



Universität für Bodenkultur Wien
Department für Wald- und Boden-
wissenschaften

Past, current and future drivers for the development of Decision Support Systems in forest management

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overview

- **Drivers for DSS development**
 - forest management demands
 - Methodological advances
 - Technology drivers
- **the current state of DSS**
- **Conclusions on further developments**



DSS pioneers



RALPH H. SPRAGUE

most cited framework article on
Decision Support Systems
in the 1980's



CLYDE W. HOLSAPPLE

Linking Knowledge management
with decision support systems
(2-volume Handbook)



ANDREW B. WHINSTON

founding Editor-in-Chief of
Decision Support Systems
journal



EFRAIM TURBAN

application of computer technology
to business and financial decision making



ROBERT H. BONCZEK (*)

co-authored book "Foundations of
Decision Support Systems" (1981)
with Holsapple and Whinston





Several reviews have been conducted...

Rauscher (1999)

Operational scale	Models	Functional service modules	Models
Regional assessments	EMDS LUCAS ^a	Function	AsiGIS IBIS ^a FVS LANDIS CRBSUM SIMPLLE
Forest level planning	RELM SPECTRUM WOODSTOCK ARCROREST SARA TERRA VISION EZ-IMPACT ^b DECISION PLUS ^a	Group negotiations	FIREBGC GYPSSES UPEST
		Vegetation dynamics	UTOOLS/UVIEW SVS ^a MATHORES
		Disturbance simulations	
		Spatial visualization	

Decision Support Systems for Ecosystem Management: An Evaluation of Existing Systems

United States Department of Agriculture
Forest Service
Rocky Mountain Forest and Range Experiment Station
Fort Collins, Colorado 80526
General Technical Report RM-GTR-296

Mowrer et al. (1997)

Gordon (2006)

Category	System Name	Biodiversity Indicators Supported										Forest Influences Supported					Complexity		
		User defined	Forest type	Forest age	Forest class	Reproduction	Species diversity	Species viability	Species abundance	Species richness	Species diversity	Forest use change	Wildfire change	Biological diversity	Forest fragmentation	Forest isolation		Spatial connectivity	
For & Bio	CLAMS																		
For & Bio	Harvest																		
For & Bio	LUCAS																		
For & Bio	MFLAM																		
For & Bio	NEO																		
For & Bio	WRIFA																		
Biodiversity	EMAS																		
Biodiversity	CAP S																		
Biodiversity	C-Plan																		
Biodiversity	MARXAN / SPEXAN																		
Biodiversity	PATCH																		
Biodiversity	RAMAS																		
Biodiversity	Refuge GAP																		
Biodiversity	ResNet & Surrogacy																		
Biodiversity	Restore																		
Biodiversity	Sites																		
Biodiversity	Vista																		
Forestry	FVS																		
Forestry	Habplan																		
Forestry	LANDIS																		
Forestry	LANDSUM																		
Forestry	LMS																		
Forestry	RELM																		
Forestry	RMLANDS																		
Forestry	SIMPLLE																		
Forestry	Spec sum																		
Forestry	MDT / TELSA																		
Forestry	Woodstock																		
General	DEFINITE																		
General	EMDS																		
General	EZ-IMPACT																		
General	ARGIS																		

Eom (1996)

Eom et al. (1998)

Eom & Kim (2005)

Journal of the Operational Research Society (1996) 49, 109-120

A survey of decision support system applications (1988-1994)

SB Eom¹, SM Lee², EB Kim³ and C. Somanjan¹

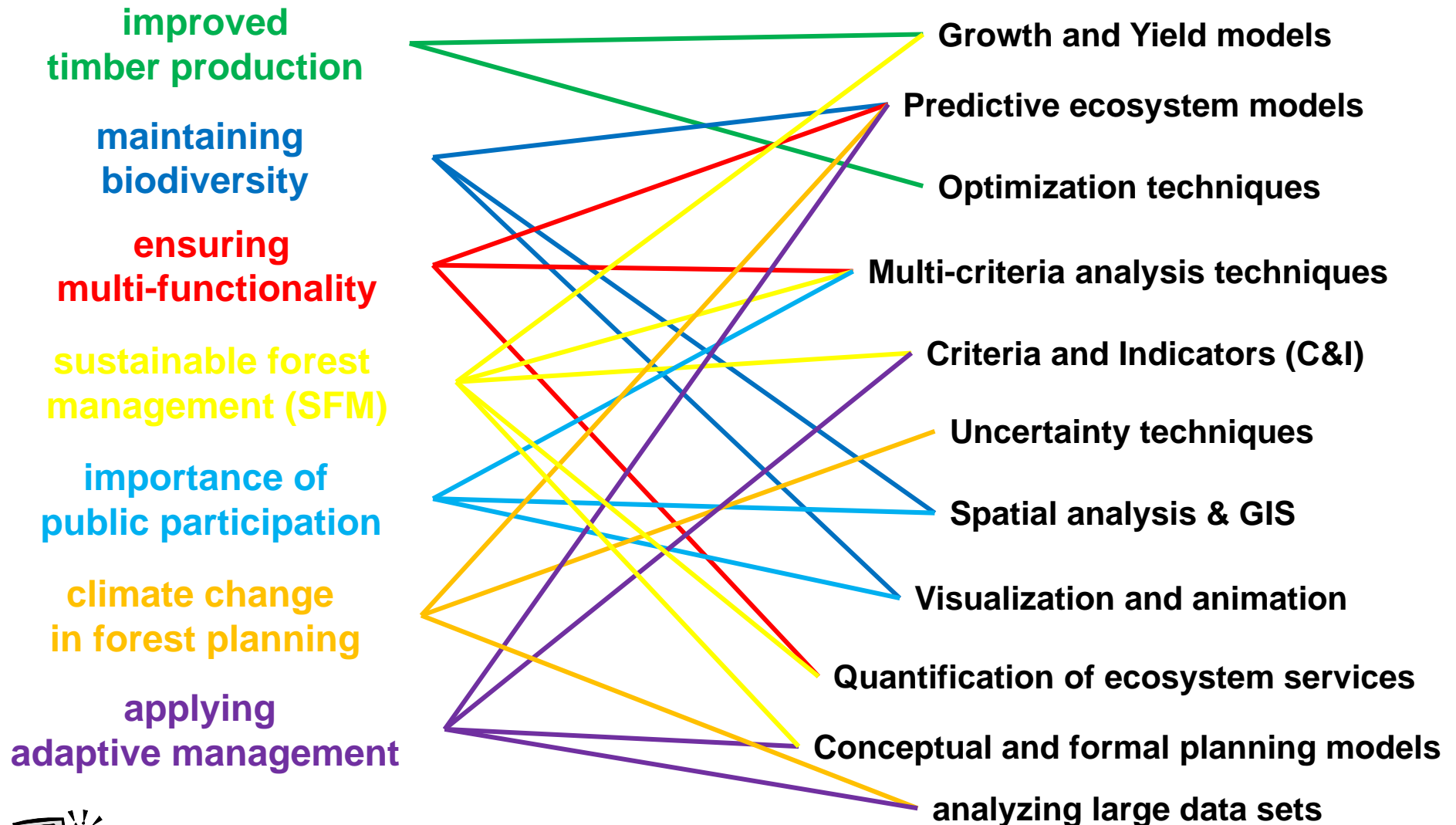
¹ Southeast Missouri State University, ² University of Nebraska, and ³ Drake University, USA

To extend a previous survey of decision support system (DSS) applications in the period (January 1971-April 1988), we have conducted a survey of DSS applications in the period (January 1988 and December 1994). Two hundred seventy-one published applications are included. The survey reveals that there appear to be more creative applications of optimization and simulation-based DSS than simulation-based applications. This is evidenced by a proportional increase of optimization and simulation-based DSS from simulation-based applications models. Most of the DSS applications are in the area of forest management. The survey also reveals that DSS applications are being used in a wide range of areas including agriculture, business, engineering, health care, and social sciences. The survey also reveals that DSS applications are being used in a wide range of areas including agriculture, business, engineering, health care, and social sciences. The survey also reveals that DSS applications are being used in a wide range of areas including agriculture, business, engineering, health care, and social sciences.

and many more to come....

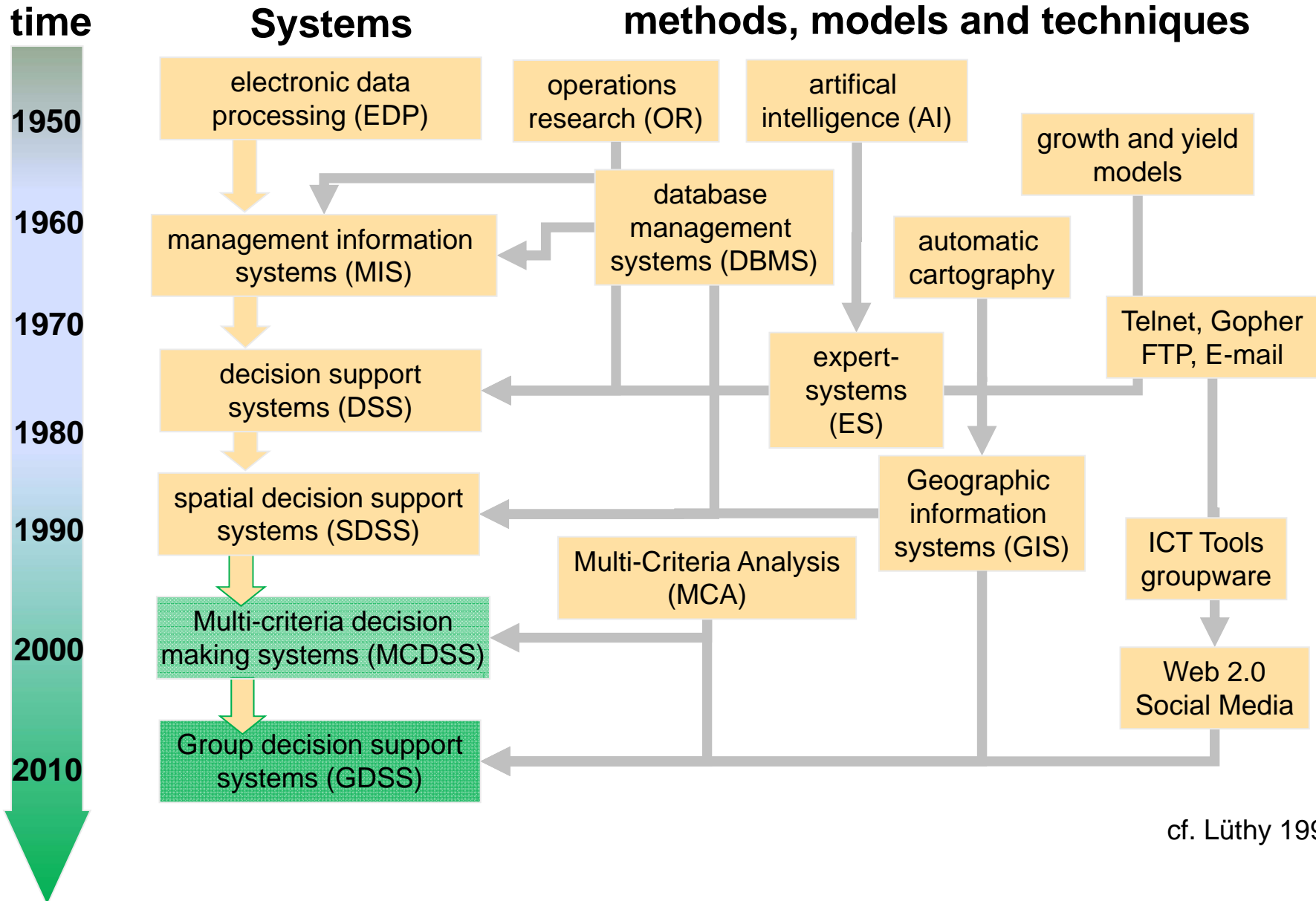


Forest management demands

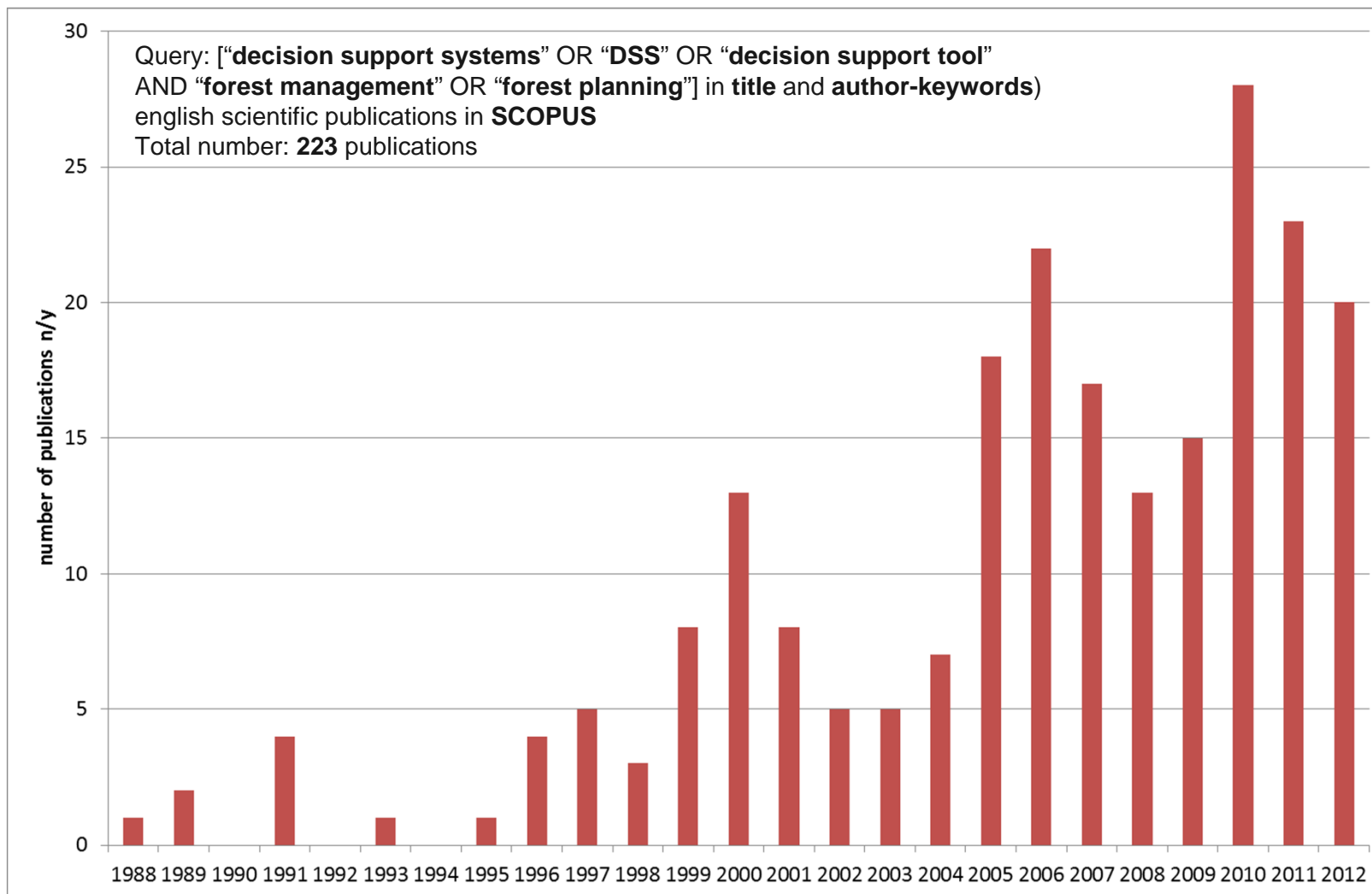


methods and technology drivers

a historical perspective...

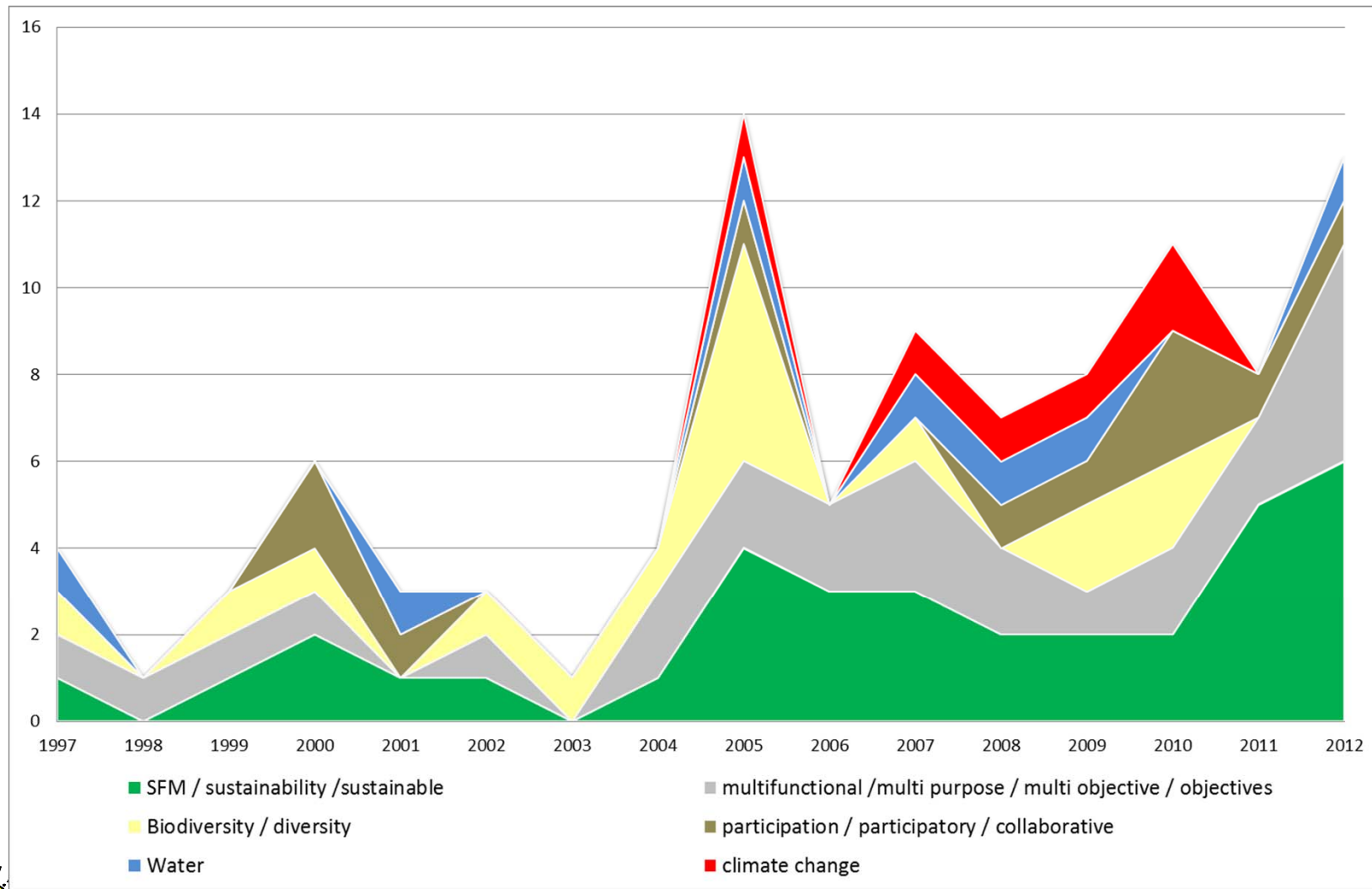


Evidence from literature

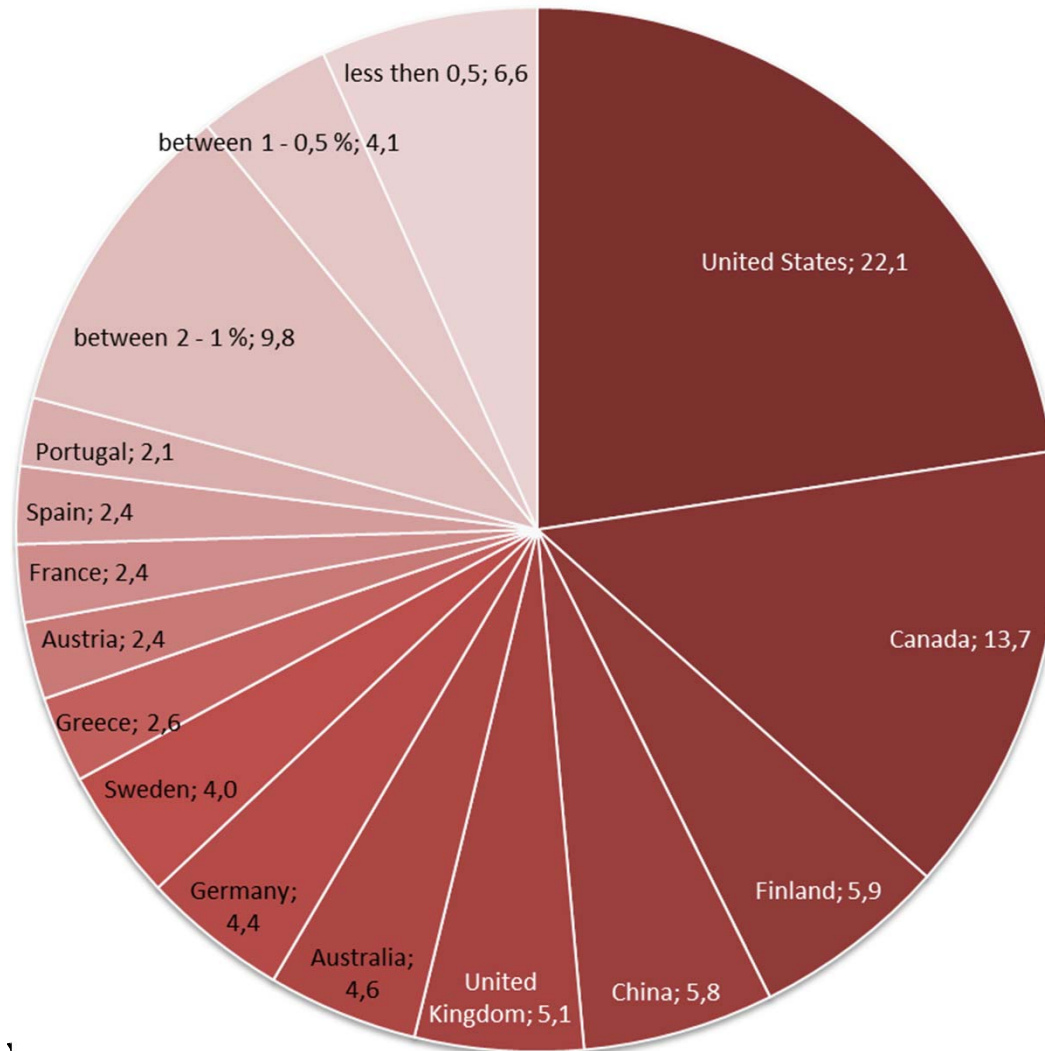


Forest Management topics

issues adressed in publications



Countries of origin

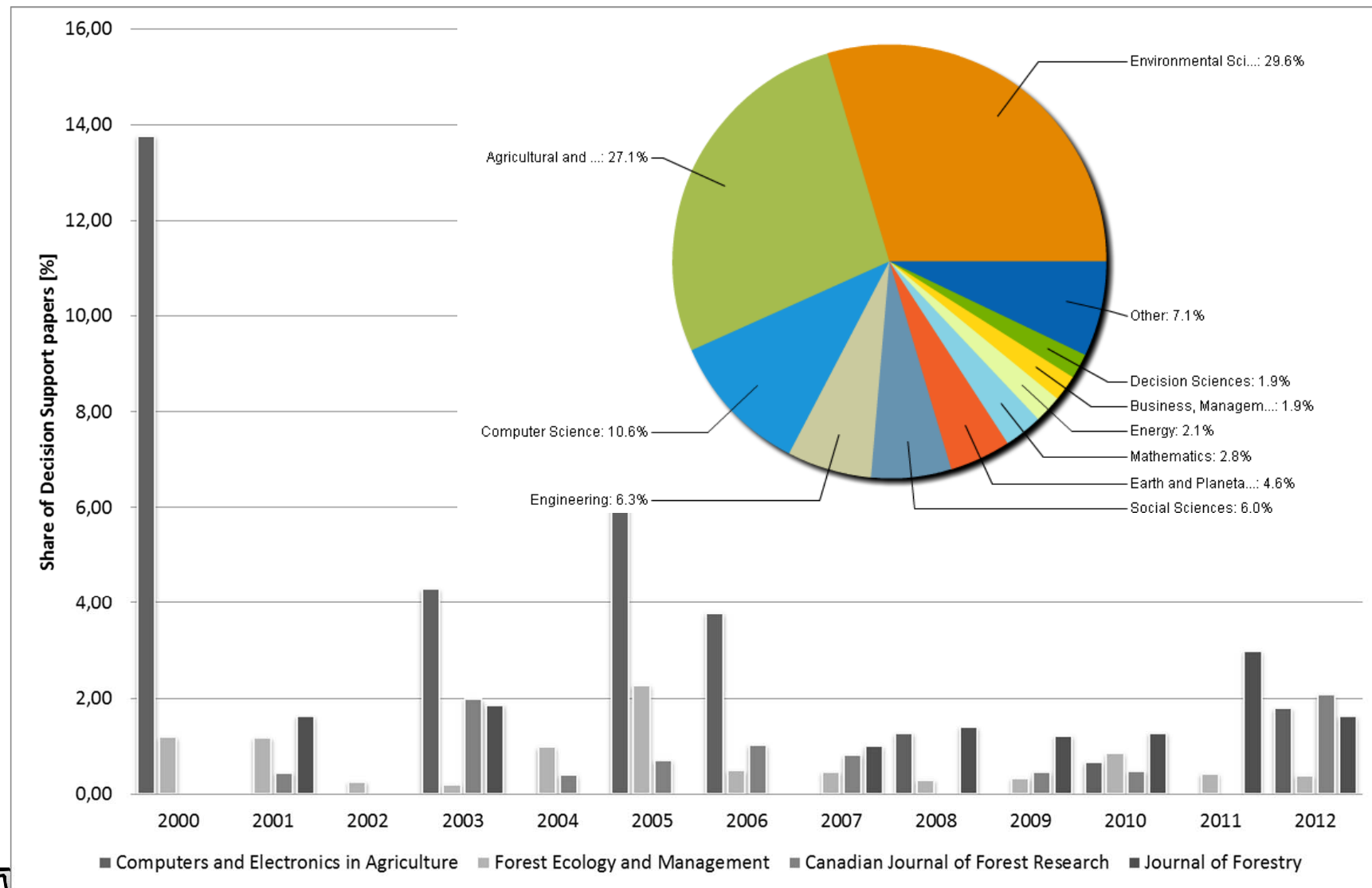


Europe (43,4%)
 United States (22,1%)
 Canada (13,7%)
 Australia (4,5%)

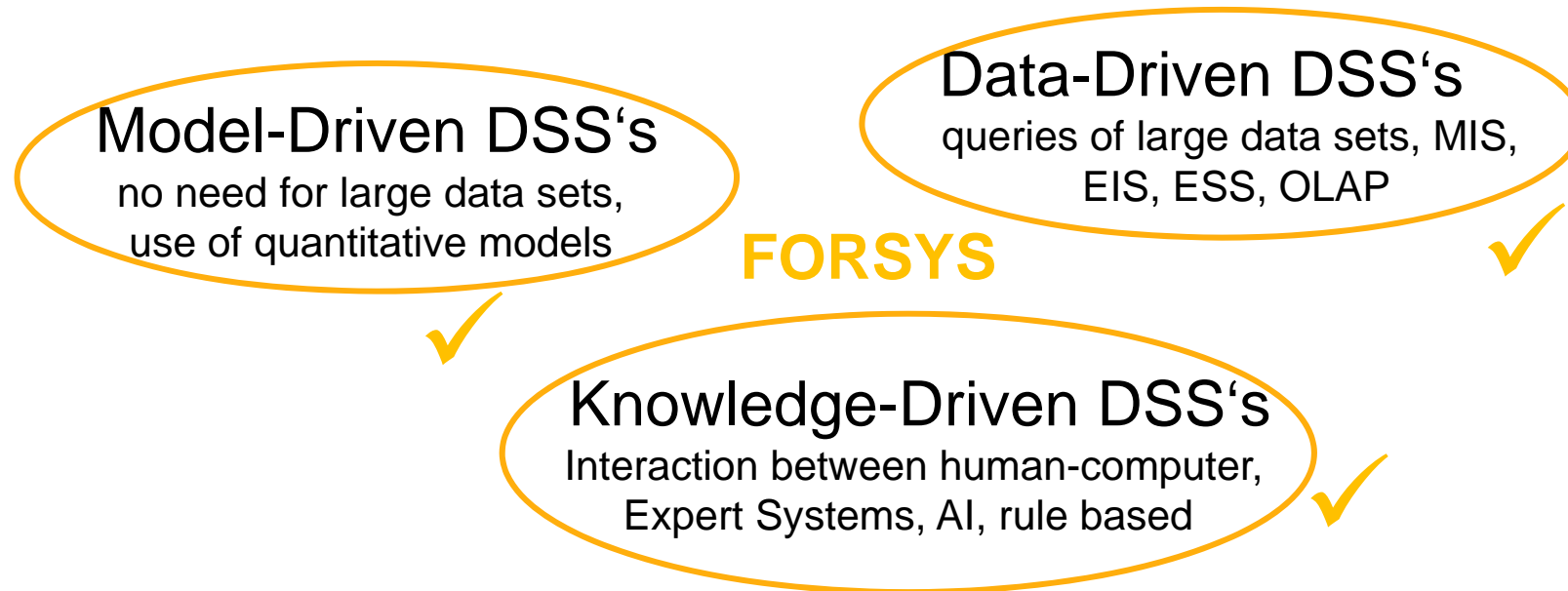
(Finland (5,9%),
 United Kingdom (5,1%)
 Germany (4,4%)
 Comprise highest number
 of papers in Europe)



Representation of DSS in journals



Summary on current state



Document-Driven DSS's

Document retrieval and analysis from large databases, use of web technologies



Communications-Driven DSS's

use of ICT, groupware, collaboration, GDSS,



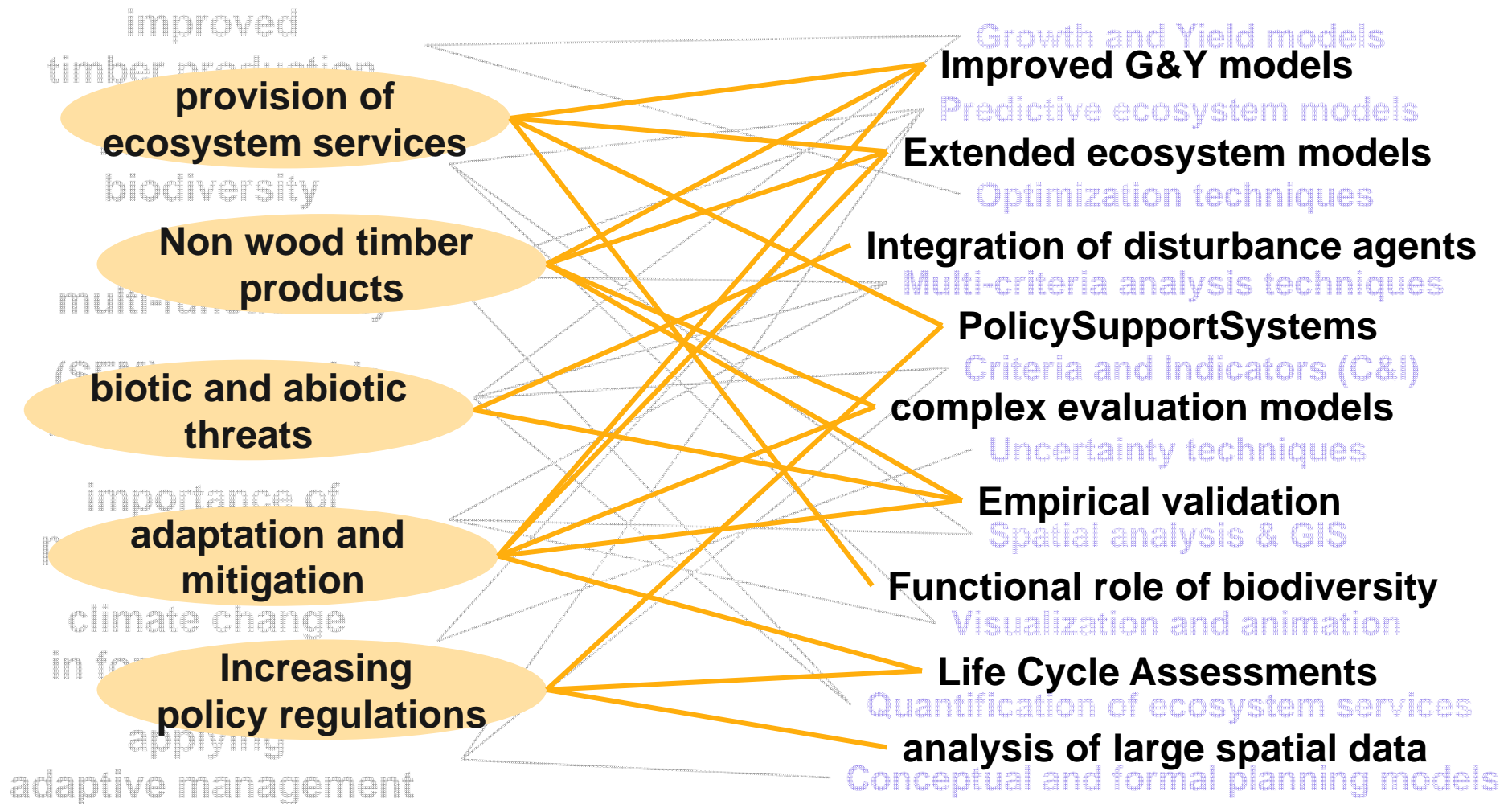
According to Power (2008);
Burstein & Holsapple (2008)



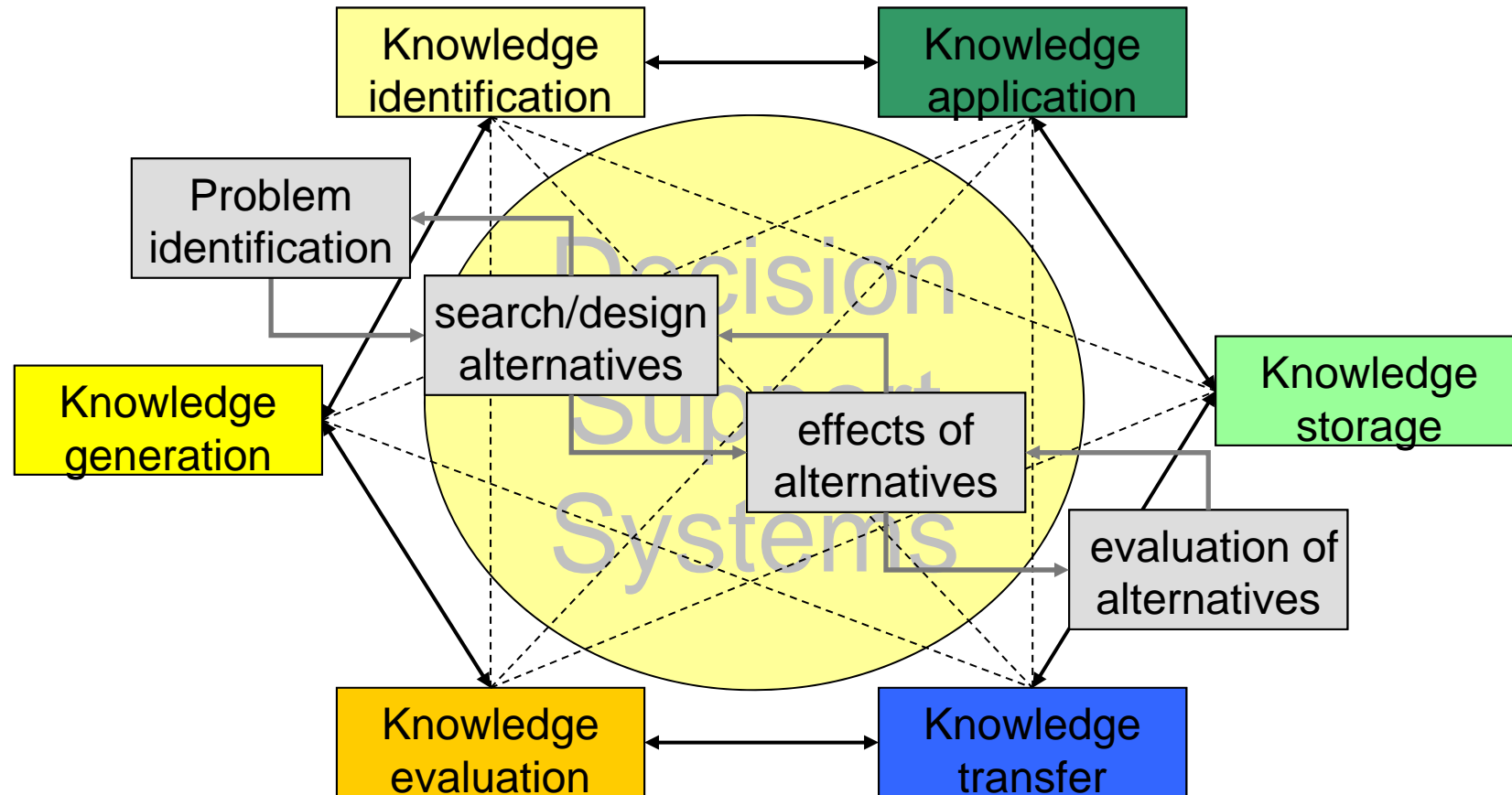
Possible future directions way ahead for DSS development...

- **forest management demands**
- **Methodological advances**
- **Technology drivers**

Selected future forest management demands



Decision Making Processes



Knowledge Management Processes

Selected future technology drivers...

- Increased **social networking** and shared repositories of digital files (e.g. videos, photos, reports, Google docs, wikis,...)
- widespread **dissemination of expert-profiles** using new media elements (e.g. blogging, chat, LinkedIn, ResearchGate, ...)
- **gaming industry** enables socio-technical innovations (e.g. user-controlled avatars, multi-user interaction, 3D animations)
- remote collaborative activities in **virtual worlds** - members of distributed teams can teleport avatars
- Increased provision of **web services** (e.g. spatial analysis not longer limited to GIS experts, MCA without software needs)
- **“internet of things”**: connects almost all devices, humans and processes to web – enables services on smartphones that communicate with public and private data



GUI: Simplicity versus complexity

User interaction will become challenging

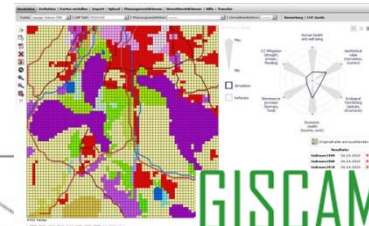


Easy way to determine the basal area



- > Built-in sensors that simplify taking measurements
- > Measurements easily taken through the user interface

Rosset, 2012



GISCAM

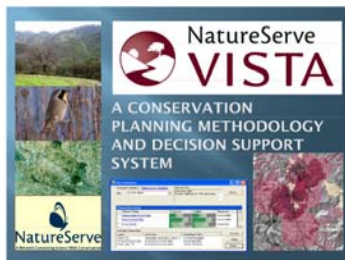


play

2. Message dilemma
3. Detail dilemma
- Between-component dilemmas**
4. Reflection dilemma
5. Representation dilem
6. Translation dilemma
- Trilemmas**
7. Assessment trilemm
8. Subject trilemma
9. Scope trilemma



ToSIA



NatureServe VISTA

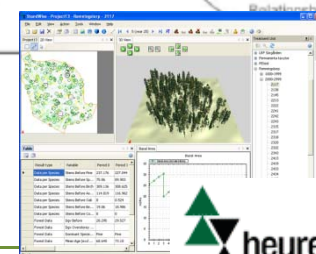
A CONSERVATION PLANNING METHODOLOGY AND DECISION SUPPORT SYSTEM

meaning

reality



ClimChaIP



heureka!



CONES



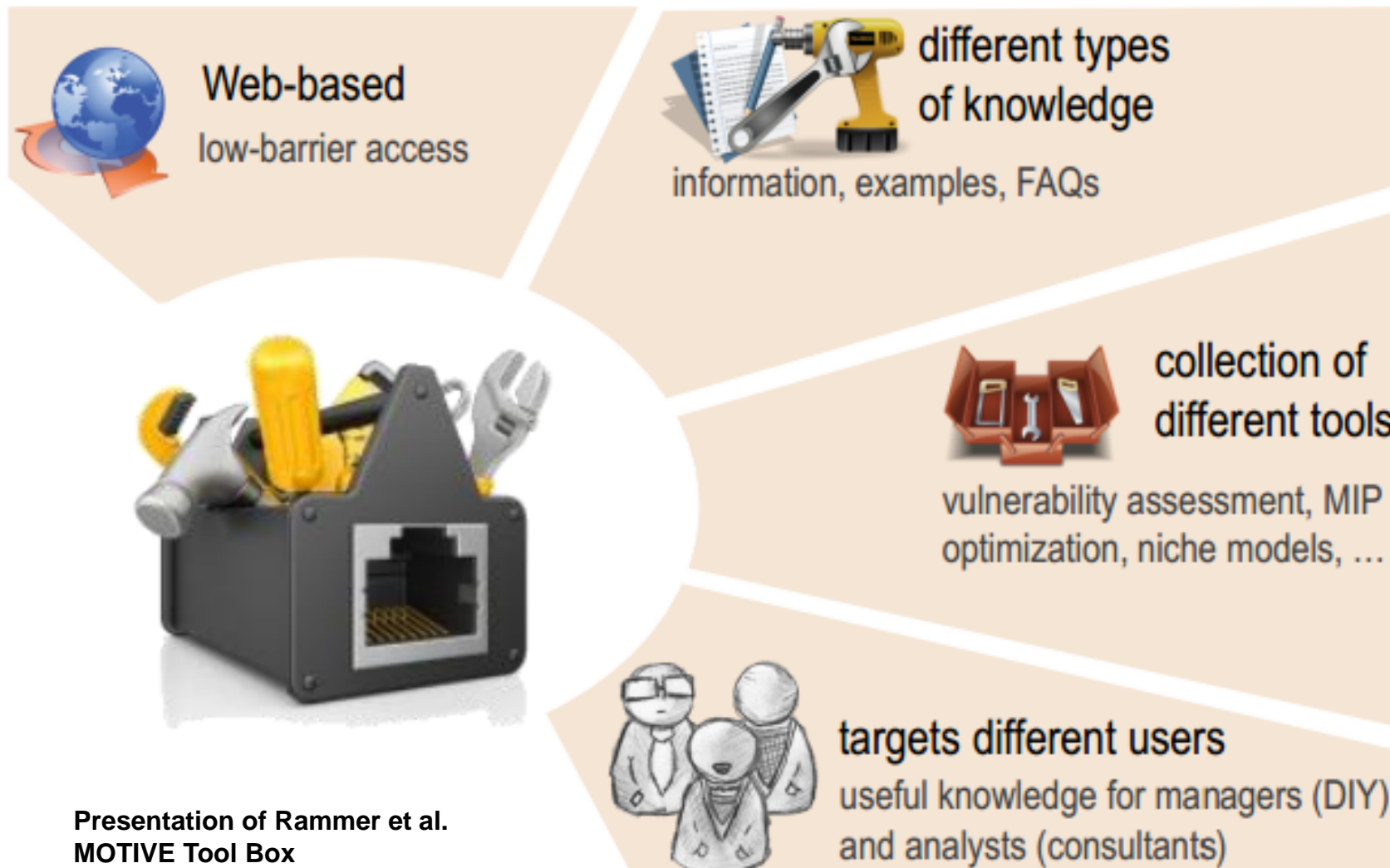
Harteveld (2009)

Changing user and model demands will stimulate DSS development

- demands for models and methods integrated in DSS will rise and lead to **complex systems**
- requests for **easy and smart tools** making use of available web services will increase
- decision makers will have **different preferences**
 - use multiple DSS-tools, each oriented toward a particular purpose, technique
 - use a single more complex DSS that encompasses multiple purposes, uses different techniques



The ToolBox approach



Presentation of Rammer et al.
MOTIVE Tool Box





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Thank's for your attention!

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