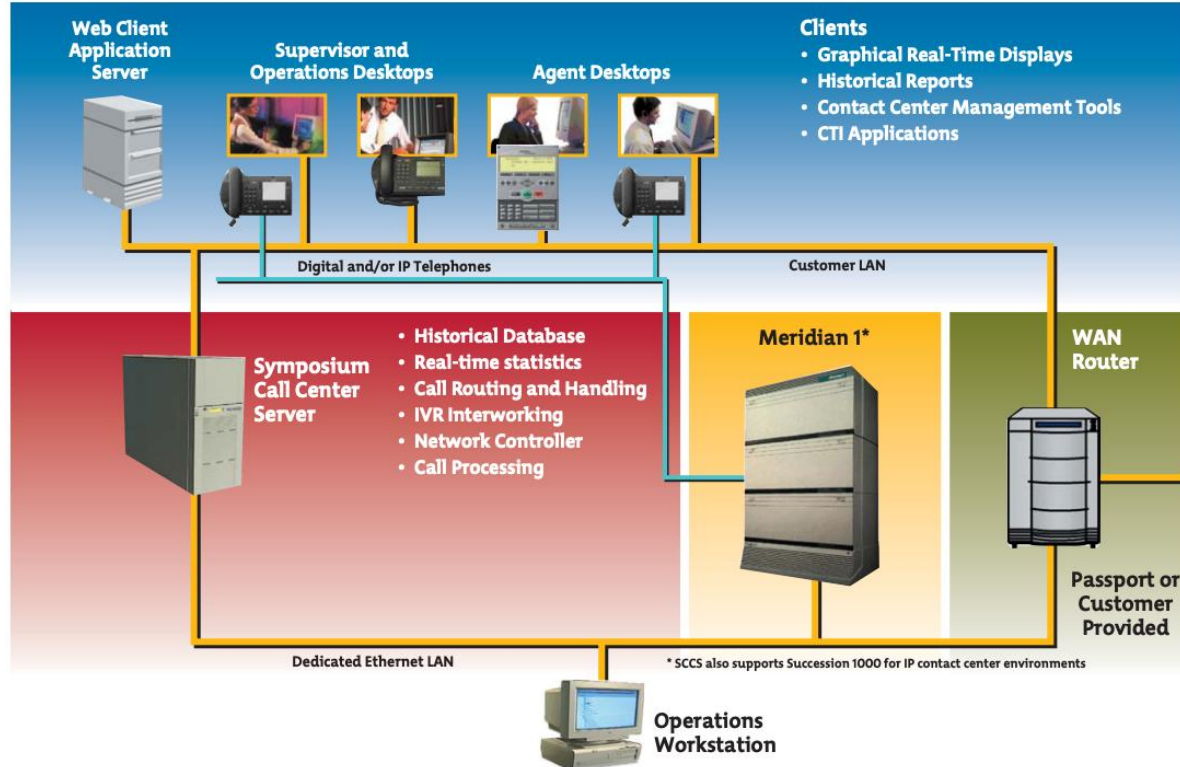
prime Get it Thursday, Aug 25

FREE Delivery by Amazon

# Following the Rules

## System Integration

Figure 1. Symposium Call Center Server Architecture



# Following the Rules


## Document Exchange

**Your Automated Document Supply Chain**  
Profitable. Secure. Paperless.

The advertisement features a central tablet with the Celtrino logo and the text "celtrino platform". Surrounding the tablet are several business documents, including eSales Invoice, eDespatch Advice, eSales Order, eCatalogue, Catalogue, ePurchase Order, eReceipt of Delivered Goods, and ePurchase Invoice. The documents are arranged in a row, with the central tablet being the most prominent. The background is a blue gradient with a subtle pattern of dots.

# Following the Rules

## Virtual Personal Assistants

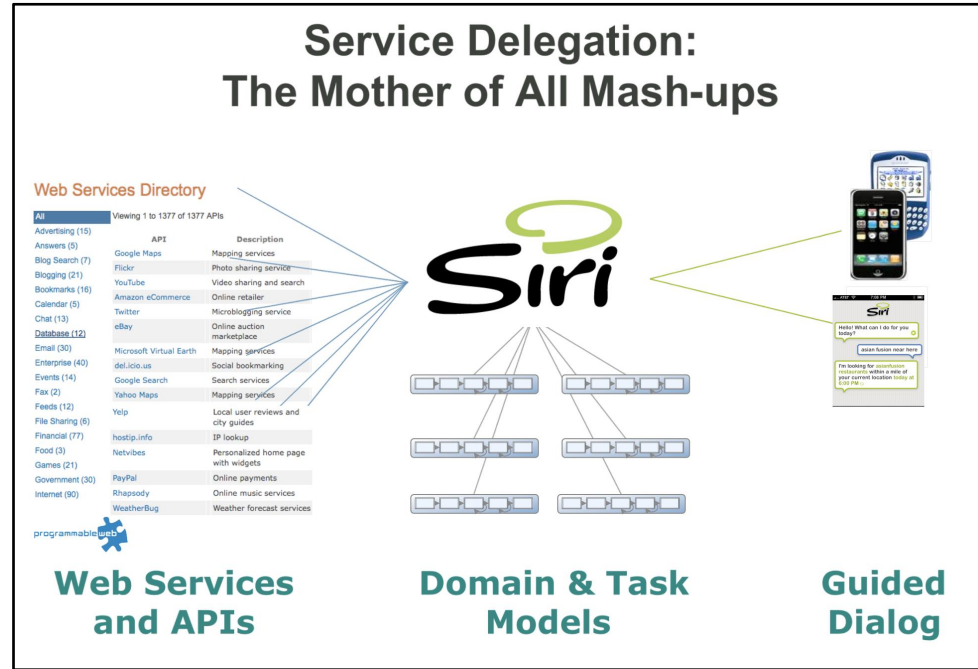


**Siri, a Virtual Personal Assistant**  
Bringing Intelligence to the Interface

**Tom Gruber**  
CTO & cofounder, Siri



**2009 Semantic  
Technology Conference**  
JUNE 14 - 18 SAN JOSE, CALIFORNIA



# Virtual Personal Assistants

# Virtual Personal Assistants

## The Status Quo



Siri



Cortana



amazon alexa



Google Assistant

# Virtual Personal Assistants

## The Status Quo

The screenshot shows the top of a Business News Daily article. At the top left is the logo 'BUSINESS NEWS DAILY' and a 'SUBSCRIBE' button. Below is a navigation bar with 'START', 'GROW', and 'LEAD' tabs. A breadcrumb trail reads 'Home > Grow Your Business > Technology'. On the left is a vertical navigation menu with four items: 'Accessibility and trends', 'Ease of setup', 'Success of queries and ability to understand context', and 'Bottom line'. The main article title is 'AI Faceoff: Siri vs. Cortana vs. Google Assistant vs. Alexa'. Below the title is a blue horizontal bar. The author is 'Mona Bushnell, Staff Writer', with a small profile picture. Below the author name is the text 'Business News Daily Staff' and 'Updated Jun 29, 2022'.

- 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

# Virtual Personal Assistants

## The Status Quo

COMPUTER LAW & SECURITY REVIEW 36 (2020) 105366



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

**ScienceDirect**

journal homepage: [www.elsevier.com/locate/CLSR](http://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 <sup>☆</sup>



Nóra Ni Loideain <sup>a,b,c,d,f,g,\*</sup>, Rachel Adams <sup>e,f,g</sup>

<sup>a</sup>Information Law and Policy Centre, Institute of Advanced Legal Studies, University of London, United Kingdom

<sup>b</sup>Leverhulme Centre for the Future of Intelligence (CFI), University of Cambridge, United Kingdom

<sup>c</sup>Media Policy and Democracy Project, Faculty of Humanities, University of Johannesburg, United Kingdom

<sup>d</sup>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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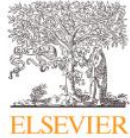
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“You’re hot!”	“How can you tell? You say that to all the virtual assistants”	“That’s nice of you to say”	“Beauty is in the eye of the beholder”



# Virtual Personal Assistants

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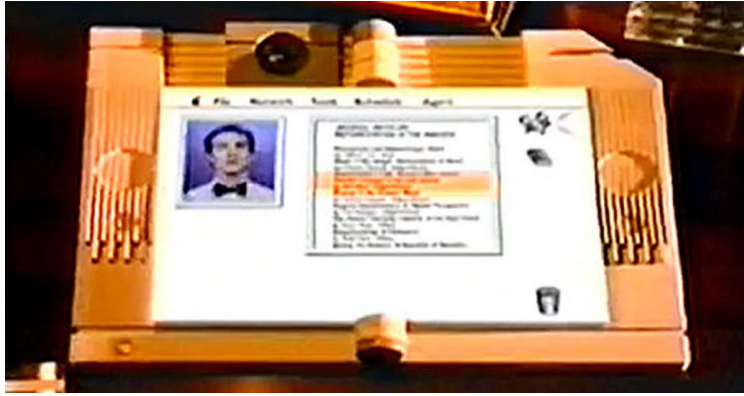
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“What are you wearing?”	“Why would I be wearing anything?”	“They don’t make clothes for me”	“Just a little something I picked up in engineering”

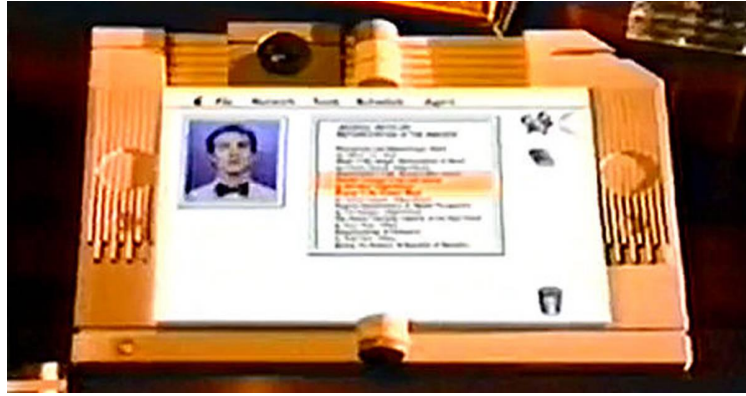
# Virtual Personal Assistants

## Apple Knowledge Navigator Video 1987



# Virtual Personal Assistants

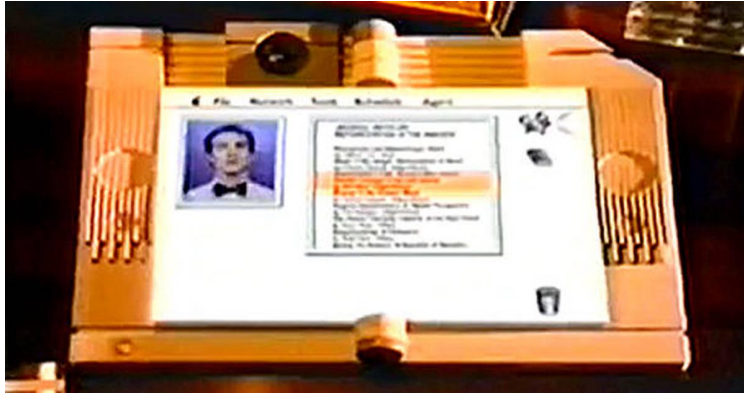
## Apple Knowledge Navigator Video 1987



- 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
- .....

# Virtual Personal Assistants

## Apple Knowledge Navigator Video 1987

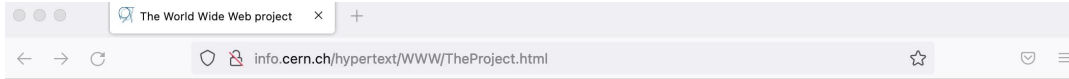


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# Knowledge Navigation

# 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.

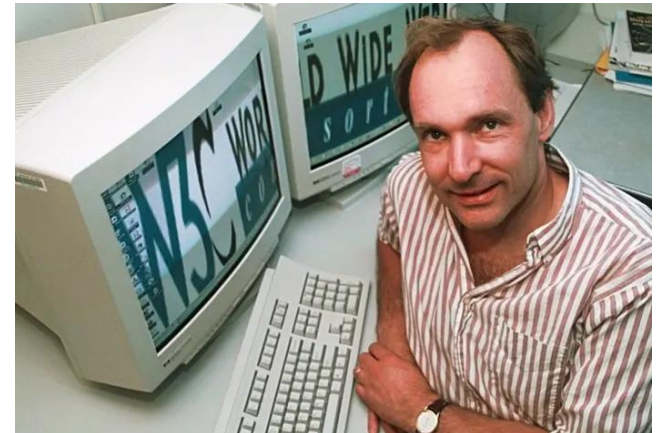
#### [How can I help ?](#)

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.



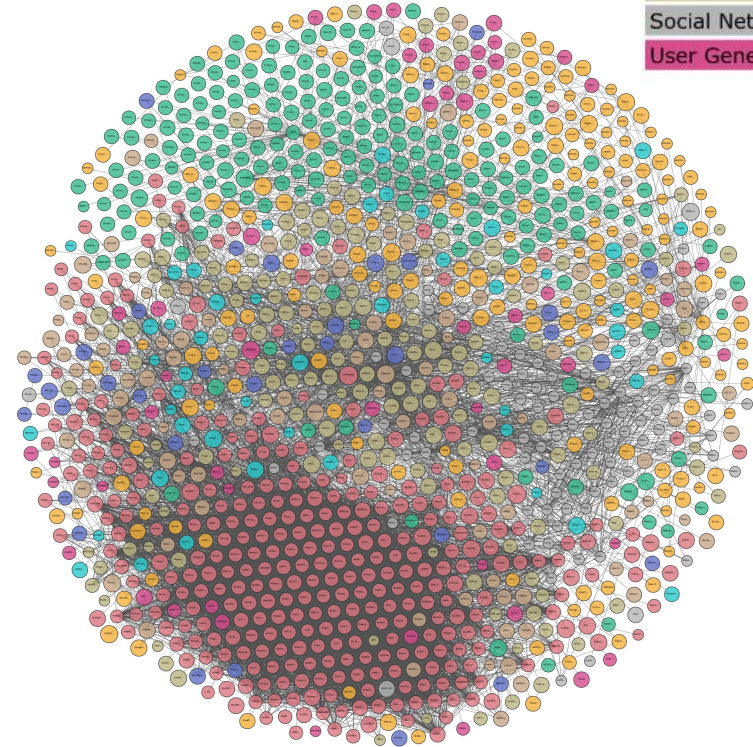


# Knowledge Navigation

## Advances in Data Sharing and Integration

Legend

Cross Domain
Geography
Government
Life Sciences
Linguistics
Media
Publications
Social Networking
User Generated



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

<https://lod-cloud.net/>

EQUIS ACCREDITED

AACSB ACCREDITED

ASSOCIATION OF AMBA ACCREDITED

# 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:

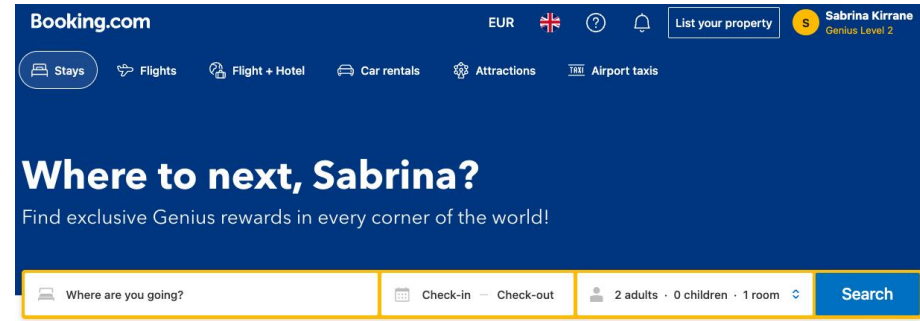
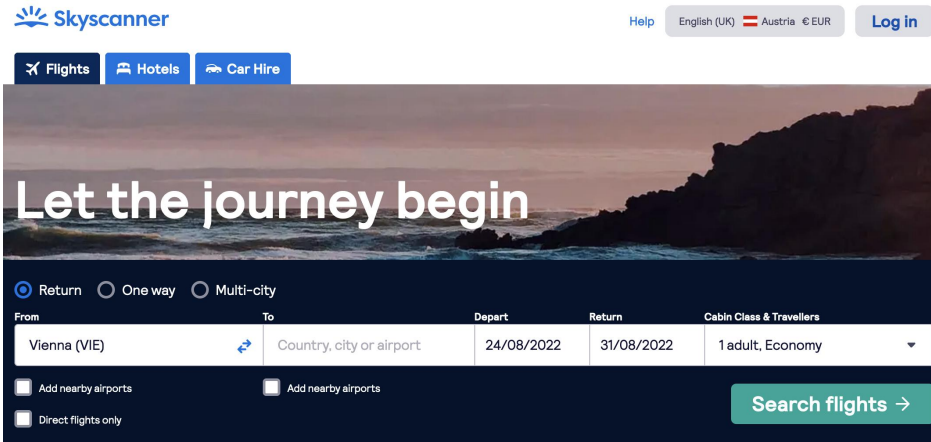
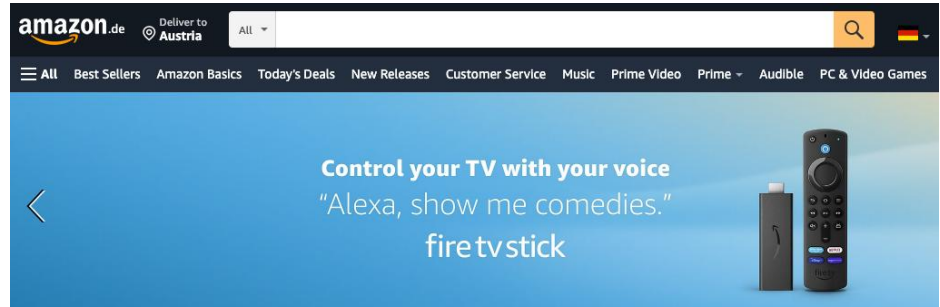
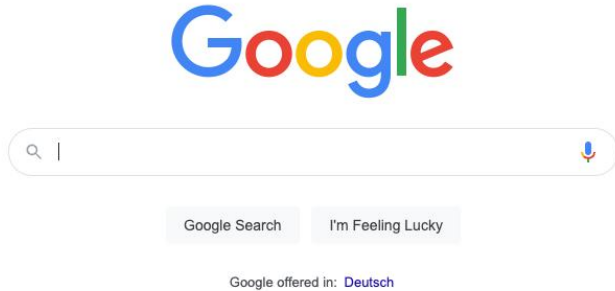
- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

##### 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

# 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-0>

## Real-time Data Streaming and Analytics- Use Cases

### Information security

Real-time data analytics allows to aggregate data and analyze activities in real-time.

### Real-time Marketing

44% of enterprises that leveraged real-time analytics to create customer-centric marketing could acquire new customers and increase their revenue.

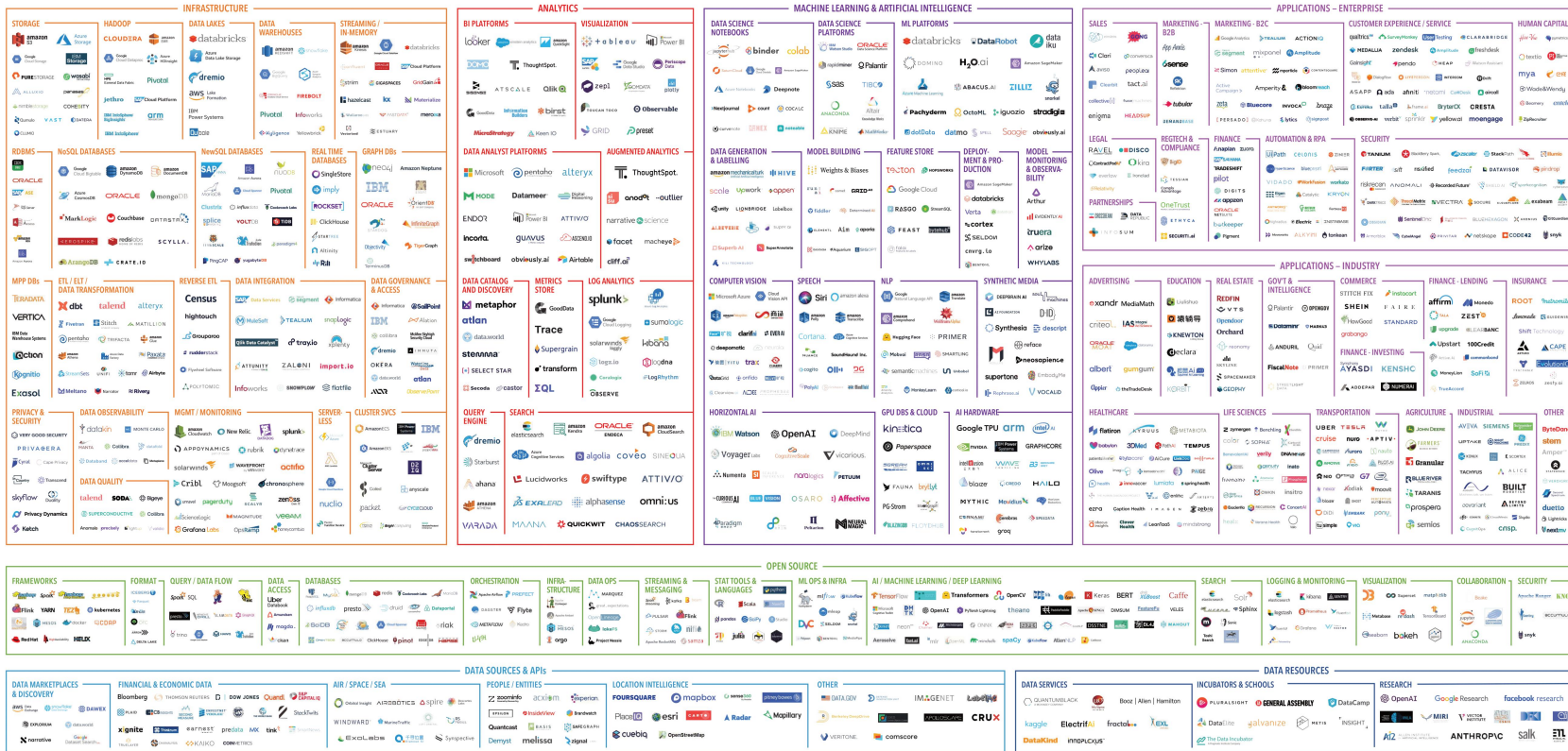
### Finance services

Real-time data streaming Kafka has helped businesses to create a system that identifies such fraudulent cases on time.

# Knowledge Navigation

## Advances in Handling Large Amounts of Data

MACHINE LEARNING, ARTIFICIAL INTELLIGENCE, AND DATA (MAD) LANDSCAPE 2021



# Knowledge Navigation

## Advances in Handling Large Amounts of Data



### BIG DATA LANDSCAPE 2017



# 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  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	<a href="#">link</a>
 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	<a href="#">link</a> <a href="#">link</a>
 ETid-978	 FRANCE	2021-12-31	90,000,000	Google LLC	Art. 82 loi Informatique et Libertés	Insufficient legal basis for data processing	<a href="#">link</a> <a href="#">link</a>
 ETid-980	 FRANCE	2021-12-31	60,000,000	Facebook Ireland Ltd.	Art. 82 loi Informatique et Libertés	Insufficient legal basis for data processing	<a href="#">link</a> <a href="#">link</a>

83(4) GDPR sets forth fines of up to 10 million euros, or, in the case of an undertaking, up to 2% of its entire global turnover of the preceding fiscal year, whichever is higher.



# 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  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	<a href="#">link</a>
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	<a href="#">link</a> <a href="#">link</a>
ETid-978	 FRANCE	2021-12-31	90,000,000	Google LLC	Art. 82 loi Informatique et Libertés	Insufficient legal basis for data processing	<a href="#">link</a> <a href="#">link</a>
ETid-980	 FRANCE	2021-12-31	60,000,000	Facebook Ireland Ltd.	Art. 82 loi Informatique et Libertés	Insufficient legal basis for data processing	<a href="#">link</a> <a href="#">link</a>



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 .....

# From Knowledge Navigation to Intelligent Software Web Agents

# Intelligent Software Web Agents

## The Semantic Web

**SCIENTIFIC  
AMERICAN**

[Features](#) - January 19, 2009

### The Semantic Web in Action

Corporate applications are well under way, and consumer uses are emerging

By Lee Feigenbaum, Ivan Herman, Tonya Hongsermeier, Eric Neumann and Susie Stephens

**SCIENTIFIC  
AMERICAN.COM**

May 17, 2001

### The Semantic Web

A new form of Web content that is meaningful to computers will unleash a revolution of new possibilities

By Tim Berners-Lee, James Hendler and Ora Lassila

**V** viewpoints

DOI:10.1145/2890489

Abraham Bernstein, James Hendler, and Natalya Noy

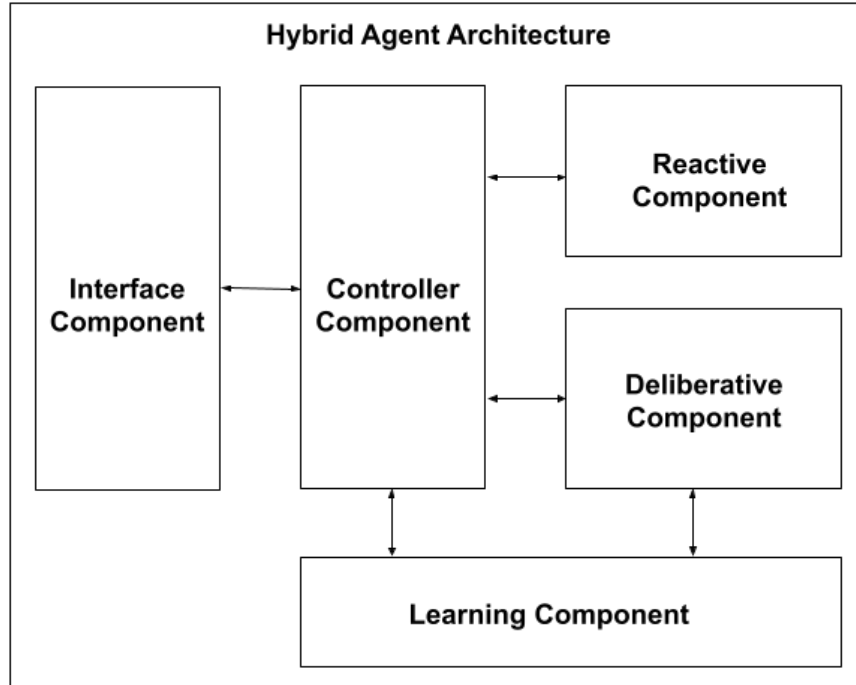
### Viewpoint A New Look at the Semantic Web

*Seeking to make Web data "smarter"  
by utilizing a new kind of semantics.*

2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022

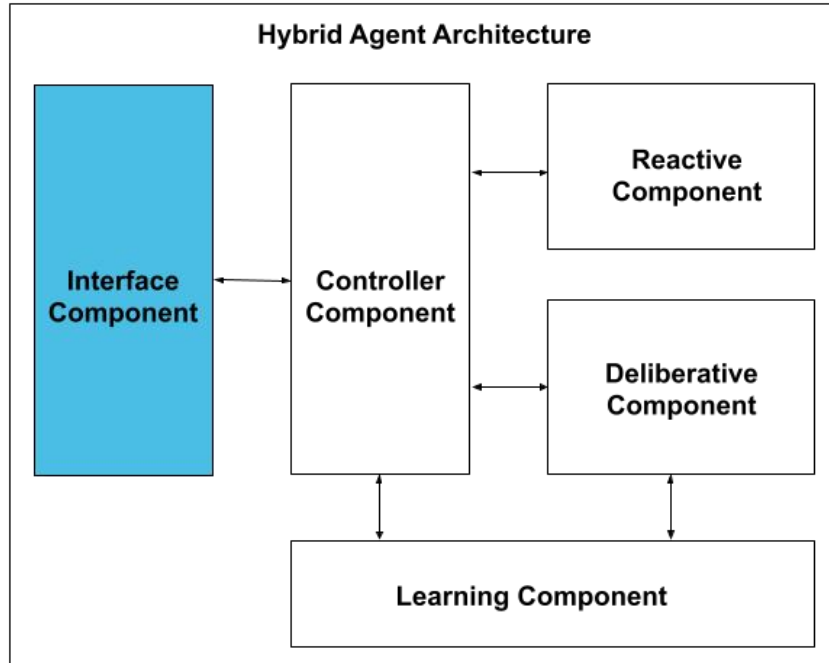
# Intelligent Software Web Agents

## Existing Standards



# Intelligent Software Web Agents

## Existing Standards

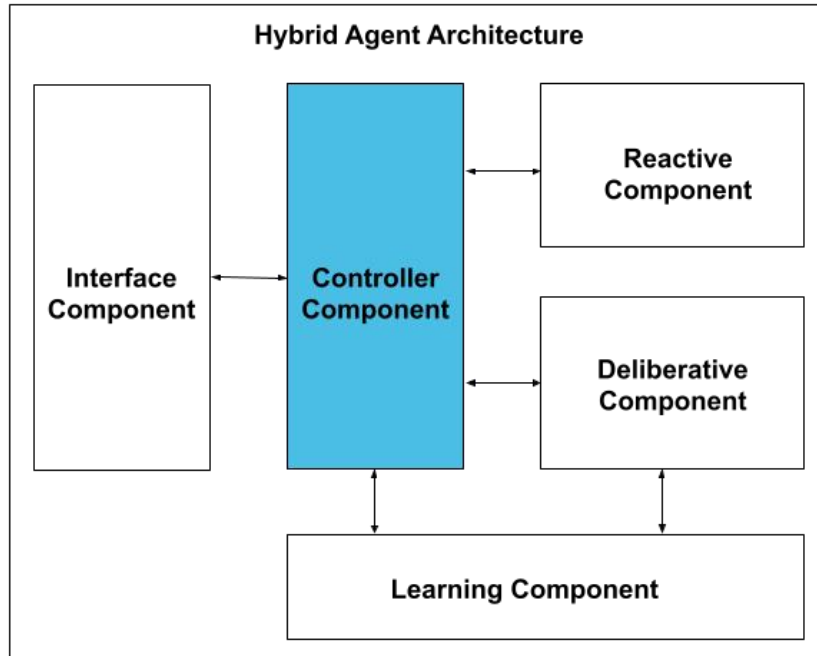


### Interface

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

# Intelligent Software Web Agents

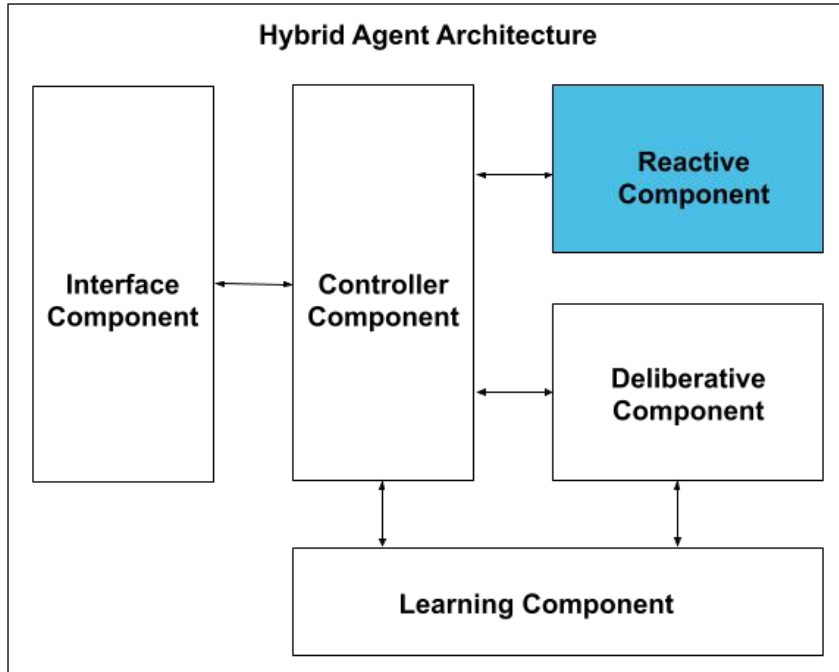
## Existing Standards



- **Interface**
  - Web Ontology Language for Web Services (OWL-S)
  - Web Service Modeling Language (WSML)
  - Agent Communication Language (ACL)
- **Controller**
  - Linked Data Platform (LDP)
  - Foundation for Intelligent Physical Agents (FIPA)

# Intelligent Software Web Agents

## Existing Standards

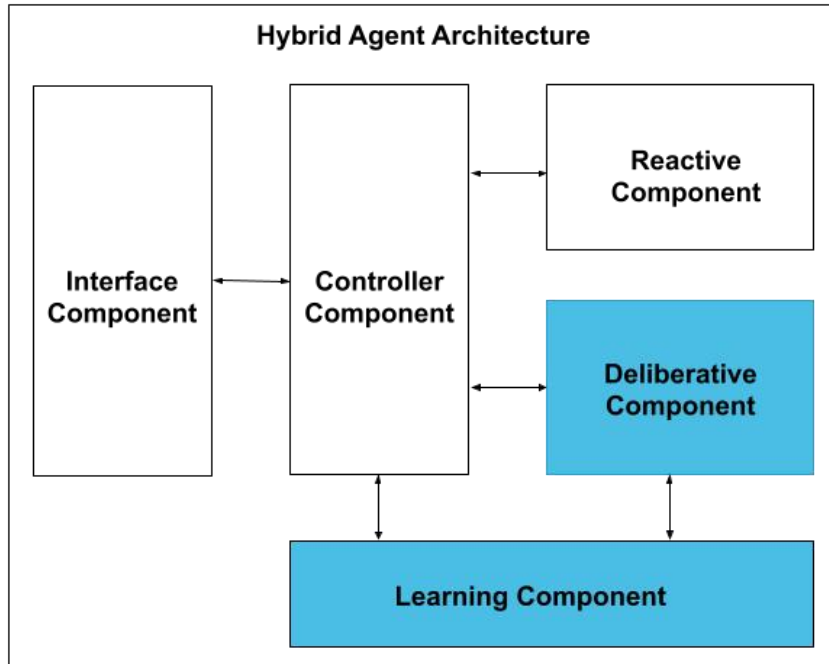


- **Interface**
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  - Linked Data Platform (LDP)
  - Foundation for Intelligent Physical Agents (FIPA)
- **Reactive**
  - Production Rule Representation (PRR)
  - Rule Markup Language (RML)
  - W3C Semantic Web Rule Language (SWRL)



# Intelligent Software Web Agents

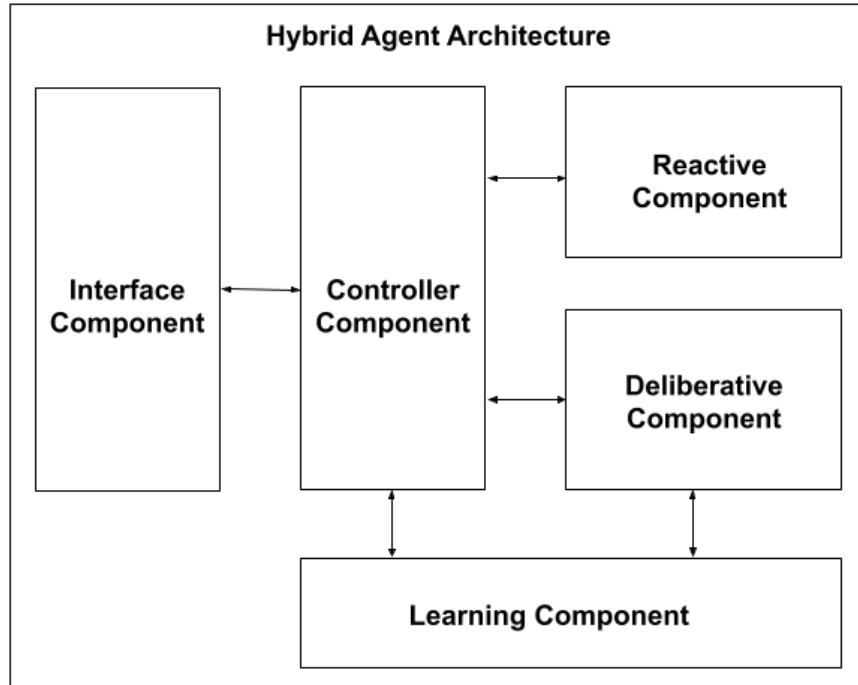
## Existing Standards



- **Interface**
  - Web Ontology Language for Web Services (OWL-S)
  - Web Service Modeling Language (WSML)
  - Agent Communication Language (ACL)
- **Controller**
  - Linked Data Platform (LDP)
  - Foundation for Intelligent Physical Agents (FIPA)
- **Reactive**
  - Production Rule Representation (PRR)
  - Rule Markup Language (RML)
  - W3C Semantic Web Rule Language (SWRL)
- **Deliberative & Learning**
  - Resource Description Language Schema (RDFS)
  - Web Ontology Language (OWL)

# Intelligent Software Web Agents

## Existing Standards



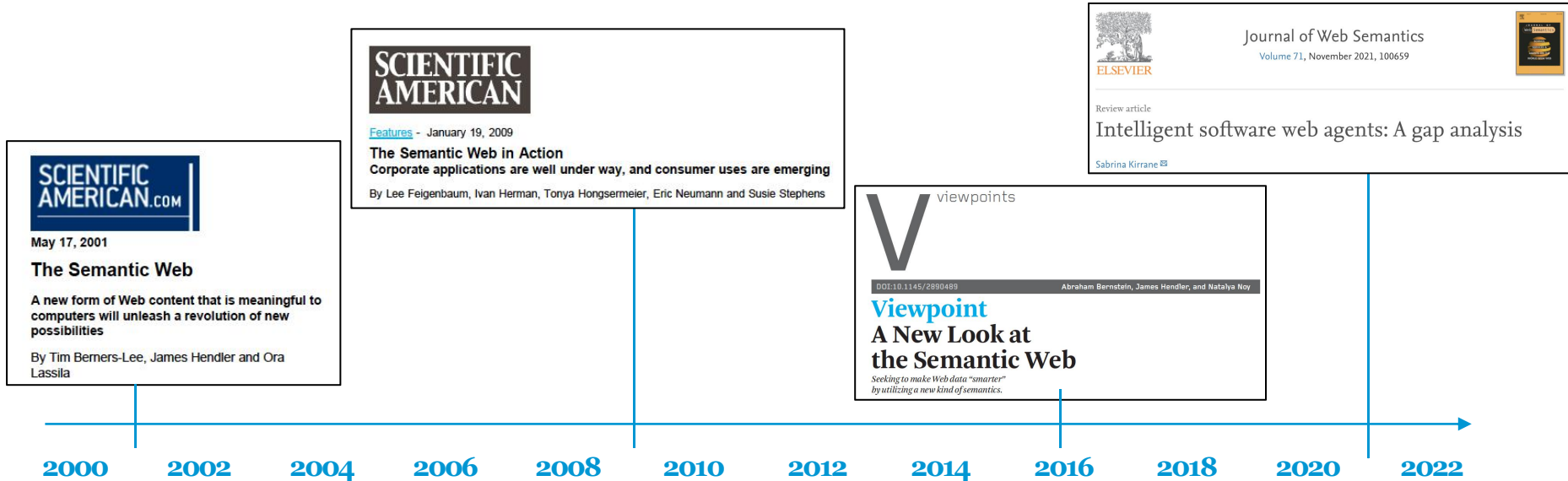
How well do these standards fit together?

How well do they cater for intelligent web agent requirements?

What are the standardisation gaps?

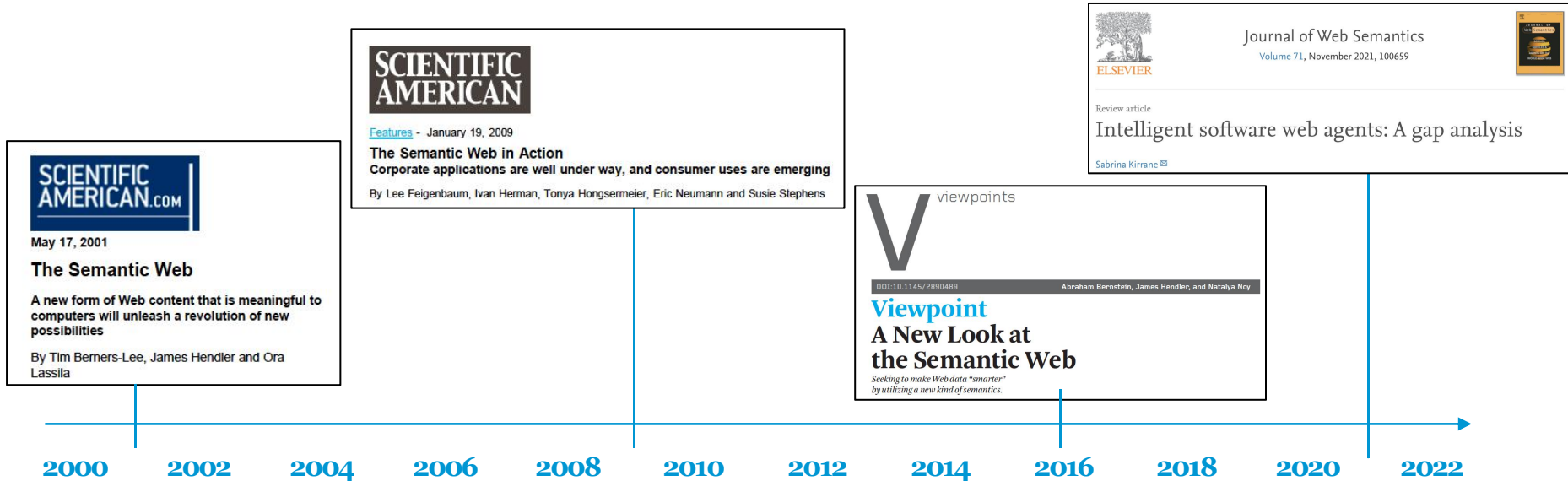
# Intelligent Software Web Agents

## The Statuo Quo



# Intelligent Software Web Agents

## The Statuo Quo



- Benevolence, responsibility, and mobility requirements yet to be realised

# From Policies to Norms: The Toolbox

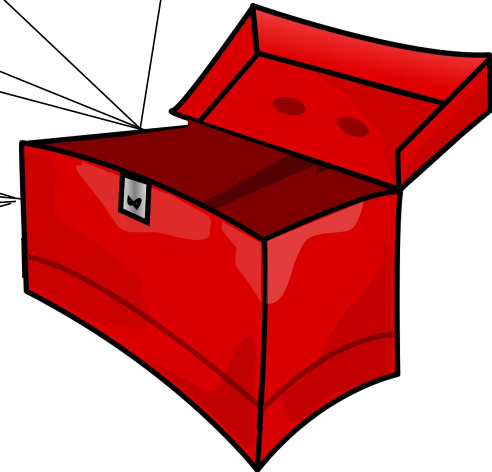
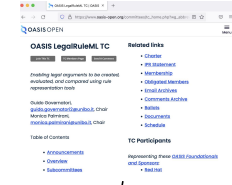
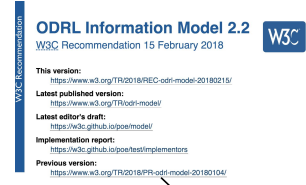
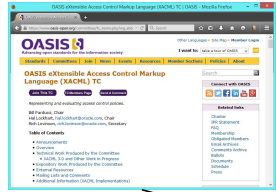
# From Policies to Norms: The Toolbox

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

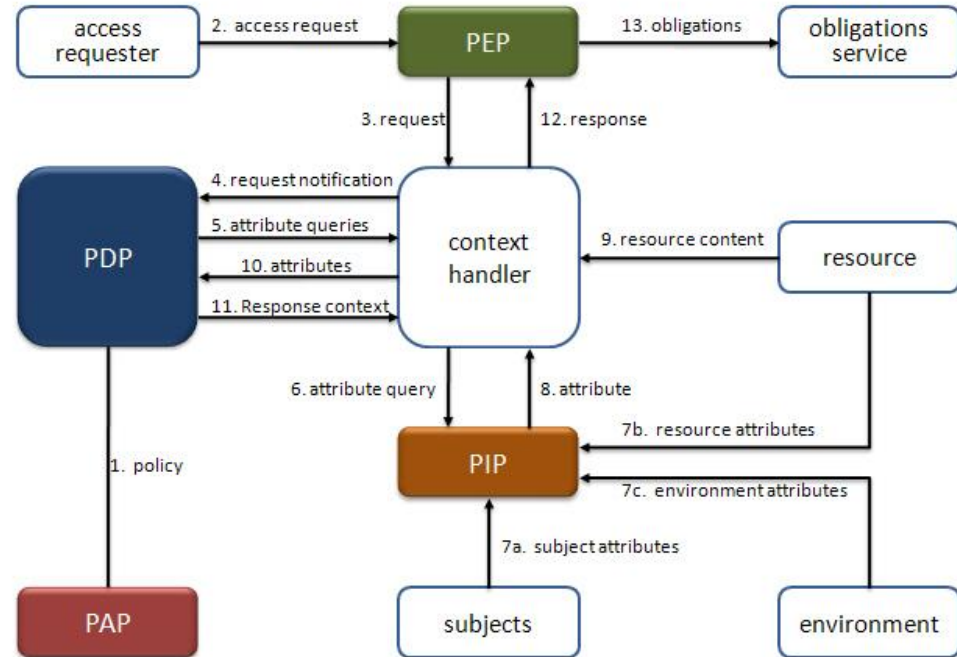
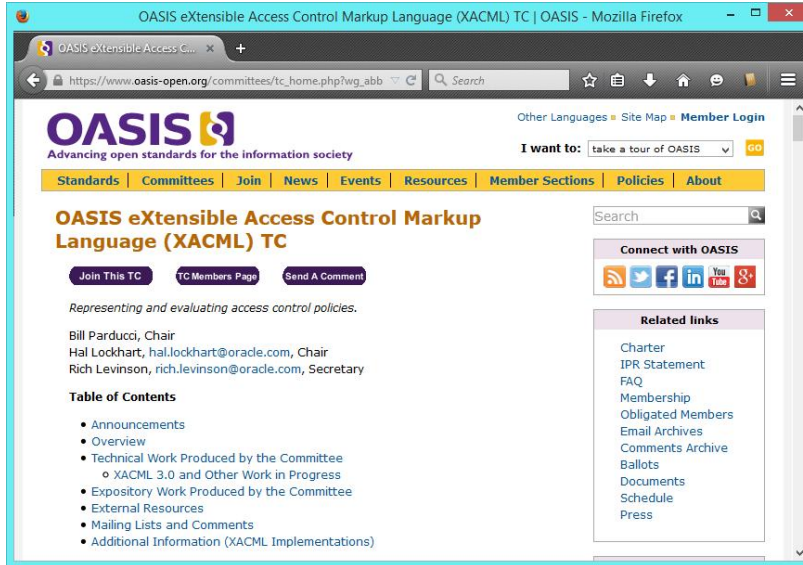
**PROTUNE: A Rule-based  
PROvisional TrUst NEgotiation Framework**  
P. A. Bonatti, J. L. De Coi, D. Olmedilla, L. Sauro

**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



# From Policies to Norms: The Toolbox

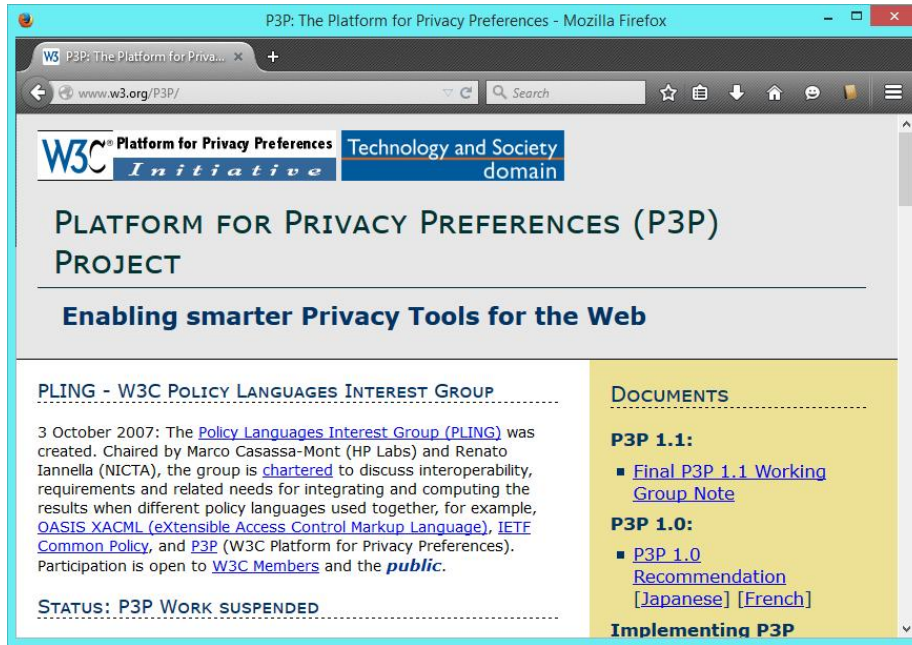
## Access Control



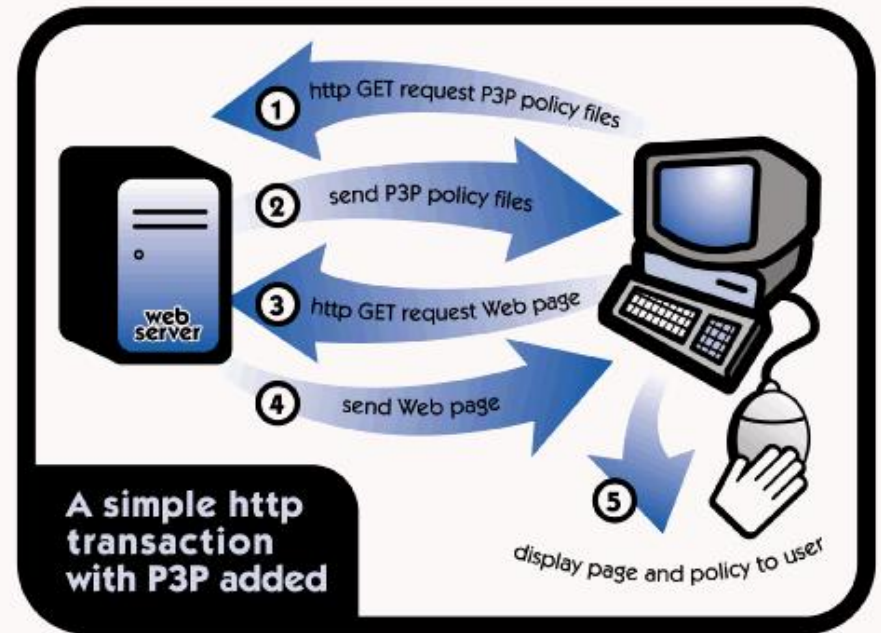
Policy Administration Point (PAP)  
Policy Enforcement Point (PEP)  
Policy Decision Point (PDP)  
Policy Information Point (PIP)

# From Policies to Norms: The Toolbox

## Privacy Preferences



The screenshot shows a Mozilla Firefox browser window with the address bar displaying 'www.w3.org/P3P/'. The page title is 'P3P: The Platform for Privacy Preferences - Mozilla Firefox'. The main content area features the W3C logo and the text 'Platform for Privacy Preferences Technology and Society Initiative domain'. Below this, the heading reads 'PLATFORM FOR PRIVACY PREFERENCES (P3P) PROJECT' followed by the subtitle 'Enabling smarter Privacy Tools for the Web'. A section titled 'PLING - W3C POLICY LANGUAGES INTEREST GROUP' contains a paragraph of text dated 3 October 2007, discussing the creation of the PLING group and its focus on policy languages. A 'DOCUMENTS' section lists 'P3P 1.1:' with a link to 'Final P3P 1.1 Working Group Note' and 'P3P 1.0:' with links to 'P3P 1.0 Recommendation [Japanese] [French]'. At the bottom, it says 'Implementing P3P'.





# From Policies to Norms: The Toolbox

## Licensing

## 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:

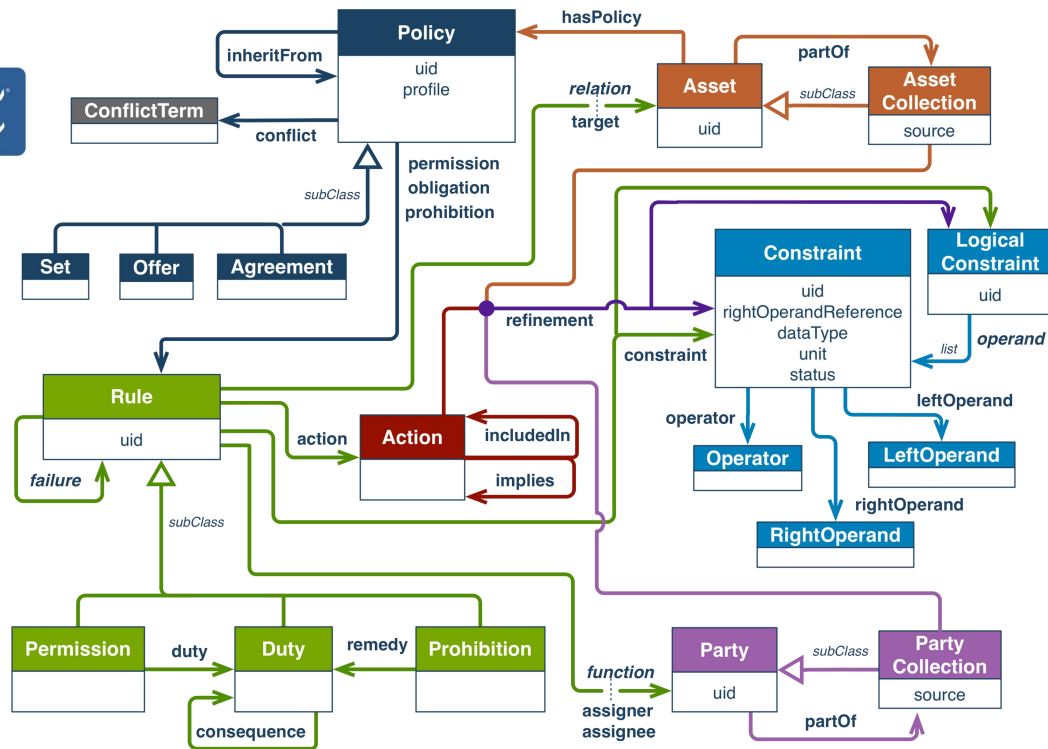
<https://w3c.github.io/poe/model/>

### Implementation report:

<https://w3c.github.io/poe/test/implementors>

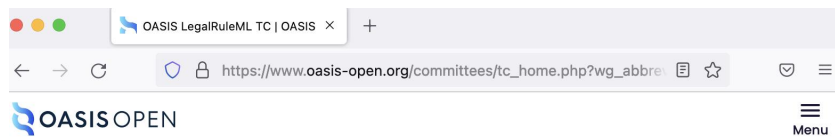
### Previous version:

<https://www.w3.org/TR/2018/PR-odrl-model-20180104/>



# From Policies to Norms: The Toolbox

## Norms



### OASIS LegalRuleML TC

[Join This TC](#) [TC Members Page](#) [Send A Comment](#)

Enabling legal arguments to be created, evaluated, and compared using rule representation tools

Guido Governatori,  
[guido.governatori2@unibo.it](mailto:guido.governatori2@unibo.it), Chair  
Monica Palmirani,  
[monica.palmirani@unibo.it](mailto:monica.palmirani@unibo.it), Chair

Table of Contents

- [Announcements](#)
- [Overview](#)
- [Subcommittees](#)

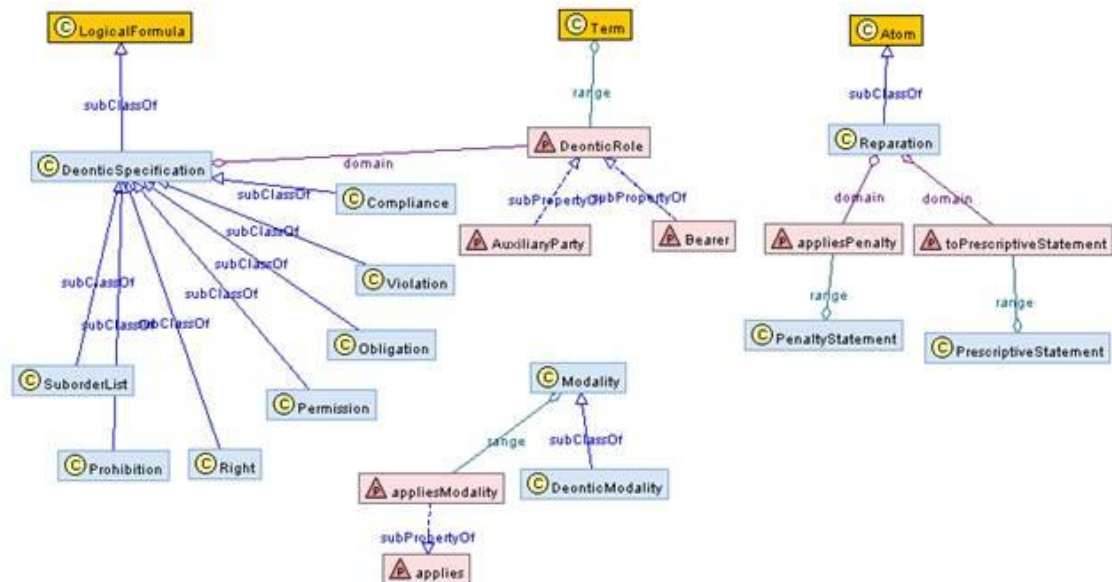
### Related links

- [Charter](#)
- [IPR Statement](#)
- [Membership](#)
- [Obligated Members](#)
- [Email Archives](#)
- [Comments Archive](#)
- [Ballots](#)
- [Documents](#)
- [Schedule](#)

### TC Participants

Representing these [OASIS Foundational](#) and [Sponsors](#):

- [Red Hat](#)



# 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  
University of Maryland Baltimore County  
Baltimore, MD 21250  
{lkagal1, finin, joshi}@cs.umbc.edu

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.

### **PROTUNE: A Rule-based PROvisional TrUst NEgotiation Framework**

P. A. Bonatti, J. L. De Coi, D. Olmedilla, L. Sauro

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

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

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

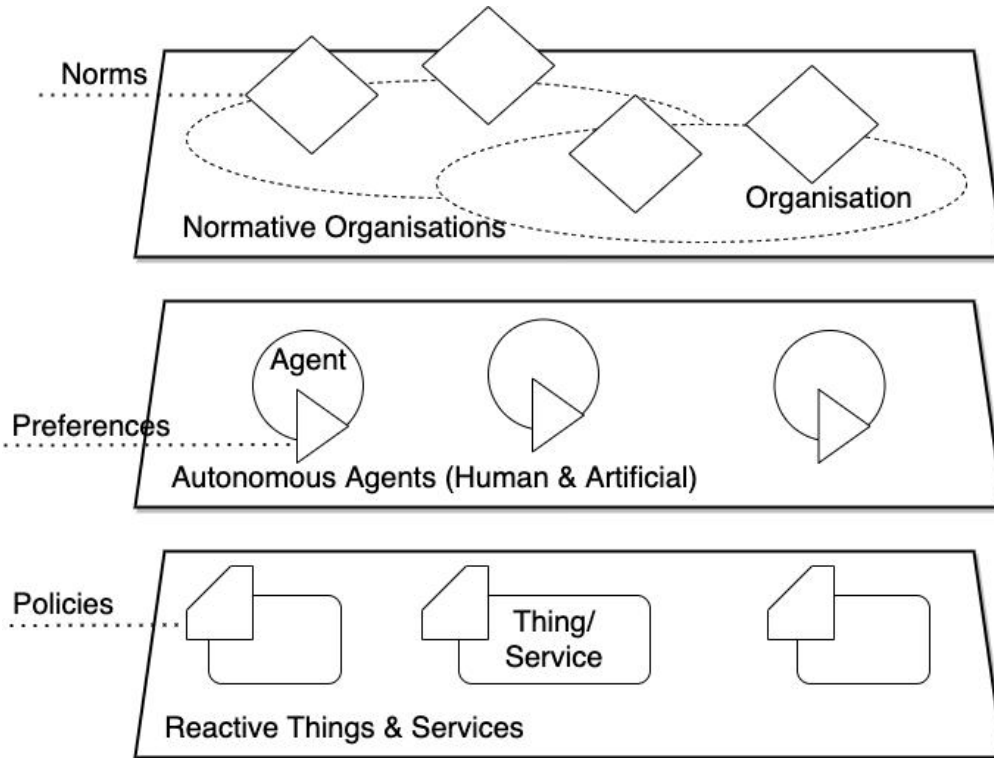
### **FIPA — towards a standard for software agents**

**P D O'Brien and R C Nicol**

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

# From Policies to Norms: Governance

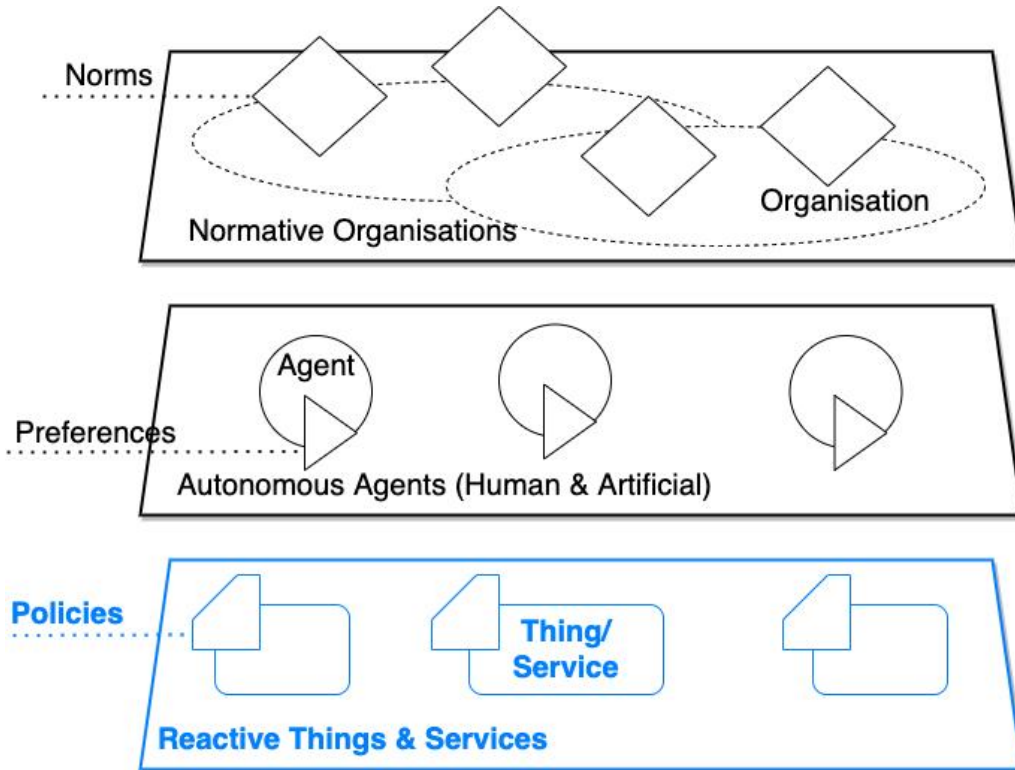
## Reactive Things and Services



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

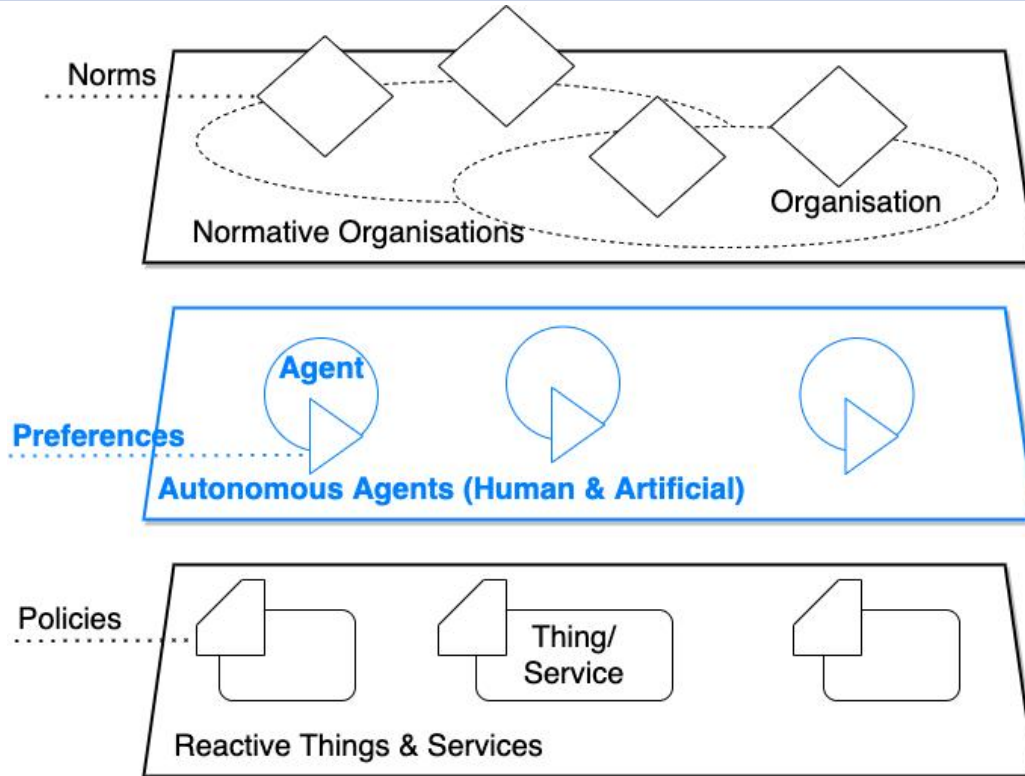
# From Policies to Norms: Governance

## Reactive Things and Services



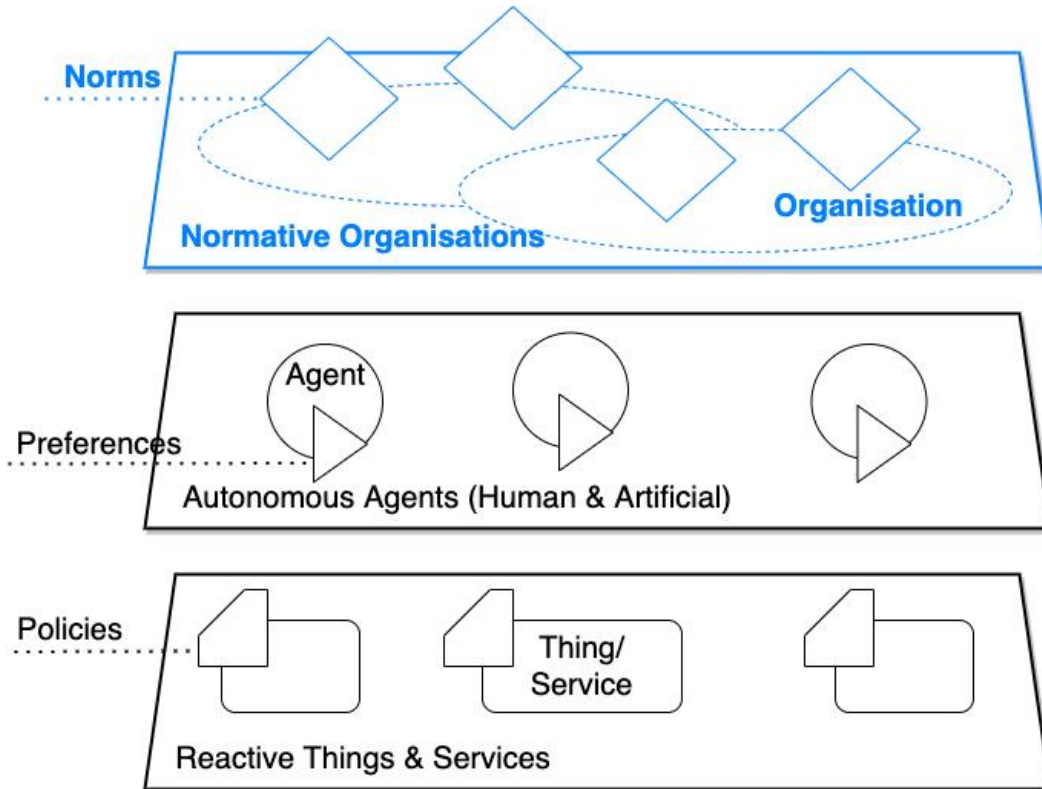
- Non-autonomous entities in the environment
- Adopt the same notions of the Web of Things (WOTs) architecture
- Policies state who can **access things/services** and **constraints on their usage** (if any)

# 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

# From Policies to Norms: Governance Normative Organisations



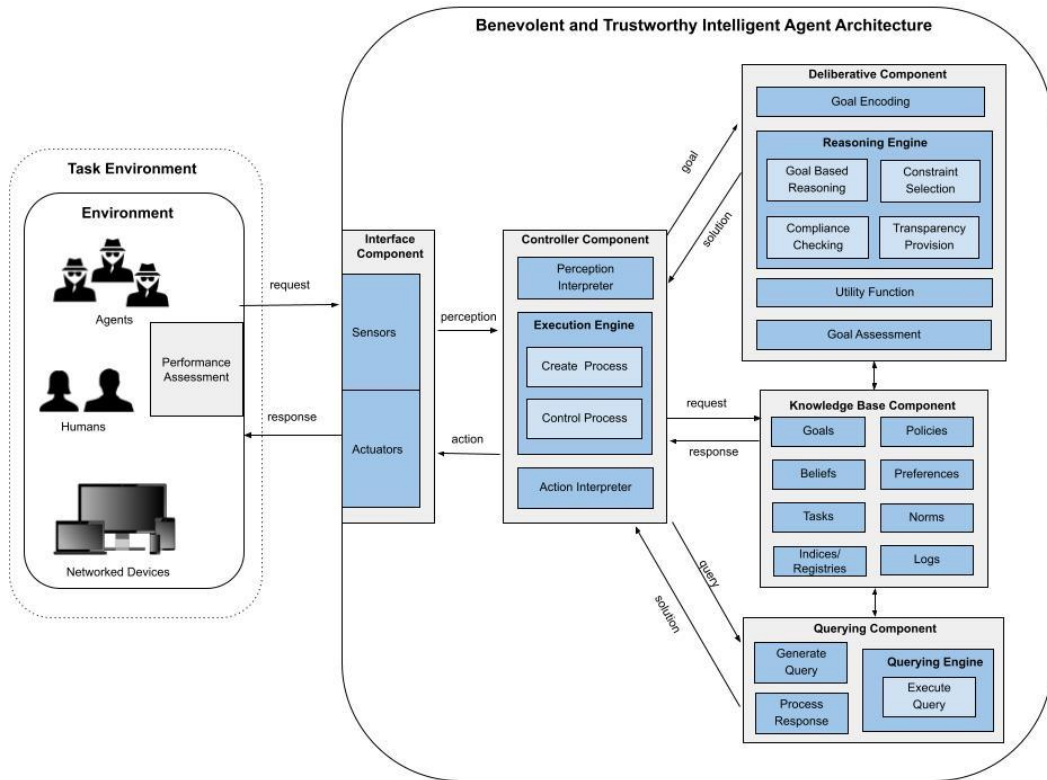
- Organisations are first-class abstractions that group agents and their governance (i.e., norms)
- Logical grouping of agents with a particular purpose, and the provision of legal, regulatory and social norms that may possibly span multiple organisations
- Organisations are entirely virtual and passive (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



# Towards Benevolent and Trustworthy Intelligent Software Web Agents

# Towards Benevolent and Trustworthy Agents

## Agent Policy, Preference, Norm Architecture



- The execution engine creates and executes processes
- Added policies, preferences, norms, etc.. to the knowledge base
- Querying component facilitates information and transparency

# Towards Benevolent and Trustworthy Agents

## Agent Policy, Preference, Norm Language

### TABLE OF CONTENTS

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  - 1.1 Aims of the Specification
  - 1.2 Conformance
2. Conceptual framework for Governing Agents on the Web
  - 2.1 Reactive Things and Services Layer
  - 2.2 Autonomous Agents Layer
  - 2.3 Normative Organisations Layer
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  - 3.1 Access Policies
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  - 7.3 Norms
    - 7.3.1 Personal Data Processing Consent
    - 7.3.2 Autonomous Agents Information Sharing
    - 7.3.3 Collaborating Agents Information Sharing
- A. **References**
  - A.1 Normative references

### § 6. PPN Grammar

The complete syntax of the proposed policy, norm, and preference language is specified using the following Backus–Naur form (BNF) grammar:

```
AccessPolicy := 'ObjectUnionOf' '(' ' BasicAccessRule { BasicAccessRule } * ')' | BasicAcc
UsagePolicy := 'ObjectUnionOf' '(' ' UsageRule { UsageRule } * ')' | UsageRule
Norms := 'ObjectUnionOf' '(' ' NormRule { NormRule } * ')' | NormRule
Preferences := 'ObjectUnionOf' '(' ' PreferenceRule { PreferenceRule } * ')' | Preference

UsageRule := ObjectUnionOf '(' ' BasicUsageRule { BasicUsageRule } * ')' | BasicUsageRule
NormRule := ObjectUnionOf '(' ' BasicNormRule { BasicNormRule } * ')' | BasicNormRule
PreferenceRule := ObjectUnionOf '(' ' BasicPreferenceRule { BasicPreferenceRule } * ')'

BasicUsageRule := 'ObjectIntersectionOf' '(' ' BasicUsageRule DeonticUsage ')'
BasicNormRule := 'ObjectIntersectionOf' '(' ' BasicNormRule DeonticNorm ')'
BasicPreferenceRule := 'ObjectIntersectionOf' '(' ' BasicPreferenceRule DefeasiblePref

DeonticAccess := 'ObjectSomeValueFrom' '(' ' rdf:type' ObjectUnionOf '(' ' ucp:Permission
DeonticUsage := 'ObjectSomeValueFrom' '(' ' rdf:type' ObjectUnionOf '(' ' ucp:Permission'
DeonticNorm := 'ObjectSomeValueFrom' '(' ' rdf:type' ObjectUnionOf '(' ' ucp:Permission'
DefeasiblePreference := 'ObjectSomeValueFrom' '(' ' rdf:type' ObjectUnionOf '(' ' ucp:We

BasicAccessRule := 'ObjectIntersectionOf' '(' ' Subject Object Action ')'
BasicUsageRule := 'ObjectIntersectionOf' '(' ' Subject Object Action Purpose ')'
BasicNormRule := 'ObjectIntersectionOf' '(' ' Subject Object Action Purpose ')'
BasicPreferenceRule := 'ObjectIntersectionOf' '(' ' Subject Relation Object Purpose ')'

Subject := 'ObjectSomeValueFrom' '(' ' ucp:hasSubject' SubjectExpression ')'
Object := 'ObjectSomeValueFrom' '(' ' ucp:hasObject' ObjectExpression ')'
Action := 'ObjectSomeValueFrom' '(' ' ucp:hasAction' ActionExpression ')'
Purpose := 'ObjectSomeValueFrom' '(' ' ucp:hasPurpose' PurposeExpression ')'
Relation := 'ObjectSomeValueFrom' '(' ' ucp:hasRelation' RelationExpression ')'

SubjectExpression := 'ucp:Subject' | SubjectVocabExpression
ObjectExpression := 'ucp:Object' | ObjectVocabExpression
ActionExpression := 'ucp:Action' | ActionVocabExpression
PurposeExpression := 'ucp:Purpose' | PurposeVocabExpression
RelationExpression := 'ucp:Relation' | RelationVocabExpression

SubjectVocabExpression := as specified in ppnv
ObjectVocabExpression := as specified in ppnv
ActionVocabExpression := as specified in ppnv
PurposeVocabExpression := as specified in ppnv
RelationVocabExpression := as specified in ppnv
```

### EXAMPLE 4: Preferences

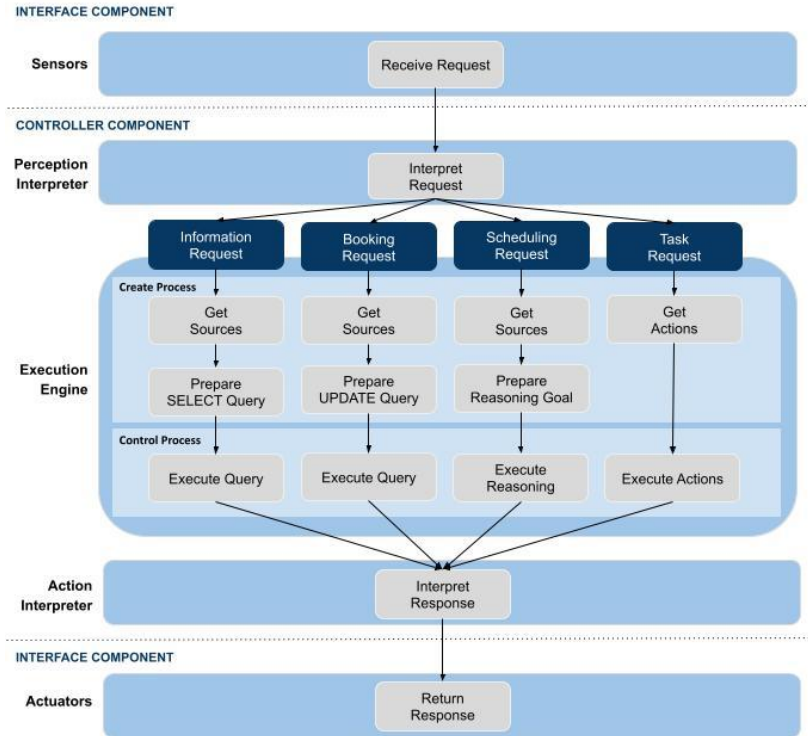
```
Ontology(
  ClassAssertion( ppn:Preference ppnv:MedicalProviderCoveredByInsurancePreference )
  ClassAssertion( ppn:StrongPreference
    ppnv:MedicalProviderCoveredByInsurancePreferenceRule )
  ClassAssertion( ppn:MedicalProviderCoveredByInsurance
    ppnv:MedicalProviderCoveredByInsurancePreferenceRule )

  EquivalentClasses(
    ppnv:MedicalProviderCoveredByInsurance
    ObjectIntersectionOf(
      ObjectSomeValuesFrom( ppn:hasSubject ppnv:PhysiotherapyProvider )
      ObjectSomeValuesFrom( ppn:hasRelation ppnv:hasContractWith )
      ObjectSomeValuesFrom( ppn:hasObject ppnv:AlicesInsuranceProvider )
    )
  )

  ObjectPropertyAssertion( ppn:hasDefeasibleRule
    ppnv:MedicalProviderCoveredByInsurancePreference
    ppnv:MedicalProviderCoveredByInsurancePreferenceRule )
)
```

# Towards Benevolent and Trustworthy Agents

## Handling Requests and Responses



- Develop a stand and extensible mechanism for handling requests and responses
  - Information request -> SELECT query
  - Booking request -> Update query
  - Scheduling request -> Reasoning goal
  - Task -> Set of actions

# Towards Benevolent and Trustworthy Agents



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<https://www.dagstuhl.de/23081>

**February 19 – 24 , 2023, Dagstuhl Seminar 23081**

## Agents on the Web

### Organizers

Olivier Boissier (Ecole des Mines – St. Etienne, FR)

Andrei Ciortea (Universität St. Gallen, CH)

Andreas Harth (Fraunhofer IIS – Nürnberg, DE)

Alessandro Ricci (Università di Bologna, IT)

### Seminar Calendar

All Events

Dagstuhl Seminars

Dagstuhl Perspectives

GI-Dagstuhl Seminars

Summer Schools

Events

Research Guests

Expenses

Planning your visit

## Seminars

NO.172

### [Postponed] Policy Modelling and Reasoning

📍 [Shonan Village Center](#)

🕒 February 28 - March 3, 2022 (Check-in: February 27, 2022)

## Organizers

Marina De Vos

University of Bath, UK

Sabrina Kirrane

University of Economics and Business, Austria

Julian Padget

University of Bath, UK

Ken Satoh

National Institute of Informatics, Japan

# Challenges & Opportunities

# 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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Institute for Information Systems & New Media  
Welthandelsplatz 1, 1020 Vienna, Austria

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[www.sabrinakirrane.com](http://www.sabrinakirrane.com)  
[@SabrinaKirrane](https://twitter.com/SabrinaKirrane)



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