

# What is a Successful Digital Library?

**ECDL 2006, Alicante, September 18, 2006**

Rao Shen, Naga Srinivas Vemuri, Weiguo Fan, and  
Edward A. Fox

fox@vt.edu      <http://fox.cs.vt.edu>

# Acknowledgements (Selected)

- **Sponsors:** NSF grant ITR-0325579, ASOR, CWRU, ETANA, Vanderbilt U., Virginia Tech
- **Faculty/Staff:** Lillian Cassel, Debra Dudley, Manuel Perez, ...
- **VT (Former) Students:** Aaron Krowne, Ming Luo, Fernando Das Neves, Ricardo Torres, Hussein Suleman, ...

# Acknowledgements (Selected)

- **Karen Borstad**, MPP
- **Giorgio Buccellati**, UCLA
- **Douglas Clark**, Walla Walla College
- **Joanne Eustis**, CWRU
- **Nick Fischio**, CWRU
- **Israel Finkelstein**, Tel-Aviv University
- **Paul Gherman**, Vanderbilt U.
- **Andrew Graham**, U. Toronto
- **Tim Harrison**, U. Toronto
- **Larry Herr**, Canadian University College
- **Christopher Holland**, LRP
- **Paul Jacobs**, Mississippi State U.
- **Douglas Knight**, Vanderbilt U.
- **Stan LaBianca**, Andrews U.
- **David McCreery**, Willamette U.
- **Eric Meyers**, Duke U.
- **Adam Porter**, Illinois College
- **Jack Sasson**, Vanderbilt U.
- **Tom Schaub**, Indiana U. of Penn.
- **Randall Younker**, Andrews U.

## ABOUT ETANA

ABZU



# ETANA

Electronic Tools and Ancient Near Eastern Archives

CORE  
TEXTS

## ARCHAEOLOGICAL PROJECTS

Copyright 2003 ETANA  
ETANA is a cooperative project of:

American Oriental Society | American Schools of Oriental Research | Case Western Reserve University  
Cobb Institute of Archaeology at Mississippi State | Oriental Institute of the University of Chicago | Society of Biblical Literature  
Sonia and Marco Nadler Institute of Archaeology of Tel Aviv University | Vanderbilt University | Virginia Polytechnic and State University

Support for ETANA has been provided by funding from the Andrew W. Mellon Foundation (8/00 to 2/02, 6/01 to 8/02)  
and the National Science Foundation (Continuing grant IIS-0325579)



# ETANA-DL Website

## ETANA-DL

Managing complex information applications:  
An archaeology digital library

[Login](#)

[New Account](#)

Search ETANA-DL for

[Visual Browse](#)

[Browse Collections](#)

[Help](#)



Want to know more about our  
collections? Click [here](#)

Your comments, suggestions and  
feedback are important to us!  
[Let us know](#) what you think.

### Welcome to ETANA-DL

This research proposes to develop a digital library (DL) for ancient Near Eastern studies with two archaeological components: DigBase (DB) - a repository and an archive for archaeological data from the Near East and beyond, and DigKit (DK) - a compatible field tool for collecting and recording archaeological data during archaeological surveys and excavations. DB is a model-based, extensible, archaeological componentized DL that will manage complex archaeological information sources based on the client-server paradigm of the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH). DK is a compatible field tool for collecting, recording and exposing archaeological data in an OAI compliant manner during archaeological surveys and excavations.

If this is the first time you are visiting the Digital Library, you might want to go thru the [short tutorial](#).

### Recent Discussions

8/23/05 - [horse of figurine](#) by [rshen@vt.edu](mailto:rshen@vt.edu)

12/3/04 - [Re: test](#) by [unni@vt.edu](mailto:unni@vt.edu)

12/3/04 - [test](#) by [unni@vt.edu](mailto:unni@vt.edu)

[Home](#)

[About ETANA](#)

[CWRU](#)

[Vanderbilt](#)

[VT](#)

[Contact us](#)



This project is [funded](#) in part by [National Science Foundation's](#) [ITR](#) program

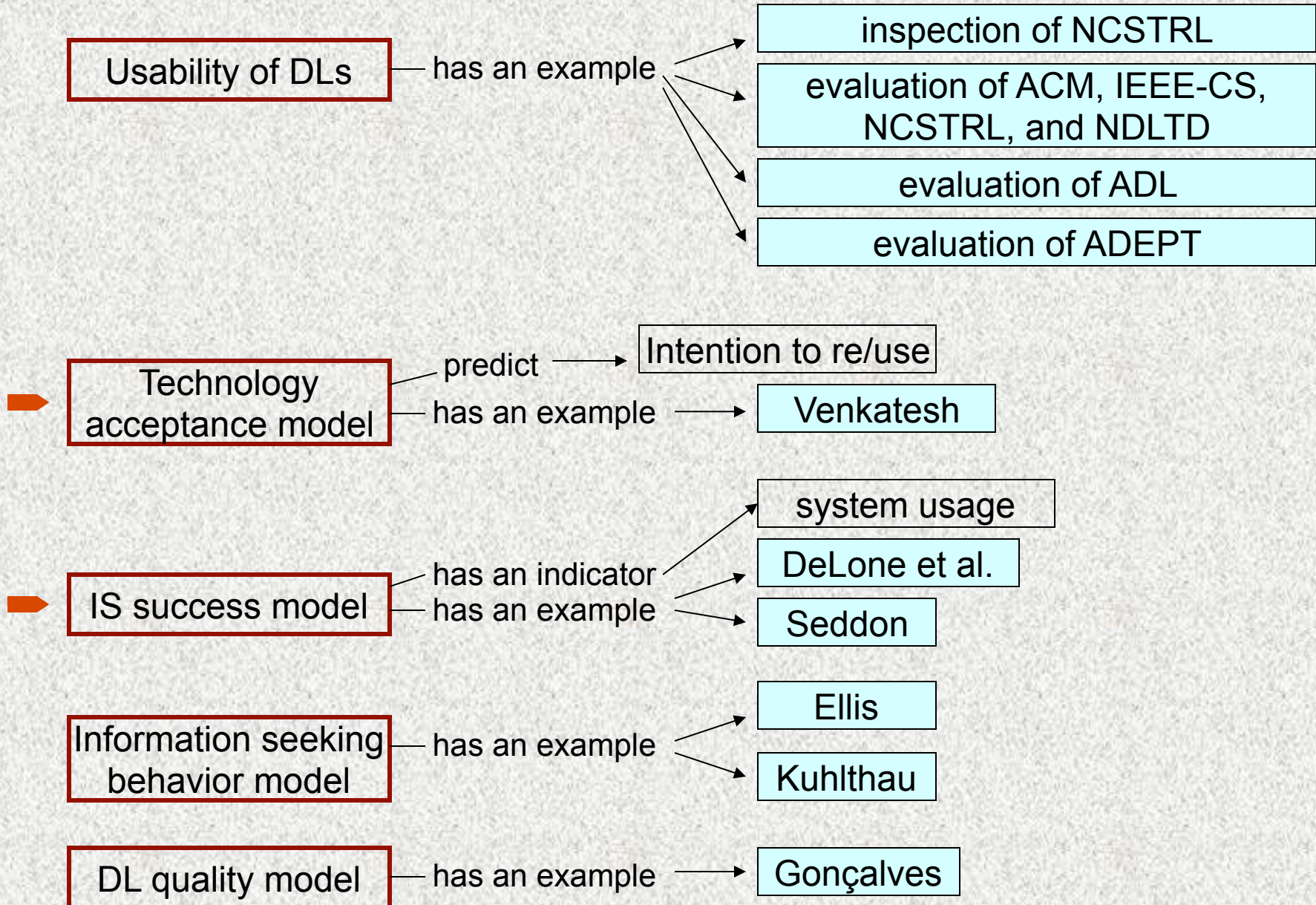
# ETANA-DL' s Member Collections

Site	Artifact Type	Original data source	Number of records harvested
Bab edh-Dhra'	Pottery	cp6 database file	7965
Lahav	Figurine	Tab-delimited text file	563
Madaba	Locus field record	Tables in Access DB	789
Megiddo	Flint	Tables in Access DB	4292
	Lab item	Tables in Access DB	11328
	Locus field record	Tables in Access DB	2163
	Miscellaneous artifact	Tables in Access DB	2453
	Pottery bucket	Tables in Access DB	9200
	Vessel	Tables in Access DB	1307
	Wall	Tables in Access DB	455
Mozan	Publication	PDF files	19
Nimrin	Bone field record	Tables in Oracle DB	7419
	Seed field record	Tables in Oracle DB	429
	Locus field record	Tables in Oracle DB	2102
Umayri	Bone field record	Tables in Access DB	2122
Total			49606

# Outline

- Prior work
- DL success model
  - From end user perspective
- Case study
- Conclusion

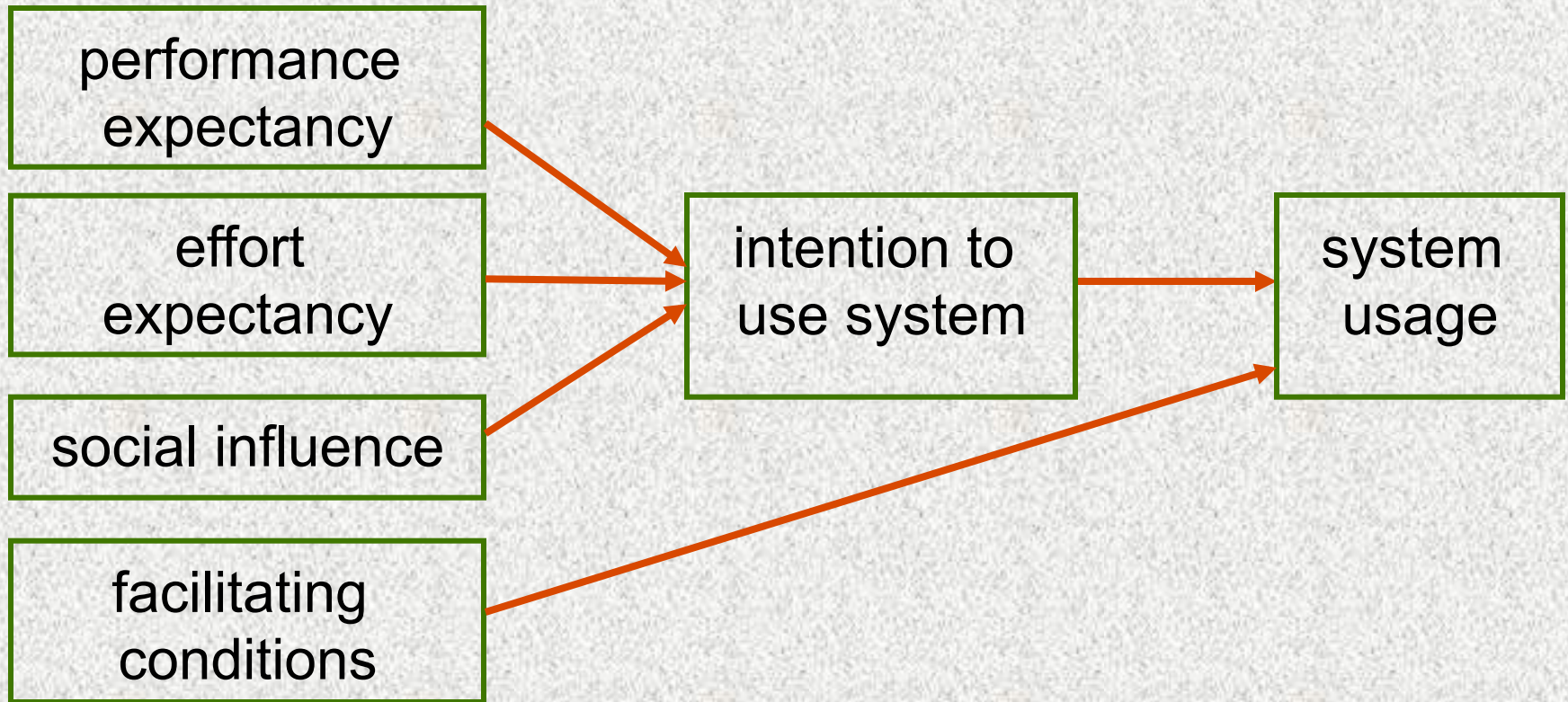
# Prior Work on Measuring DL Success





# Behavioral Attitude & Intension to Use — Venkatesh Model of IT Adoption

## Unified Theory of Acceptance and Use of Technology

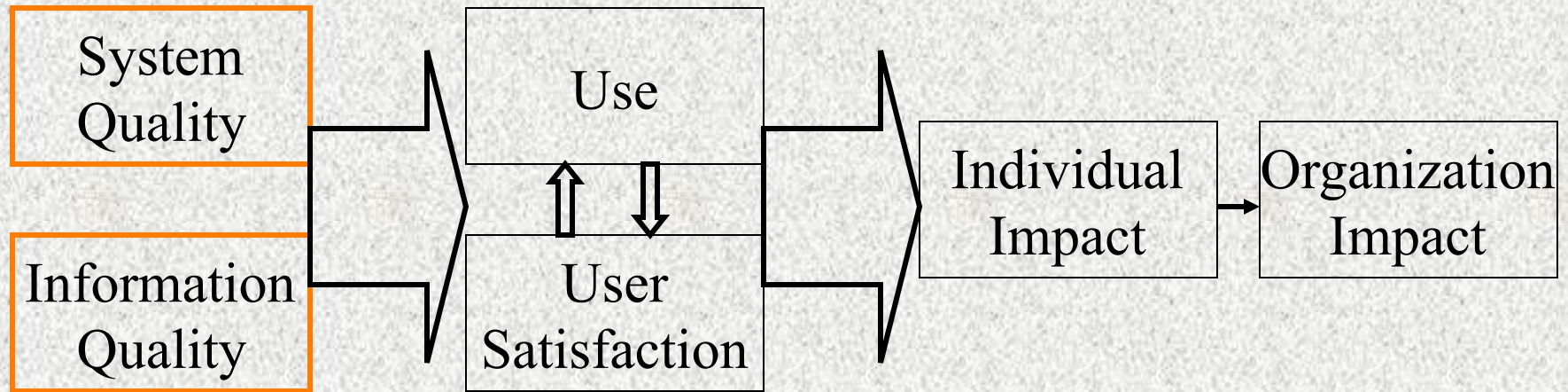


# Venkatesh Model of IT Adoption

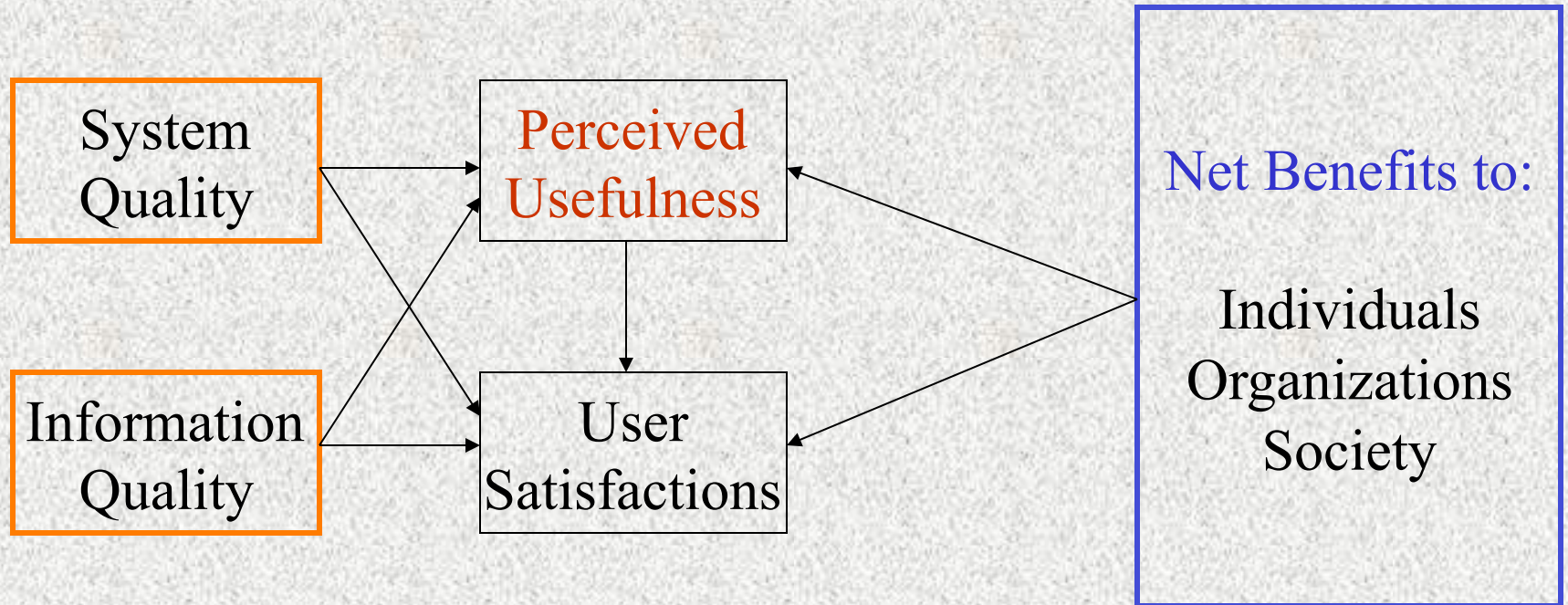
- Performance expectancy:
  - perceived **usefulness**, extrinsic motivation, job-fit, relative advantage, and outcome expectations
- Effort expectancy
  - the degree of **ease associated with the use of system**
- Social influence
  - Subjective norms, social factors, and image
- Facilitating conditions
  - the degree to which an individual believes that an organizational and technical infrastructure exist to support the system



# DeLone and McLean Model of IS Success



# Seddon Model of IS Success



# Outline

- Prior work
- **DL success model**
  - **From end user perspective**
- Case study
- Conclusion



# DL Success Model

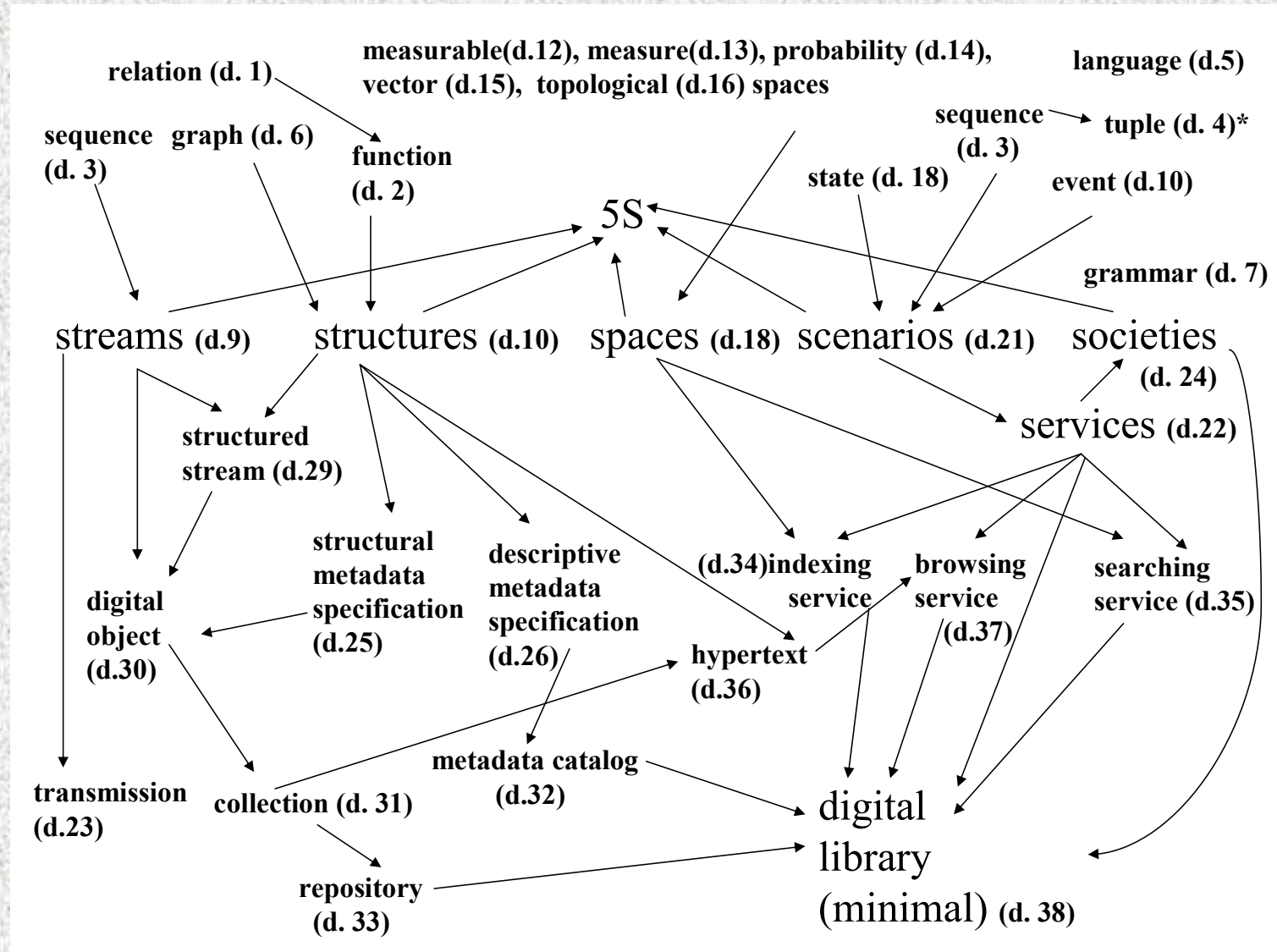
- 5S and minimal DL
- Synthesize
  - IS success and adoption models (see above)
  - Information life cycle model (Borgman et al.)
  - 5S-based DL quality model (Gonçalves et al.)
  - Information-seeking behavior models (Ellis' and Kuhlthau' s)
- From end user perspective

# Informal 5S & DL Definitions

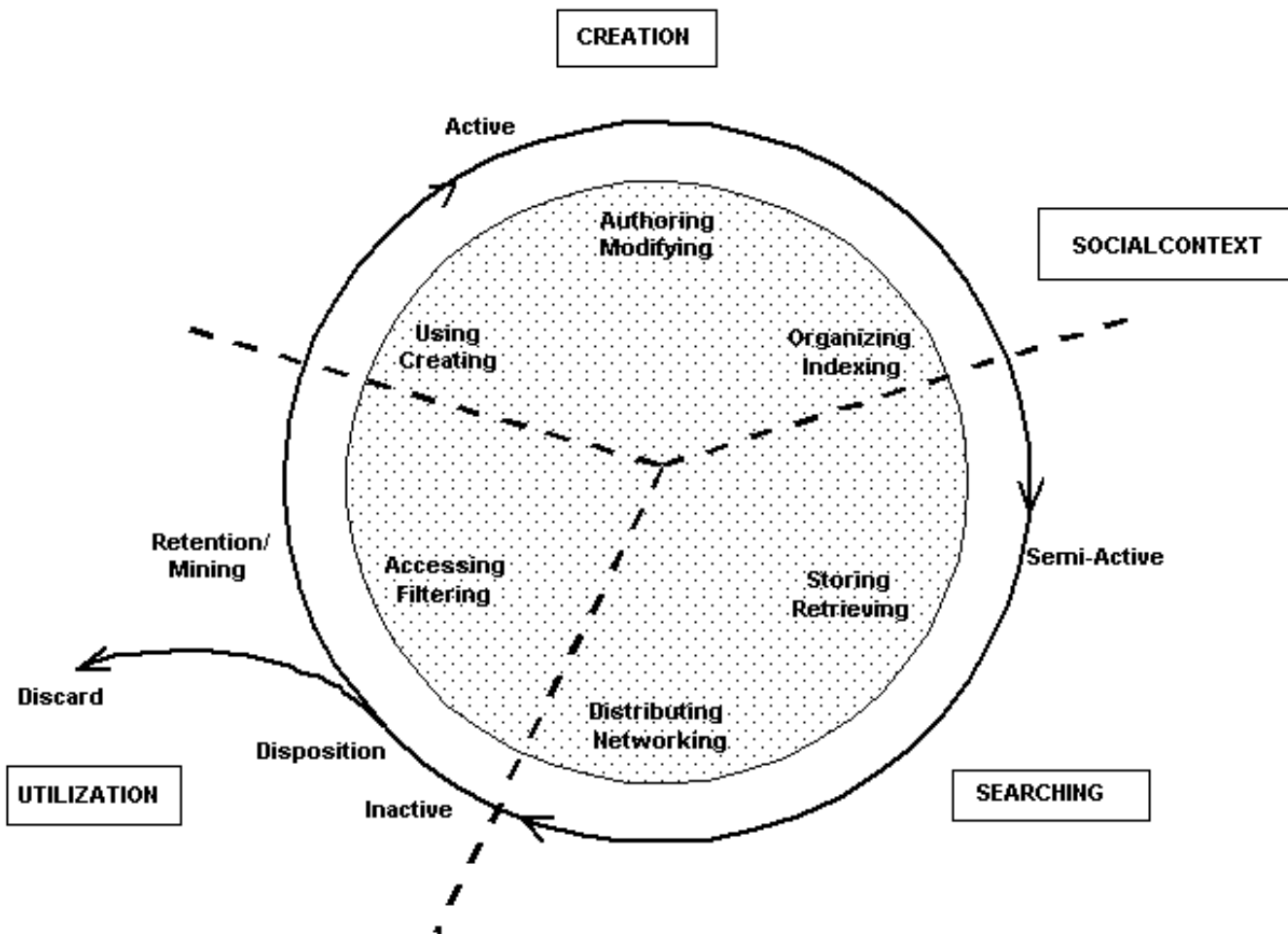
DLs are complex systems that

- help satisfy info needs of users (**societies**)
- provide info services (**scenarios**)
- organize info in usable ways (**structures**)
- present info in usable ways (**spaces**)
- communicate info with users (**streams**)

# 5S and DL formal definitions and compositions (April 2004 TOIS)



# Information Life Cycle

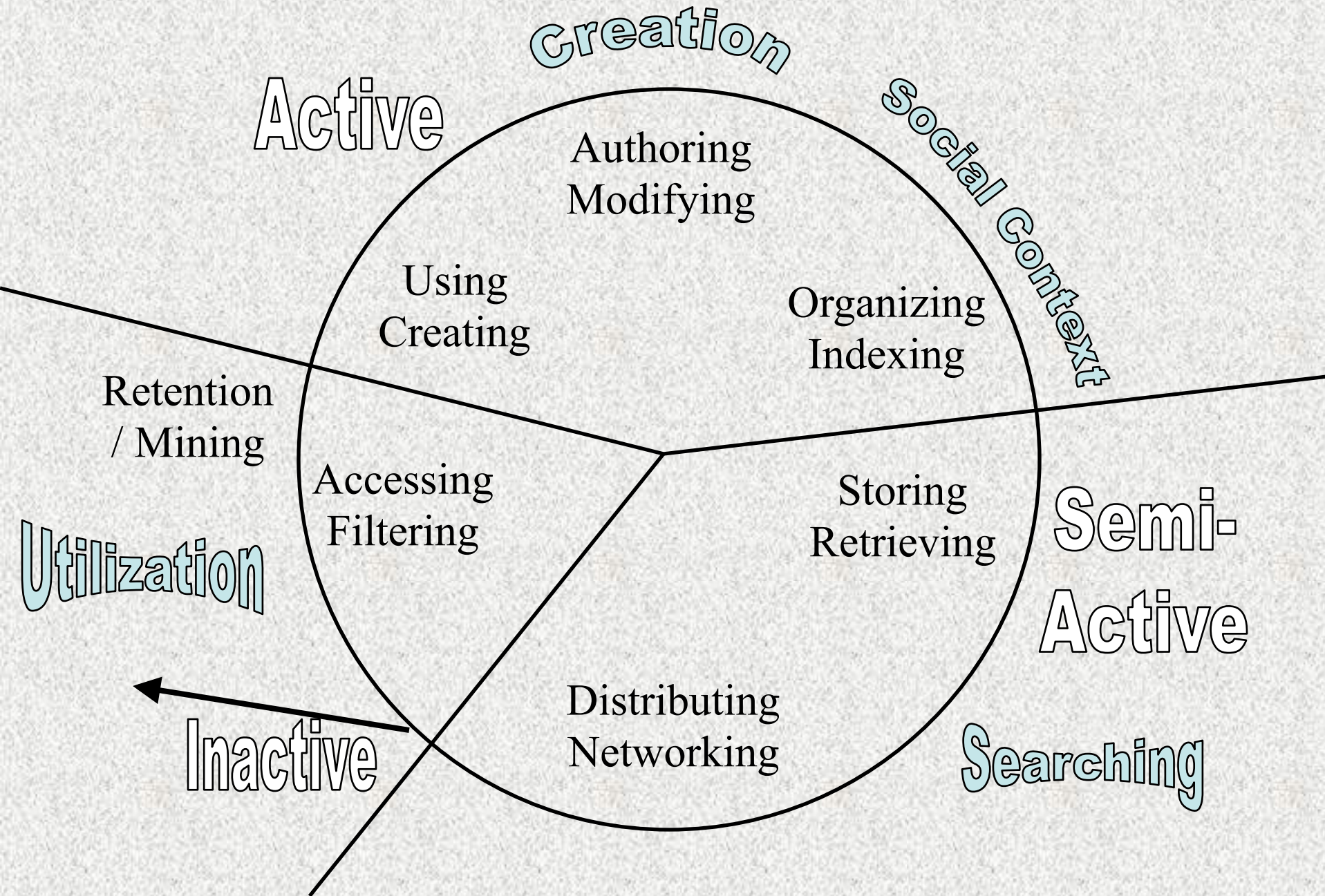


NOTE: The outer ring indicates the life cycle stages (active, semi-active, and inactive) for a given type of information artifact (such as business records, artworks, documents, or scientific data). The stages are superimposed on six types of information uses or processes (shaded circle). The cycle has three major phases: information creation, searching, and utilization. The alignment of the cycle stages with the steps of information handling and process phases may vary according to the particular social or institutional context.

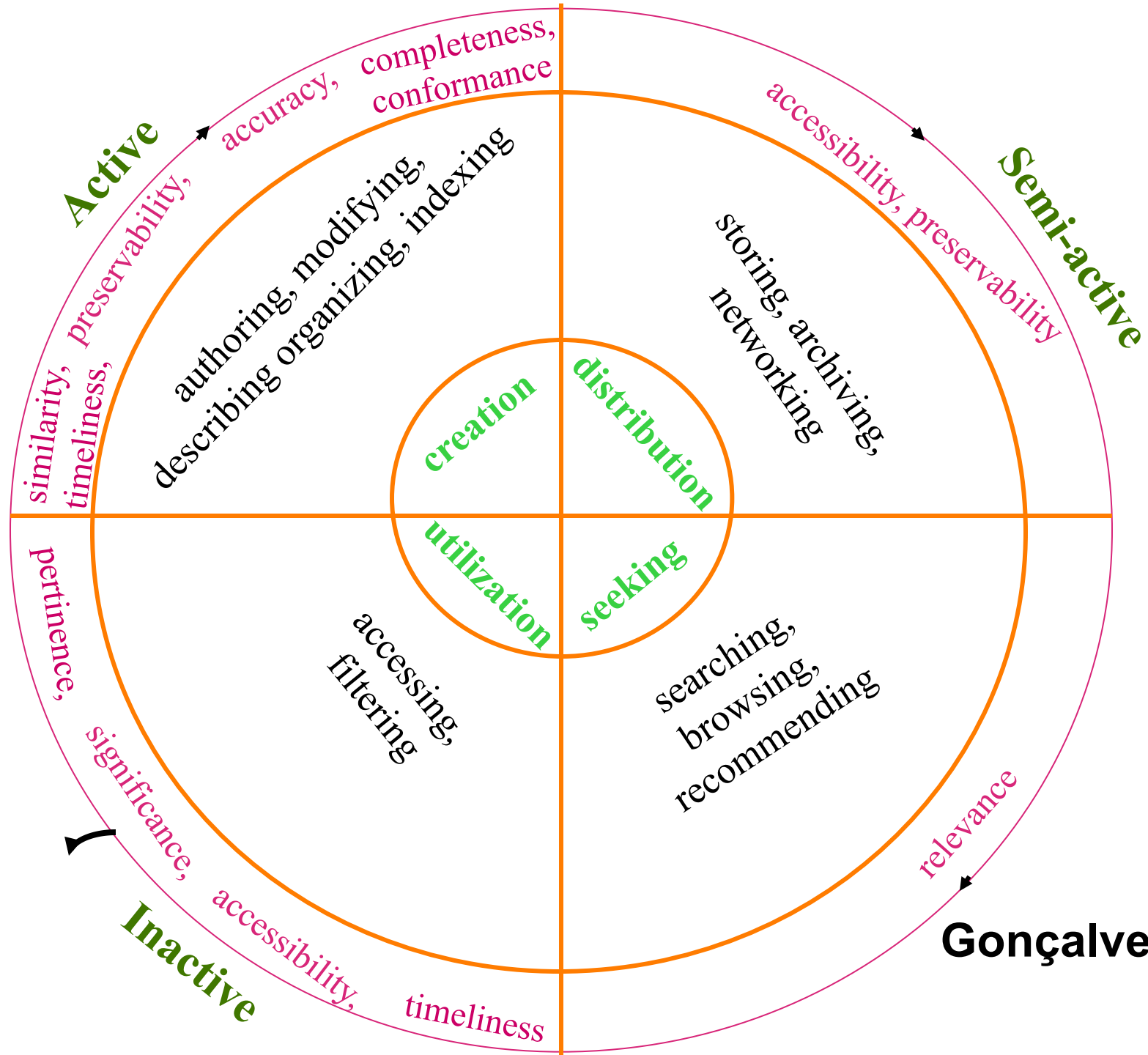
Borgman et al.:  
Workshop Report on  
Social Aspects of  
Digital Libraries:  
[http://www-lis.gseis.  
ucla.edu/DL/](http://www-lis.gseis.ucla.edu/DL/)



# Information Life Cycle



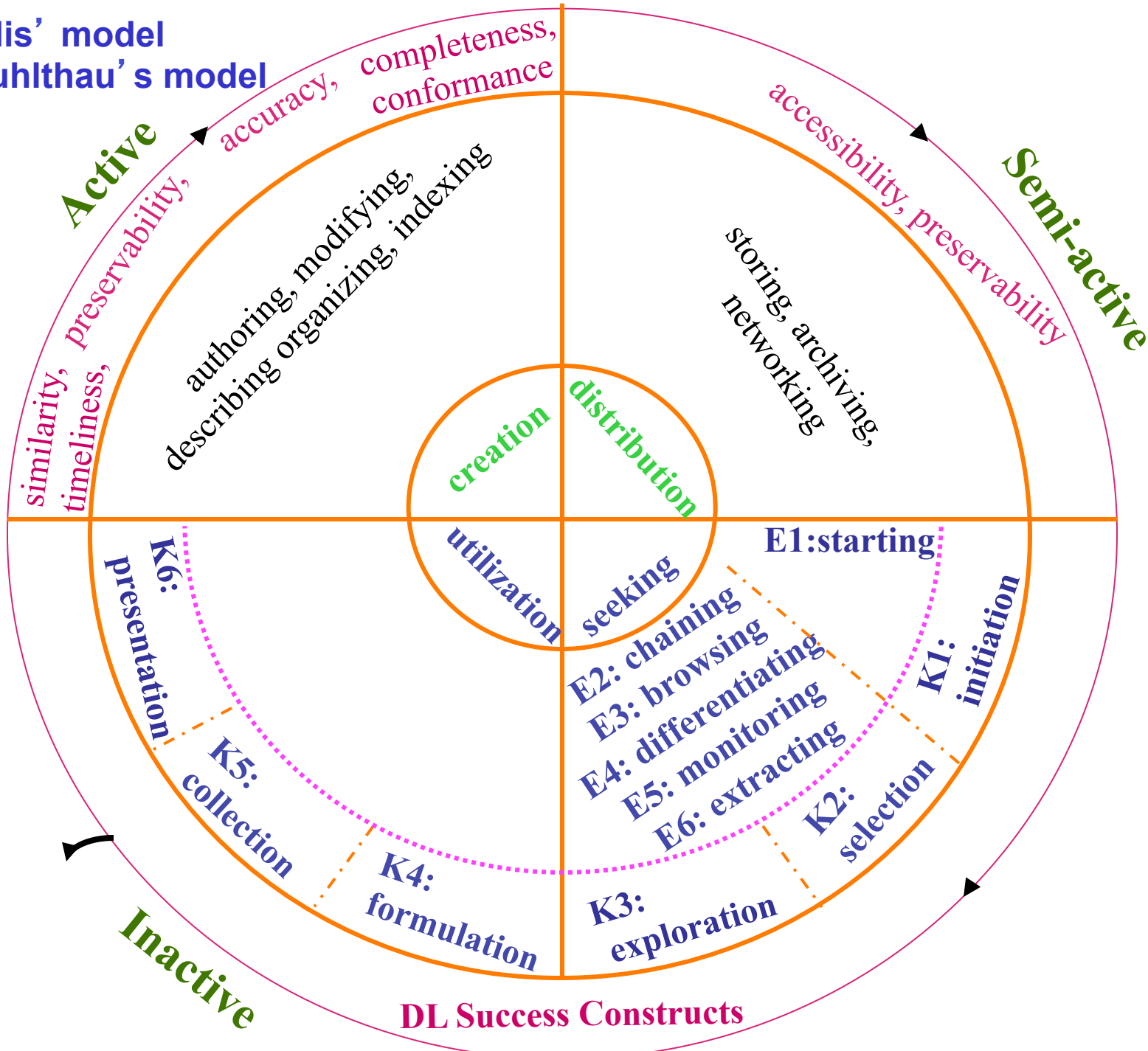




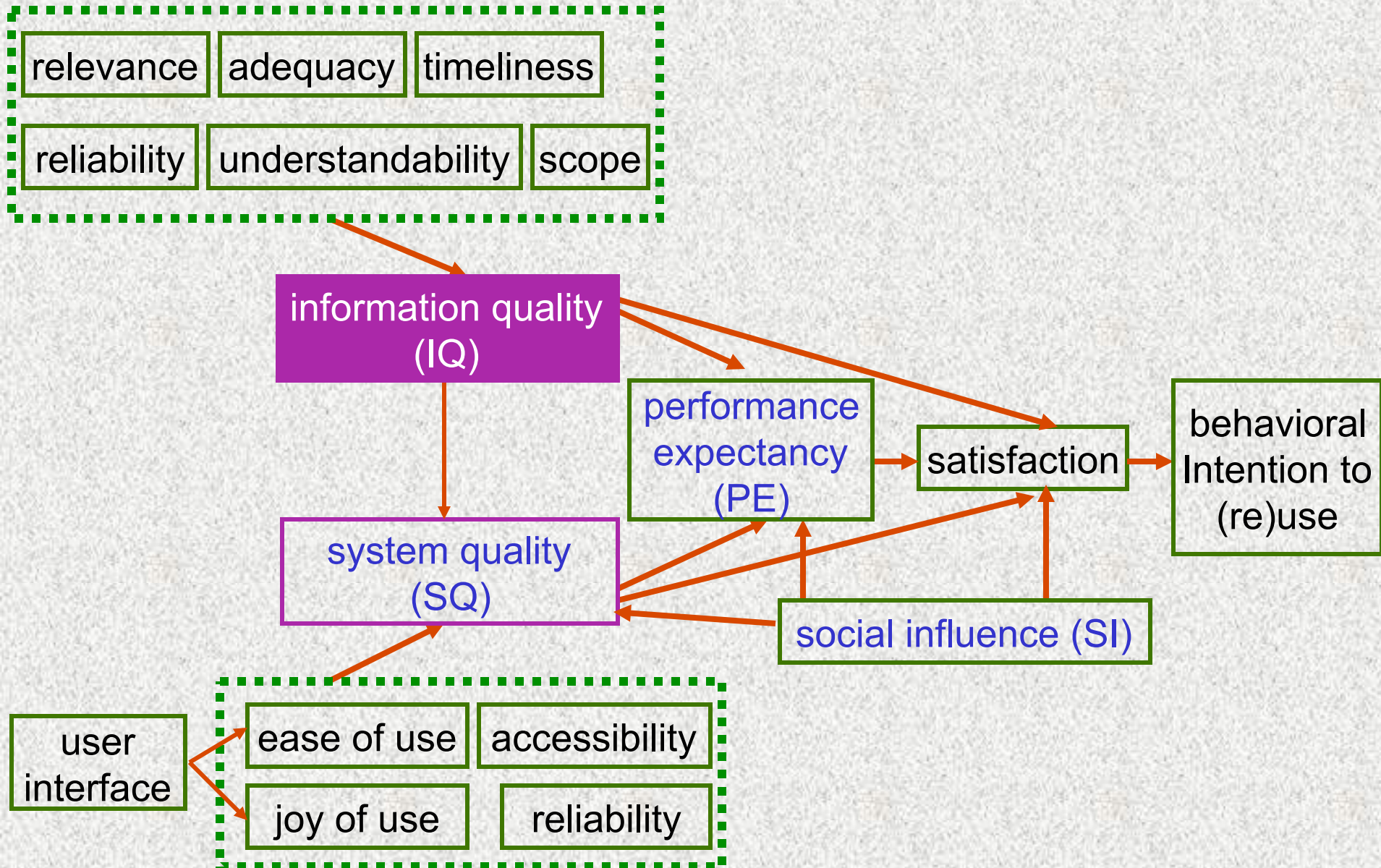
**Gonçalves et al.**

<b><i>DL quality dimension</i></b>	<b><i>DL success manifest variable</i></b>	<b><i>5S and DL concept</i></b>	<b><i>DL success construct</i></b>
<i>accessibility</i> <i>accuracy</i> <i>completeness</i> <i>consistence</i> <i>conformance</i> <i>pertinence</i> <i>preservability</i> <i>relevance</i> <i>significance</i> <i>similarity</i> <i>timeliness</i>	<i>adequacy</i> <i>relevance</i> <i>reliability</i> <i>scope</i> <i>timeliness</i> <i>understandability</i>	<u><i>stream, structure</i></u> <i>digital object</i> <i>metadata</i> <i>collection</i> <i>catalog</i> <i>repository</i>	<i>information quality (IQ)</i>
<i>composability</i> <i>efficiency</i> <i>effectiveness</i> <i>extensibility</i> <i>reusability</i> <i>reliability</i>	<i>accessibility</i> <i>reliability</i> <i>ease of use</i> <i>joy of use</i>	<u><i>society, scenario,</i></u> <u><i>space</i></u> <i>service</i>	<i>system quality (SQ)</i> <i>performance expectancy (PE)</i>
	<i>DL visibility</i>	<u><i>society</i></u>	<i>social influence (SI)</i>

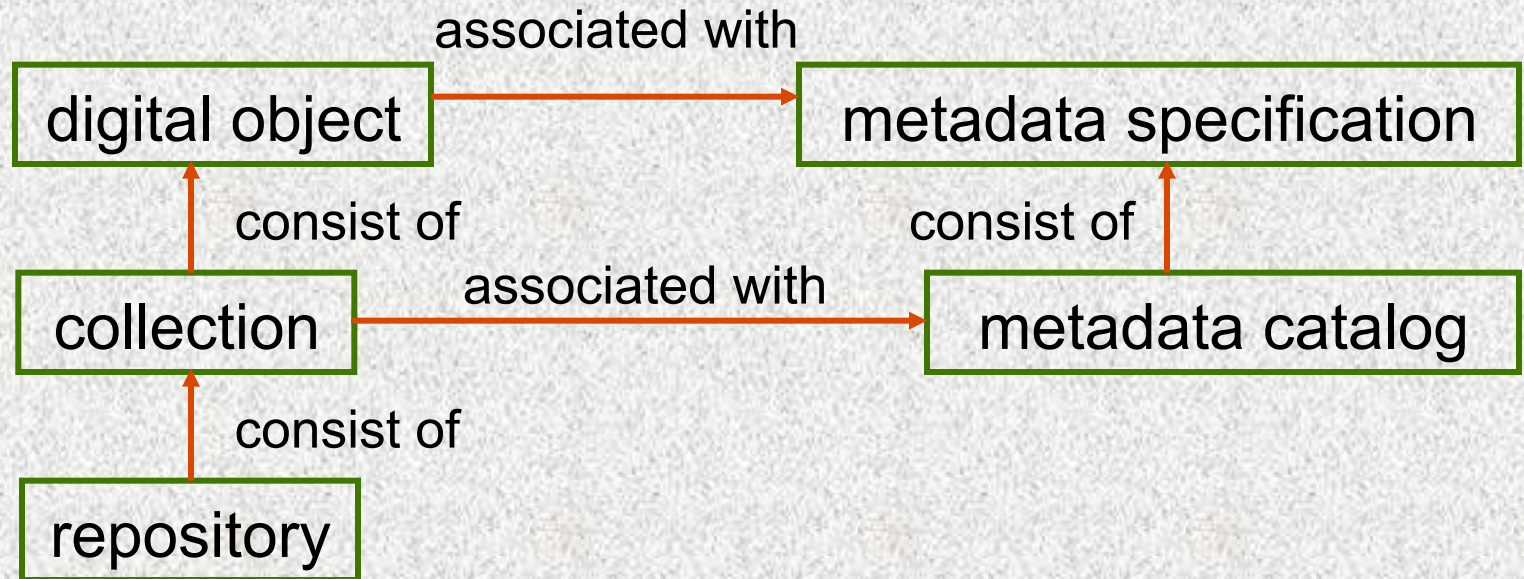
E: Ellis' model  
K: Kuhlthau's model



# DL Success Model

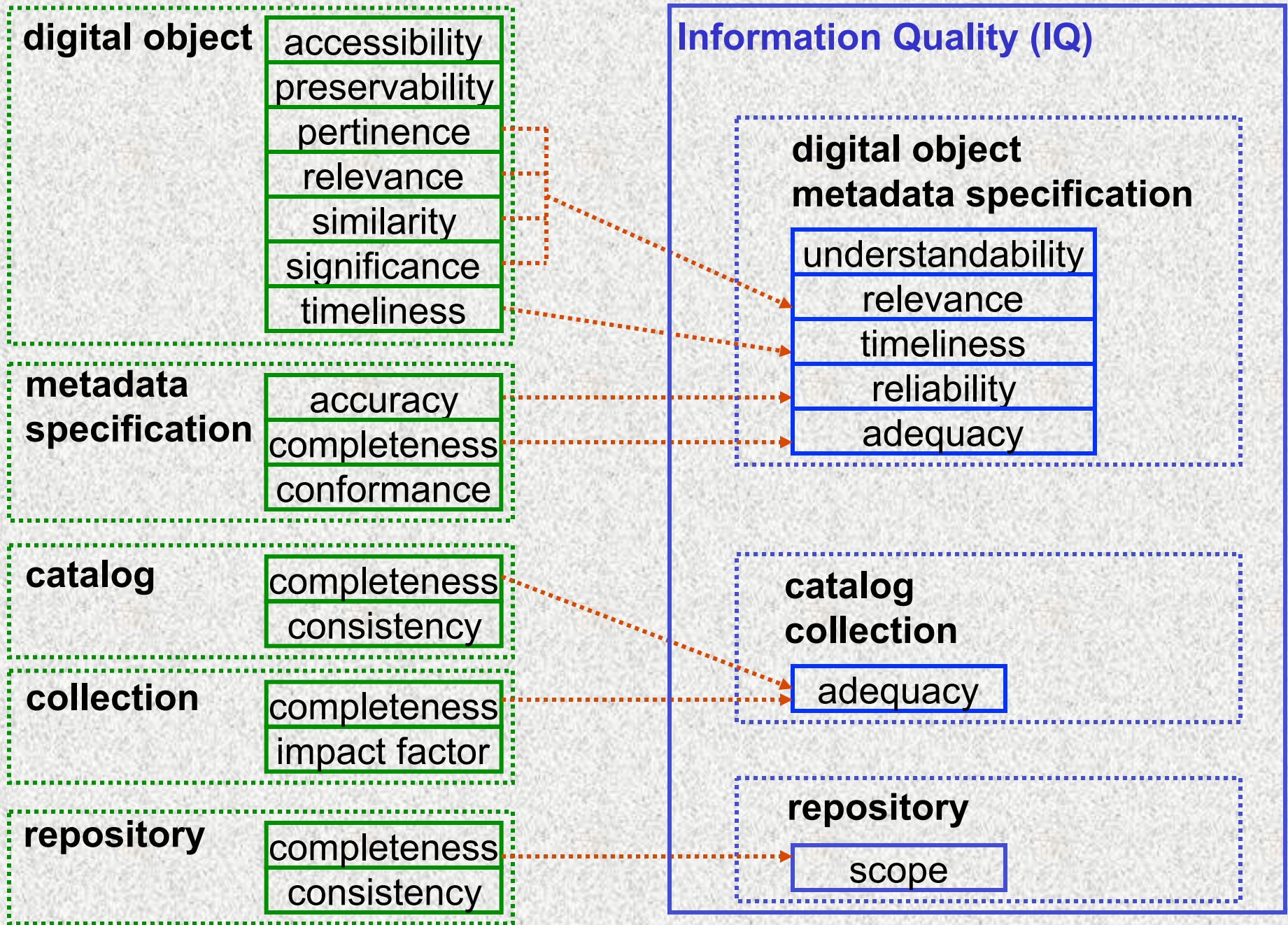


# DL Concepts Regarding Information

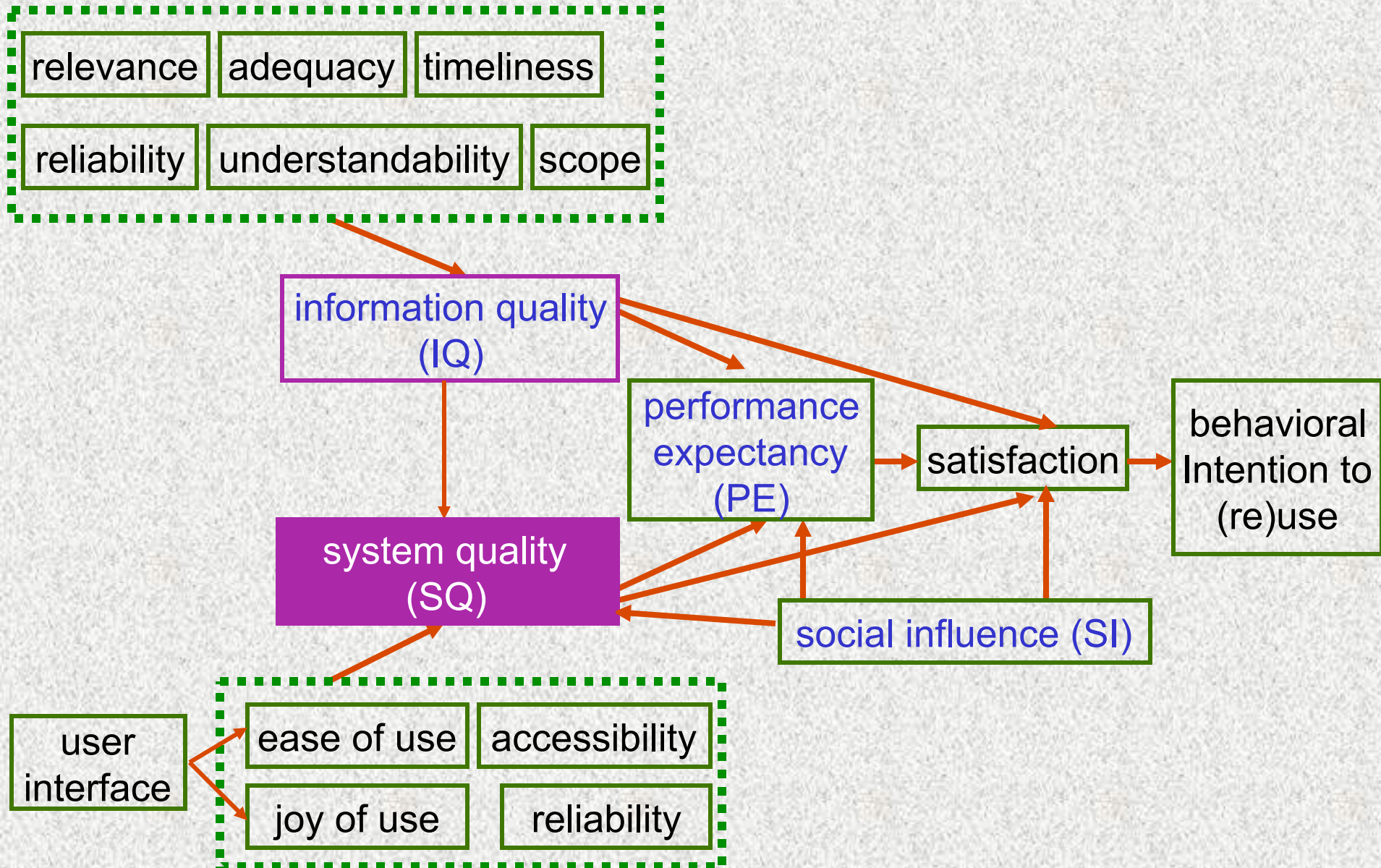




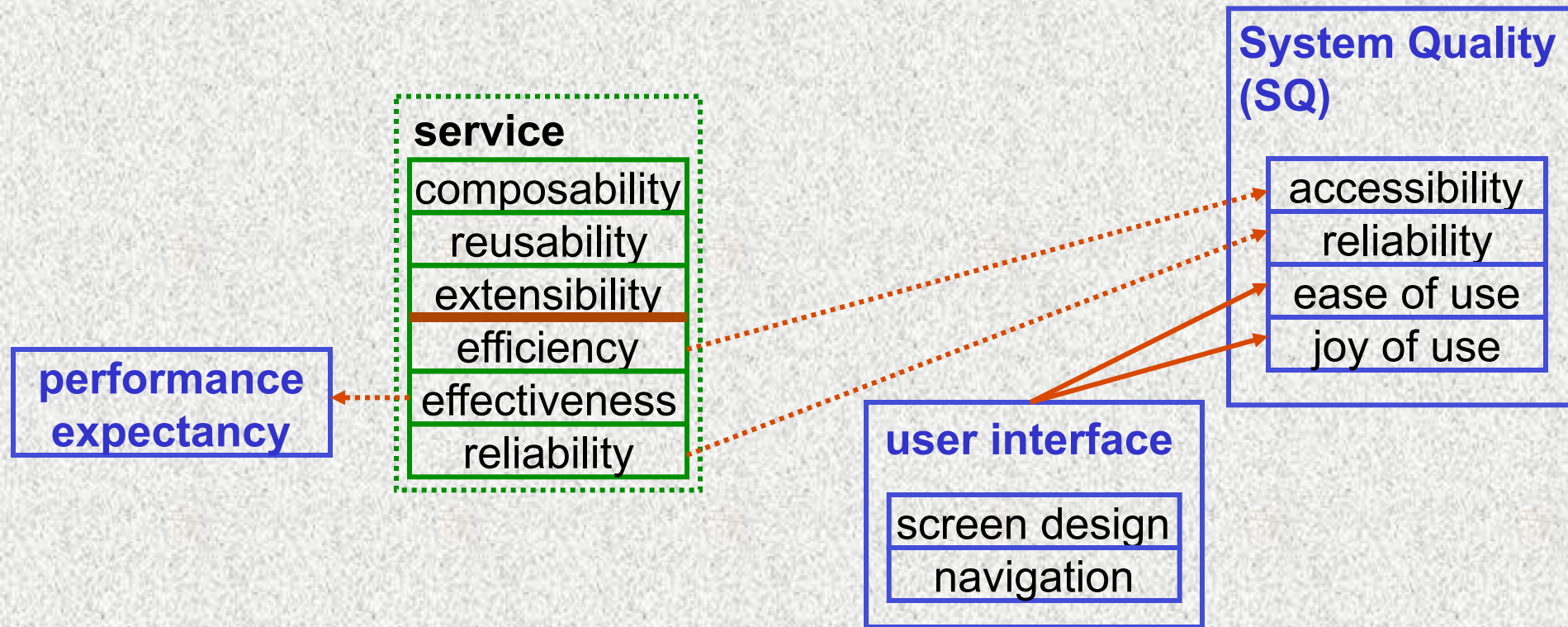
# Digital Library IQ



# DL Success Model



# Digital Library SQ



# Outline

- Prior work
- DL success model
  - From end user perspective
- **Case study**
- Conclusion



# Case Study

- Part of requirements analysis for ETANA-DL
  - Email interviews with 5 prestigious archaeologists
  - Face to face workplace interviews with 11 archaeologists
- Associate the 4 constructs of DL success model with the activities occurring in the seeking and utilization phases



# DL Success Constructs Associated with Seeking and Utilization Phases

<b><i>DL success Construct</i></b>	<b><i>seeking phase</i></b>		<b><i>utilization phase</i></b>		
	<i>starting (E1/K1)</i>	<i>selection exploration (E2-E6)/(K2-K3)</i>	<i>formulation (K4)</i>	<i>collection (K5)</i>	<i>presentation (K6)</i>
<i>social influence</i>	<i>DL visibility</i>				
<i>information quality</i>		<i>adequacy, scope</i>	<i>accuracy</i>		
<i>system quality</i>		<i>ease of use joy of use (interface)</i>	<i>accessibility</i>	<i>accessibility</i>	<i>accessibility</i>
<i>performance expectancy</i>		<i>usefulness (interface)</i>			

# DL Success Constructs Associated with Seeking Phase

- **E1**: Starting' activity in Ellis' model (**K1**: 'initiation' stage in Kuhlthau's model)
  - Social Influence (SI) — DL visibility
    - ❖ Publicize existence of a DL
    - ❖ Provide a DL alert service

# DL Success Constructs Associated with Seeking Phase

- E2-E6: ‘chaining’, ‘browsing’, ‘differentiating’, ‘monitoring’, and ‘extracting’ in Ellis’ model (K2-K3: ‘selection’ and ‘exploration’ stages in Kuhlthau’ s model)
  - Information Quality (IQ)
  - System Quality (SQ)
  - Performance Expectancy (PE)

# DL Success Constructs Associated with Seeking Phase

- E2-E6: ‘chaining’, ‘browsing’, ‘differentiating’, ‘monitoring’, and ‘extracting’ in Ellis’ model (K2-K3: ‘selection’ and ‘exploration’ stages in Kuhlthau’ s model)
  - Information Quality (IQ)
    - ❖ Adequacy (degree of sufficiency and completeness) of DL collections and metadata catalogs
    - ❖ Scope of DL repository

# DL Success Constructs Associated with Seeking Phases

- E2-E6: ‘chaining’, ‘browsing’, ‘differentiating’, ‘monitoring’, and ‘extracting’ in Ellis’ model (K2-K3: ‘selection’ and ‘exploration’ stages in Kuhlthau’s model)
  - System Quality (SQ)
    - ❖ Ease of use
    - ❖ Joy of use



# DL Success Constructs Associated with Seeking Phases

- E2-E6: ‘chaining’, ‘browsing’, ‘differentiating’, ‘monitoring’, and ‘extracting’ in Ellis’ model (K2-K3: ‘selection’ and ‘exploration’ stages in Kuhlthau’ s model)
  - Performance Expectancy (PE)
    - ❖ Usefulness

# DL Success Constructs Associated with Seeking Phases

- E2-E6: ‘chaining’, ‘browsing’, ‘differentiating’, ‘monitoring’, and ‘extracting’ in Ellis’ model (K2-K3: ‘selection’ and ‘exploration’ stages in Kuhlthau’ s model)
  - System Quality & Performance Expectancy
    - ❖ DL interface: screen design & navigation

# DL Success Constructs Associated with Utilization Phase

- K4-K6: ‘formulation’ , ‘collection’, and ‘presentation’ stage in Kuhlthau’ s model
  - Information Quality
    - ❖ information accuracy
    - ❖ information accessibility

# Outline

- Prior work
- DL success model
  - From end user perspective
- Case study
- **Conclusion**

# Conclusion

- Lay the foundation for defining success of DLs from the view of DL end users
- Assume a multi-theoretical perspective
- Synthesize many related research areas in terms of theory and empirical work
- Explicate and illustrate our approach by a case study with ETANA and usability
- Connect with other work on DL quality: led by Emory funded by IMLS, DELOS ...



Questions?  
Comments?

See <http://fox.cs.vt.edu/talks/2006/20060918ECDLsuccess.ppt>

**Thank You!**