SDI Effectiveness from the User & Use Perspective

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Outline of the Presentation

- Why user/use perspective?
- Why effectiveness?
- Concepts and measures of effective use of IS/GIS/SDI
- Empirical results from a US survey
- Further discussion and conclusion

Why SDI User/Use Perspective?

- Most definitions emphasize the importance of use and users of SDI:
  - The networked spatial databases and data handling … facilitating the sharing, access to and responsible use of spatial data … *(Groot and McLaughlin 2000, p. 3).*
  - SDI should be user-driven *(Williamson 2003, Masser 2005)*
- Discovery, access and use are often used interchangeably
- Current measures of SDI are limited within metadata, clearinghouse usability, geo-portal hits, standards

Why Effectiveness?

- Discovery and access = prerequisites for use
- The SDI investments are recuperated through substantive applications in various societal realms (emergencies, sustainable urban development, alleviation of poverty, governance) = THE EFFECT
- Few studies attempt to explore the context and nature of SDI use: Nedovic-Budic et al. (2004), Harvey & Tulloch (2006), Puri (2006) and others
- Our focus is on SDI effectiveness

Concepts & Measures

Author	Concept	Definition	Measures
Clapp et al. (1989) (LIS Lit)	Operational effectiveness	Program outputs that include information availability and satisfaction of information needs, quality and service	• Accuracy of positional and attribute data • Availability of current data • Data collection time • Accessibility of maps and tabular data
	Program effectiveness	Effects in terms of timely problem recognition and enhanced decision making	• Time needed to make decisions • Explicitness of decisions • Identification and clarification of conflicts • Communication and interpretation of information • Confidence in analyses

Concepts & Measures

Author	Concept	Definition	Measures
DeLone and McLean (1992) (IS Lit)	Use	Amount, nature, level and duration of use	• Number of functions performed • Reports generated • Charges for system use • Frequency of access • Use for intended purpose • Type of information used
	Individual effects	Information value if use influences decisions	Information understanding, learning, awareness, problem identification, decision effectiveness
	Organizational effects	Improvement in organizational performance including better understanding of decision context	• Productivity • Return on investment • Product quality

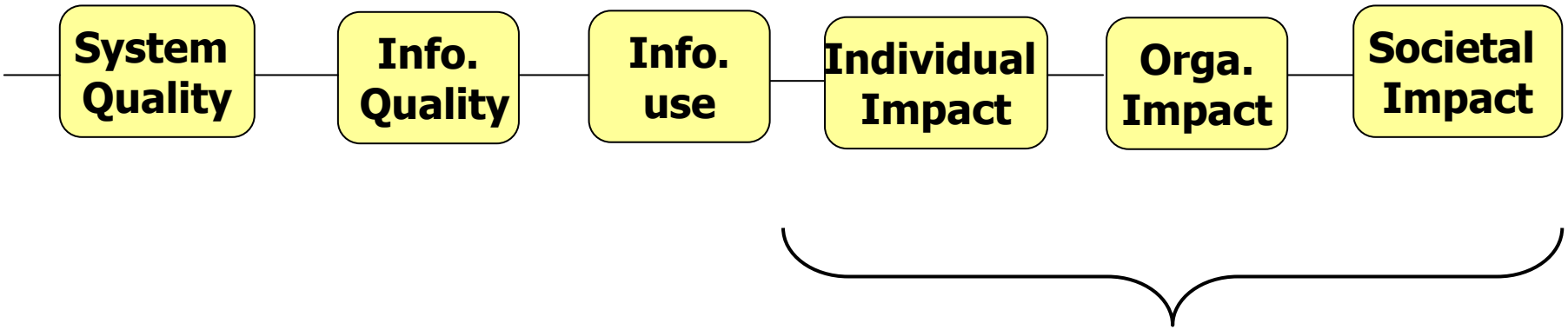
Concepts & Measures

Author	Concept	Definition	Measures
Calkins and Obermeyer (1991) (GIS Lit)	Effective use of GI	Improvement in decision-making through the use of geographic information	• Assumptions questioned • Decision alternatives evaluated • Decisions modified/changed
Tulloch et al. (1996) (GIS Lit)	Effectiveness of multipurpose LIS	Effectiveness benefits accrue across local government agencies once an MPLIS is used for analysis	• Better information • Higher information
Gerstein (2003) (ICT Lit)	Effective use	Capacity and opportunity to successfully integrate ICTs to achieve users' self- or collaboratively defined goals	Goal achievement

Concepts & Measures

Author	Concept	Definition	Measures
Blomberg et. al. 1994. (ICT Lit)	Usefulness	System's functionality actually makes sense and adds value in relation to a particular work setting	
Mundel (1983) (IS Lit)	Organizational effectiveness	Organizational performance	• Improvement in product quality • Accomplishes an intended purpose
Zwart (1991) (LIS Lit)	Value of LIS	Degree to which information generated by a system is used and the level of importance of decisions	Decisions: not even referred to, used to support values or decisions, or used to change values or decisions. Importance: important and not so important.

Summary of the Concepts and Measures



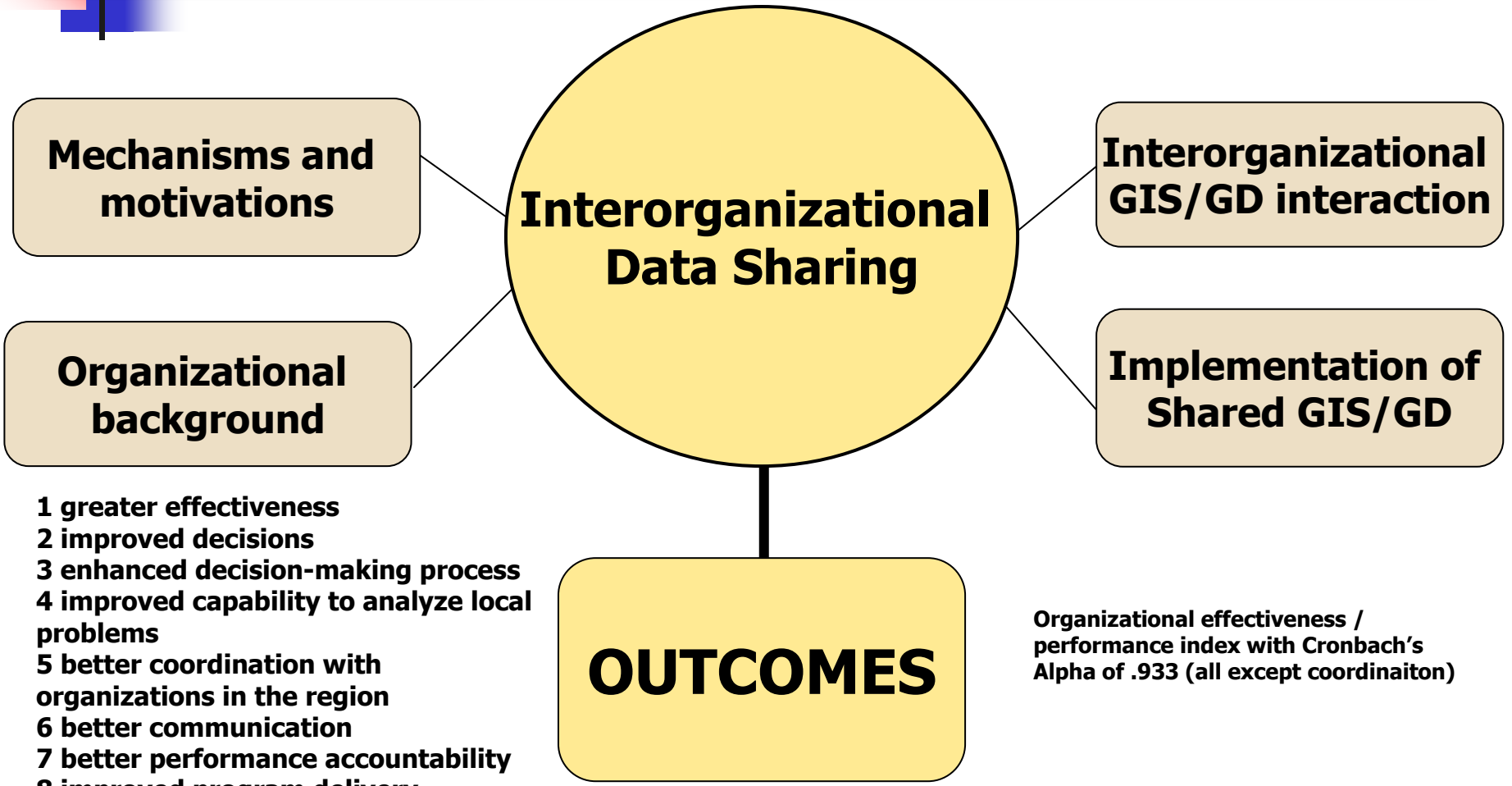
Survey of Interorganizational Data Sharing in the US

- National US survey conducted in 2000
- 107 clusters were targeted in the non-random purposive sampling; all 50 states; 2 clusters per state (except the least and most populous)
- Clusters were identified through NSGIC/FGDC 1998 Framework Survey, literature, telephone screening
- 529 questionnaires distributed; 245 returned (46% response rate); 228 analyzed (at least 2 responses per cluster required)
- Analysis: descriptive statistics, Chi-square cross tabulations, factor analysis, discriminant analysis, and proc mix regression (hierarchical)

Results relevant for understanding of SDI:

Information infrastructure share some characteristics of interorganizational or distributed information systems *(Hanseth and Monterio, Unpublished Book)*

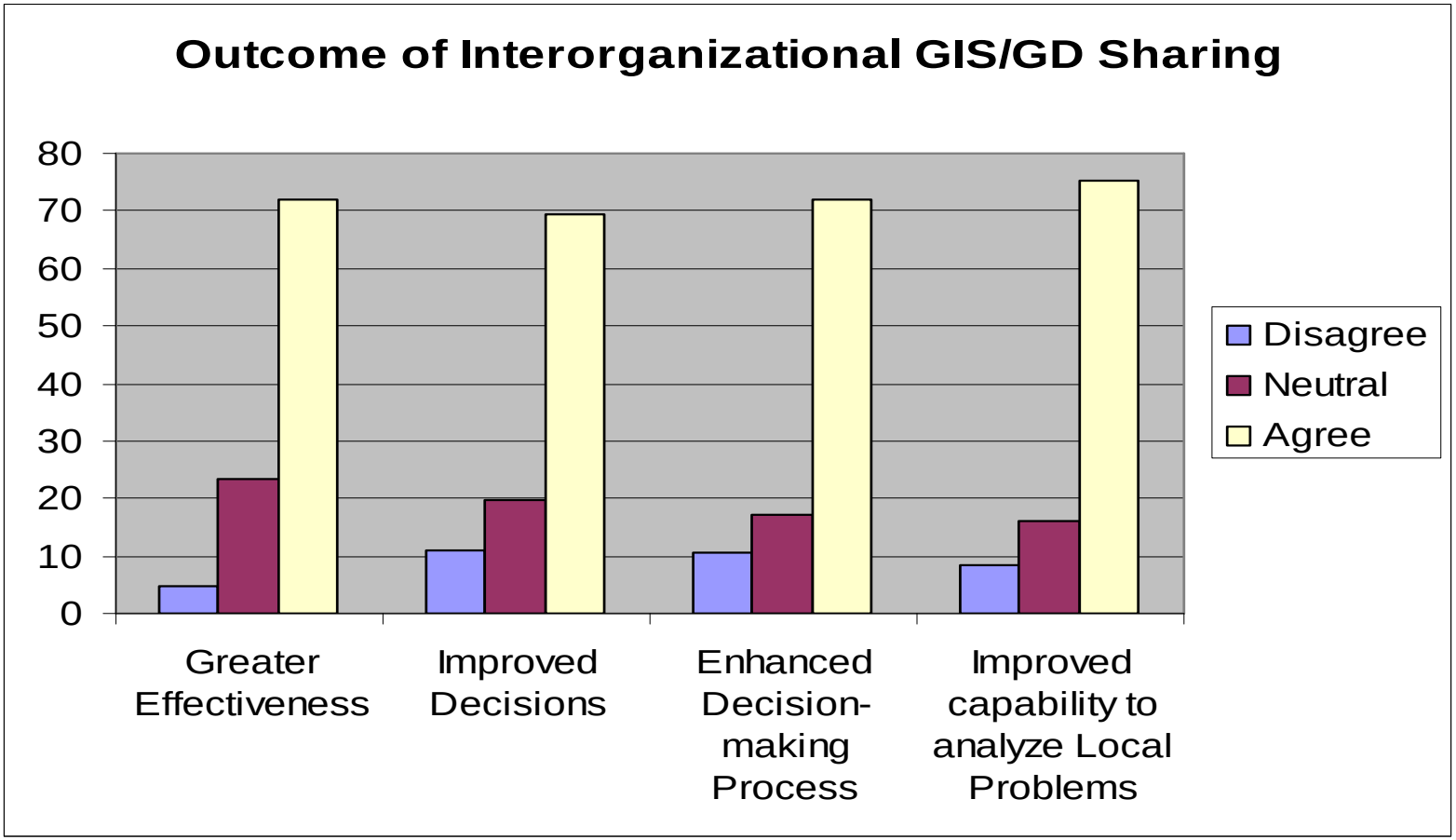
Sections of the Survey



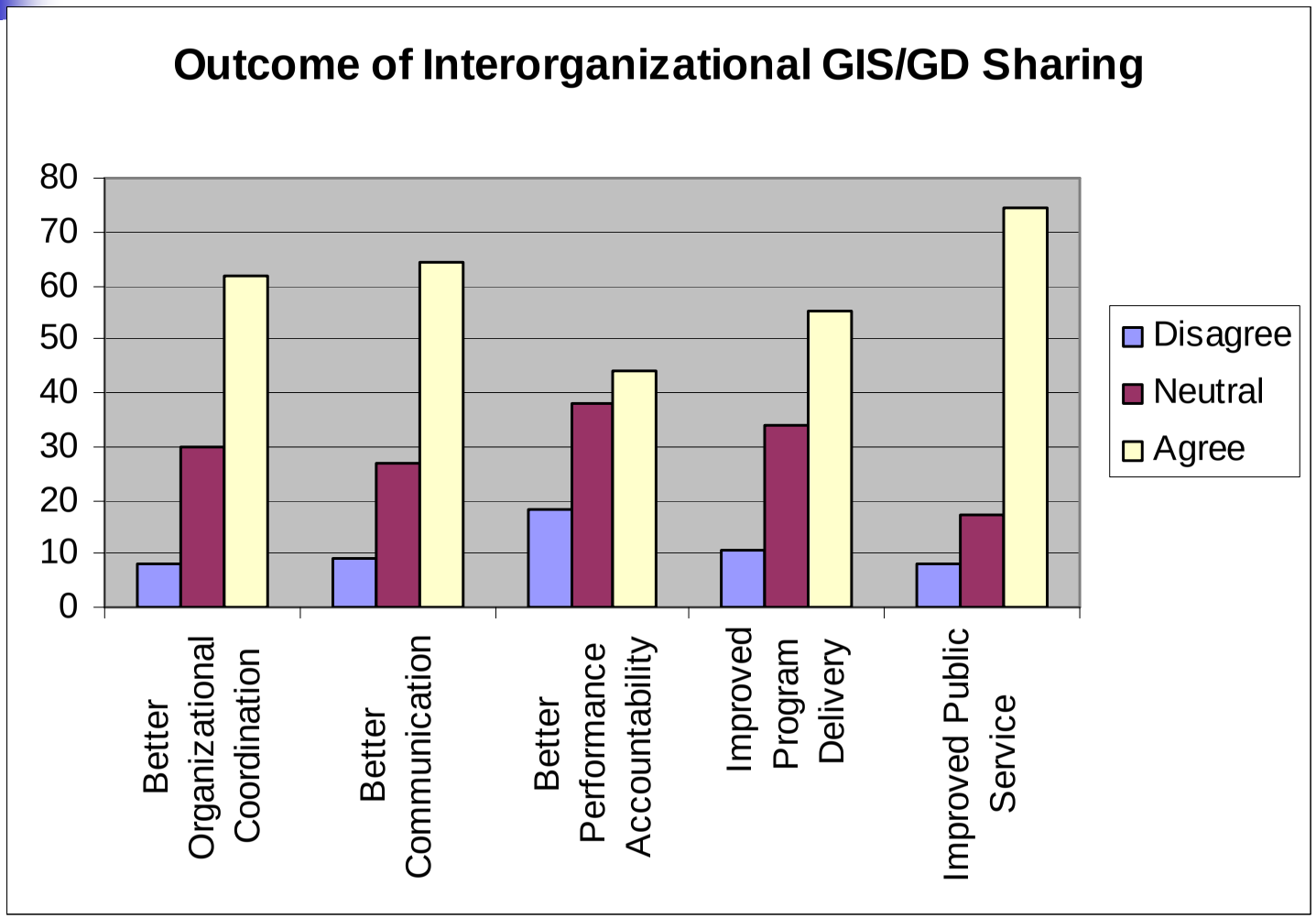
1 greater effectiveness
2 improved decisions
3 enhanced decision-making process
4 improved capability to analyze local problems
5 better coordination with organizations in the region
6 better communication
7 better performance accountability
8 improved program delivery
9 improved public service

Organizational effectiveness / performance index with Cronbach's Alpha of .933 (all except coordinaiton)

Findings: *Effectiveness*



Findings: *Effectiveness*



Outcomes against Process and Structural Variables

Independent Variables	Organizational effectiveness
ORG. RESOURCES [RESSCALE]	0.3702
COOP. HISTORY [COOSCALE]	0.0413
ORG. STABILITY [STASCALE]	0.8276
SHARED ACCESS [ACCSCALE]	0.6567
INTERORG. PROCESS [IORSCALE]	0.0637
LEADERSHIP & MGMT. [LEASCALE]	0.0057
IMPLEM. CAPACITY [CAPSCALE]	0.3352
[REGION]	0.5725
[SIZE] – POPULATION	0.7166
[GIS_IS] UNIT VS OTHERS	0.0640
[EXTENT] – COORD. DATABASE	0.4194
[NATURE] – FORMAL	0.6688
[PARTICIP]ATION – LEAD MEMBER	0.3471
[CONTRIB2]UTION – FINANCIAL	0.7436
Interactions	
LEASCALE*REGION	

Outcomes against Process and Structural Variables

Independent Variables	organizational effectivenesss
LEASCALE*GIS_IS	0.0435
LEASCALE*EXTENT	
LEASCALE*NATURE	
LEASCALE*PARTICIP	
LEASCALE*CONTRIB	
REGION*SIZE	
REGION*EXTENT	
REGION*NATURE	
REGION*PARTICIP	
REGION*GIS_IS	
SIZE*NATURE	
SIZE*PARTICIP	
GIS_IS*EXTENT	
GIS_IS*NATURE	
GIS_IS*PARTICIP	
GIS_IS*CONTRIB	
EXTENT*PARTICIP	
*NATURE*PARTICIP*	0.0682
NATURE*CONTRIB	
CONTRIB*PARTICIP	

Effectiveness against Interorganizational Process Variables

INTERORGANIZATIONAL PROCESS VARIABLES	EFFECTIVENESS (index)
1 MORE RESOURCES & CONTROL	
2 UNCOOPERATIVE PARTICIPANTS	
3 CONTRIBUTED LESS THAN COULD AFFORD	
4 NEGOTIATION PRACTICED	
5 PERSISTANCE	+
6 A LOT OF EXTRA TIME SPENT	
7 WILLINGNESS TO ADJUST	
8 POSITIVEE NEGOTIATION EXPERIENCE	
9 UNDERSTANDING FOR NEEDS & PRIORITIES OF OTHERS	

	Statistically significant at 0.05 level
+	Positive relationship
-	Negative relationship

Effectiveness against Interorganizational Process Variables

INTERORGANIZATIONAL PROCESS VARIABLES	EFFECTIVENESS (index)
10 OWN GOALS COME BEFORE COOPERATION	
11 COMMUNICATION PRACTICED	+
12 PARTICIPANTS DIFFICULT TO ACCESS	
13 REDEFINED OWN SCOPE OF WORK	
14 WORK & RESOURCES EXPENDED FOR OTHERS	+
15 LEADERS COMMITTED TO SHARING	
16 NEW RESPONSIBILITIES BACKED BY RESOURCES	
17 CONTRIBUTIONS RELATIVE TO RETURNS	
18-19 ACCESS TO SHARED COMPONENTS (SCALE)	
20 EQUAL DECISION-MAKING POWER	
21 DEFINED ROLES AND RESPONSIBILITIES	+

	Statistically significant at 0.05 level
+	Positive relationship
-	Negative relationship

Discussion

- Goal achievement depends on how clearly goals are defined; Clarity and consistency of policy, program
- Levels of effectiveness: operational, management, or strategic levels? (Worrall 1994)
- Heffron (1989) notes the multidimensionality and difficulty of measuring the concept of effectiveness.
- Different actors perceive SDI use differently. Then, how to measure effectiveness and for whom?

Discussion

- Relevant questions: How do users seek information and why? How is information put to use? How do information needs and activities change over time?
- Two levels of analysis: individual and organizational users; passive and active
- Users' sense-making (Dervin and Nilan 1986, Dervin 1989), domestication of IS (Stewart and Williamson 2005), and situated use (Bruce 1999)-– concepts still to be translated and used in SDI context

Conclusions

- Use and users' perspective focusing on effective use--one of the approaches for SDI evaluation
- Survey results provide a sense of the perceived effectiveness of GI sharing; dependent on the process, relationships
- Both theoretical and methodological issues need to be addressed in measuring SDIs from use and users perspective

Comments and suggestions !