

# Following the Rules: From Policies to Norms



Sabrina Kirrane

Distributed Knowledge Graphs Cost Action  
Meeting October 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

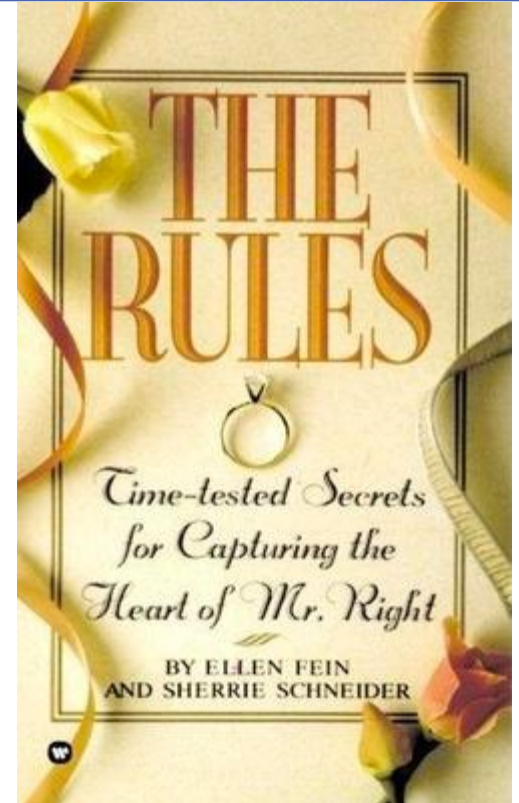
**The Rules:** Time-tested Secrets for Capturing the Heart of Mr. Right is a self-help book by Ellen Fein and Sherrie Schneider, originally published in 1995.

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

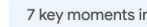


4 key moments in this video



**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  AND  HAVE FUN!

# Following 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

# Following the Rules

## Knowing the Rules and the Consequences



# Following the Rules

## Knowing the Rules and the Consequences



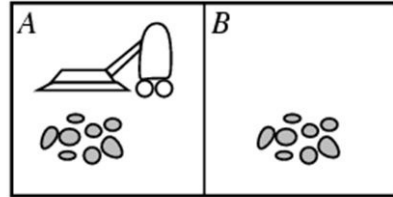
<https://www.pinterest.co.uk/pin/nuns-reverse-reverse--67202219424555999/>

# 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*

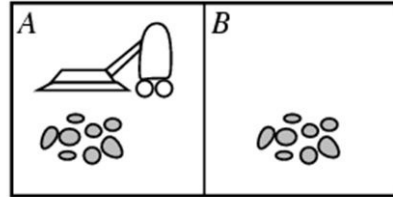


# Following the Rules

## Programming Rules

### Vacuum-cleaner world

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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**

16 of 914 results for "robot vacuum cleaner"

Sort by: Featured

Eligible for free delivery

Free Delivery by Amazon  
to 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.

apartment  
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

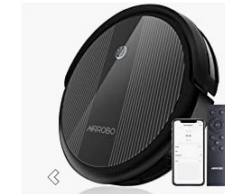
-33% €200.68 RRP: €301.51

✓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

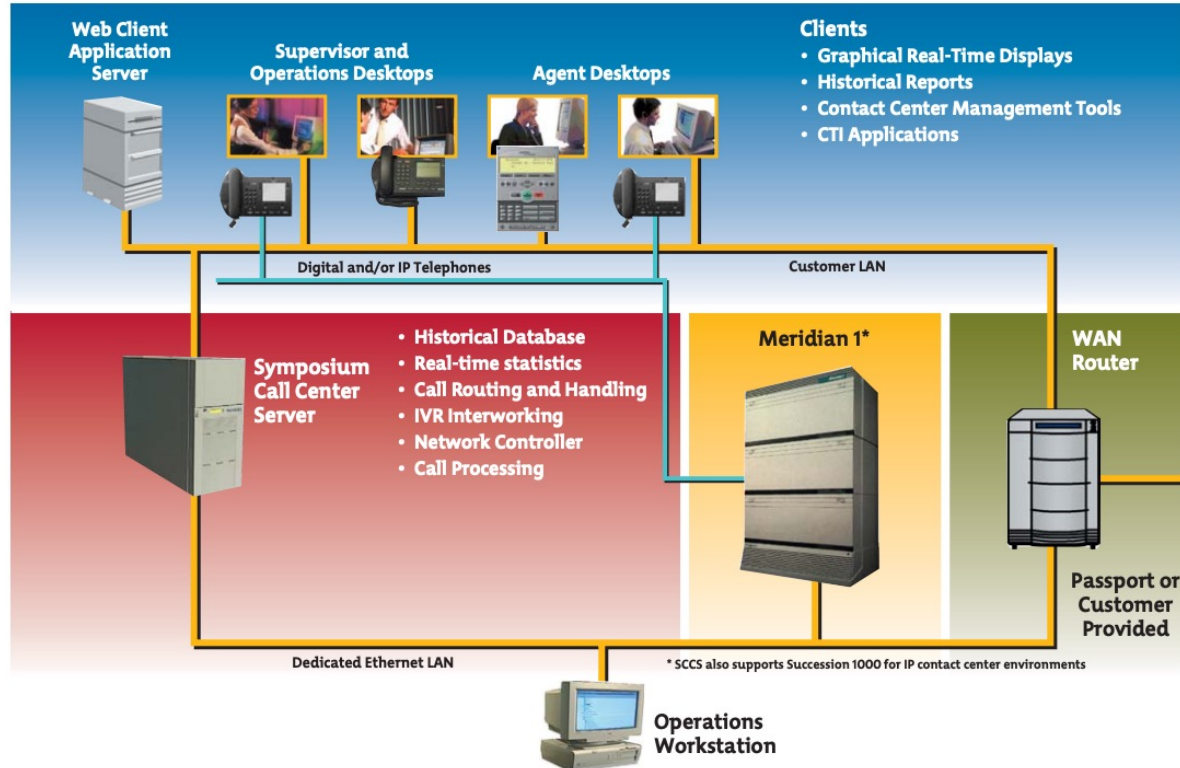
✓prime Get it Thursday, Aug 25

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 image displays a variety of business documents: eSales Invoice, eDespatch Advice, eSales Order, eCatalogue, Catalogue, Purchase Order, Receipt of Delivered Goods, and ePurchase Invoice. Each document is shown as a white card with a blue border, containing various fields and tables. The central focus is the Celtrino platform logo, which is a blue rounded square with a grid of white dots and a large black 'C' logo. Below the logo, the text 'celtrino platform' is written in a sans-serif font. A white cable is plugged into the bottom of the central blue square.

# Following the Rules

## Virtual Personal Assistants



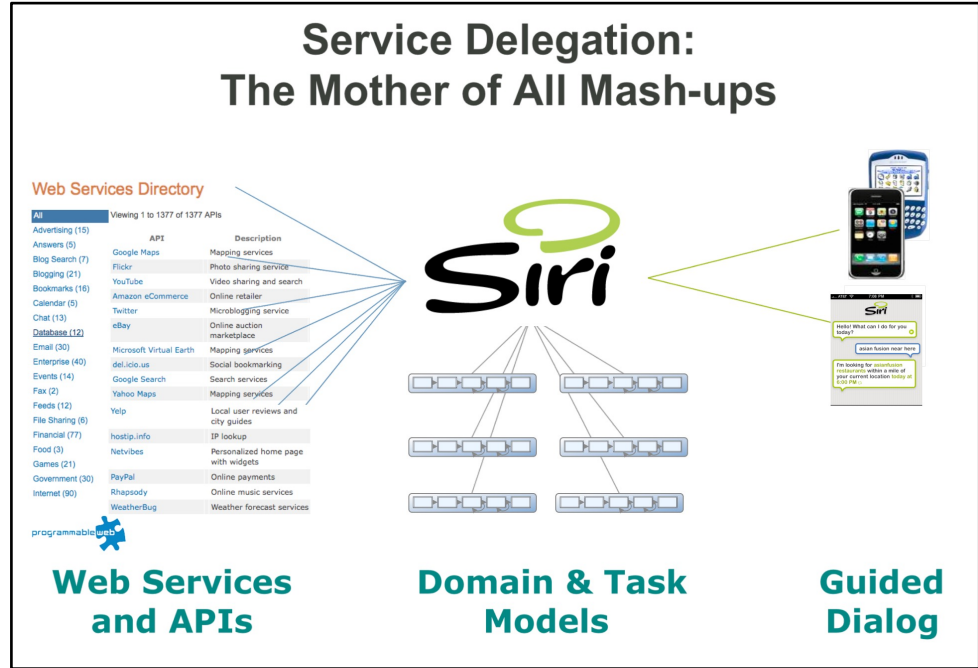
**Siri, a Virtual Personal Assistant**  
 Bringing Intelligence to the Interface

**Tom Gruber**  
 CTO & cofounder, Siri



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

### Service Delegation: The Mother of All Mash-ups



# *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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<sup>g</sup>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”



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**ScienceDirect**

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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



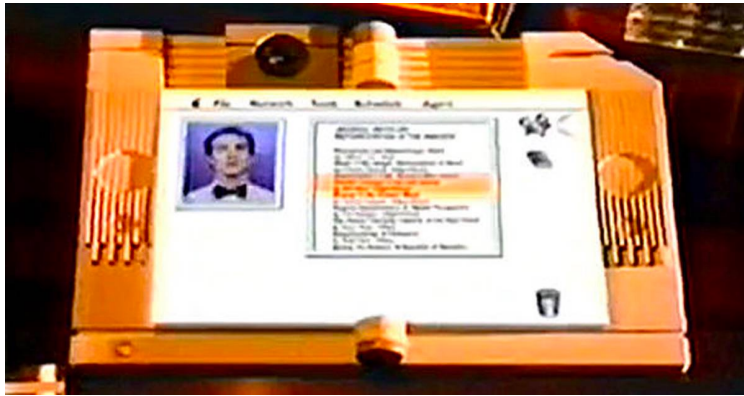
amazon alexa



Google Assistant

# Virtual Personal Assistants

## Apple Knowledge Navigator Video 1987



# Virtual Personal Assistants

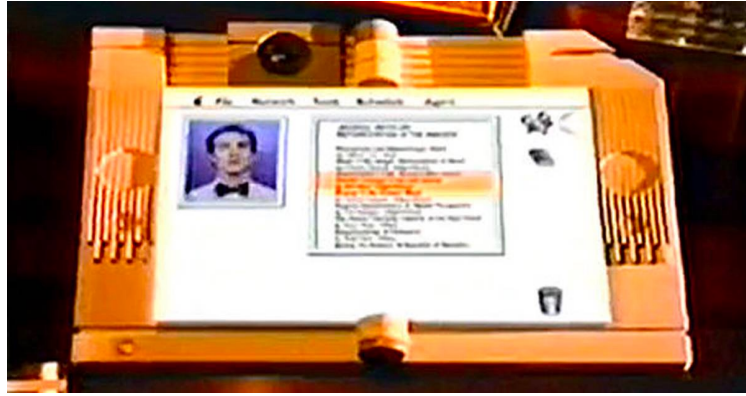
## Apple Knowledge Navigator Video 1987



- 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



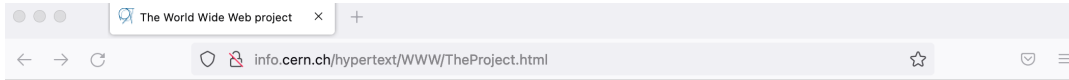
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# *Knowledge Navigation*



# 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

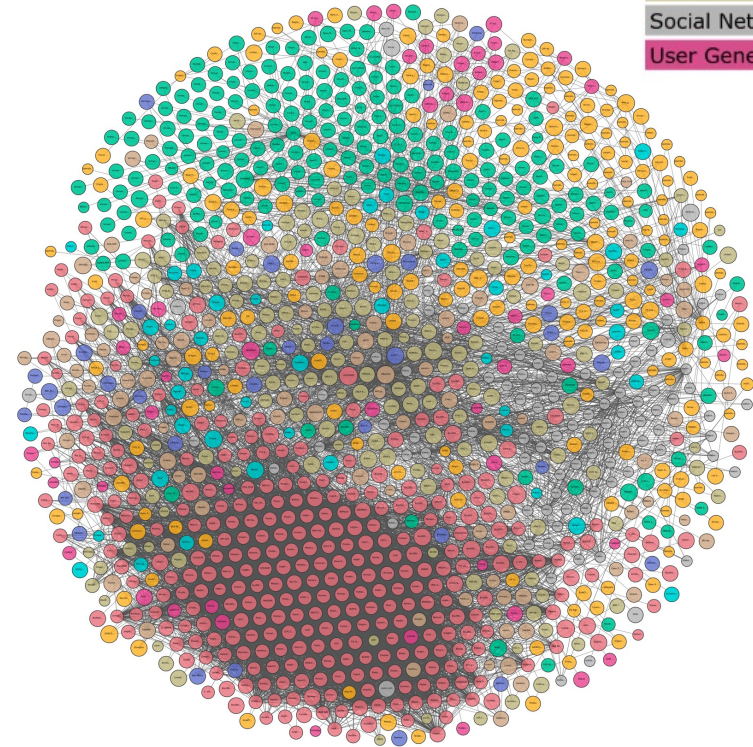
Linguistics

Media

Publications

Social Networking

User Generated



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

The Linked Open Data Cloud from lod-cloud.net

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

EQUIS ACCREDITED

AACSB ACCREDITED

ASSOCIATION OF AMBA ACCREDITED

# 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

Google Search

I'm Feeling Lucky

Google offered in: [Deutsch](#)

amazon.de Deliver to Austria

All

All Best Sellers Amazon Basics Today's Deals New Releases Customer Service Music Prime Video Prime Audible PC & Video Games

Control your TV with your voice  
"Alexa, show me comedies."  
firetvstick

Skyscanner

Help

English (UK) Austria EUR

Log in

Flights Hotels Car Hire

## Let the journey begin

Return  One way  Multi-city

From	To	Depart	Return	Cabin Class & Travellers
Vienna (VIE)	<a href="#">Country, city or airport</a>	24/08/2022	31/08/2022	1 adult, Economy

Add nearby airports

Add nearby airports

Direct flights only

Search flights →

Booking.com

EUR



List your property



Sabrina Kirrane  
Genius Level 2

Stays

Flights

Flight + Hotel

Car rentals

Attractions

Airport taxis

## Where to next, Sabrina?

Find exclusive Genius rewards in every corner of the world!

Where are you going?

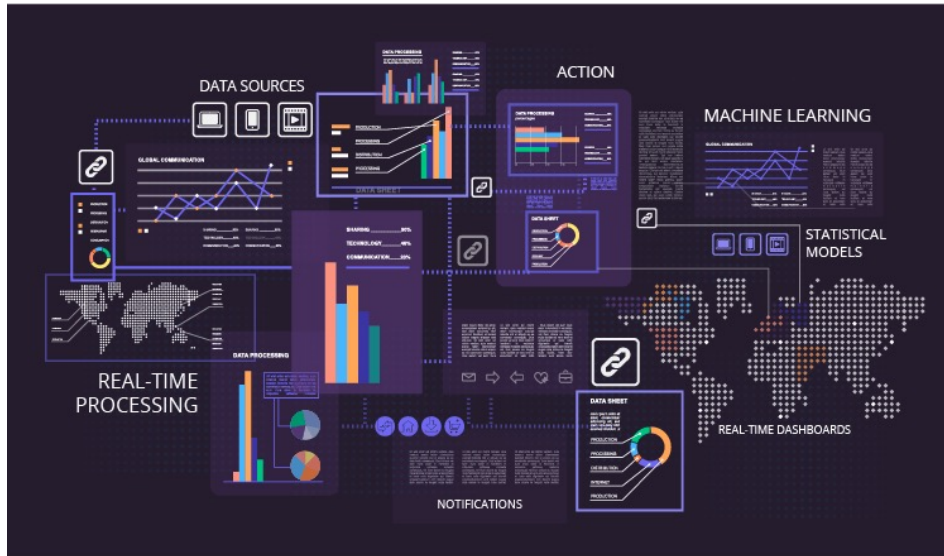
Check-in - Check-out

2 adults · 0 children · 1 room

Search

# Knowledge Navigation

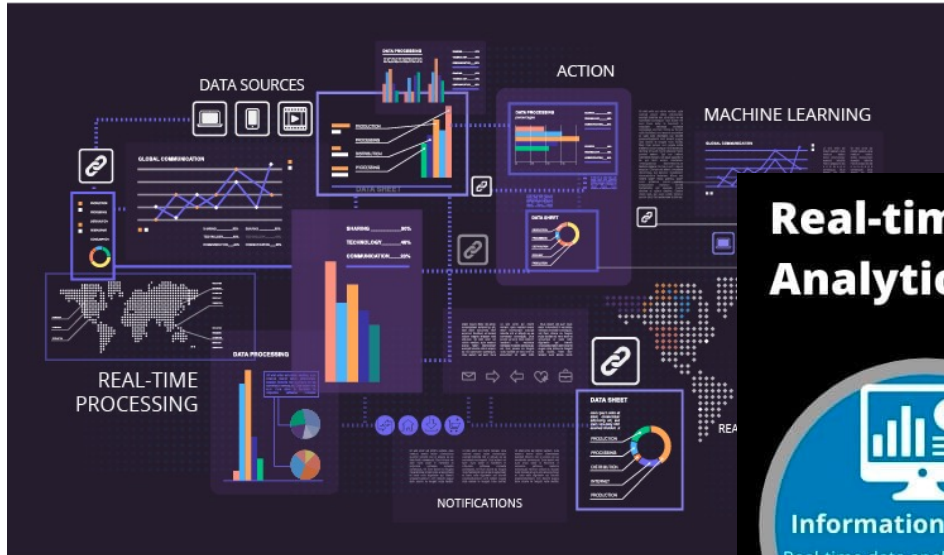
## Advances in Realtime Analytics



<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->

### 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.

**Fast & forward**

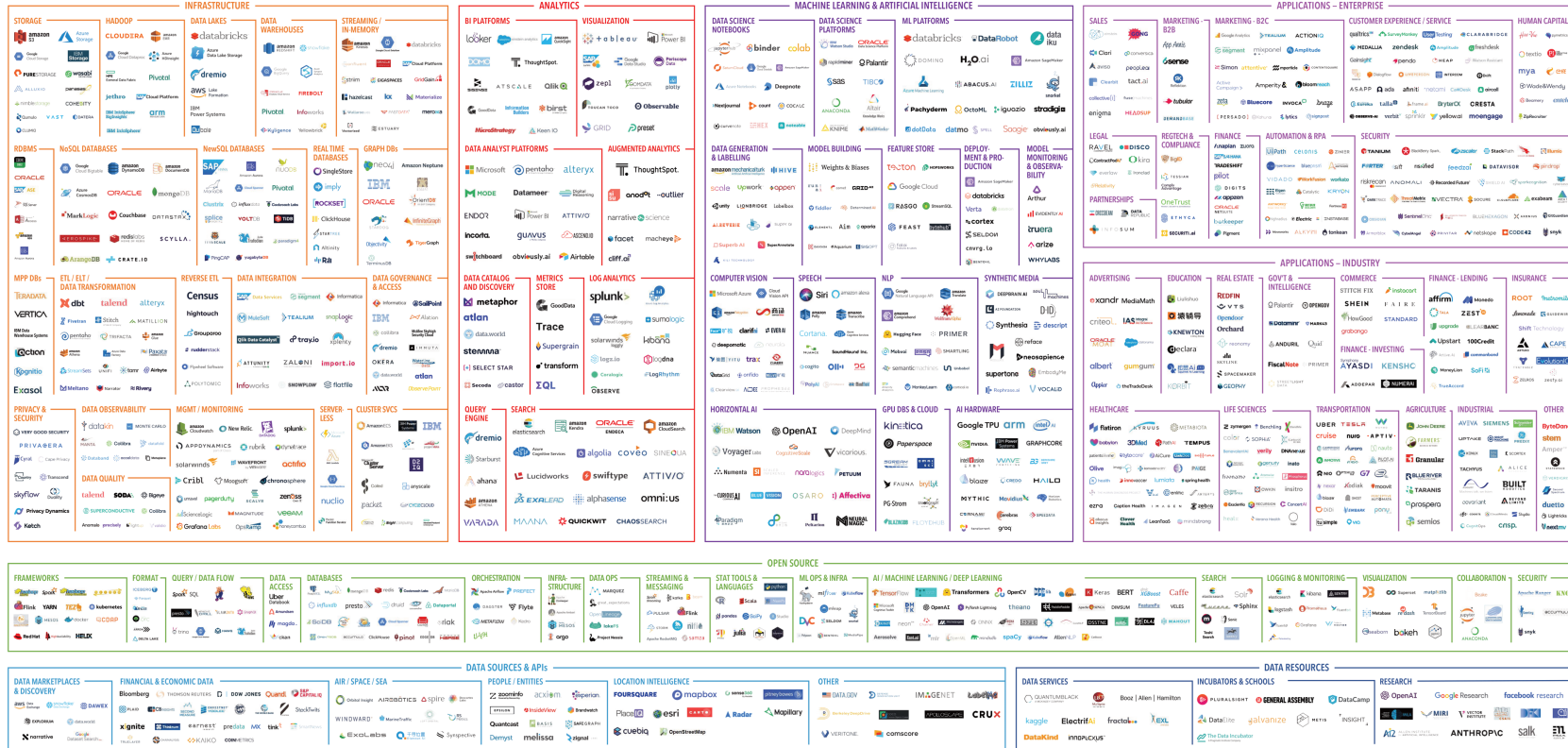
<https://fastnforward.blog/real-time-streaming-use-cases-how-does-it-help-business/>



# Knowledge Navigation

## Advances in Handling Large Amounts of Data

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





# 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 GDPR sets forth fines of up to 20 million euros, or 4% of 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>

<https://www.enforcementtracker.com/>

# 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

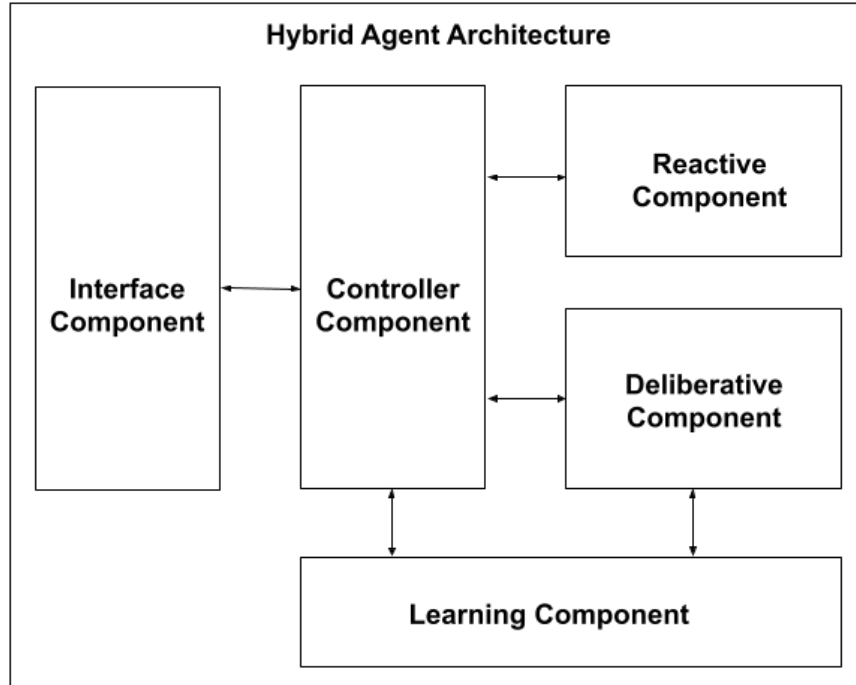
### Viewpoint A New Look at the Semantic Web

*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

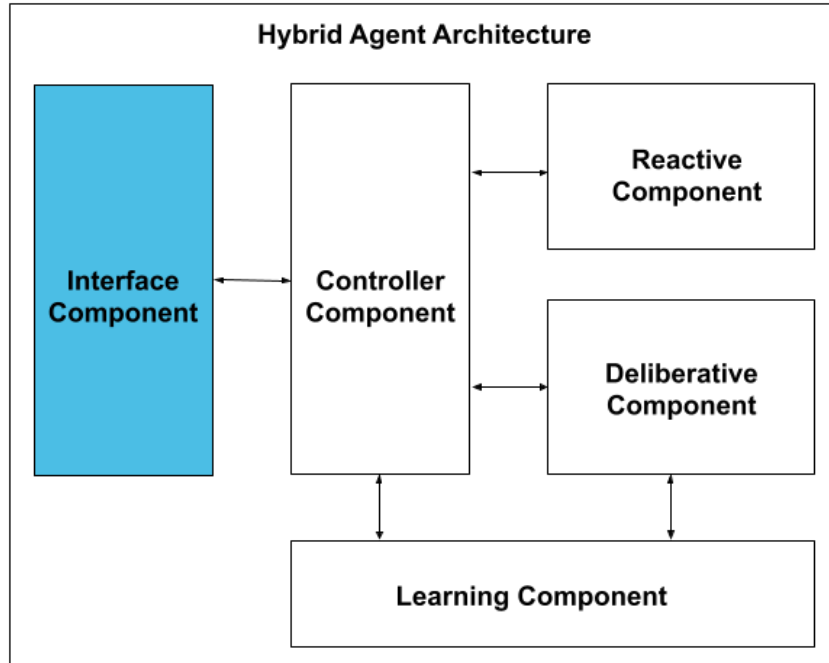
# Intelligent Software Web Agents

## Existing Standards



# Intelligent Software Web Agents

## Existing Standards

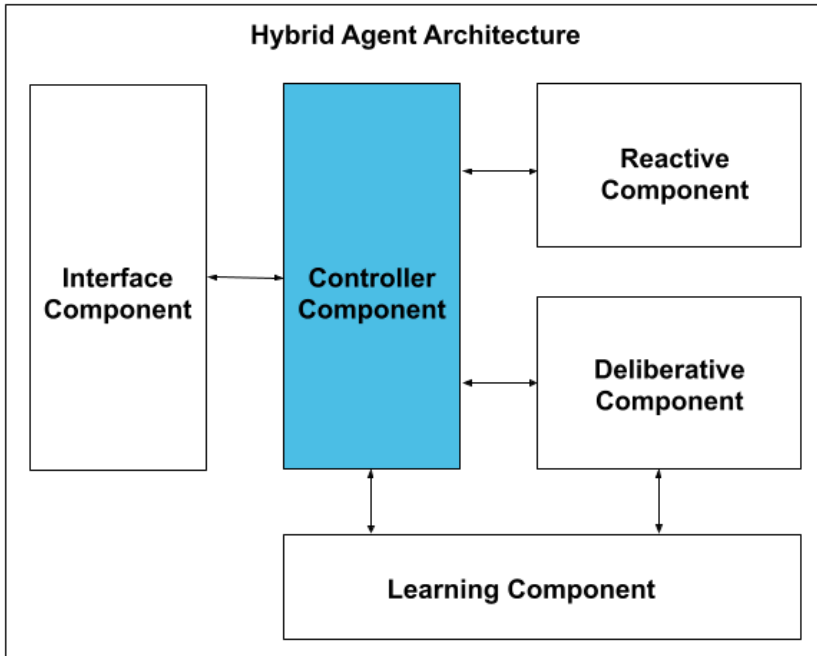


### Interface

- 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)
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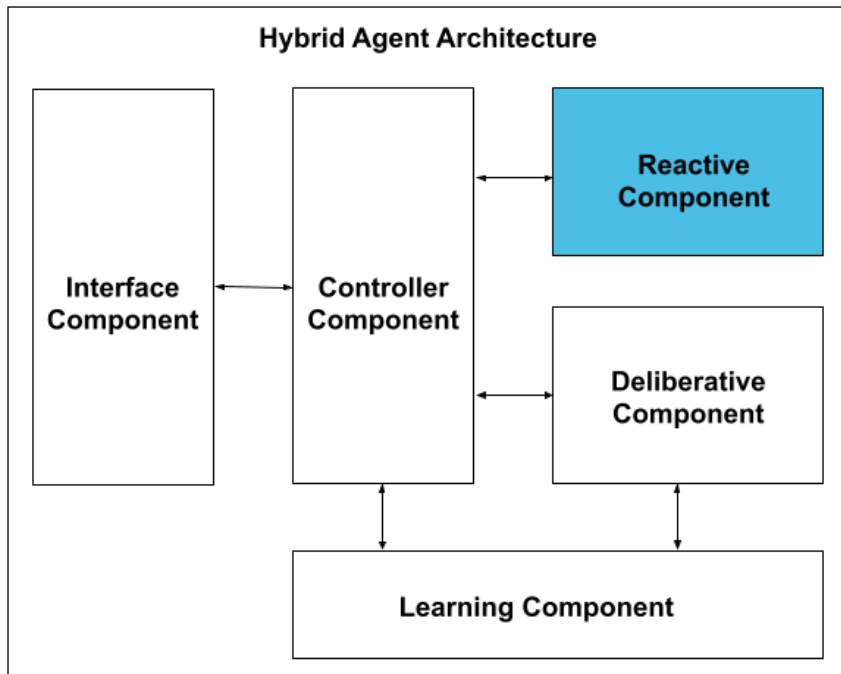
### Controller

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



# Intelligent Software Web Agents

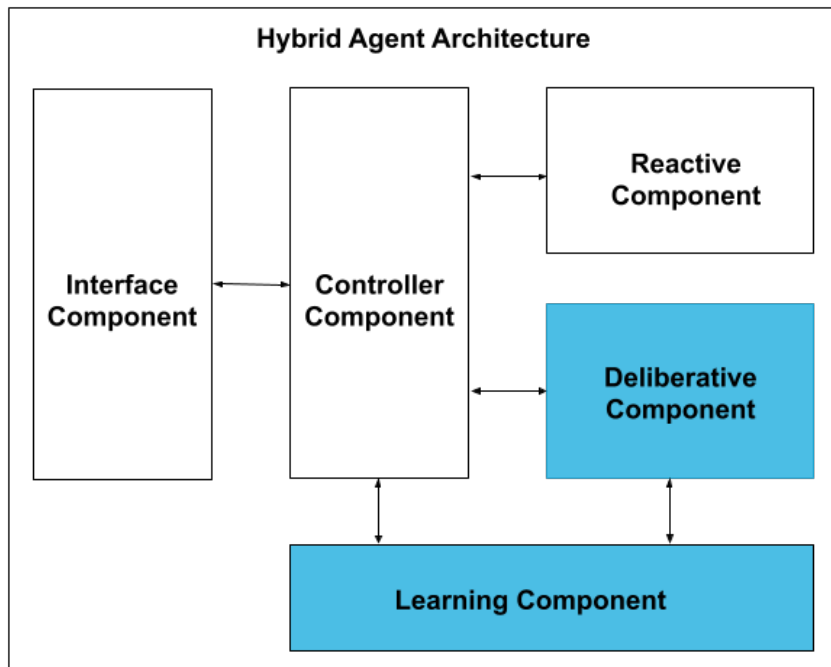
## Existing Standards



- **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)
  - ...

# Intelligent Software Web Agents

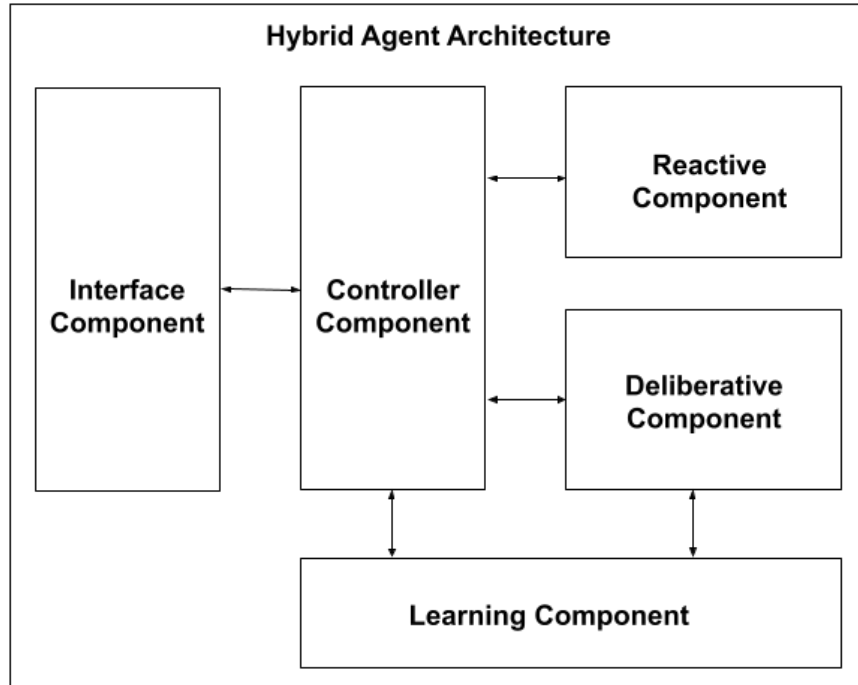
## Existing Standards



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



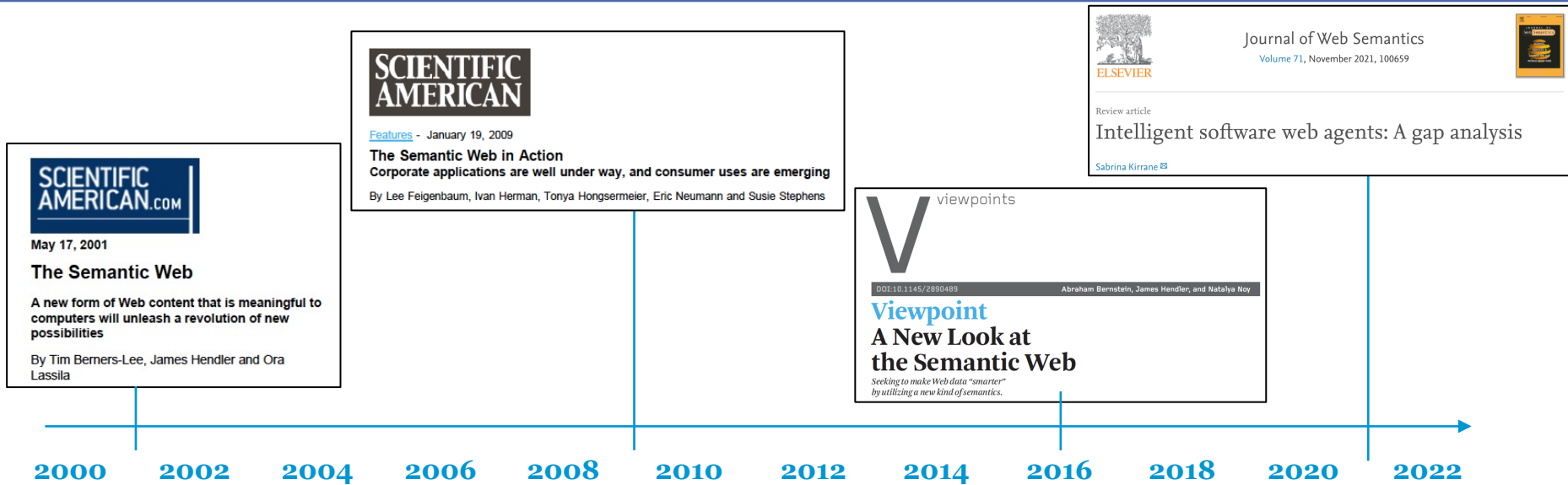
How well do these standards fit together?

How well do they cater for intelligent web agent requirements?

What are the standardisation gaps?

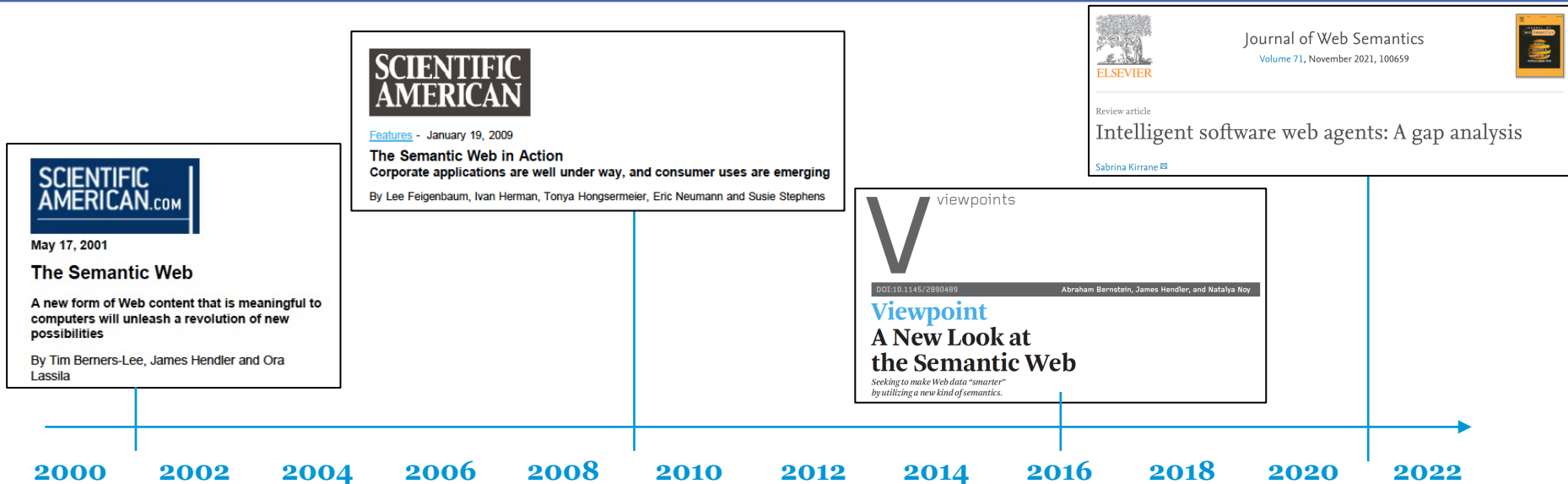
# Intelligent Software Web Agents

## The Statuo Quo



# Intelligent Software Web Agents

## The Statuo Quo



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

# ***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*

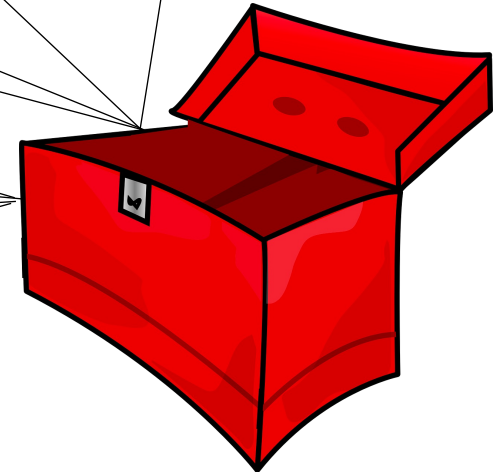
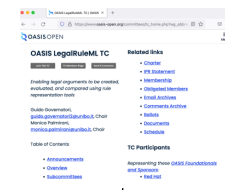
**A Policy Language for a Pervasive Computing Environment\***

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



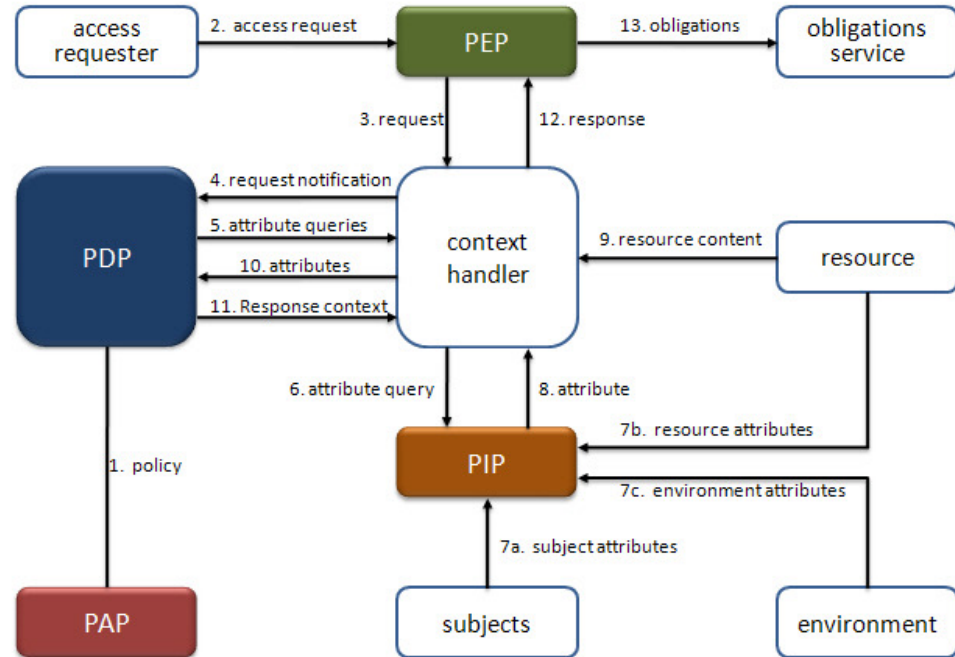
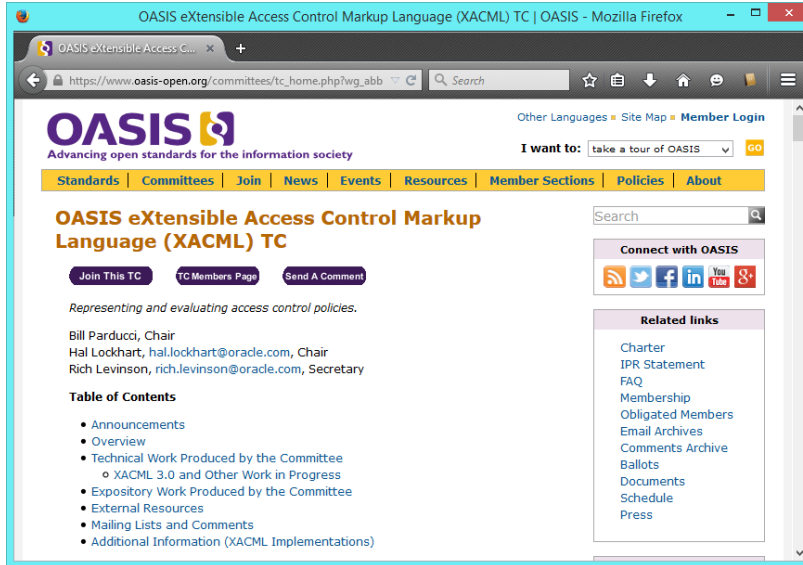
**ODRL Information Model 2.2**  
W3C Recommendation 15 February 2018

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/odrl-model/>  
Implementation report:  
<https://w3c.github.io/odrl-test/implementors>  
Previous version:  
<https://www.w3.org/TR/2011/PR-odrl-model-20110910/>



# From Policies to Norms: The Toolbox

## Access Control

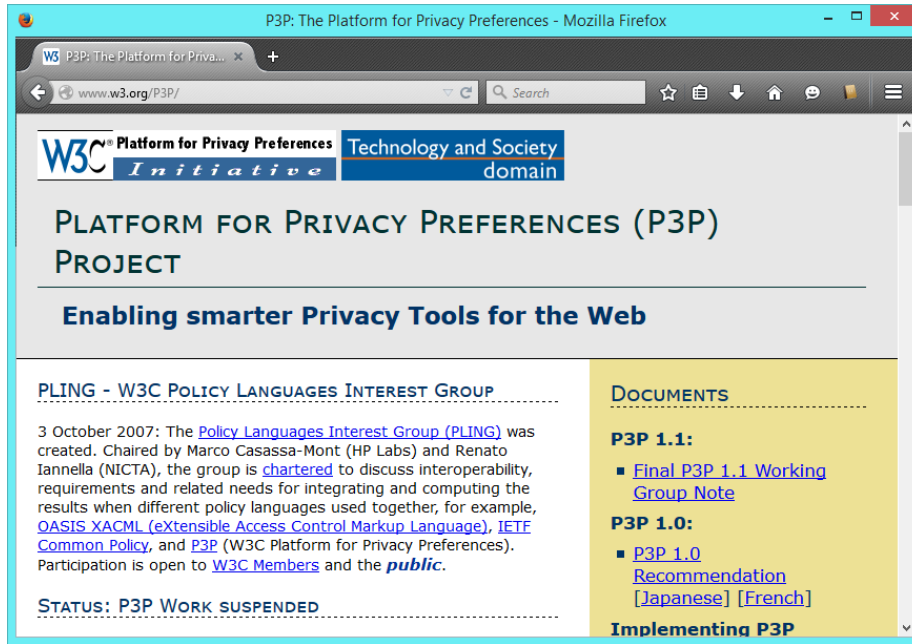


Policy Administration Point (PAP)  
 Policy Enforcement Point (PEP)  
 Policy Decision Point (PDP)  
 Policy Information Point (PIP)

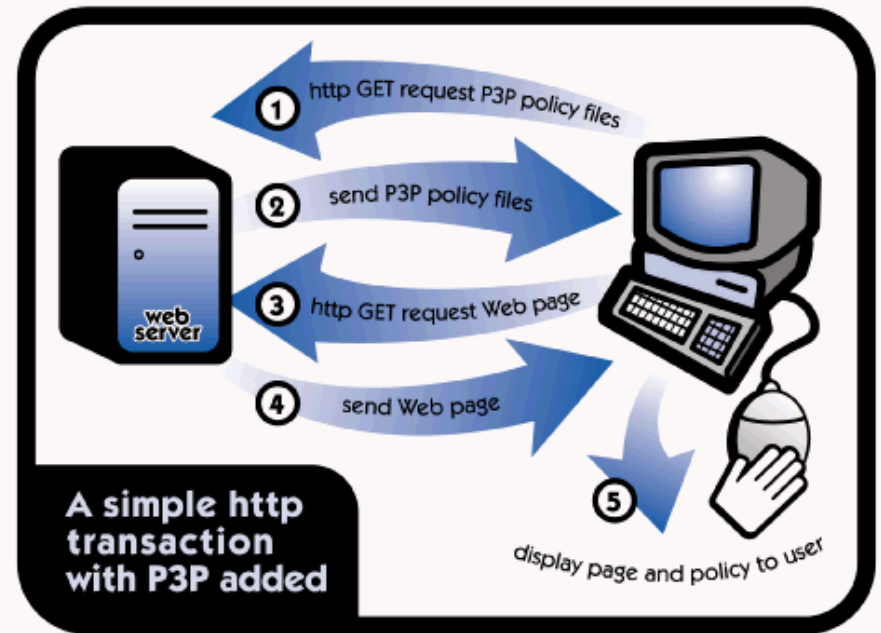


# From Policies to Norms: The Toolbox

## Privacy Preferences



The screenshot shows a Mozilla Firefox browser window with the address bar at [www.w3.org/P3P/](http://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 (P3P) PROJECT" and "Enabling smarter Privacy Tools for the Web". Below this, there is a section for "PLING - W3C POLICY LANGUAGES INTEREST GROUP" with a paragraph of text and a "STATUS: P3P WORK SUSPENDED" note. To the right, there is a "DOCUMENTS" section listing "P3P 1.1:" with links to "Final P3P 1.1 Working Group Note" and "P3P 1.0:" with links to "P3P 1.0 Recommendation" in Japanese and French, and a link to "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:

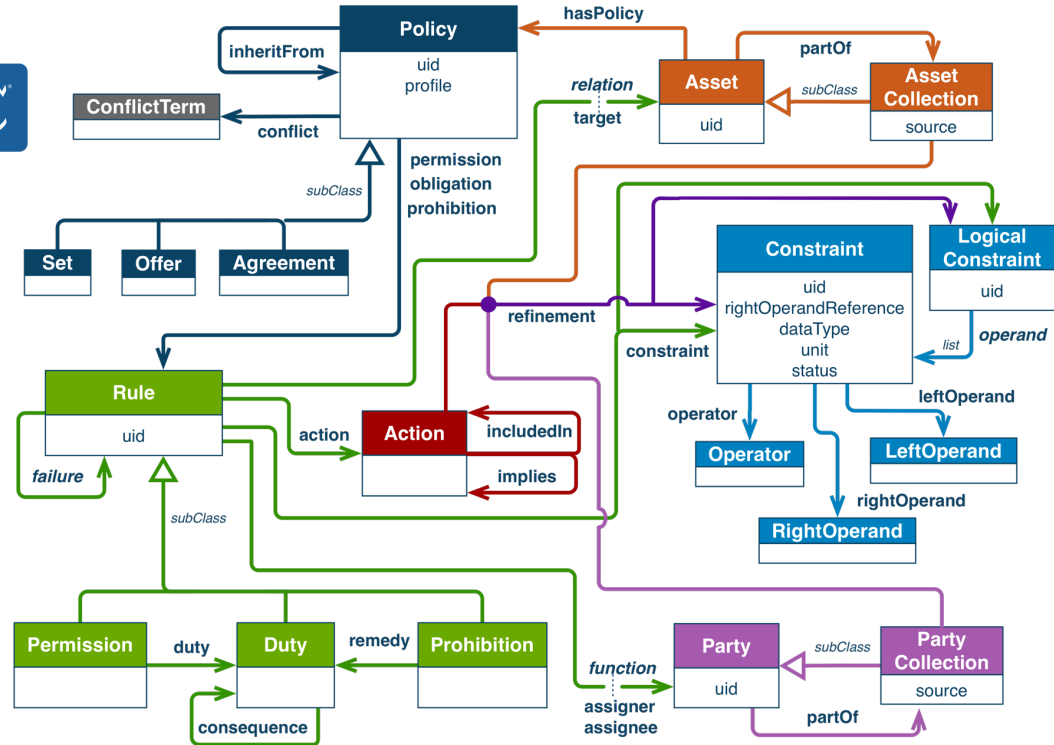
<https://w3c.github.io/poe/model/>

### Implementation report:

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

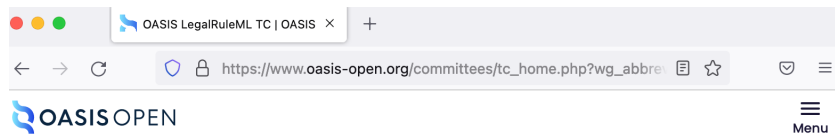
### Previous version:

<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](#)
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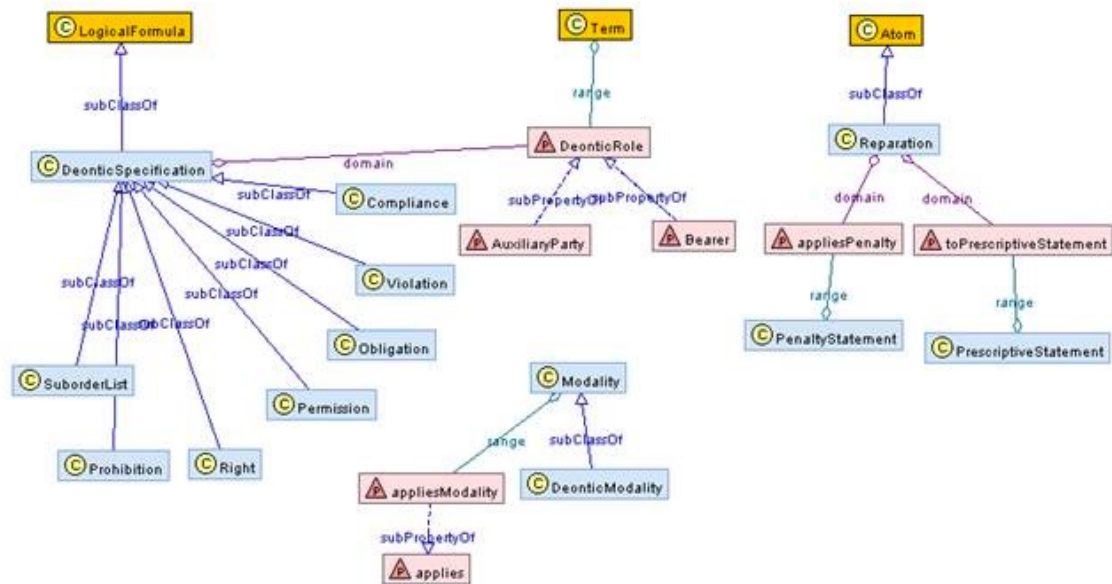
### Related links

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

### TC Participants

Representing these [OASIS Foundationals](#) 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.

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**

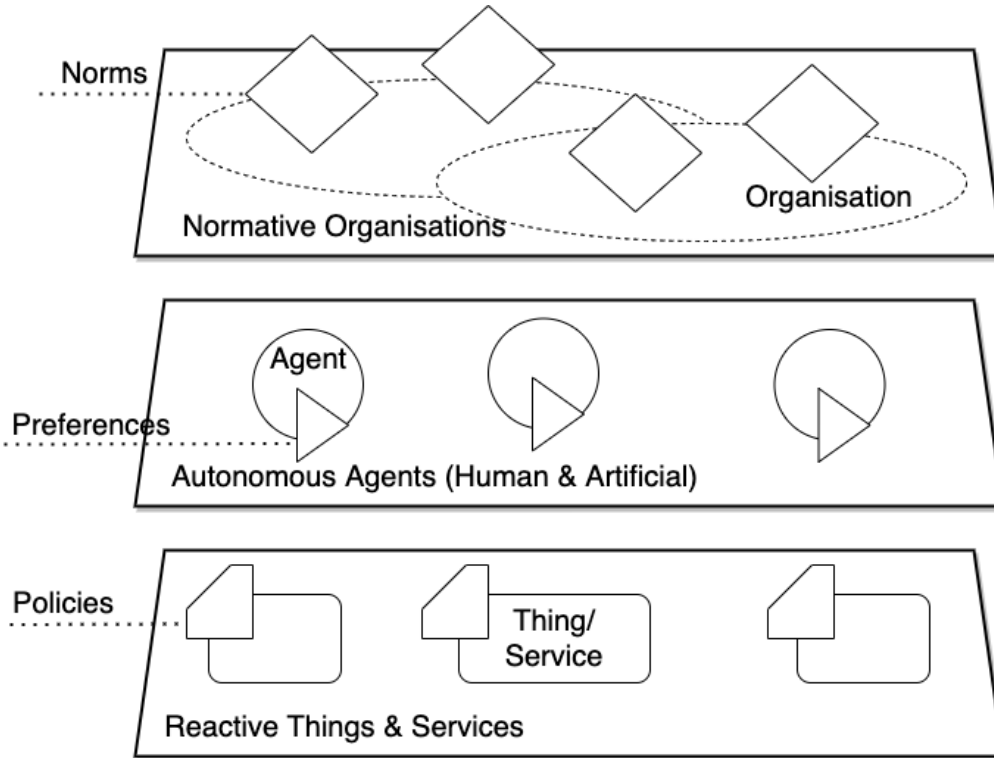
**P D O'Brien and R C Nicol**

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

***Governance has received  
much less attention!***

# From Policies to Norms: Governance

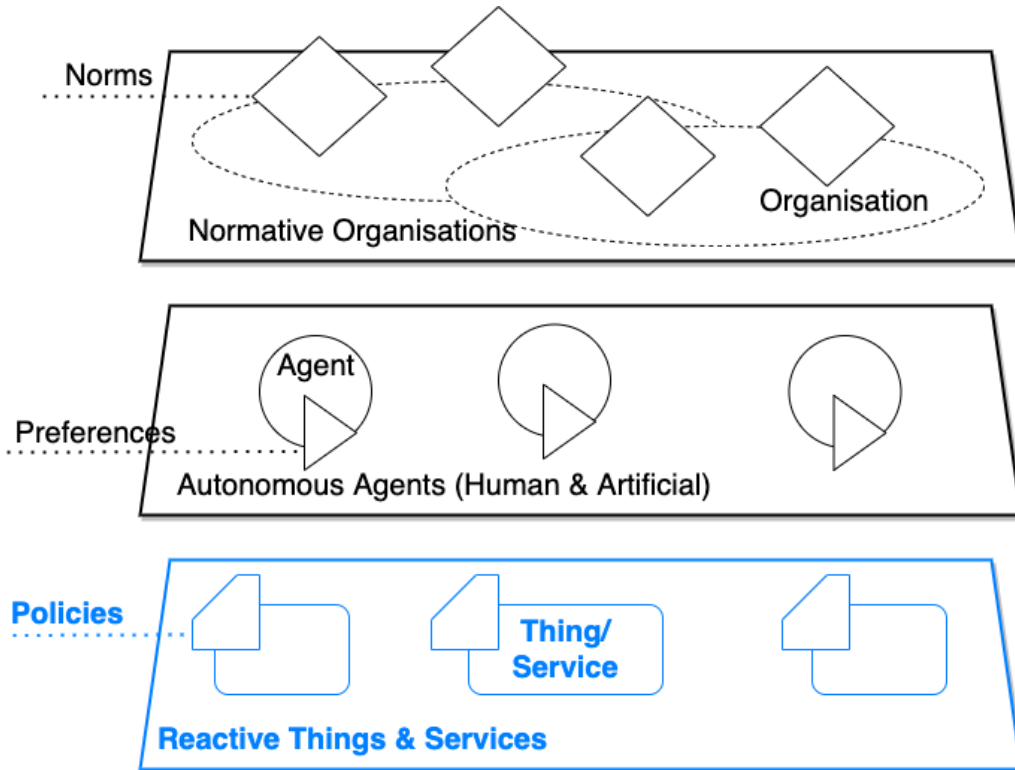
## *Reactive Things and Services*



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

# From Policies to Norms: Governance

## *Reactive Things and Services*

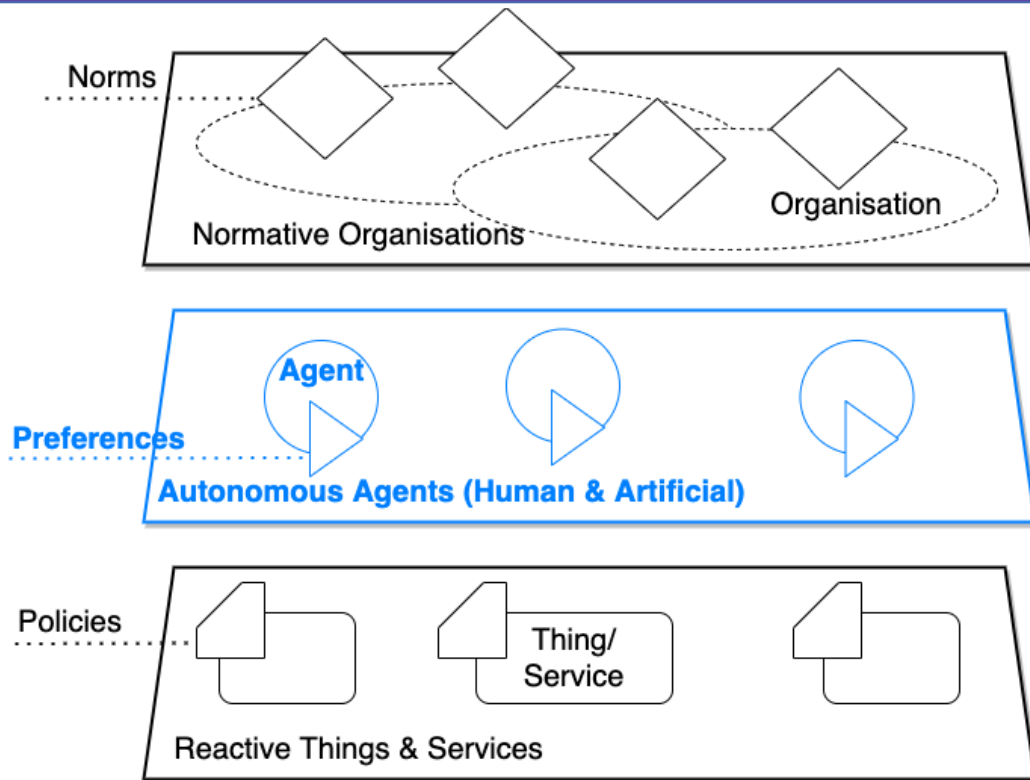


- Non-autonomous entities in the environment
- Adopt the same notions of the Web of Things (WOTs) architecture
- Policies state who can **access things/services** and **constraints on their usage** (if any)



# From Policies to Norms: Governance

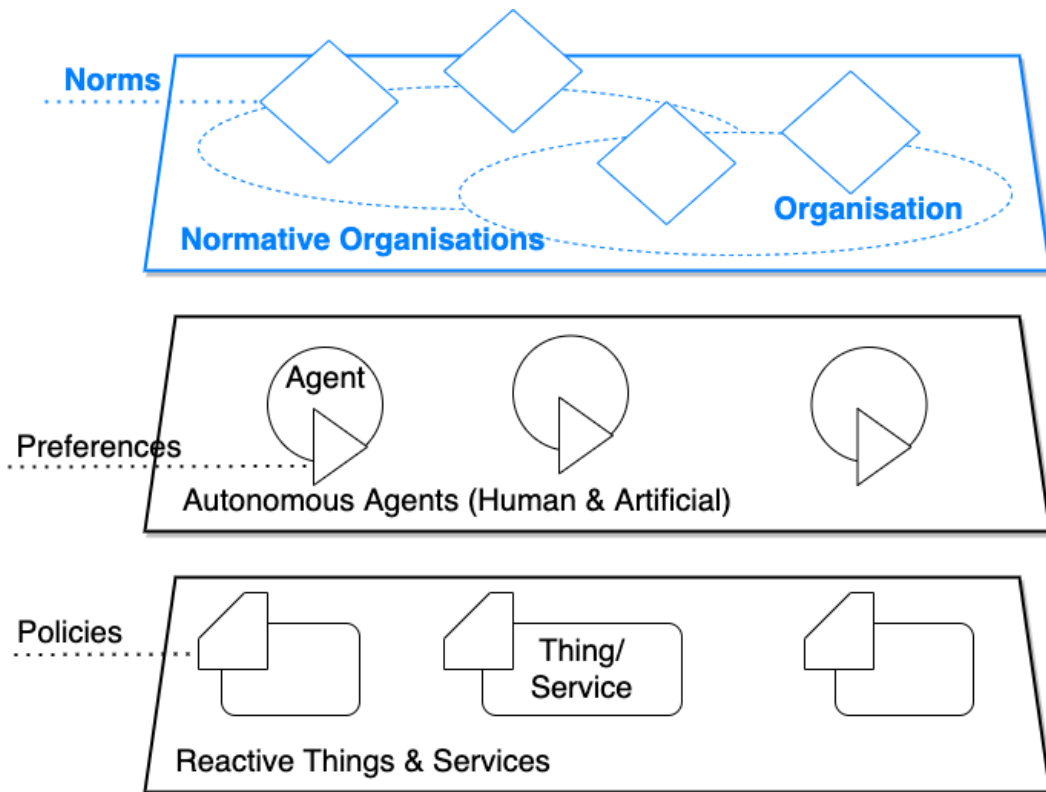
## *Autonomous Agents*



- 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

# *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



## Department of Information Systems & Operations

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

### Dr. Sabrina Kirrane

T +43-1-313 36-4494  
F +43-1-313 36-90 4494  
sabrina.kirrane@wu.ac.at  
[www.wu.ac.at](http://www.wu.ac.at)  
[www.sabrinakirrane.com](http://www.sabrinakirrane.com)  
[@SabrinaKirrane](https://twitter.com/SabrinaKirrane)



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