

Semantic Wikis: Approaches, Applications, and Perspectives

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Goals and Schedule

Goals:

- ▶ Introducing to academic research on semantic wikis (morning)
- ▶ Introducing to academic and non-academic semantic wiki applications and systems (morning)
- ▶ Supervised sketching of possible research projects on semantic wikis (afternoon)

Schedule:

- ▶ 9:00 – 10:30: Lecture
- ▶ 11:00 – 12:00: Lecture
- ▶ 12:00 – 12:30: Choice of projects and building of teams
- ▶ 14:30 – 16:30: Project sketching

1. Wikis as They are
2. From Wikis to Semantic Wikis
3. First Breed: Typed Links as Semantic Relationships
4. Second Breed: Ontologies as Schemas
5. Unconventional Semantic Wikis
6. Semantic Wiki Applications
7. Technologies Developed for Semantic Wikis
8. Possible Ways Ahead
9. Project Sketching

1. Wikis as They are

Wikis are

- ▶ easy to use read-write web-sites
- ▶ cloud computing tools for collaborative authoring
- ▶ hypertext systems
- ▶ editing and organising tools

Wiki usually have

- ▶ flat page spaces — links are used for structuring
- ▶ full text search within all pages
- ▶ versioning with rollback

Most wikis so far do not have instant saving

Some wikis support multimedia content

1. Wikis as They are

Principles that have guided Ward Cunningham in the design of WikiWikiWeb (1995), the first wiki:

- ▶ Simple – easier to use than abuse.
- ▶ Open – every user can edit a page
- ▶ Incremental – links to yet inexistent pages are possible
- ▶ Organic – text and structure can be updated at any time
- ▶ Mundane – small markup sufficient for the common use
- ▶ Universal – editing and organising similar to writing
- ▶ Overt – a formatted text suggests markup
- ▶ Unified – flat page space
- ▶ Precise – precise page titles avoiding name clashes
- ▶ Tolerant – interpretation preferred to error messages
- ▶ Obervable – every user can see the activity on the wiki
- ▶ Convergent – duplication discouraged

1. Wikis as They are

Probable reasons for the success of wikis:

- ▶ Ease of use due to simplified markup and error-tolerance
- ▶ Availability from a Web browser without software to install

Wikis are successfully used for applications benefitting from:

- ▶ crowdsourcing
- ▶ collaborative work amongst communities of interests
- ▶ personal information management

Standard reference on wikis:

Bo Leuf and Ward Cunningham: The WikiWay – Quick Collaboration on the Web, Addison-Wesley, 2001

2. From Wikis to Semantic Wikis

Observations having led to semantic wikis:

- ▶ Typing a link allows to interpret its as a triple (subject/link origin page – predicate/link type – object/link target page)
- ▶ Wiki users have tried to express more semantics in many ways:
 - ▶ page as concept
 - ▶ typed links as semantic relations between concepts
 - ▶ logical structure expressed through the link structure

2. From Wikis to Semantic Wikis

Issues differently addressed by semantic wikis' developers:

- ▶ The triple structure of typed links suggest to use RDF/S:
 - ▶ Is RDF or RDFS convenient? sufficient?
 - ▶ Would informal annotations be beneficial?
- ▶ Interpreting wiki pages as concepts and typed links as properties might lead to many undesirable pages
Example: person with an identity, a professional occupation, a family, addresses, etc.
- ▶ Typed links as semantic relationships are simple but:
 - ▶ Would a link base be preferable to in-text link definitions?
 - ▶ How can some sort of semantic correctness or consistency be ensured?
 - ▶ What would a wiki-way semantic editor look like?
- ▶ What reasoning, if at all, should be offered?
- ▶ What query/retrieval functions should be offered?

2. From Wikis to Semantic Wikis

The questions above have been answered in different manners:

- ▶ First breed of semantic wikis: Typed links as semantic relationships
- ▶ Second breed of semantic wikis: Ontologies as schemas

2. From Wikis to Semantic Wikis

Semantic wiki systems considered:

- ▶ 24 semantic wiki systems selected from the scientific literature
- ▶ preference given to the most cited systems

Advantages of this choice:

- ▶ The objectives of the systems' developers are known

Drawbacks of this choice:

- ▶ valuable systems might be ignored
- ▶ prototypes instead of full-fledged maintained systems: scientific research rarely achieves full-fledged systems

3. First Breed: Typed Links as Semantic Relationships

Semantic Wikis of the first breed

- ▶ express semantics as typed links representing triples (subject-property-object)
- ▶ have simple user interfaces typically with three panes:
 - ▶ a pane for the (editable) text of a wiki page
 - ▶ a pane for the (editable or not editable) meta-data to this wiki page
 - usually in the form of (property-object) pairs, the implicit subject being the topic of the given wiki page
 - ▶ a navigation pane
 - usually listing related pages determined from the meta-data

3. First Breed: Typed Links as Semantic Relationships

With semantic wikis of the first breed, meta-data

- ▶ are mostly expressed in RDF
- ▶ can include some limited RDFS (like classes)
- ▶ have no blank nodes
- ▶ have no, or very limited, reasoning (like inheritance)
- ▶ rarely cover user roles or role models

3. First Breed: Typed Links as Semantic Relationships

First flavour of semantic wikis of the first breed:

- ▶ metadata are specified like links within the text in a parentheses-based syntax
- ▶ the meta-data cannot be edited without the page text
- ▶ the meta-data pane(s) can only be used in read mode

Systems:

Kawawiki (2006), Makna and MultiMakna (2006), MewKISS (2005), Platypus (2004), Rhizome (2005), SemperWiki (2005), SHAWN (2005), TaOPIS (2008), WikSAR (2006)

3. First Breed: Typed Links as Semantic Relationships

Second flavour of semantic wikis of the first breed:

- ▶ text and meta-data are specified separately
- ▶ the meta-data pane can be used both in read and in edit modes

Systems:

Kawawiki (2006), Platypus (2004), Rhizome (2005), SemperWiki (2005), SHAWN (2005)

3. First Breed: Typed Links as Semantic Relationships

First or second breed?

Some semantic wikis of the first breed can be seen as both first and second flavour if

- ▶ they give rise to an in-text specification of meta-data
- ▶ their meta-data specifications
 - ▶ either have to be on specific text lines (SemperWiki, Shawn)
 - ▶ or are collected in linkbases (Platypus)

4. Second Breed: Ontologies as Schemas

Semantic wikis of a second breed aim at allowing for

- ▶ richer meta-data than expressible in triples (subject-predicate-object) namely full-fledged ontologies
- ▶ reasoning with “wiki-stored” ontologies

One of the motivations for the second breed of semantic wikis has been Wikipedia:

Wikipedia’s infoboxes can be seen as textual expression of

- ▶ semantically rich concepts
- ▶ relationships amongst concepts.

4. Second Breed: Ontologies as Schemas

Semantically rich ontologies can hardly be expressed in-text

Most semantic wikis of the second breed therefore have editable meta-data panes

4. Second Breed: Ontologies as Schemas

The development of semantic wikis of the second breed has been boosted by the Semantic Web research community seeing them

- ▶ as “wikis for the semantic web”
- ▶ or as “semantic web in the small”

These views are not fully compatible and can be realised in different manners

Therefore, semantic wikis of the second breed also come in two flavours:

- ▶ Semantic wikis with ontology development capabilities
- ▶ Semantic wikis without ontology development capabilities

4. Second Breed: Ontologies as Schemas

First flavour:

Semantic wikis with ontology development capabilities

- ▶ drawn by the view of semantic wikis as “semantic webs in the small”
- ▶ striving for semantic wikis capable of
 - ▶ importing complex ontologies
 - ▶ using these ontologies for semantically structuring the wikis' contents
 - ▶ supporting further development of the imported ontologies

4. Second Breed: Ontologies as Schemas

Semantic MediaWiki (2005):

One of – if not the – first semantic wiki of the second breed:

The overall objective of the project is to develop a single solution for semantic annotation that fits the needs of most Wikimedia projects and still meets the Wiki-specific requirements of usability and performance.

4. Second Breed: Ontologies as Schemas

Semantic wikis of the first flavour of the second breed can be seen as

- ▶ human-readable interfaces to ontologies
- ▶ more or less sophisticated ontology management systems

Systems:

Freebase (2005), Graphingwiki (2006), Gnowsis Wiki (2006), Makna and Multi-Makna (2006), Semantic MediaWiki (2005), OntoWiki (2006), Swooki (2008), Topincs Wiki (2006), Ylvi (2006)

4. Second Breed: Ontologies as Schemas

Second Flavour:

Semantic wikis without ontology development capabilities

Drawn by the views that

- ▶ semantic wikis do not have to provide tools for developing/
managing complex ontologies
- ▶ well-engineered ontologies are better specified outside a
semantic wiki

4. Second Breed: Ontologies as Schemas

IkeWiki (2006) is a prominent representative of the second flavour of semantic wikis of the second breed

Systems:

BOWiki (2008), COW (2006), IkeWiki (2006), Kaukolu (2006)

4. Second Breed: Ontologies as Schemas

Wikitology:

Interpreting, like most semantic wikis of the second breed,

- ▶ a wiki page as an entity definition
- ▶ typed links from a wiki page seen as an entity as properties of that entity

4. Second Breed: Ontologies as Schemas

Freebase is special: it is first and foremost a wiki application, not a wiki system

Freebase is about collecting common knowledge through crowdsourcing

In 2010 Google purchased Metaweb, the company developing and running Freebase

4. Second Breed: Ontologies as Schemas

1st breed: Semantics through typed links

1st flavour: in-text typed links

Kawawiki, 2005, [46]

Makna and MultiMakna, 2006, [70]

MewKISS, 2005, [67, 68]

Platypus, 2004, [95]

Rhizome, 2005, [94, 93]

TaOPIS, 2008, [88]

WikSAR, 2006, [4]

2nd flavour: typed links outside text

Kawawiki, 2006 [46]

Platypus, 2004, [95]

Rhizome, 2005, [94, 93]

SemperWiki, 2005, [71]

SHAWN, 2005, [3]

4. Second Breed: Ontologies as Schemas

2nd Breed: Ontologies as wiki schemas

1st flavour: wiki for semantics / wiki for ontology development

Freebase, 2005, [10]

Graphingwiki, 2006, [33]

Gnowsis Wiki, 2006, [82, 81]

Makna and Multi-Makna, 2006, [70]

Semantic MediaWiki, 2005, [98, 54]

OntoWiki, 2006, [1]

Swooki, 2008, [79]

Topincs Wiki, 2006, [21]

Ylvi, 2006, [77]

2nd flavour: Semantic for wiki / wiki not for ontology development

BOWiki, 2008, [5]

COW, 2006, [35]

IkeWiki, 2006, [83, 87]

Kaukolu, 2006, [47]

5. Unconventional Semantic Wikis

A few unconventional approaches to semantic wikis have been investigated

For lack of a meaningful classification, they are listed below in the alphabetic order of the system names

This makes this section unstructured, reflecting what it is about

5. Unconventional Semantic Wikis

AceWiki – Controlled English

- ▶ builds upon ACE (Attempto Controlled English)
 - ▶ resembles a natural language but with a limited grammar
 - ▶ requiring non-ambiguously specification of the meaning of each word used
 - ▶ entities and concepts are represented as nouns, roles as transitive verbs or of-constructs
 - ▶ similar to a logic and/or knowledge representation language
 - ▶ An ACE specification is executable
- ▶ wiki pages contain parts of an ACE specification

5. Unconventional Semantic Wikis

BOWiki – Consistency Checks

Semantic MediaWiki based wiki for biologists

The goal was to “develop a collaboratively curated knowledge basis that automatically verifies its ontological adequacy”

BoWiki has been “designed to eliminate the need for costly and time consuming manual expert database curation, while providing users with an automated reasoning system to verify the consistency of newly added content to the knowledge base”

- ▶ uses OWL DL and Pellet for consistency checking
- ▶ besides error messages, does not provide any support for coping with inconsistent data

Second breed (“ontologies as wiki schema”) second flavour (“no tool for ontology development”)

5. Unconventional Semantic Wikis

Freebase – Inconsistency-Tolerance

Semantic wiki of the second breed (“ontology as wiki schema”)
first flavour (“wiki for semantics”)

Also an unconventional semantic wiki because it is tolerant to inconsistencies:

There is no intrinsic hierarchy of categories or canonical world view of all knowledge. Conflicting and contradictory types and properties may exist simultaneously.

Freebase, and no other semantic wiki, addresses how to cope with inconsistencies

5. Unconventional Semantic Wikis

Graphingwiki – Protocol Dependencies

- ▶ extends the wiki MoinMoin
- ▶ offers specific rules for detecting dependencies in network protocols
- ▶ provides with a specific visualisation of such dependencies
- ▶ supports RDF meta-data expressed with a syntax similar to that of Semantic MediaWiki
- ▶ inference rules are expressed in wiki pages

5. Unconventional Semantic Wikis

KnowWE – Decision Support Systems

- ▶ tuned to building decision support systems
- ▶ relies on a general purpose “task ontology” for problem solving
- ▶ relies on a reasoner tuned to this task ontology
- ▶ supports the specification of “application ontologies”
- ▶ one wiki page describes a situation or a cause of a fault
- ▶ ontology concepts are marked in the textual description aimed at human readers
- ▶ rules expressing how faults relate to observations are specified in a specific area of the wiki pages
- ▶ solutions generated in problem solving session are saved in wiki pages

5. Unconventional Semantic Wikis

Makna – Workflow

workflow management according to the WfMC process definition reference model

While traversing a process graph the [workflow] engine [of the semantic wiki] fires events –e.g. process-start, process-end, task-start, task-end and task-assign– which can be associated with custom actions.

5. Unconventional Semantic Wikis

OntoWiki – Ontology Editing, Maps and Calendars

Semantic wiki of the second breed (“ontologies as wiki schema”)
first flavour (“wiki for semantics”)

Also unconventional semantic wiki because of

- ▶ editing ontologies and metadata more in the focus of OntoWiki than editing text
- ▶ OntoWiki supports specific applications requiring specific data rendering: Maps and Calendars

5. Unconventional Semantic Wikis

OpenRecord – Tables

data are entered using tables like those of a relational database

The project has considered in the past to

incorporate simple spreadsheet features, as well as interactive charting and graphing features, and OLAP and pivot table features.

5. Unconventional Semantic Wikis

ShyWiki – Spatial Hypertext

- ▶ wiki page is a collection of “notes” spatially organised in a two dimensional plane
 - ▶ a note may include other notes
 - ▶ a note may contain text, images, and/or anchors of simple links (in different colours)
- ▶ links may be typed
- ▶ semantic relationships between notes are spatially expressed as follows:
 - ▶ Disjointness: notes are not in contact with each other
 - ▶ Intersection: one note partially covers another
 - ▶ Subsumption: a note is inside another
 - ▶ Connection: a note is tangent to another
 - ▶ Clusters, lists as well as one to one, one-to-n- and m-to-n-relationship may be expressed in similar manners

Spatially expressed relations amongst notes are transformed into RDF triples, a wiki page being interpreted as a concept

5. Unconventional Semantic Wikis

SweetWiki – Conceptual Model Reified and Folksonomies

Semantic wiki of the second flavour (“semantics for wikis”) second breed (“ontologies as wiki schema”)

Two special features:

- ▶ Conceptual data model specified in an OWL ontology

Makes it possible to use the same query language for both, the conceptual model and the application

- ▶ Supports of social tagging (or folksonomies)

A predefined RDF ontology is used for associating tags with wiki pages or media content

Makes it possible to use the same reasoner for inferences from tags as from the application’s ontology

Not addressed: How to migrate from informal tags to a formalised ontology (“knowledge maturing”)

5. Unconventional Semantic Wikis

SWiki – Ontological Linking

Makes it possible to specify concepts and semantic relationships between concepts and to automatically relate with links concepts in different wiki pages that are semantically related

called “ontological linking” and described as follows:

links should be inserted into documents based on source anchor text specified in an ontology.

Reverses the approach of other semantic wikis: Instead of deriving semantic relationships from links, SWiki derives links from semantic relationships

SWiki’s “ontological linking” is close to the notion of link base

5. Unconventional Semantic Wikis

Swooki – Peer-to-Peer for Mass Collaboration

peer-to-peer semantic wiki designed as a realisation of Semantic MediaWiki using Wooki, a peer-to-peer wiki system aiming at mass collaboration

5. Unconventional Semantic Wikis

TaOPis Wiki – F-Logic

Semantic wiki of the first breed (“semantics through typed links”) and first flavour (“in-text typed links”)

Using TaOPis one can develop an F-Logic ontology

TaOPis Wiki provides an object-oriented wikipitology

The developers of TaOPis Wiki seem to suggest that the object-oriented model of TaOPis Wiki makes informal tags “self-organize” into a formal ontology

5. Unconventional Semantic Wikis

Thinkbase – Visual Browser

Thinkbase is a visual browser for Freebase with two panes:

- ▶ A first pane displaying a portion of the semantic graph centred at a concept and consisting of the concepts directly related to that concept
- ▶ a second pane displaying a text for that concept

This visualisation in the first pane can be extended by repeatedly expanding the portion of the graph displayed and by collapsing some of the nodes (representing concepts)

Thinkbase has an edit mode which succinctly described as follows:

Our research prototype also provides some functionality to edit the content of Freebase through the visual representation (e.g. add new relationships).

5. Unconventional Semantic Wikis

Topincs Wiki – Topic Maps Ontology Edition

Topincs Wiki is of the second breed (“ontologies as wiki schema”) and first flavour (“wikis for semantics”)

Wiki for the collaborative editing of topic maps a knowledge representation formalism similar to RDF

The core concepts of Topic Maps are topics, n-ary associations between topics, and occurrences of topics, while the core concepts of RDF are resources and binary relationships

Topincs wiki has not been designed for text entries, even though textual data can be added in a Topincs Wiki

5. Unconventional Semantic Wikis

wikiCalc – Spreadsheets

Wiki system for text and spreadsheets

The formulas included in a spreadsheet can be seen as – executable
– meta-data

wikiCalc supports text, spreadsheets, and hypertext links, and offers a rich layout

wikiCalc offers two edit modes:

- ▶ a WYSWYG edit mode
- ▶ a markup edit modes

5. Unconventional Semantic Wikis

- 2005:
 - Freebase, Inconsistency-Tolerance
 - SWiki, Ontological Linking
- 2006:
 - GraphingWiki, Protocol Dependencies
 - OntoWiki, Ontology Editing, Maps and Calendars
 - OpenRecord, Tables
 - SweetWiki, Reified Conceptual Model and Folksonomies
 - Topincs Wiki, Topic Maps Ontology Editing
 - Yilvi, Spreadsheets
- 2008:
 - ACEWiki, Controlled English
 - BoWiki, Consistency Check
 - Swooki, Peer-to-Peer for Mass Collaboration
 - TaOPIs, F-Logic
- 2010:
 - KnowWE, Decision Support Systems
- 2011:
 - ShyWiki, Spatial Hypertext

6. Semantic Wiki Applications

Fully developed applications as well as sketched use cases

- ▶ Knowledge Engineering
- ▶ Encyclopaedias, Dictionaries, and Collections of Documents
- ▶ Content Management and Semantic Portals
- ▶ Personal Information Management
- ▶ Learning and Communities of Practice
- ▶ Industrial Process Design
- ▶ eGovernment
- ▶ Corporate Intranet
- ▶ Team Coordination
- ▶ Software Development
- ▶ Building Decision-Support Systems

6. Semantic Wiki Applications

Knowledge Engineering

Primary application area for semantic wikis

In-depth comparison of knowledge engineering with traditional approaches and with semantic wikis still missing

6. Semantic Wiki Applications

Encyclopaedias, Dictionaries, and Collections of Documents

Wikipedia

- ▶ made wikis popular
- ▶ motivated semantic wikis

Applications investigated so far:

- ▶ A Japanese biology dictionary
- ▶ A bibliographical lexicon
- ▶ Cooking recipes (WikiTaaable with Semantic MediaWiki)
- ▶ Software licenses
- ▶ Information on a conference (First Semantic Wiki Workshop of 2006)
- ▶ “Mathematical knowledge management” (SWIM)

6. Semantic Wiki Applications

Content Management and Semantic Portals

- ▶ Classical content management for collaborative edition and publication
- ▶ Semantic portal the content of which is described by an ontology

Example: AIFB web site powered by Semantic MediaWiki

6. Semantic Wiki Applications

Personal Information Management

Might seem strange an application for semantic wikis since no collaboration

Personal information management systems are often targeted at small groups

Personal information management systems (Chandler, Haystack, WikiPad, VoodooPad) are similar to semantic wikis:

- ▶ Data annotated with meta-data
- ▶ links
- ▶ semantic properties for bringing together various kinds of contents like
 - ▶ mail
 - ▶ instant messages
 - ▶ address books
 - ▶ notes-to-self

Personal information management benefits from instant updating

6. Semantic Wiki Applications

Learning and Communities of Practice

The uses of wikis for learning and by communities of practice are similar

Community of practice:

- ▶ community of persons
- ▶ a domain of knowledge
- ▶ shared activities (or practices)

6. Semantic Wiki Applications

Industrial Process Design

With the semantic wiki MewKISS

Requires temporal knowledge for specifying algorithms

6. Semantic Wiki Applications

eGovernment

Key issue in eGovernment: collect and aggregate data from different administrations

The variety of data, administrations and needs makes ontologies promising

Access model desirable

6. Semantic Wiki Applications

Corporate Intranet

Kaukolu used as a communication platform on a corporate intranet

Social media are deployed in corporation aiming at boosting communication between personal

6. Semantic Wiki Applications

Team Coordination

In the wiki, project members coordinate their activities, and describe their progress on their deliverables. This data can then be collected from the wiki and reused in other applications, e.g. to create monthly report figures, or even up-to-date status reports that are generated on request. As the semantic wiki reuses the companys metadata schema for documents and respects the associated constraints (e.g. no document must have more than one title and topics must stem from a predefined set of topics), the automatic integration into the corporate information infrastructure works smoothly.

6. Semantic Wiki Applications

Software Development

Many open-source projects are accompanied by a documentation wiki

Such a wiki can benefit in several ways from the use of semantics

6. Semantic Wiki Applications

Building Decision-Support Systems

KnowWE (mentioned above) provides support for

- ▶ building and maintaining ontologies
- ▶ using them in building decision support systems

7. Technologies Developed for Semantic Wikis

- ▶ Conceptual Models
- ▶ Ontology Convergence
- ▶ Reasoning
- ▶ Navigation, Querying and Search
- ▶ Systems and Architectures

7. Technologies Developed for Semantic Wikis

Conceptual Models

Conceptual models: How data and meta-data are seen by the wikis users

Issues addressed:

- ▶ Page structure
- ▶ Informal annotation/semantics
- ▶ Combining informal and formal semantics
- ▶ Representing wiki users in the wiki
- ▶ Tracking inconsistencies
- ▶ Inconsistency-tolerant reasoning

7. Technologies Developed for Semantic Wikis

Ontology Convergence

How the “types” of pages and links expressed as (subject-predicate-object) can evolve over time into an ontology:

We find that seeding a Wiki with typed pages and links has a strong effect on the quality of the emerging structure and that [ontology] convergence tools have the potential to replicate that effect with an unseeded Wiki.

7. Technologies Developed for Semantic Wikis

Reasoning

View maintenance: Updating a view (data derived by answering a query) after the queried data have changed

Refers to formerly developed techniques:

- ▶ reason maintenance (AI)
- ▶ belief revision (AI)
- ▶ view updates (DB)

7. Technologies Developed for Semantic Wikis

Navigation, Querying and Search

- ▶ Facetted browsing – facts, or properties of the data, automatically derived
Convenient facets: frequent, uniformly distributed, occur in a manageable number of pages
- ▶ Querying of text or RDF meta-data with SPARQL or specific query languages
 - ▶ Reasoning: query language KAON or COW
 - ▶ Rhizome: query language RxPath for easy RDF queries
 - ▶ WikSAR: queries as series of predicate-object pairs
 - ▶ Semantic Media-Wiki: (1) SMW-QL queries similar to mark-up and close-world assumption, (2) keywords over RDF
 - ▶ KWQL of KiWi: from keyword search to web querying powered by the semantic ranking PEST

7. Technologies Developed for Semantic Wikis

Systems and Architectures

- ▶ Specific triple store for semantic wikis with access right model
- ▶ Semantic wiki farm UfoWiki (using the triple store 3store)
- ▶ PIWiki (extension to DokuWiki): Software for realising semantic wiki systems Reasoning can be specified in Prolog, in RDF, or in OWL
- ▶ KiWi: an extensible and adaptable software for building different kinds of social semantic systems, amongst other semantic wiki systems
Façading mechanism providing different Java views on data

8. Possible Ways Ahead

- ▶ Keeping Layout and Logic Apart
- ▶ User Definable Navigation Aids
- ▶ A Wiki Way for Rule Programming
- ▶ Higher Semantic Layers or Meta-Circularity
- ▶ Collage Wiki
- ▶ Editable Inferences
- ▶ Simple Reasoning
- ▶ Querying
- ▶ Marrying Informal and Formal Meta-Data
- ▶ Document Interpretation of Ontologies
- ▶ Engineering Semantic Wikis
- ▶ Novel Semantic Wiki Applications

8. Possible Ways Ahead

Keeping Layout and Logic Apart

A wiki's simplified markup does not distinguish between layout and structure

For semantic wikis, distinguishing layout and structure would be beneficial:

- ▶ Structure expresses semantics
- ▶ Enables context-dependent renderings

Research Challenge: Design of a simple, wiki-ish stylesheet language (inspired from CSS?)

8. Possible Ways Ahead

User Definable Navigation Aids

Prominent feature of most semantic wikis: Semantics-based navigation aid

This aid is so far predefined

Semantic notions like “related”, “personally relevant”, or “context” could be defined by, and computed from, rules, making the navigation aid user-definable

Research Challenges:

- ▶ Design of a language requiring no programming skills
- ▶ Make the language error tolerant
- ▶ Ensure termination without compromising the language expressiveness

8. Possible Ways Ahead

A Wiki Way for Rule Programming

Rule programming for semantic made easy through convenient syntax and semantics and program analysis for

- ▶ suggesting data type
- ▶ suggesting language constructs
- ▶ detecting properties like type mismatches and dependencies

Research Challenge: Offering this the Wiki Way

8. Possible Ways Ahead

Higher Semantic Layers or Meta-Circularity

If meta-data are useful, then meta-data for meta-data are useful, too

Research Challenges:

- ▶ A conceptual framework for meta-data at any possible depth which is wiki-ish, that is:
 - ▶ easy to understand
 - ▶ easy to use
- ▶ A rule language for a semantic wiki offering meta-circularity

8. Possible Ways Ahead

Collage Wiki

Multimedia support in wikis and semantic wikis is so far basic

Multimedia beyond images (videos, graphics, etc.) is rarely supported by wikis

Emerging technologies and standards (HTML5, the Media Fragments URI²¹ and the Ontology for Media Resources²²) make possible treating multimedia content the wiki way

Research Challenges:

- ▶ A multimedia wiki for collages (or mashups) of multimedia f
- ▶ Relate collage and semantics
- ▶ Use cases (simple “story telling”? advanced broadcaster archives?)

8. Possible Ways Ahead

Editable Inferences

View: Content defined by a query and generated either when the view is specified, or when it is accessed

Explain to users how such data are generated or inferred

Editable inferences

Research challenges:

- ▶ Go beyond a mere “inference tracking”
- ▶ Easy to use editor for view update / belief revision / view update

8. Possible Ways Ahead

Simple Reasoning

Rule language as simple as possible specifically designed for semantic wikis.

Research challenges:

- ▶ default (or non-monotonic) negation
- ▶ classical logic negation
- ▶ inference by excluded middle
- ▶ meta-circularity
- ▶ bnodes and leanness (in the sense of RDF)
- ▶ state changes
- ▶ consistency
- ▶ recursion
- ▶ termination
- ▶ bounded complexity

8. Possible Ways Ahead

Querying

Unified approach to query the data and the meta-data of a semantic wiki

Research Challenges:

- ▶ Reasoning-aware query answering
- ▶ Bringing together querying and search
- ▶ Simple query languages

8. Possible Ways Ahead

Marrying Informal and Formal Meta-Data

Knowledge maturing

Research challenges:

- ▶ Develop an approach
- ▶ Demonstrate its practicability on use cases

8. Possible Ways Ahead

Document Interpretation of Ontologies

Partly or fully automatic generation of textual documentation for ontologies

Refer to ontology verbalisation

Research challenges:

- ▶ If P1 is the wiki page of a concept C1, P2 the wiki page of a concept C2, then how could the page of the concept that is the intersection of C1 and C2 be built using the pages P1 and P2?
- ▶ How would wiki pages of classes / concepts be related and linked to that of instances of these classes?

8. Possible Ways Ahead

Engineering Semantic Wikis

Sort of Model-View-Controller model and programming framework for an easy implementation of semantic wiki systems

Research challenges:

- ▶ Work out a Model
- ▶ Work out generic components
- ▶ Choose the programming language

8. Possible Ways Ahead

Novel Semantic Wiki Applications

- ▶ Translation or semantic wikis for internationalization
- ▶ Reasoning for advanced calendars

Research challenge: Good balance between application development and scientific research

9. Project Sketching

Suggested work plan:

- ▶ Choose an issue and advertise it (10–15 mn)
- ▶ Build teams (3 to 5 persons) each to work out one issue
- ▶ Investigate the issue considering
 - ▶ Its practical relevance
 - ▶ Its research relevance
 - ▶ Minimal prototype needed for an evaluation
 - ▶ Use case(s) needed for an evaluation
- ▶ Present the team's outcome (20–30 mn)
- ▶ Provide constructive criticisms of the work of others

9. Project Sketching

Questions to answers

- ▶ Is it a research project on wikis?
- ▶ What complementary competences does require the research project?
- ▶ What are the work packages or complementary aspects of the research project?
- ▶ What would be convenient a work plan and schedule for the research project?
- ▶ What are issues of relevance for a deployable system but not necessarily for a proof-of-concept prototype?