

# Web-based Support Systems

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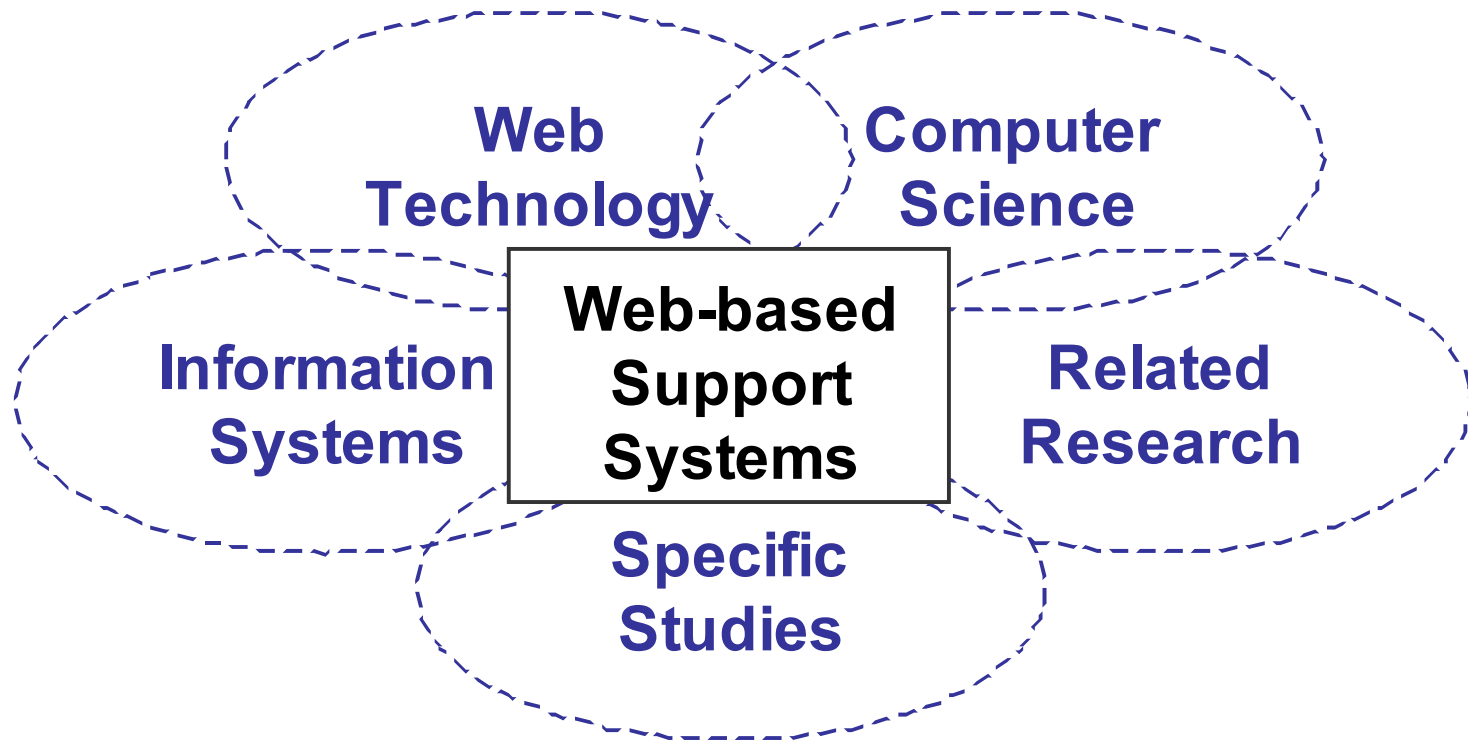
# Web-based Support Systems (WSS)

- An emerging multidisciplinary research area that studies the support of human activities with the Web as the common platform, medium and interface.
- One of the goals of building WSS is to extend the human physical limitation of information processing in the information age.

# WSS & WI

- Moving support systems online is an increasing trend in Web Intelligence research.
- WSS are a multidisciplinary research: the supported field, computer science, information technology, and Web technology.

# WSS: A Multidisciplinary Research



# Advances in Science and Technology

- More data/information
- More tools
- More difficult problems
- More complex tasks
- More demands for quality and productivity
- .....

# Advances in Computer and Web Technology

- More opportunities
  - Availability, accessibility, flexibility
- More challenges
  - Find the right information/tools,
  - Learn/use the existing tools
- Faster changes
  - Keep up with the pace of the changes.

# Why WSS?

- To take the opportunities of the Web.
- To meet the challenges of the Web.
- To extend the human physical limitations of information processing.
- To overcome many limitations that computerized support systems suffered from.
- To keep up with the advance of technology advances.



# Computerized Support systems

- It is impossible to develop a fully automated computer system.
- More practical substitute systems
  - Decision support systems (DSS)
  - Computer aided software engineering (CASE)
  - Computer aided design (CAD)
  - Computer aided education (CAE)

# What Can We Do with the Web

- Provides a distributed infrastructure for information processing and communications
- Delivers timely, secure information and tools with user friendly interface.
- Has no time or geographic restrictions.
- Is used as a new channel for research discuss (collaboration).
- Standardized user interface framework (HTML, CSS, XML).
- Results can be controlled and retrieved remotely and instantly.
- Has potential to reach a much larger user base.

# Why the Web?

- The Web is used as
  - The basic infrastructure
  - The common user interface
  - The universal platform
  - The mediumfor delivering and providing support of various human activities.

# WSS Naming Convention

*A*: a particular domain/field

*A* + support systems (CS&IT) =

*A* support systems

Web + *A* + support systems =

Web-based support systems

Examples:

Decision support systems,

Web-based decision support systems

# Two Dimensional View of WSS

- WSS may be viewed as extensions of existing studies in two dimensions
  - Application dimension  
From decision support to other types of support systems (e.g., data mining support, retrieval support, reading support, etc.).
  - Technology dimension  
From old technology based to new technology based systems.

# Two Dimensional View of WSS

	Technology		
Domain	Computer	Web	...
Decision Making	DSS	WDSS	...
Information Retrieval	IRSS	WIRSS	...
Science Research	RSS	WRSS	...
Learning	LSS	WLSS	...
Knowledge management	KMSS	WKMSS	...
Data mining	DMSS	WDMSS	...
Medical	MSS	WMSS	...
...	...	...	...

# Goals of WSS Research

- Combining the isolated research efforts on various support systems.
- Integrating the diverse general or specific computerized systems.
- Extract the commonality to form a new and separate sub-field of study.
- Applying existing approaches and developing new theories and approaches for WSS.

# WSS Workshops

- 2003, JingTao Yao and Pawan Lingras co-organized the 1<sup>st</sup> International Workshop on Web-based Support System
  - <http://www2.cs.uregina.ca/~wss/wss03/>
- 2004, JingTao Yao, Vijay Raghavan, and Guoyin Wang co-organized the 2<sup>nd</sup> International Workshop on Web-based Support System
  - <http://www2.cs.uregina.ca/~wss/wss04/>
- 2006, JingTao Yao, Kanliang co-organized the 3<sup>rd</sup> International Workshop on Web-based Support System
  - <http://www2.cs.uregina.ca/~wss/wss06/>



# WSS Proceedings

## WSS 2003

WI/IAT 2003 Workshop on  
Applications, Products and Services of  
Web-based Support Systems



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## WSS 2004

The Second International Workshop on  
Web-based Support Systems

In Conjunction with IEEE/WIC/ACM WI/IAT'04



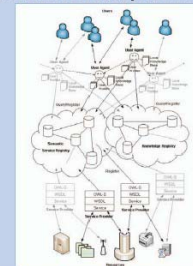
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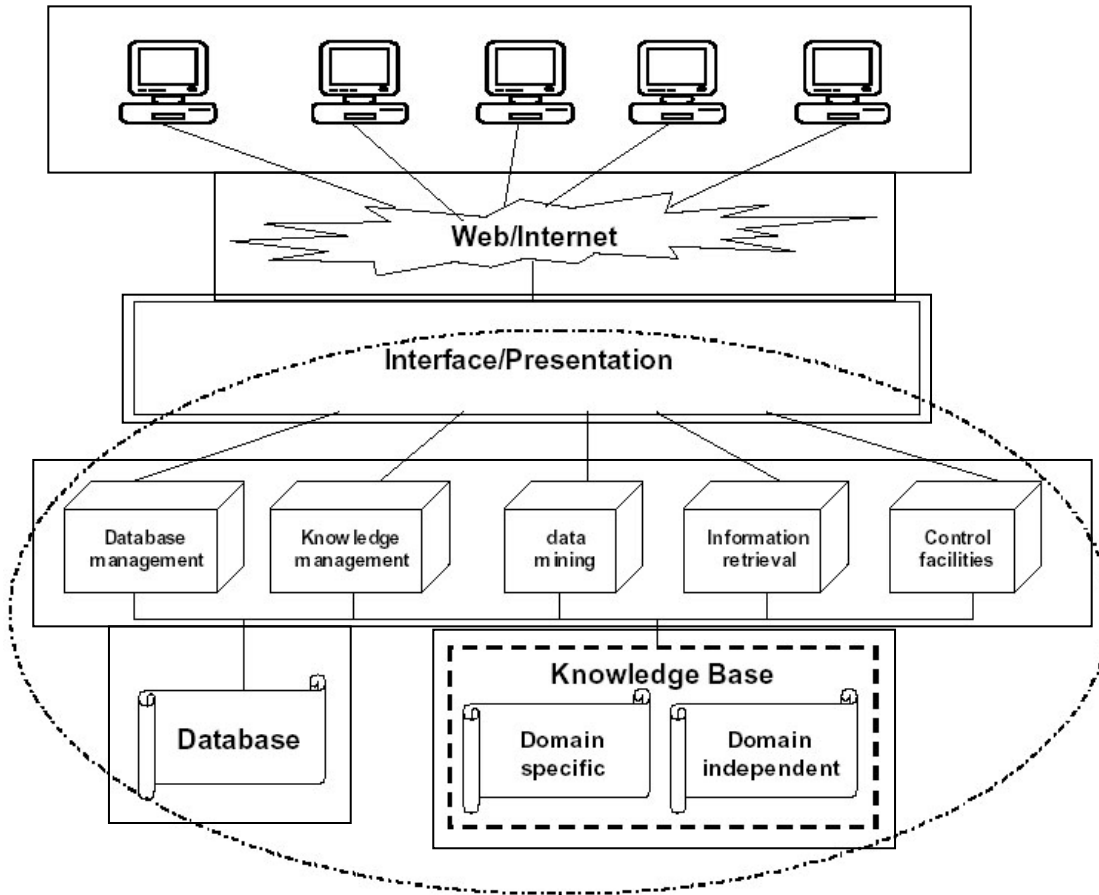


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# General Architecture of WSS



Larger user base

Web technology

Standardized UI

Information technology

Domain dependent /  
independent information

# WSS Research

- Study of domain independent theories, models, and techniques of WSS as a separate field on its own.
- Study of concrete models of WSS specific domains, such as decision support, research support, retrieval support.
- Design and implementation of variable WSS.

# WSS Directions

- Support systems (semi-automatic, interactive) may be more valuable than fully automatic systems, particularly in domains with unstructured problems.
- Users/experts play an active role in using support systems.
- Support systems are a new type of tools that help human to perform various task.
- Support systems will extend the capacity of human, instead of replace them.

# Research on WSS

- Operations & logic
  - Understand the needs of WSS
  - Domain specific
  - Domain independent
- Support facilities
  - What can CS/IT/Web offer
  - Domain specific
  - Domain independent

# Basic issues of WSS

- Supporting domain independent activities
  - Reading
  - Writing
  - Presentation
  - Communication
  - .....
- Support domain dependent activities
  - Decision analysis
  - Strategic decision making
  - Risk analysis
  - .....

# Scope of WSS

- Web-based support systems for specific domains.
- Web-based applications.
- Techniques related to WSS.
- Design and development of WSS

# WSS for Specific Domains

- Web-based decision support systems
- Web-based group decision support systems
- Web-based executive support systems
- Web-based business support systems
- Web-based negotiation support systems
- Web-based medical support systems
- Web-based research support systems
- Web-based information retrieval support systems
- Web-based education support systems
- Web-based learning support systems
- Web-based teaching support systems



# Web-based Applications

- Web-based knowledge management systems
- Web-based groupware systems
- Web-based financial and economic systems
- Internet banking systems
- Web-based multimedia systems

# Techniques Related to WSS

- Web information management
- Web information retrieval
- Web data mining and farming
- Web search engines

# Design and Development of WSS

- Web-based systems development
- CASE tools and software for developing Web-based applications
- Systems analysis and design methods for Web-based applications
- User-interface design issues for Web-based applications
- Visualizations of Web-based systems
- Security issues related to Web-based applications

# Web-based Research Support Systems

- A specific type of WSS
- The general ideas of WSS apply to WRSS
- It is an example to demonstrate the usefulness of the study of WSS.
- Three Types of WRSS
  - Support individual researchers
  - Support research management
  - Support research collaborations

# Scientific Research in the Web Age

- As new technologies evolve and existing technologies expand, a scientist needs to adjust accordingly and make full use of them when carrying out research.
- Scientists face many challenges in using Web-based information resources, such as information overload, misinformation, fees, poorly designed navigation, retrieval, and browsing tools.

# Interdisciplinary Nature Research Support Systems

- Research methodologies:
  - Purpose of research (science), research methods, research activities, etc.
- Computer science
  - Computer systems that support various research activities.
- Web
  - As an infrastructure and a medium of support delivery, as an common user interface.
- WRSS integrates and extends existing computer technologies and systems to serve scientists.

# WRSS

- How to support scientists to meet such challenges is an important issue.
- Many computer systems have been implemented to support various research activities.
  - Meta search engines
  - World (spelling, grammar checking)
  - Citation indexes: Web of Science, Google Scholar, DBLP, CiteSeer

# A Model of the Research Process

- Idea-generating phase.
- Problem-definition phase.
- Procedure-design/planning phase.
- Observation/experimentation phase.
- Data-analysis phase.
- Results-interpretation/explanation phase.
- Communication phase



# Role of WRSS

- Active role of WRSS: scientists play an active role in using a passive system vs. WRSS play a more active role to assist scientists.
- Rationality and feasibility: research process is relatively discipline independent, which makes WRSS feasible.
  - Separation of general research process and discipline specific knowledge.

# Characteristics of WRSS

- Conceptual organization of WRSS:  
Sequentially according to the sequence of research phases, hierarchically based on the complexity of research activities.
- Personalized support.
- Adaptation over time.
- Web platform.

# Functionalities of WRSS

- Profile management: to collect, organize, and store all relevant information the scientists.
- Resource management:
  - Many types of resources exist for supporting research, such as human resources, tool resources, and information/knowledge resources.
  - The objective is to identify the suitable resource to support scientists' research needs.
- Data/knowledge management: to record, store and retrieve the useful data, information and knowledge during the entire research process.

# Specific Supporting Functionalities

- Exploring support
- Retrieval support
- Reading support
- Analyzing support
- Writing support

# Contributing Computer Science Fields

- Database
- Information retrieval
- Data mining system, statistics software
- Visualization
- Graphics user interfaces
- Text editors and processors
- Intelligent agents
- Many more .....

# Other Examples

- Two undergoing projects
  - Web-based learning support: treasure hunting games
  - Web-based research support: Weblog

# Web of Science

- Reference Search
- Citation Analysis
- GrC

# Conclusion

- Support systems will play more and more important roles in the near future. They provide a potential solution for information/tool overload and the complexity of modern problems.
- It is necessary and beneficial to study Web-based support systems as a separate sub-field of research.
- The successful story of Decision Support Systems can be repeated in other domains.



# Conclusion

- WSS is a newly identified research area
- The research on WSS is a natural evolution of the existing research.
  - DSS => WDSS => WSS
  - DSS => Computerized SS => WSS
- We identify domain, scope, research of WSS
- WRSS is a concrete example of WSS.
- Expect that WSS will attract more research.

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# Where is Regina?

