Communicative Dimensions of Meta-Design: The Digital Water Education Library

Mick Khoo, L3D Meeting

February 11, 2004

Structure

- 1. Meta-design and communication
- 2. Digital Water Education Library
- 3. Problem
- 4. Analysis
- 5. Intervention
- 6. Outcomes
- 7. Conclusions

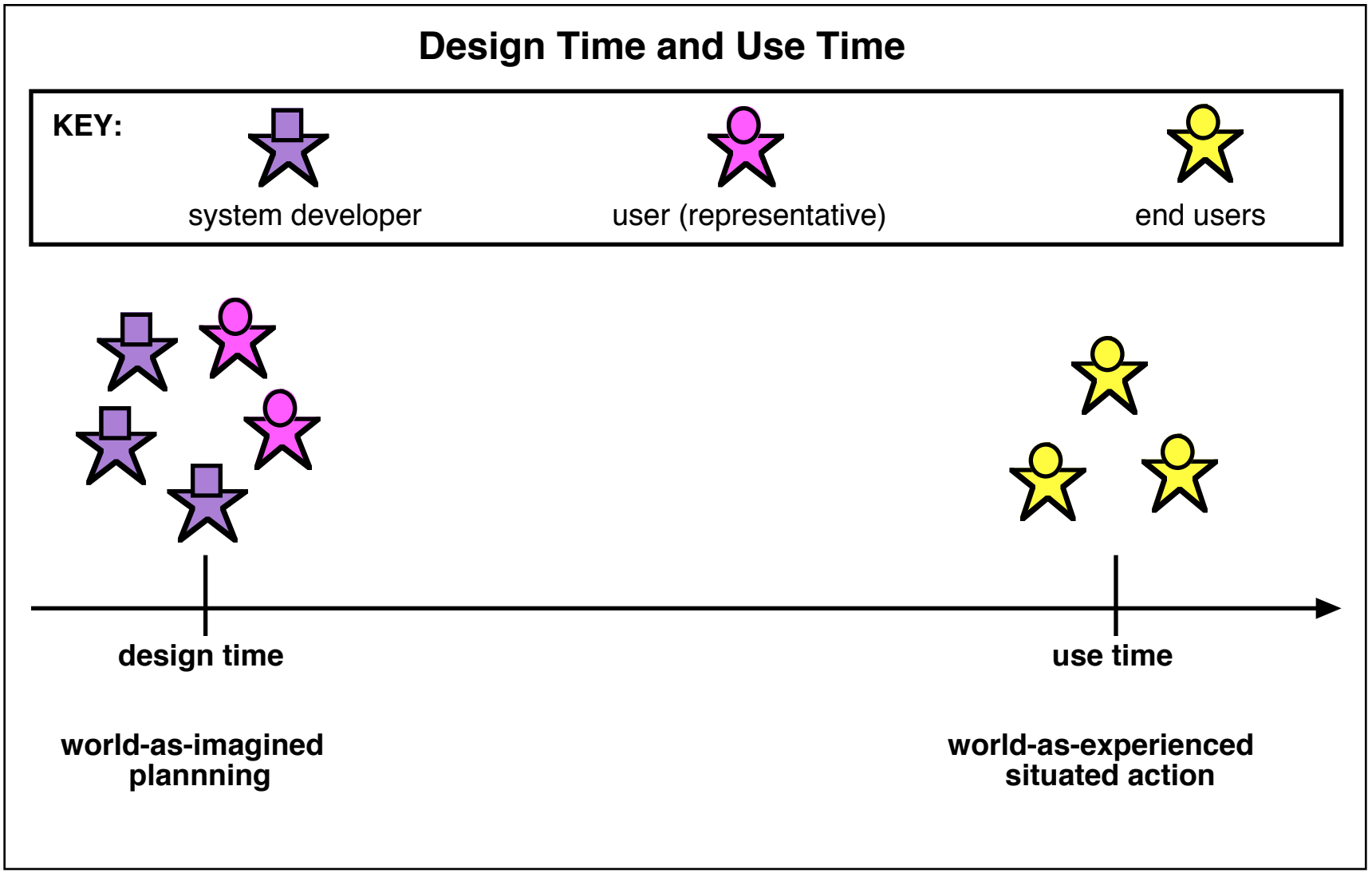
Conclusions

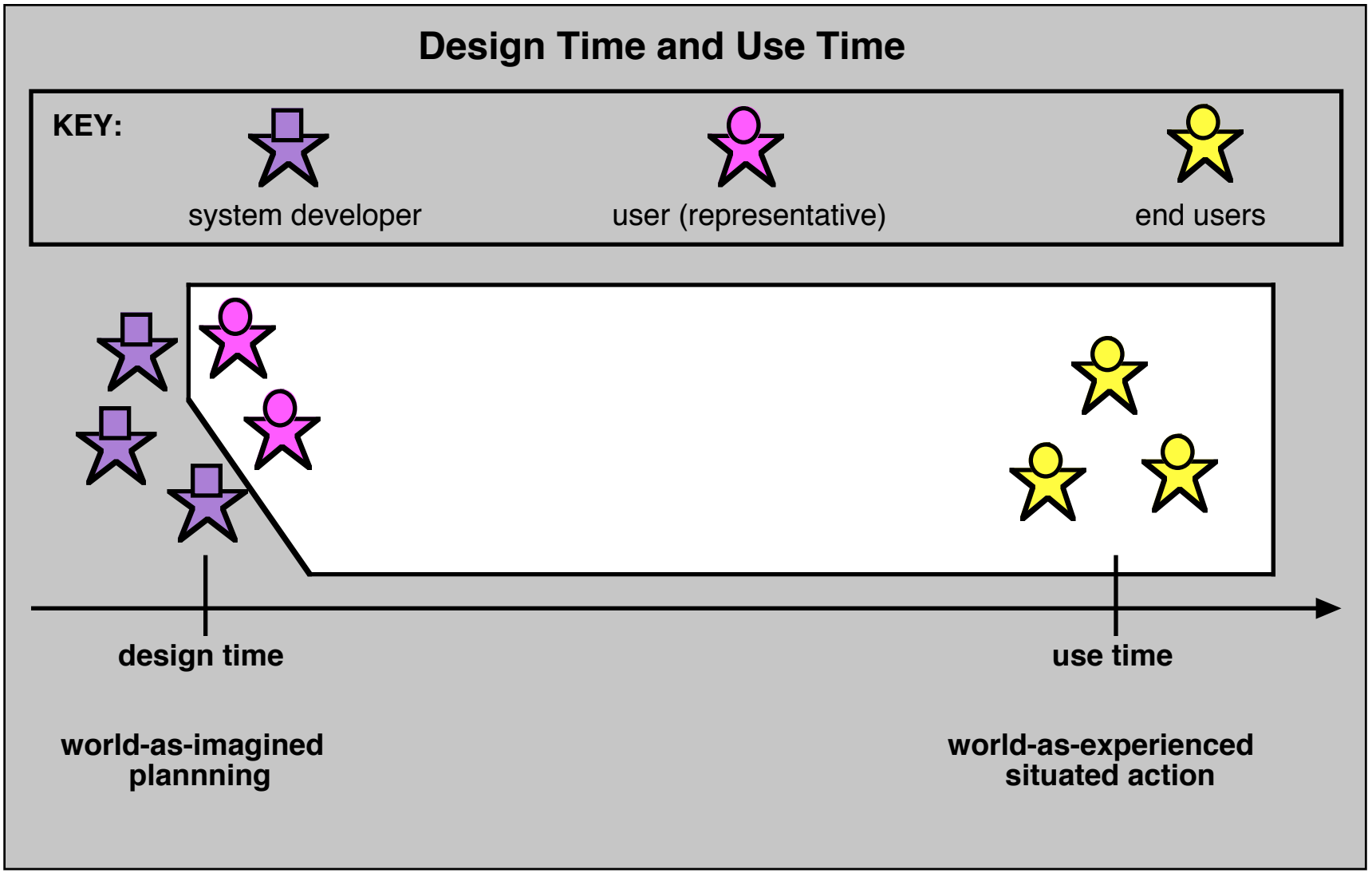
- Designers, users, and designer-users working together with the same technology, can embrace differing definitions of that technology
- In some cases these differences may not be readily apparent to these participants
- Meta-design can play a role in the design and support of communication between designers, users, and designer-users

1. Meta-design and Communication

Meta-Design & Communication

- Meta-design models the involvement of representatives of user communities in the design of artifacts that they will use
- 'User-developers' mediate between the worlds of developers and users to develop artifacts better suited to their user needs
- Implicit in meta-design is a model of communication that assumes that developers, user-developers, and users can talk amongst each other
- In reality, how does this communication work?


Design Time and Use Time
KEY:
system developer
user (representative)
end users
design time
use time
world-as-imagined
plannning
world-as-experienced
situated action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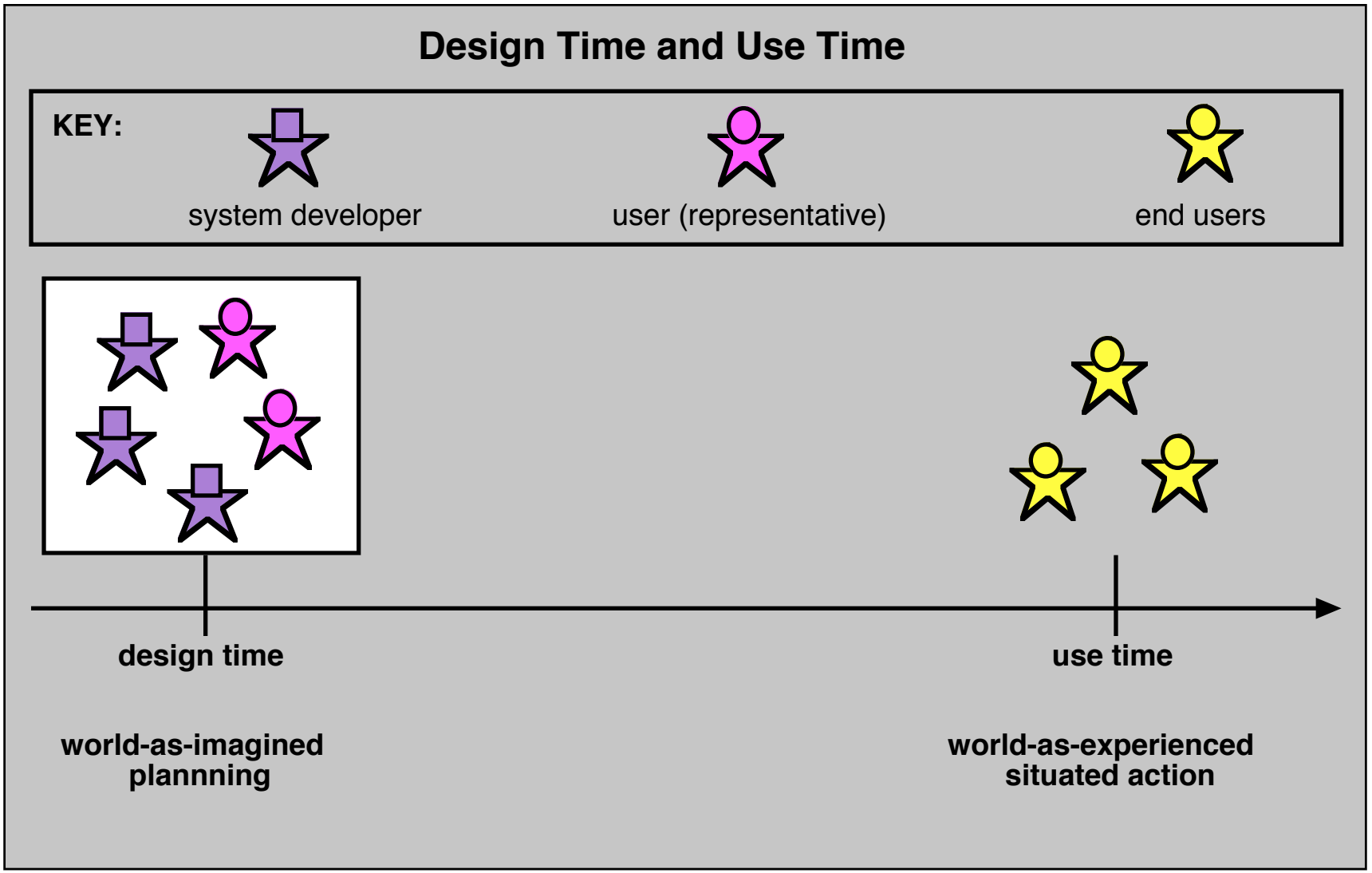
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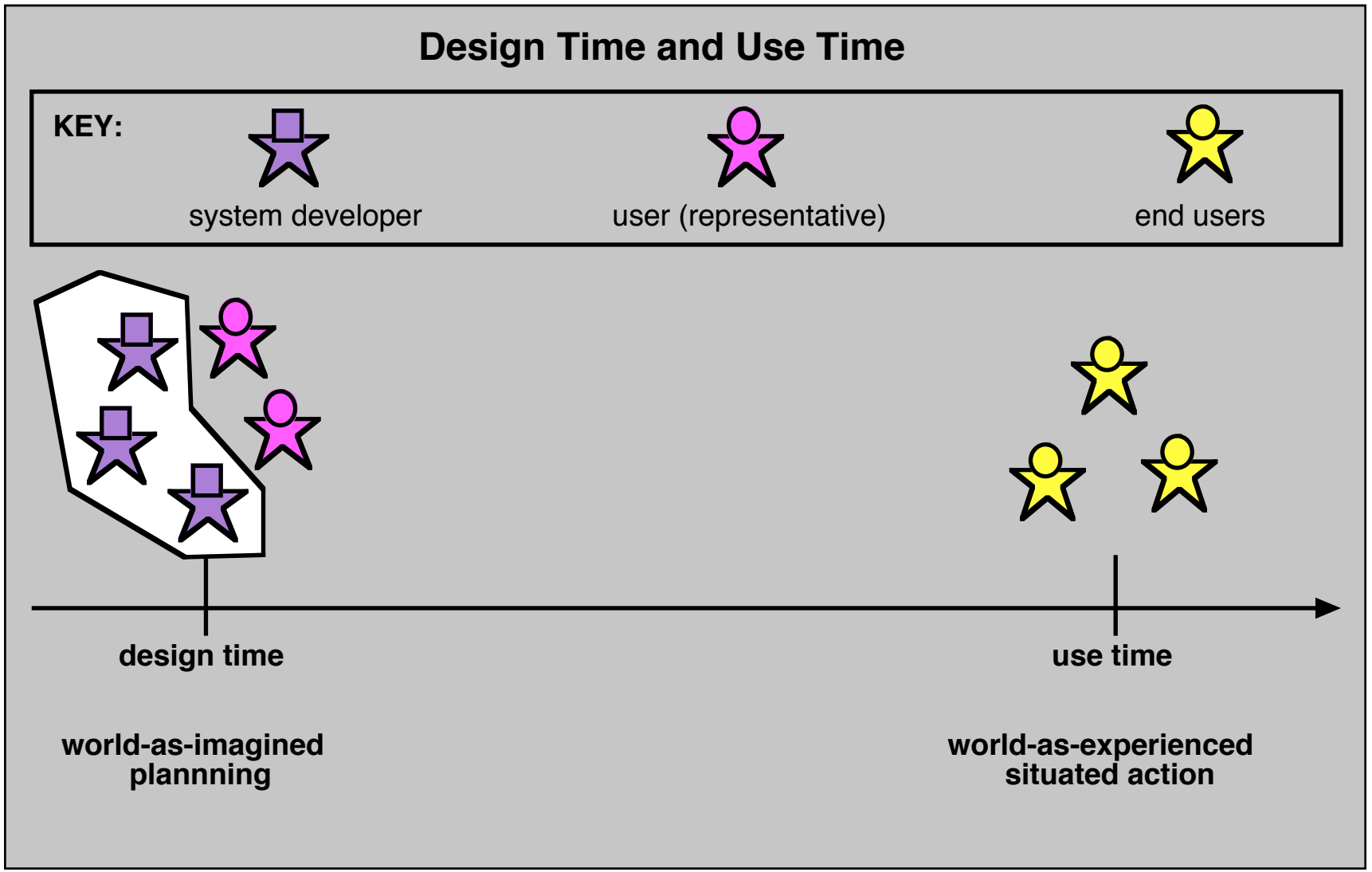
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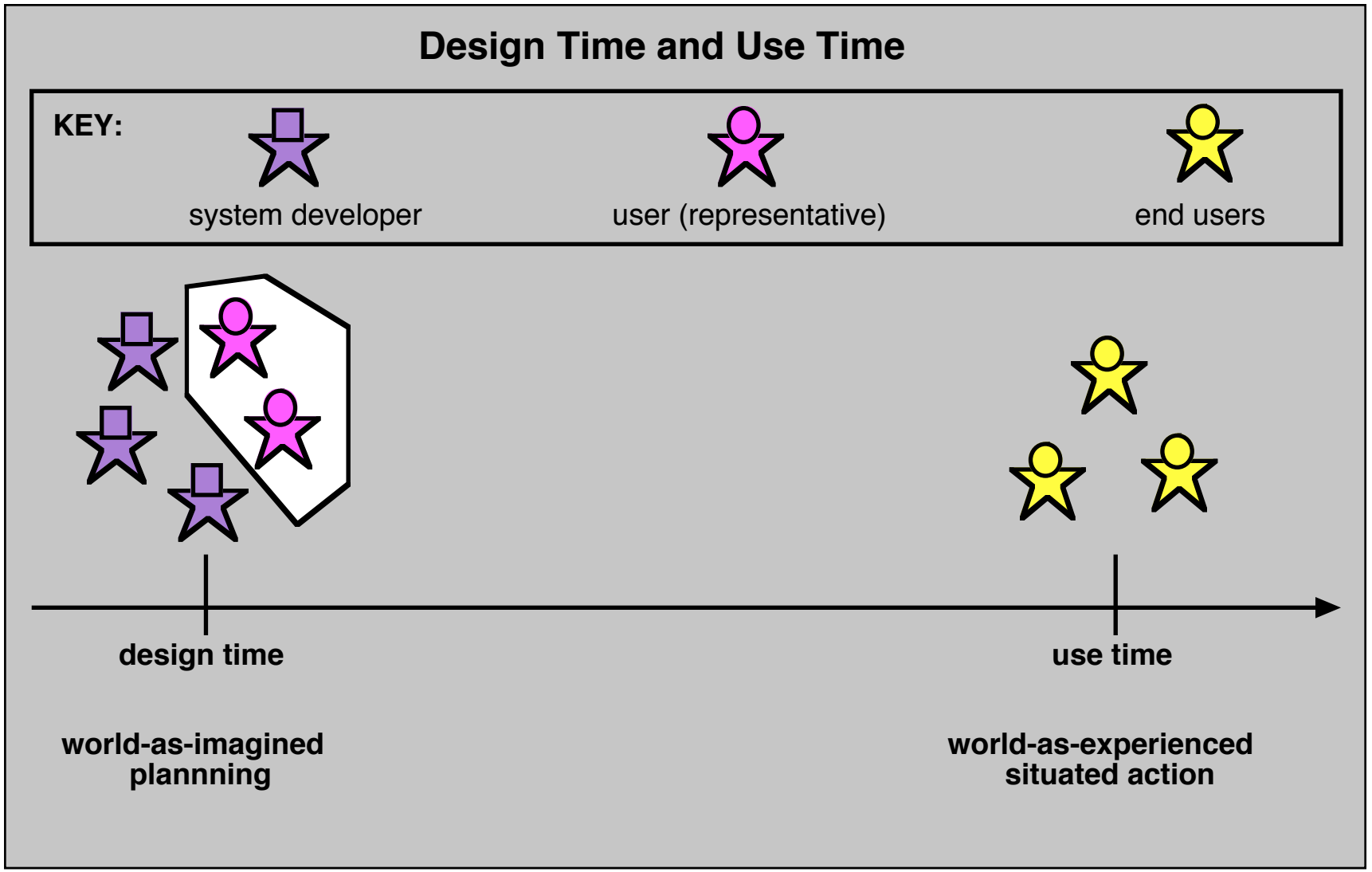
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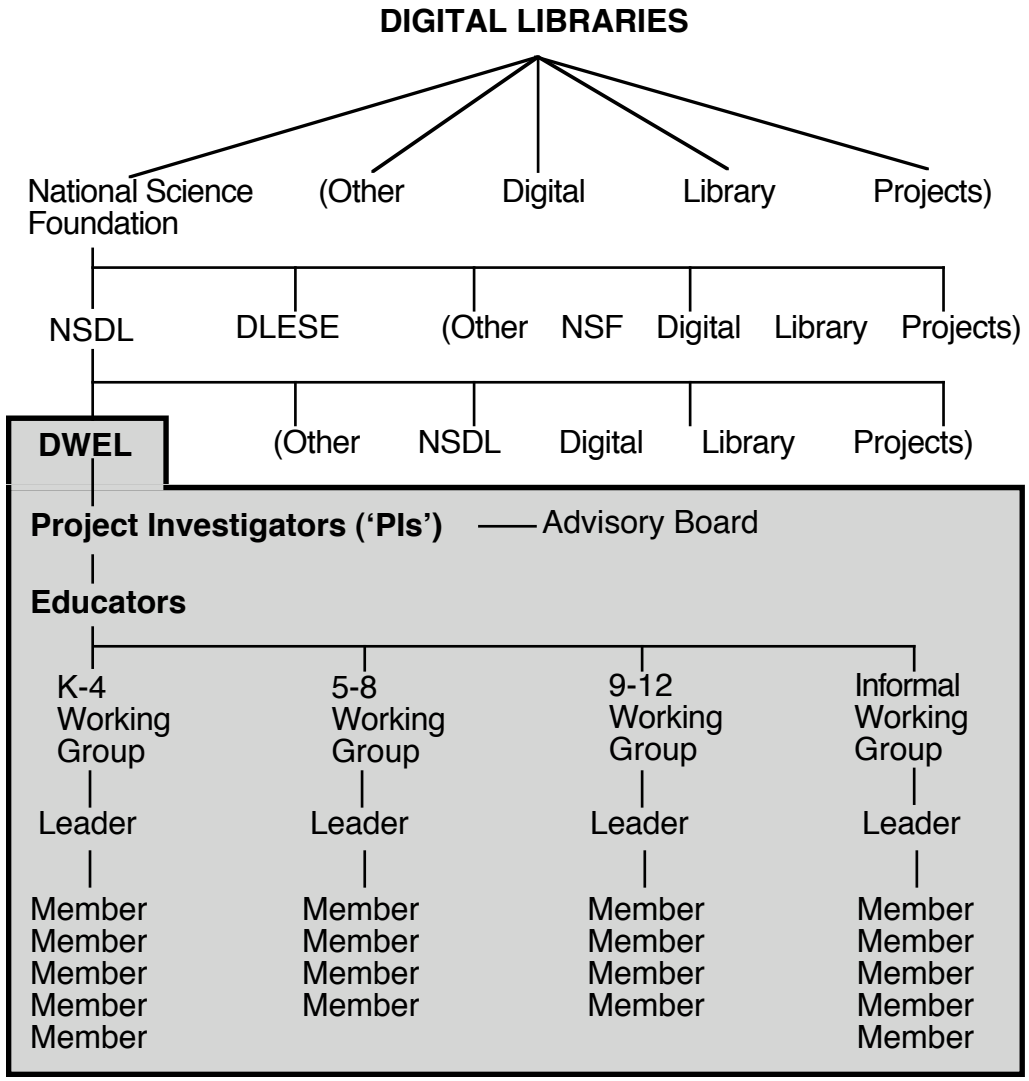
Meta-Design & Communication

- Different groups are involved in MD
- These groups can also be heterogenous
- Giddens, Ehn, Wittgenstein, Orlikowski suggest that these groups may have different ontological/practical understandings of the artifact
- How to maintain and support communication between different groups and understandings?

2. The Digital Water Education Library

DWEL

- 2 year NSF DL project
- 500 exemplary online resources to teach about water in K-12 and informal educational settings
- Structuring documents, e.g. scope statement, review criteria
- Accessed to DLESE as a complete collection
- Using approx. 25 volunteers
- Web tools:
  - Cataloguing tool (DLESE)
  - WebCT as design environment
  - E-mail, browsers, etc.



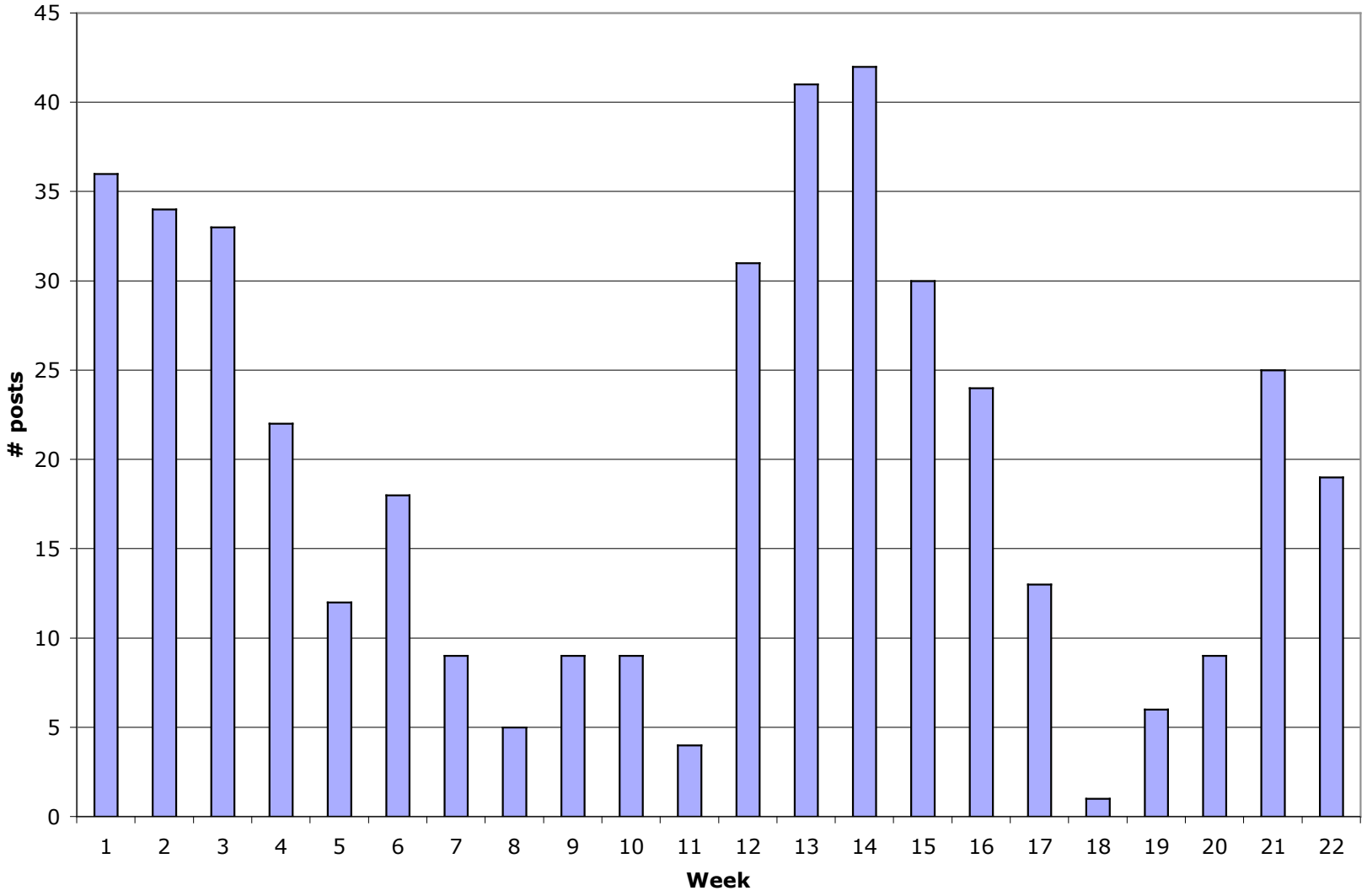
Institutional context for DWEL

Shaded area = WebCT environment

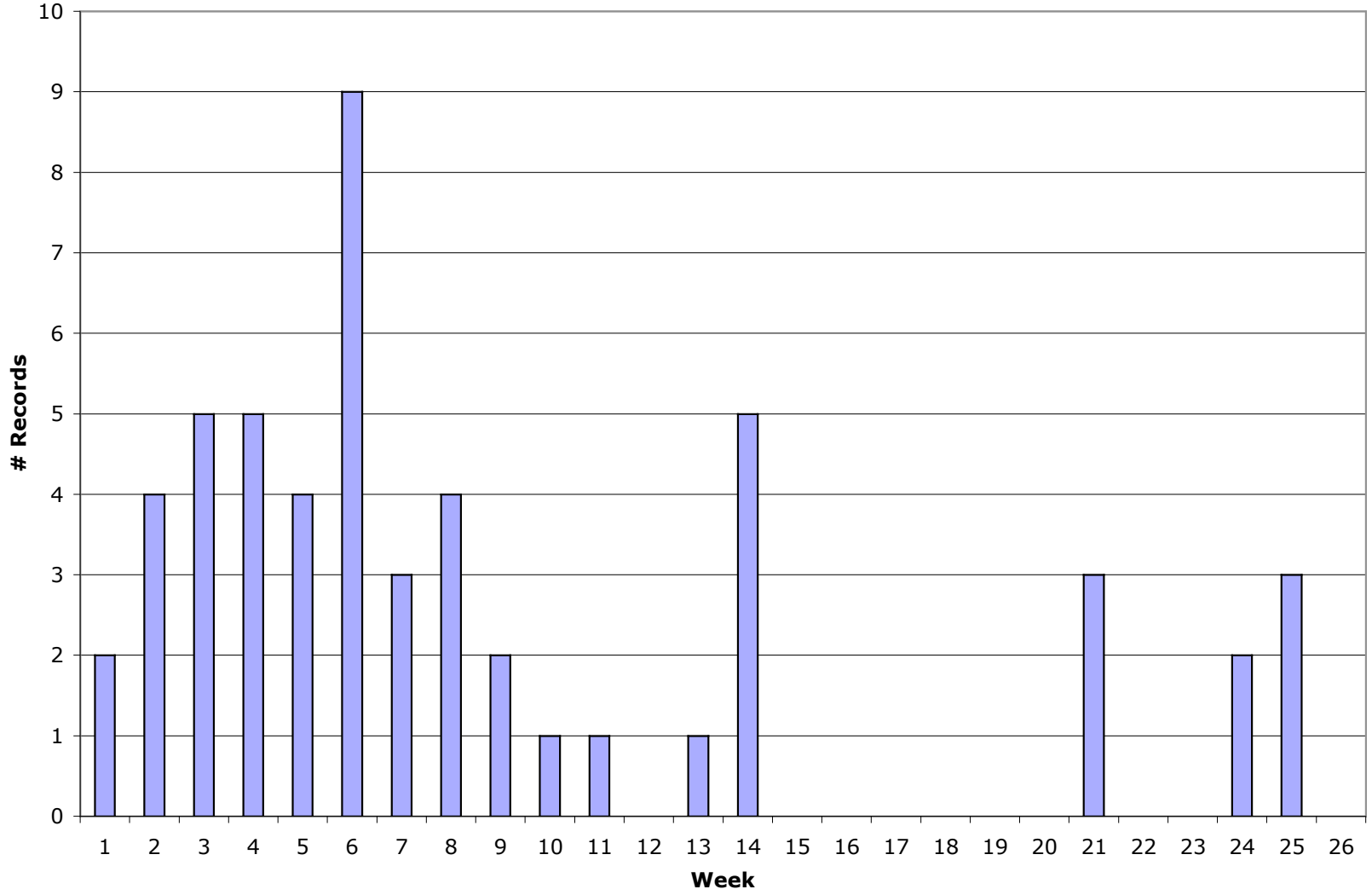
DWEL workshops, January 2002

3. The Problem

WebCT posts, first 6 months



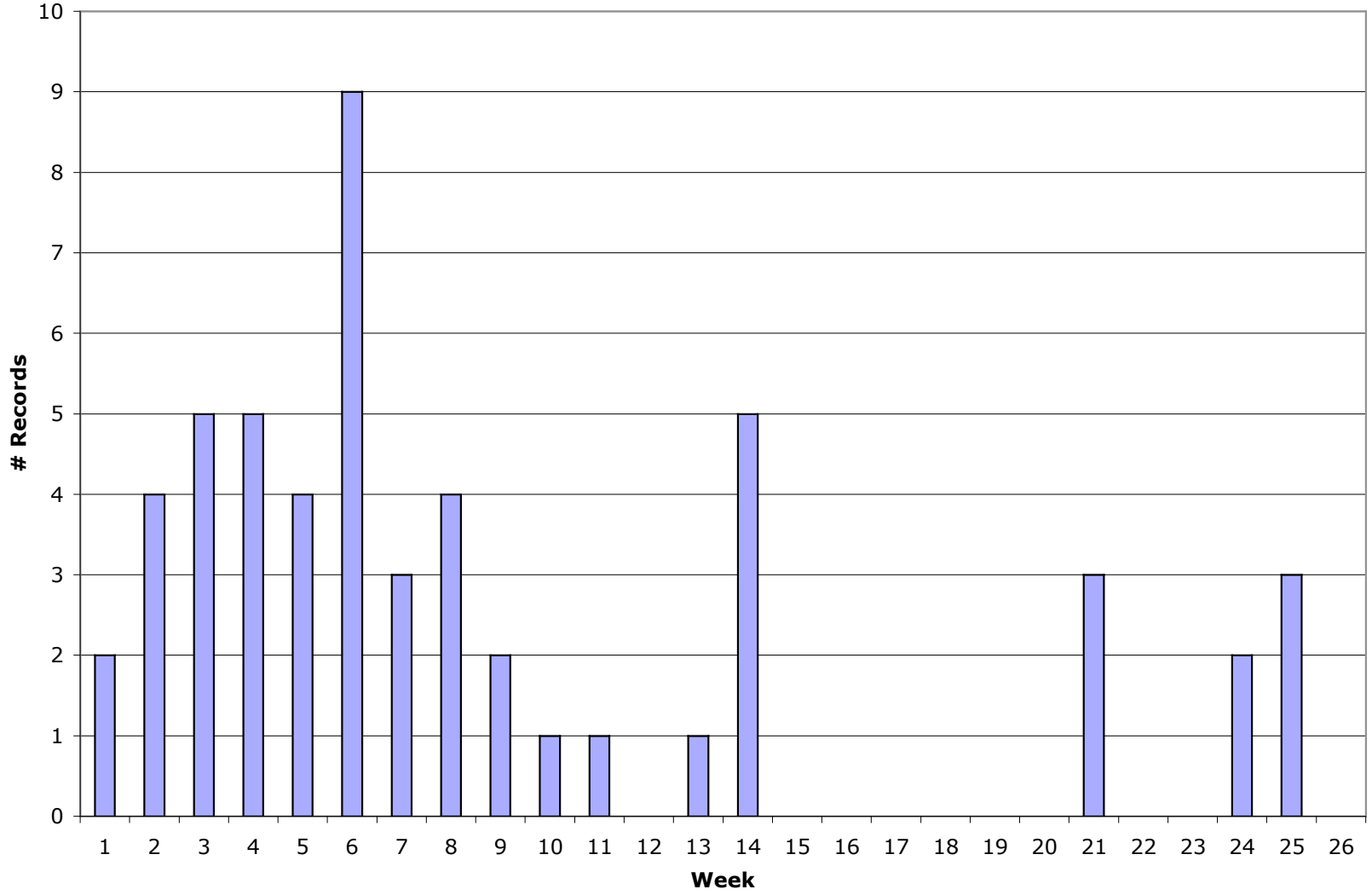
Catalogue records, first 6 months



Initial Actions/Interventions

- Questionnaire/survey
- Regular PI telecons
- Cataloguers are busy people; tasks are complex; more structure required
- ‘Buddy system’
- Regular assignments
- PI/Working Group Leader telecons

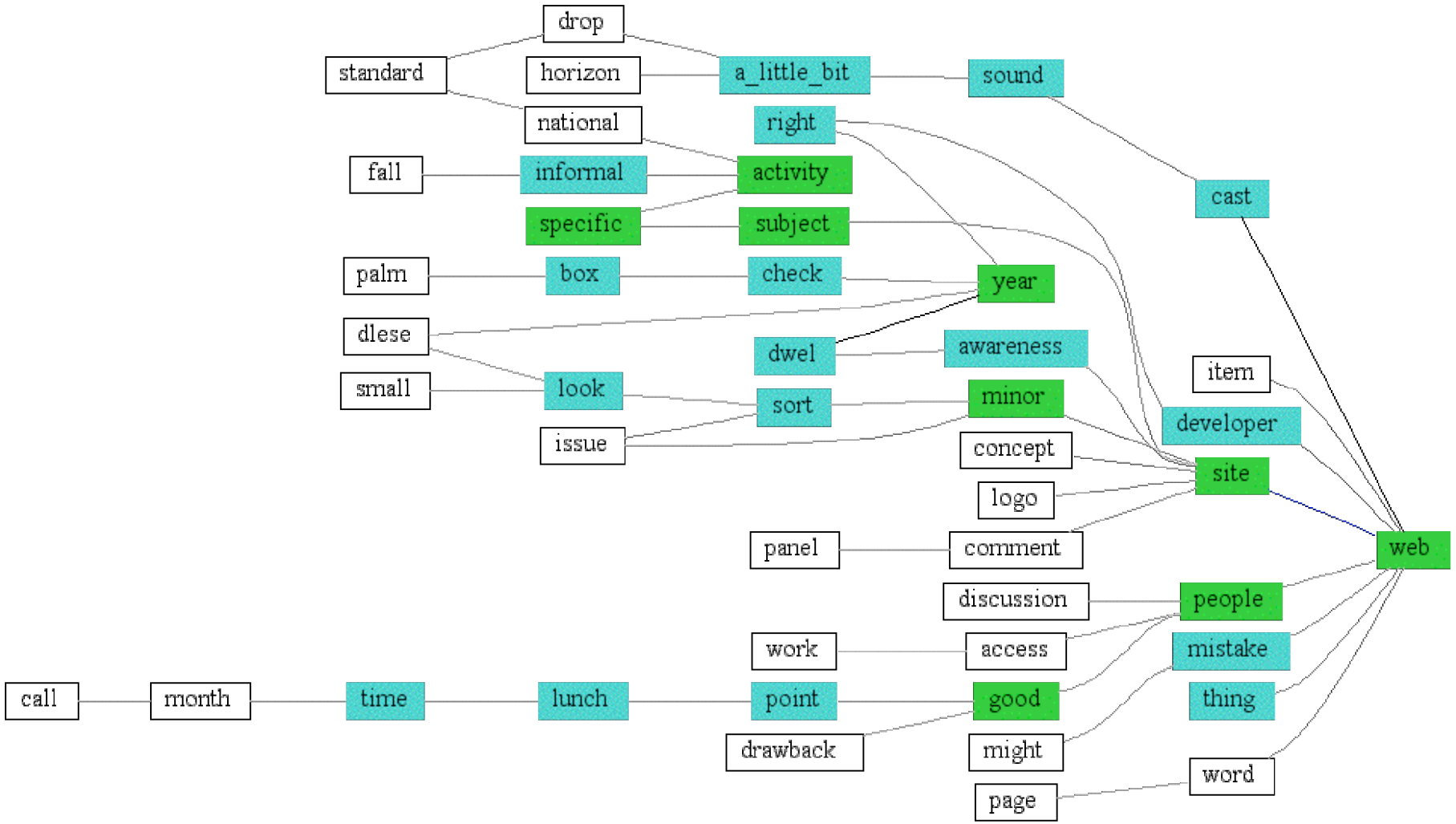
Catalogue records, first 6 months



4. The Analysis

Centering Resonance Analysis

- Form of Latent Semantic Analysis
- Focuses on nouns as units of meaning
- Clusters nouns based on frequency and relationship to other nouns
- Analyses large amounts of org comm
- DWEL: Project proposal and other documents, transcripts of 3 days of meetings between developers and users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activity
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dwel
awareness
item
small
look
sort
minor
developer
issue
concept
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logo
panel
comment
web
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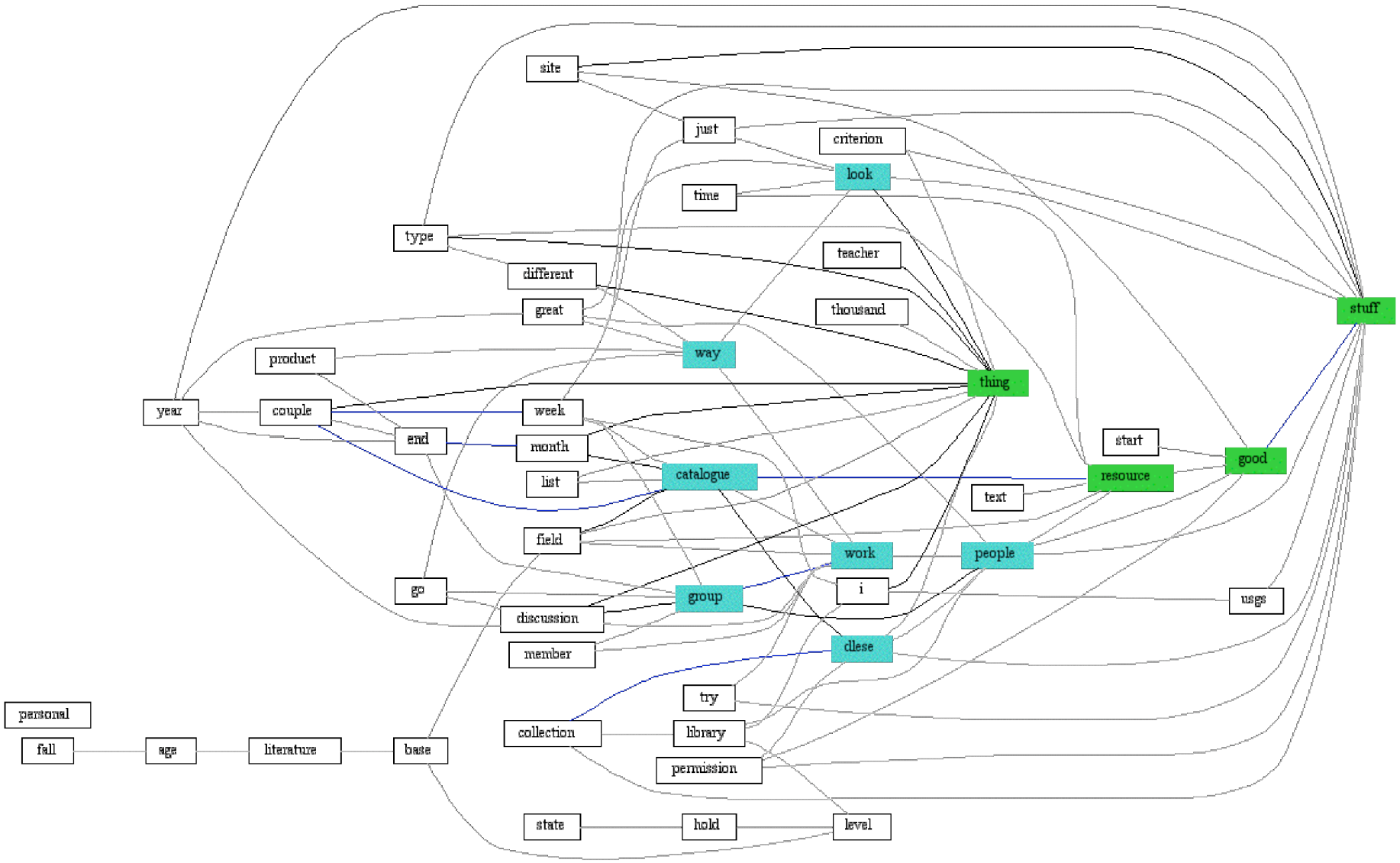
people
work
access
mistake
call
month
time
lunch
point
good
thing
drawback
might
word
page


site
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month
start
good
list
catalogue
resource
text
field
work
people
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group
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try
personal
collection
library
fall
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literature
base
permission
state
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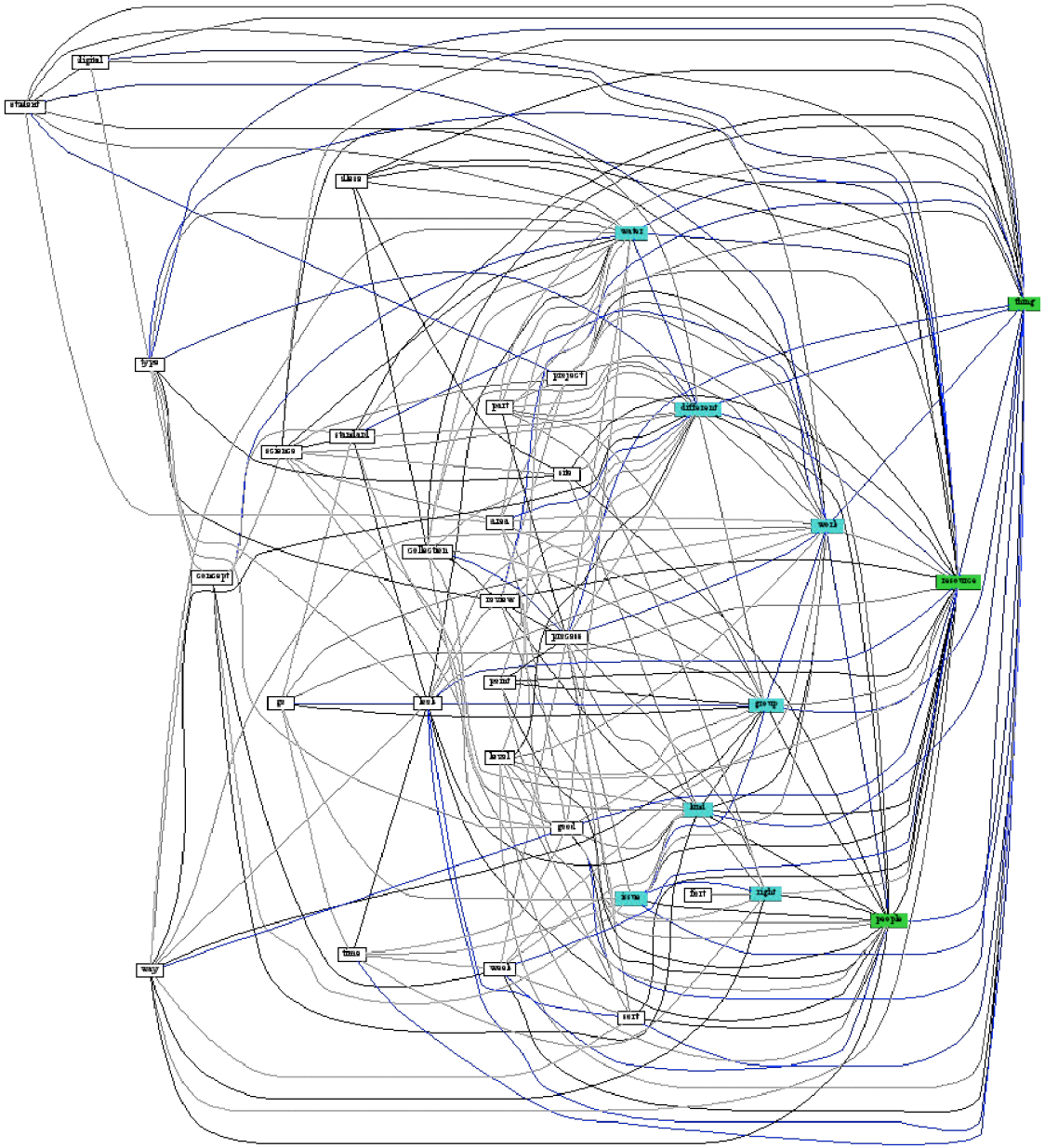
level



CRA: Use of 'Resource'

Proposal Fall 2001	**Advisory Board Meeting January 2002**					**Working Group Meeting January 2002**		
EG+TS	**BA**	**EG**	**RJ**	**TS**		**BA**	**EG**	**BA+EG+TS**
Resource	Thing	Thing	Thing	**Resource**		Thing	Thing	Thing
Collection	Stuff	**Resource**	Concept	Sort		**Resource**	**Concept**	**Resource**
DWEL	Good	People	**Resource**	Thing		Great	**Resource**	Great
Water	**Resource**	Work	People	People		Time	Type	Site
Student	People	Group	A	***Process***		Year	Site	Time
Science	Look	Right	Way	***Collection***		Student	Information	Student
Research	***DLESE***	Different	Student	***DLESE***		Site	Good	Year
Project	Work	Water	Work	Water		Way	Kind	Information
Digital	***Catalogue***	Kind	Topic	Site		Go	Level	Look
Teacher	Group	Issue	Literature	***Metadata***		Rule	***Group***	***Group***
DLESE	Way	Sort	Kind	Way		Idea	Science	Go
Material	Level	Process	Level	Point		Information	Professional	Idea

Table 1b: Use of words other than 'resource'

Proposal	**Advisory Board Meeting**					**Working Group Meeting**		
	AW	**JV**	**NK**	**SI**	**SV**			**All**
	Web	Lesson	Work	Kind	Thing			Site
	Site	Teacher	***Group***	Thing	Stuff			Thing
	People	Child	Right	Science	Science			Child
	Good	Thing	Powerful	Work	Work			Teacher
	Subject	Development	Use	Use	Workflow			Good
	Activity	*Test*	Question	Example	Way			***Group***
	Specific	Literature	Tool	Project	Process			Standard
	Year	Grade	Teacher	Judge	School			Data
	Minor	Student	Place	National	Level			Different
	Developer	Fiction	Background	Year	Just			Student
	Cast	Go	X	Student	Train			Level
	Point	Background	Research	Point	Kind			Point

Initial Analysis (I)

- User-developers and developers have different understandings of DLs
- User see DLs as bricks-and-mortar libraries that are digitised
- Developers see DLs as digital artifacts with certain library-like characteristics (Khoo 2001)

Initial Analysis (II)

- Use/lack of use of word resource interpreted to mean:
- User-developers see DWEL in terms of classroom practice
- Developers tend to see DWEL in terms of database, populated with a structured collection of reviewed educational resources described with metadata

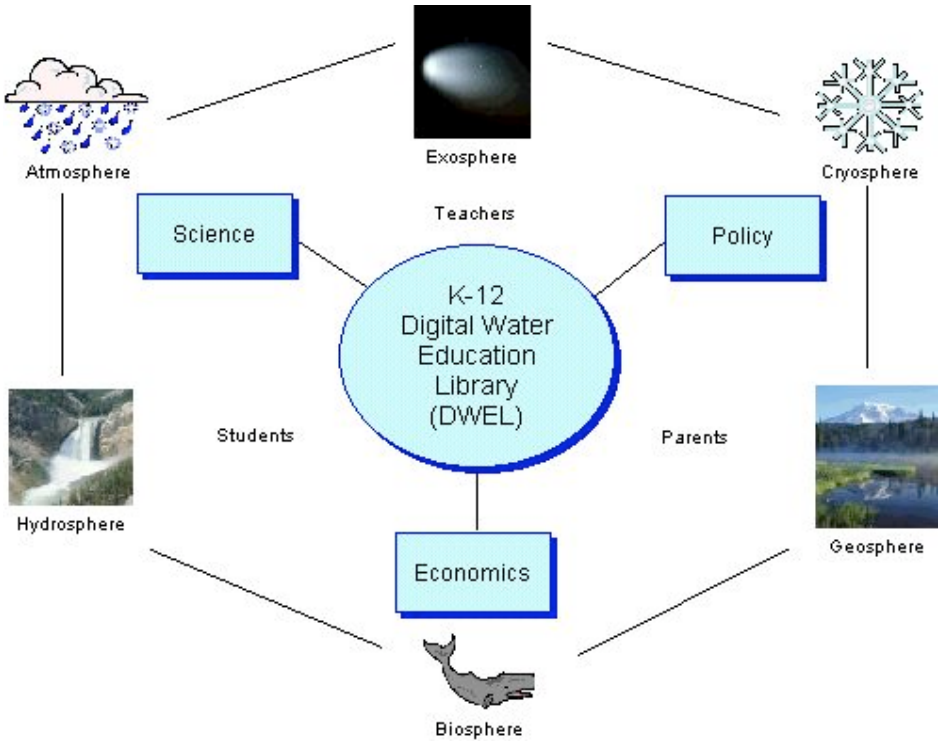
Analysis (III)

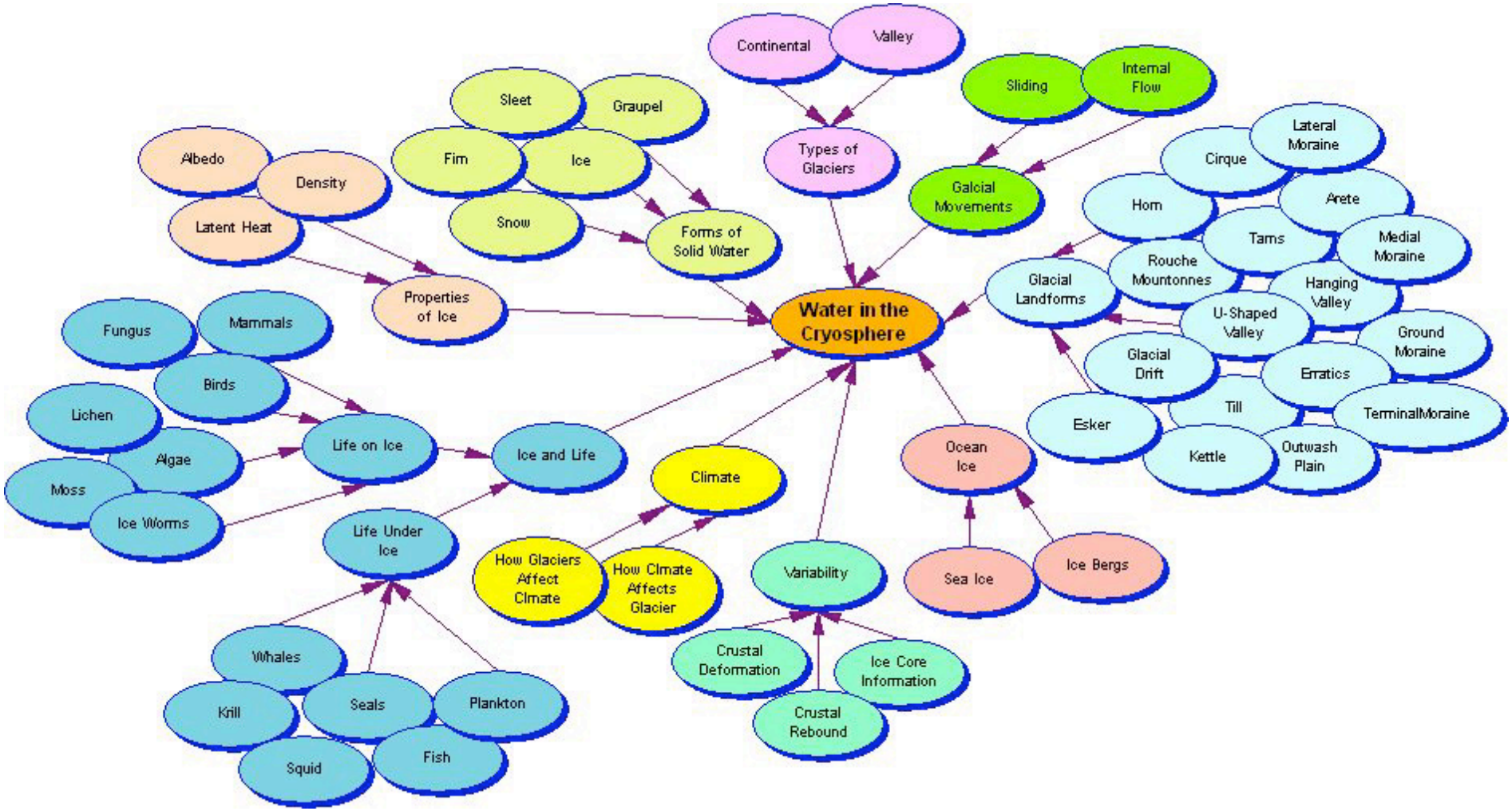
- These differences were not apparent to those who attended the January 2002 meeting - they had thought that they were in agreement
- This suggests that the differences identified by CRA are different practical and *ontological* framings of DWEL
- How to support communication between developer-users and developers, when differences are ontological?
- How to represent developer's frame to user-developers?

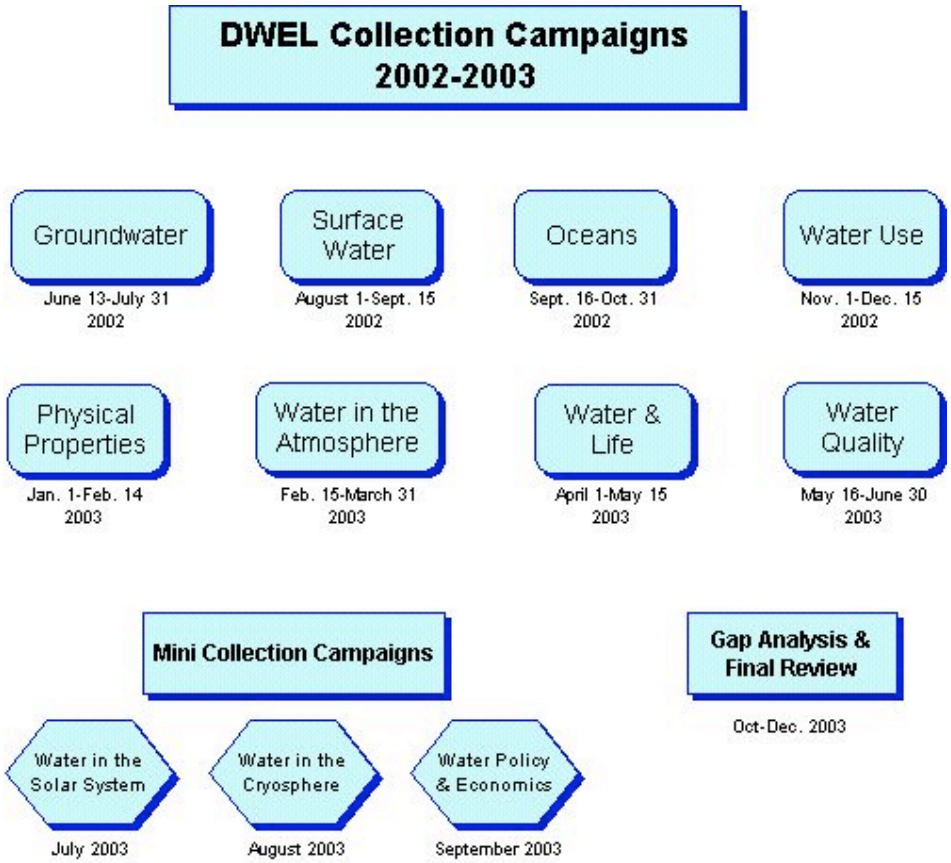
5. Intervention

Intervention: Representing the Project

- How to make designer model of DWEL available to user-developers?
- Decompose DWEL as an artifact into series of easily understandable components
- Represent these components graphically, e.g.:
  - DWEL as a series of interlinked subject domains that provide full scope coverage
  - DWEL as a series of tasks linked to the development of those domains over the life of the project

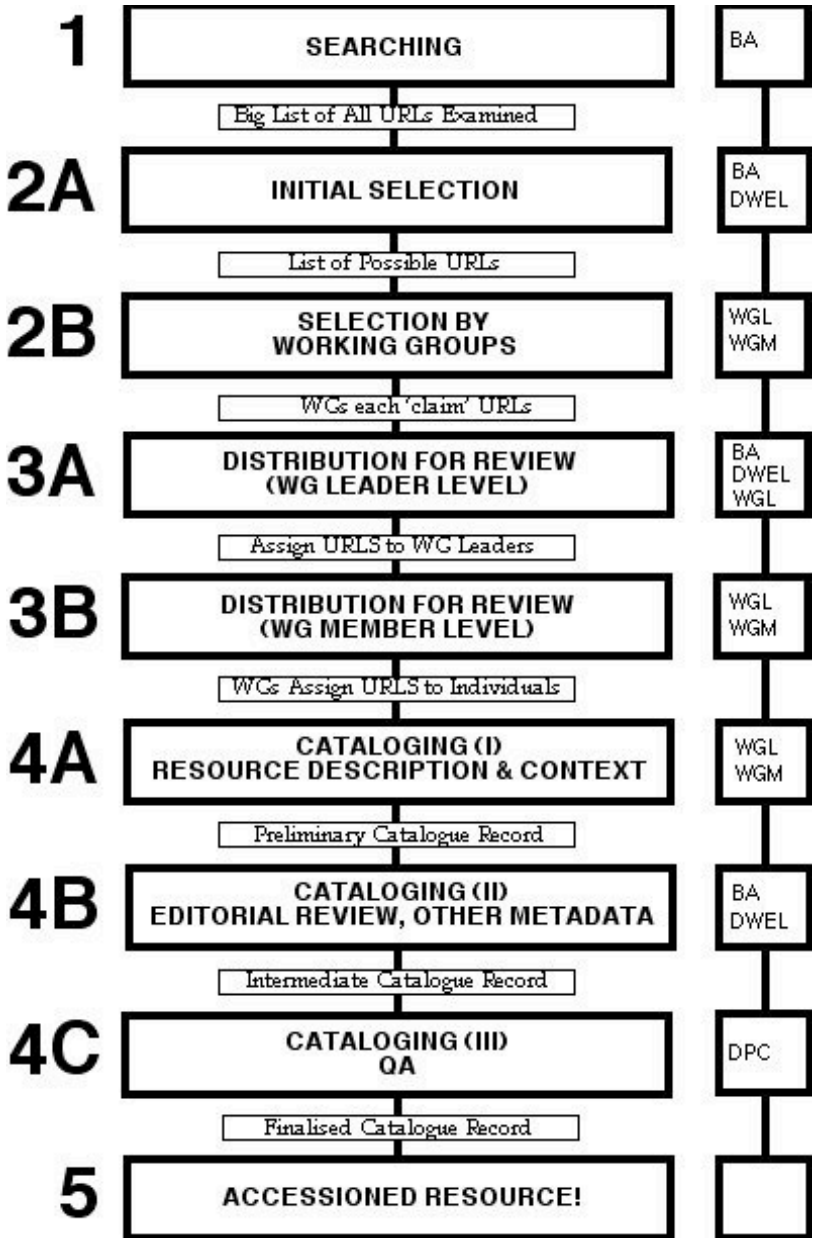

Atmosphere
Exosphere
Cryosphere
Science
Teachers
Policy
K-12
Digital Water
Education
Library
(DWEL)
Students
Parents
Hydrosphere
Geosphere
Economics
Biosphere


Water in the Cryosphere
Types of Glaciers
Continental
Valley
Galcial Movements
Sliding
Internal Flow
Forms of Solid Water
Sleet
Graupel
Fim
Ice
Snow
Properties of Ice
Albedo
Density
Latent Heat
Glacial Landforms
Cirque
Lateral Moraine
Horn
Arete
Tarns
Medial Moraine
Rouche Mountonnes
Hanging Valley
U-Shaped Valley
Ground Moraine
Glacial Drift
Erratics
Till
TerminalMoraine
Esker
Kettle
Outwash Plain
Ice and Life
Life on Ice
Fungus
Mammals
Birds
Lichen
Algae
Moss
Ice Worms
Climate
How Glaciers Affect Climate
How Climate Affects Glacier
Life Under Ice
Whales
Krill
Seals
Plankton
Squid
Fish
Variability
Crustal Deformation
Ice Core Information
Crustal Rebound
Ocean Ice
Sea Ice
Ice Bergs

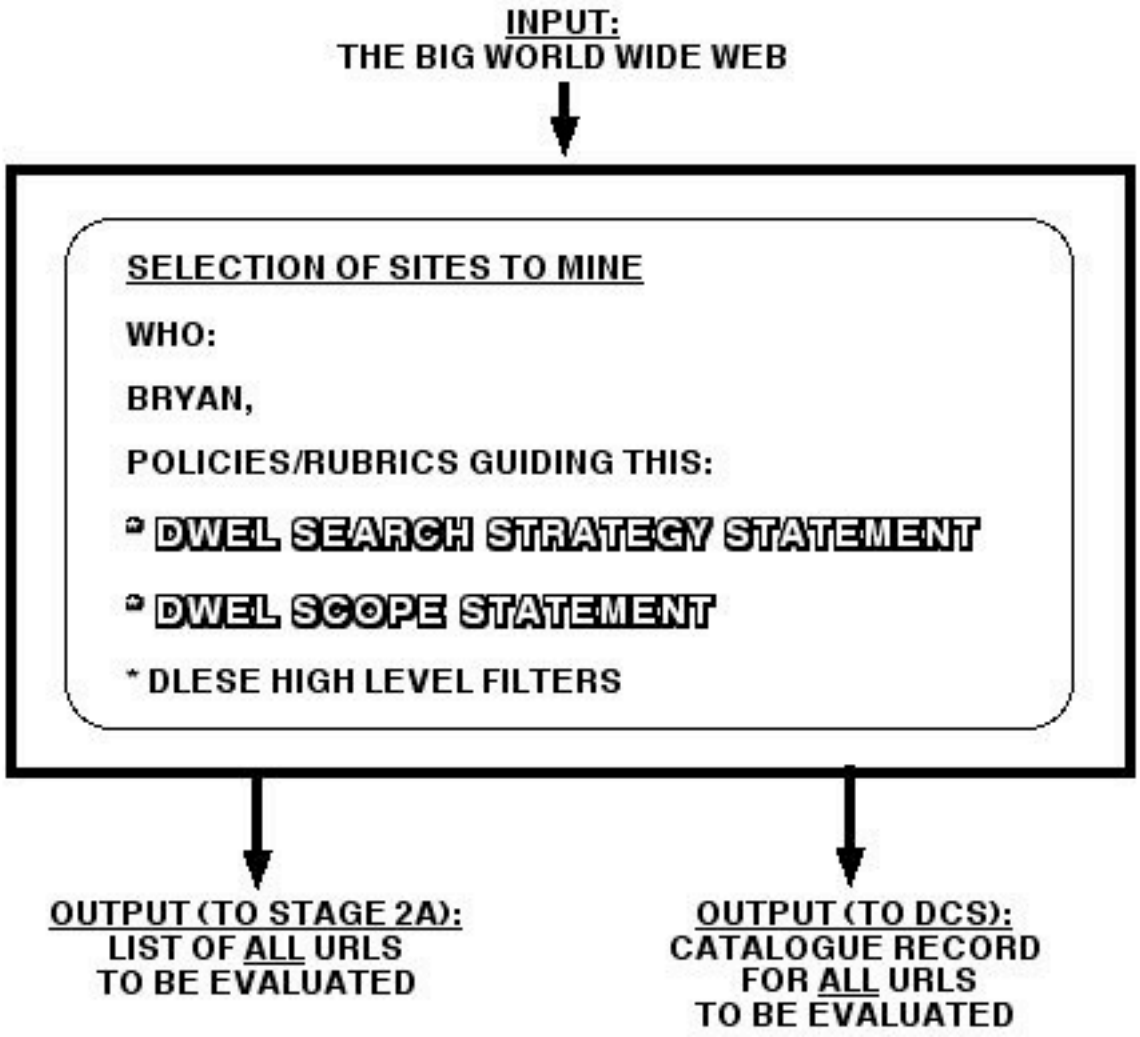

DWEL Collection Campaigns
2002-2003
Groundwater
June 13-July 31
2002
Surface Water
August 1-Sept. 15
2002
Oceans
Sept. 16-Oct. 31
2002
Water Use
Nov. 1-Dec. 15
2002
Physical Properties
Jan. 1-Feb. 14
2003
Water in the Atmosphere
Feb. 15-March 31
2003
Water & Life
April 1-May 15
2003
Water Quality
May 16-June 30
2003
Mini Collection Campaigns
Water in the Solar System
July 2003
Water in the Cryosphere
August 2003
Water Policy & Economics
September 2003
Gap Analysis & Final Review
Oct-Dec. 2003

Intervention: Representing the Problem

- How to make designer model of collection development available to user-developers?
- Decompose complex collection devpt process into series of easily understandable steps
- Represent these steps graphically


1
SEARCHING
BA
Big List of All URLs Examined
2A
INITIAL SELECTION
BA
DWEL
List of Possible URLs
2B
SELECTION BY
WORKING GROUPS
WGL
WGM
WGs each 'claim' URLs
3A
DISTRIBUTION FOR REVIEW
(WG LEADER LEVEL)
BA
DWEL
WGL
Assign URLS to WG Leaders
3B
DISTRIBUTION FOR REVIEW
(WG MEMBER LEVEL)
WGL
WGM
WGs Assign URLS to Individuals
4A
CATALOGING (I)
RESOURCE DESCRIPTION & CONTEXT
WGL
WGM
Preliminary Catalogue Record
4B
CATALOGING (II)
EDITORIAL REVIEW, OTHER METADATA
BA
DWEL
Intermediate Catalogue Record
4C
CATALOGING (III)
QA
DPC
Finalised Catalogue Record
5
ACCESSIONED RESOURCE!

1 SEARCHING


INPUT:
THE BIG WORLD WIDE WEB
SELECTION OF SITES TO MINE
WHO:
BRYAN,
POLICIES/RUBRICS GUIDING THIS:
* DWEL SEARCH STRATEGY STATEMENT
* DWEL SCOPE STATEMENT
* DLESE HIGH LEVEL FILTERS
OUTPUT (TO STAGE 2A):
LIST OF ALL URLS
TO BE EVALUATED
OUTPUT (TO DCS):
CATALOGUE RECORD
FOR ALL URLS
TO BE EVALUATED

4A CATALOGUING: RESOURCE DESCRIPTION

INPUT (FROM STAGE 3B):
LIST OF URLS ASSIGNED TO WORKING GROUPS

RESOURCE DESCRIPTION AND CONTENT

WHO:

WORKING GROUP MEMBERS, WORKING GROUP LEADERS

HOW:

- WG LEADERS AND MEMBERS ENTER, IN APPROPRIATE DCS RECORD FIELD, DESCRIPTIONS OF RESOURCES ASSIGNED IN STAGES 3A AND 3B
- WG LEADERS AND MEMBERS ARE ENCOURAGED TO COMPLETE OTHER FIELDS, IF THEIR EXPERTISE PERMITS
- RECORD IS SUBMITTED TO DCS

POLICIES/RUBRICS GUIDING THIS:

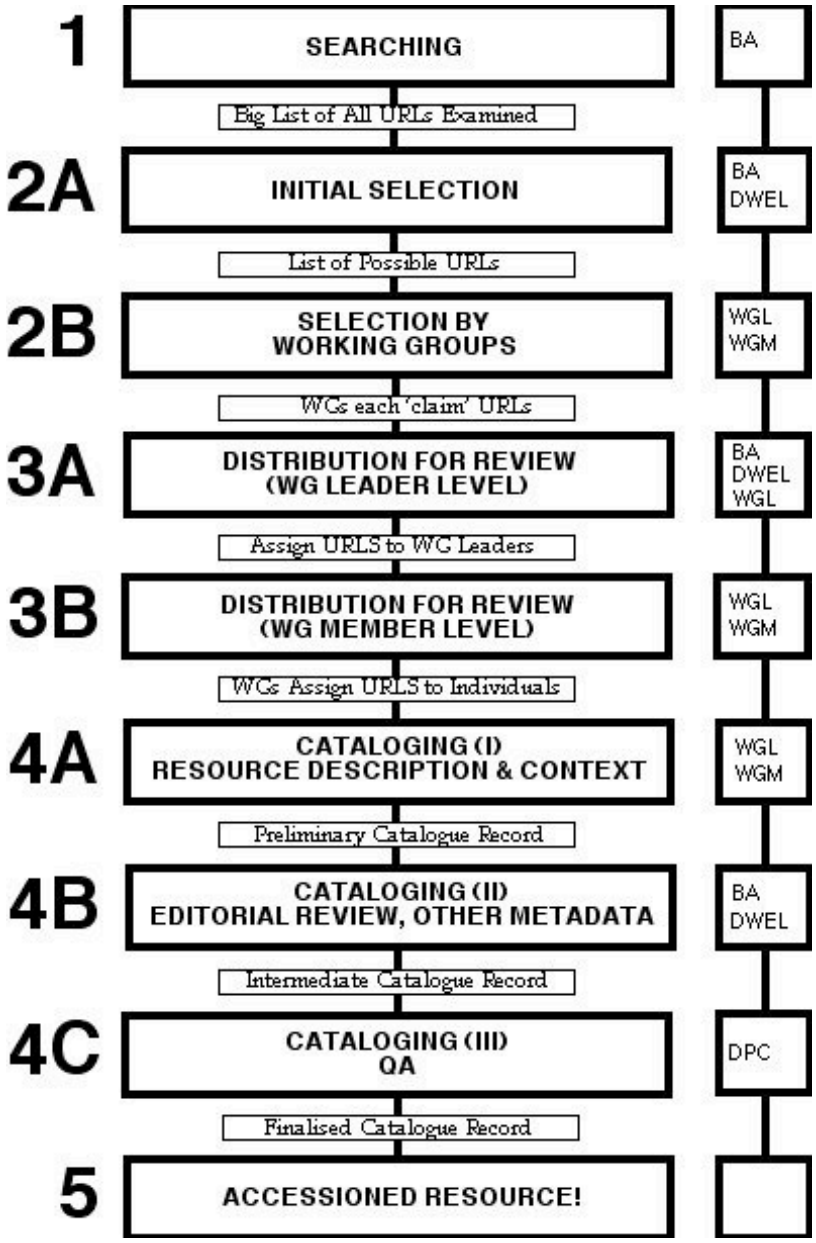
- DWEL SCOPE STATEMENT
- DWEL DESCRIPTION RUBRIC
- DCS CATALOGUING BEST PRACTICES, STANDARDS RUBRIC, ETC.

COMMUNICATION:

E-MAIL, WEBCT

OUTPUT (TO STAGE 4B):
DWEL CATALOGUE RECORD WITH AT LEAST COMPLETED DESCRIPTION FIELD; MOVE TO 'SAVE AND SUBMIT'

REJECTED RESOURCES (TO DCS):
- SCORE AGAINST RUBRIC
- ENTER SCORE (AND IF POSSIBLE FEEDBACK FOR DEVELOPERS) IN CATALOGUE RECORD DESCRIPTION FIELD
- TRANSFER RECORD TO 'HOLDING'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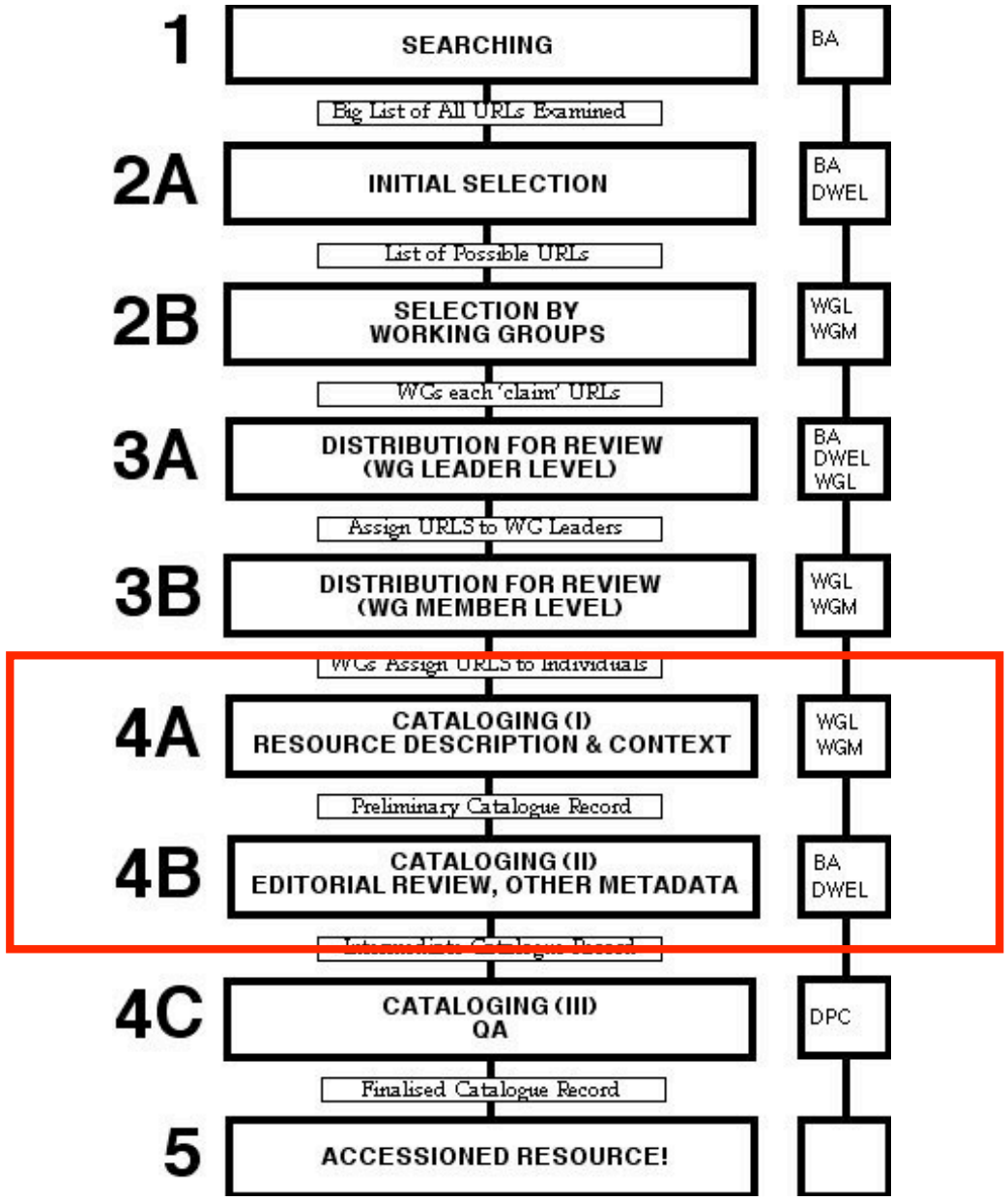
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DPC
Finalised Catalogue Record
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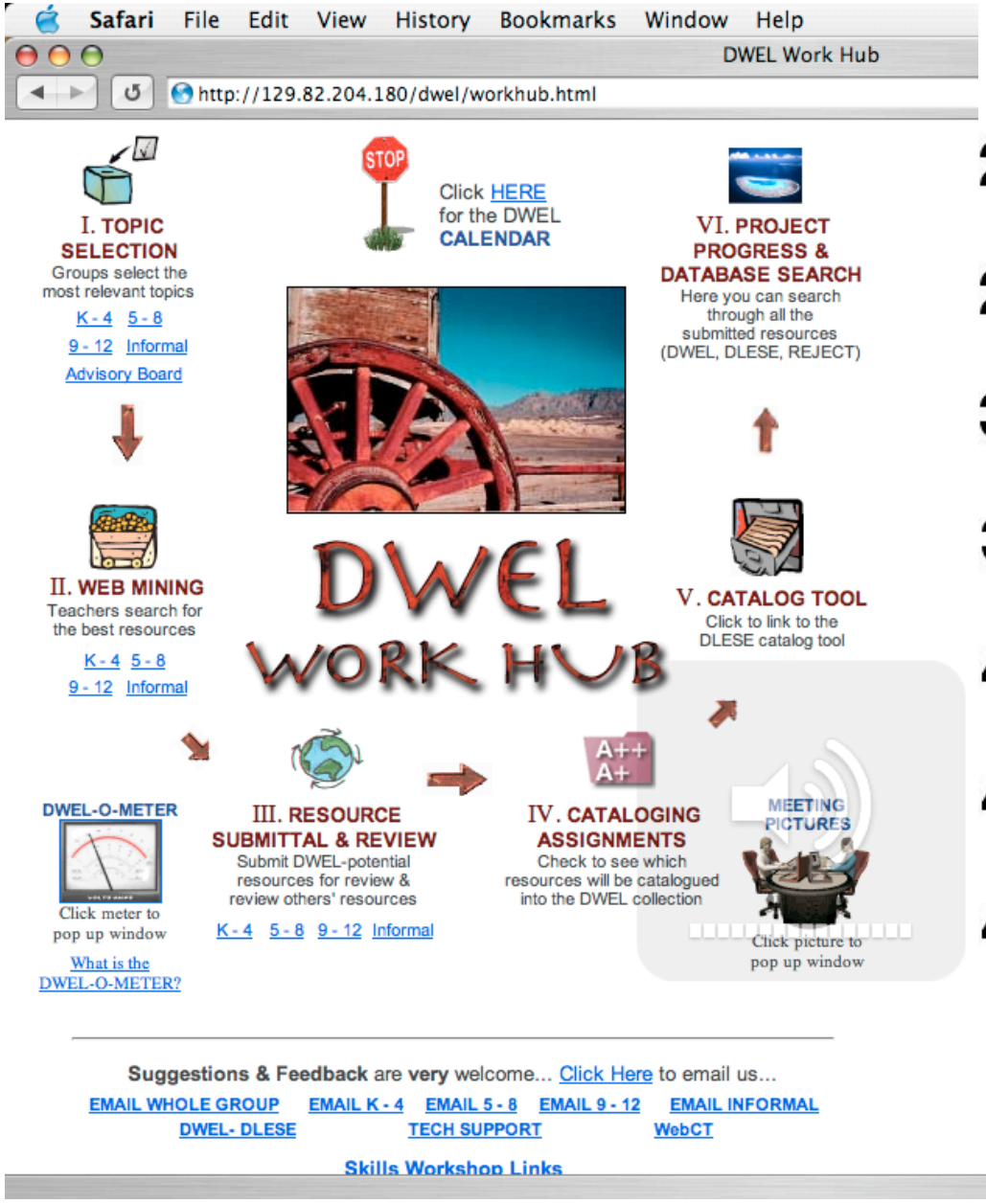
ACCESSIONED RESOURCE!

Intervention: Designing a solution

- Workflow model turned into online tool - the DWEL WorkHub - at CSU
- Series of linked web pages and forms that guided the educators through the selection, reviewing, cataloguing and metadata generation steps outlined in original graphic

Safari File Edit View History Bookmarks Window Help
Wed 10:23 AM (Charged)
DWEL Work Hub
http://129.82.204.180/dwel/workhub.html
dwel work hub
I. TOPIC SELECTION
Groups select the most relevant topics
K - 4 5 - 8
9 - 12 Informal
Advisory Board
Click HERE for the DWEL CALENDAR
VI. PROJECT PROGRESS & DATABASE SEARCH
Here you can search through all the submitted resources (DWEL, DLESE, REJECT)
DWEL
WORK HUB
II. WEB MINING
Teachers search for the best resources
K - 4 5 - 8
9 - 12 Informal
V. CATALOG TOOL
Click to link to the DLESE catalog tool
DWEL-O-METER
Click meter to pop up window
What is the DWEL-O-METER?
III. RESOURCE SUBMITTAL & REVIEW
Submit DWEL-potential resources for review & review others' resources
K - 4 5 - 8 9 - 12 Informal
IV. CATALOGING ASSIGNMENTS
Check to see which resources will be catalogued into the DWEL collection
A++
A+
MEETING PICTURES
Click picture to pop up window
Suggestions & Feedback are very welcome... Click Here to email us...
EMAIL WHOLE GROUP EMAIL K - 4 EMAIL 5 - 8 EMAIL 9 - 12 EMAIL INFORMAL
DWEL- DLESE TECH SUPPORT WebCT
Skills Workshop Links


Safari File Edit View History Bookmarks Window Help
DWEL Work Hub
http://129.82.204.180/dwel/workhub.html
I. TOPIC SELECTION
Groups select the most relevant topics
K - 4 5 - 8
9 - 12 Informal
Advisory Board
STOP
Click HERE for the DWEL CALENDAR
VI. PROJECT PROGRESS & DATABASE SEARCH
Here you can search through all the submitted resources (DWEL, DLESE, REJECT)
DWEL WORK HUB
II. WEB MINING
Teachers search for the best resources
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Click to link to the DLESE catalog tool
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Click meter to pop up window
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A++ A+
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Check to see which resources will be catalogued into the DWEL collection
MEETING PICTURES
Click picture to pop up window
Suggestions & Feedback are very welcome... Click Here to email us...
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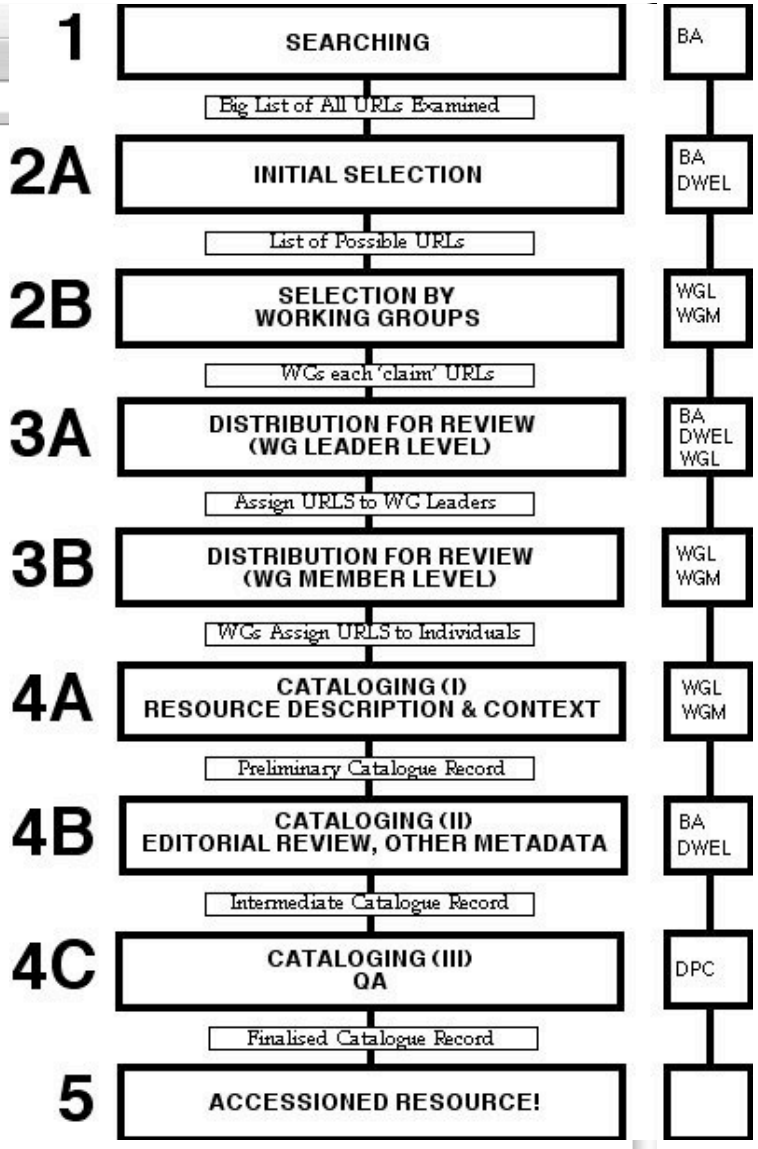
DWEL- DLESE TECH SUPPORT WebCT
Skills Workshop Links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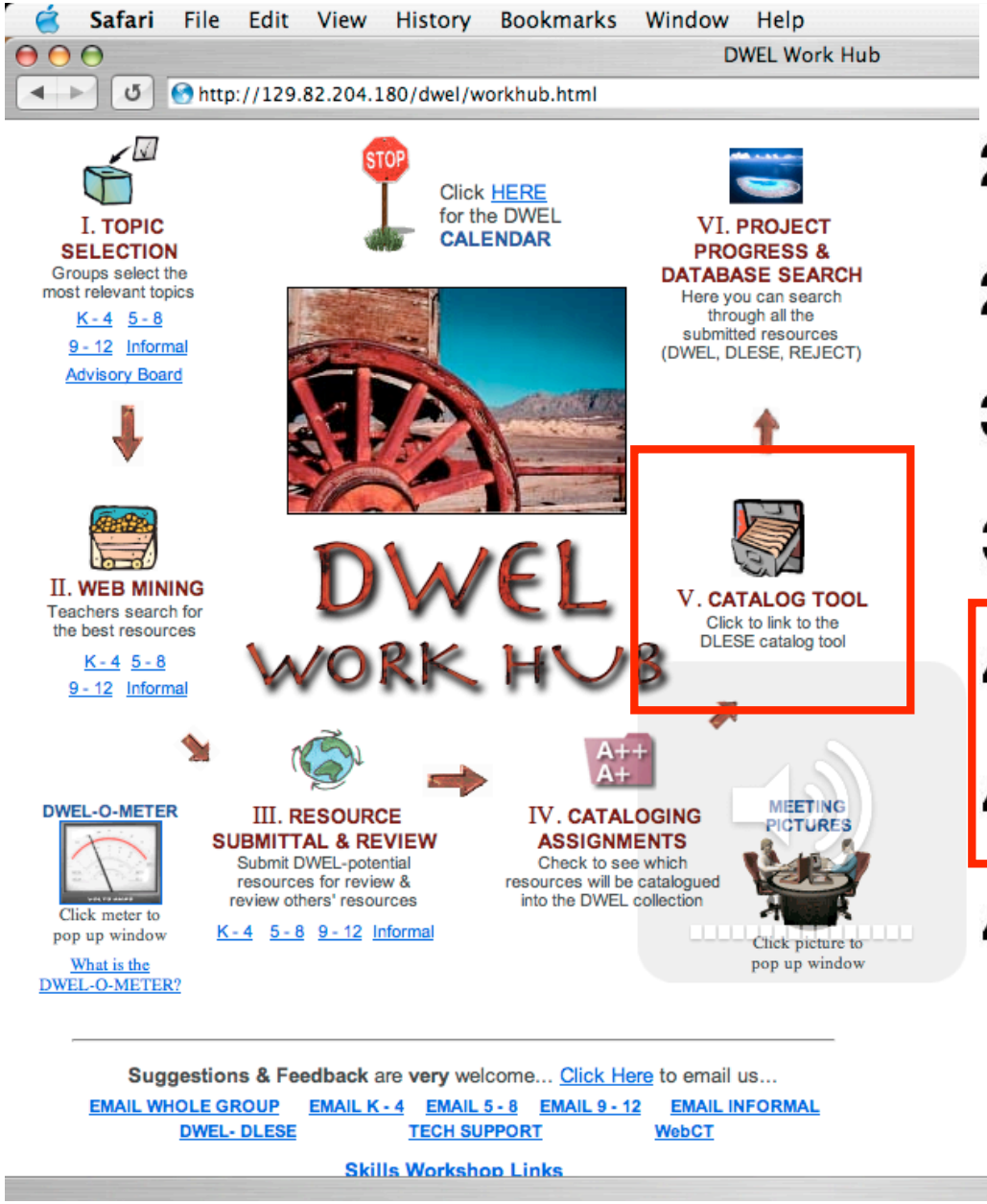
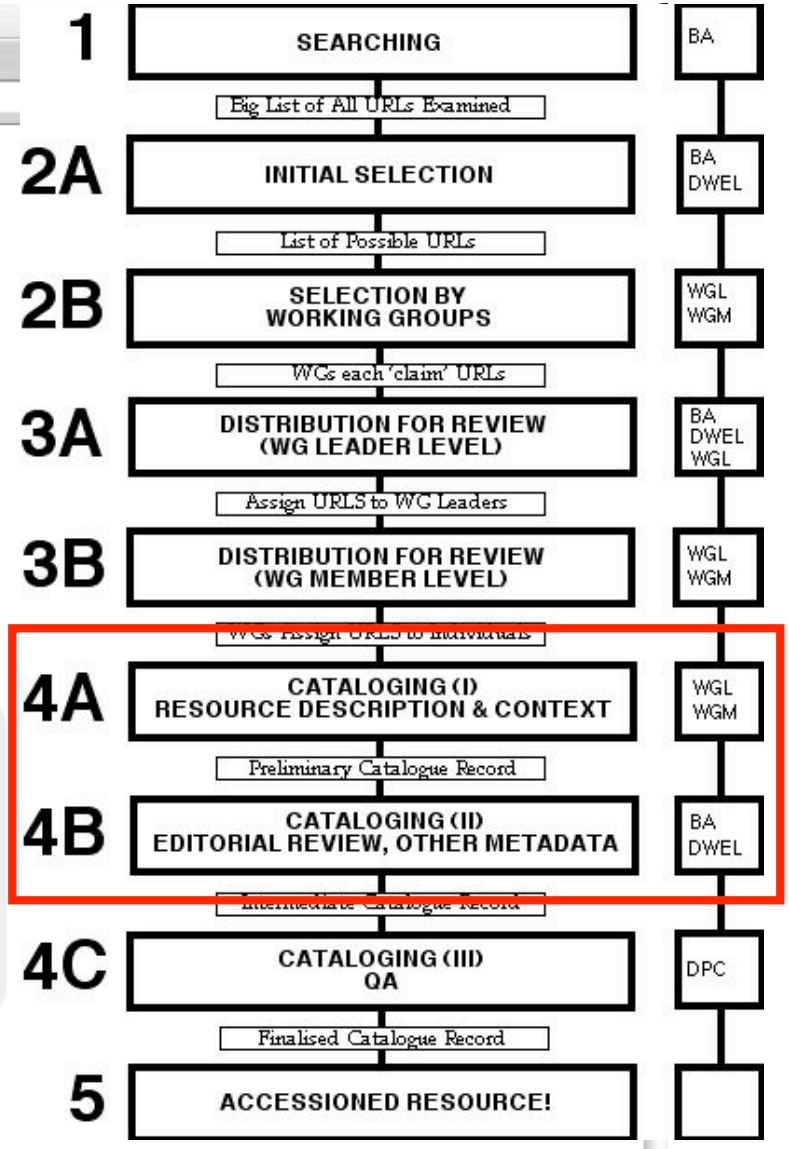
5
ACCESSIONED RESOURCE!


Safari File Edit View History Bookmarks Window Help
DWEL Work Hub
http://129.82.204.180/dwel/workhub.html
I. TOPIC SELECTION
Groups select the most relevant topics
K - 4 5 - 8
9 - 12 Informal
Advisory Board
STOP
Click HERE for the DWEL CALENDAR
VI. PROJECT PROGRESS & DATABASE SEARCH
Here you can search through all the submitted resources (DWEL, DLESE, REJECT)
DWEL WORK HUB
II. WEB MINING
Teachers search for the best resources
K - 4 5 - 8
9 - 12 Informal
V. CATALOG TOOL
Click to link to the DLESE catalog tool
DWEL-O-METER
Click meter to pop up window
What is the DWEL-O-METER?
III. RESOURCE SUBMITTAL & REVIEW
Submit DWEL-potential resources for review & review others' resources
K - 4 5 - 8 9 - 12 Informal
IV. CATALOGING ASSIGNMENTS
Check to see which resources will be catalogued into the DWEL collection
A++
A+
MEETING PICTURES
Click picture to pop up window
Suggestions & Feedback are very welcome... Click Here to email us...
EMAIL WHOLE GROUP EMAIL K - 4 EMAIL 5 - 8 EMAIL 9 - 12 EMAIL INFORMAL
DWEL- DLESE TECH SUPPORT WebCT
Skills Workshop Links


1
SEARCHING
BA
Big List of All URLs Examined
2A
INITIAL SELECTION
BA
DWEL
List of Possible URLs
2B
SELECTION BY WORKING GROUPS
WGL
WGM
WGs each 'claim' URLs
3A
DISTRIBUTION FOR REVIEW (WG LEADER LEVEL)
BA
DWEL
WGL
Assign URLS to WG Leaders
3B
DISTRIBUTION FOR REVIEW (WG MEMBER LEVEL)
WGL
WGM
4A
CATALOGING (I) RESOURCE DESCRIPTION & CONTEXT
WGL
WGM
Preliminary Catalogue Record
4B
CATALOGING (II) EDITORIAL REVIEW, OTHER METADATA
BA
DWEL
4C
CATALOGING (III) QA
DPC
Finalised Catalogue Record
5
ACCESSIONED RESOURCE!

Intervention: Implementation

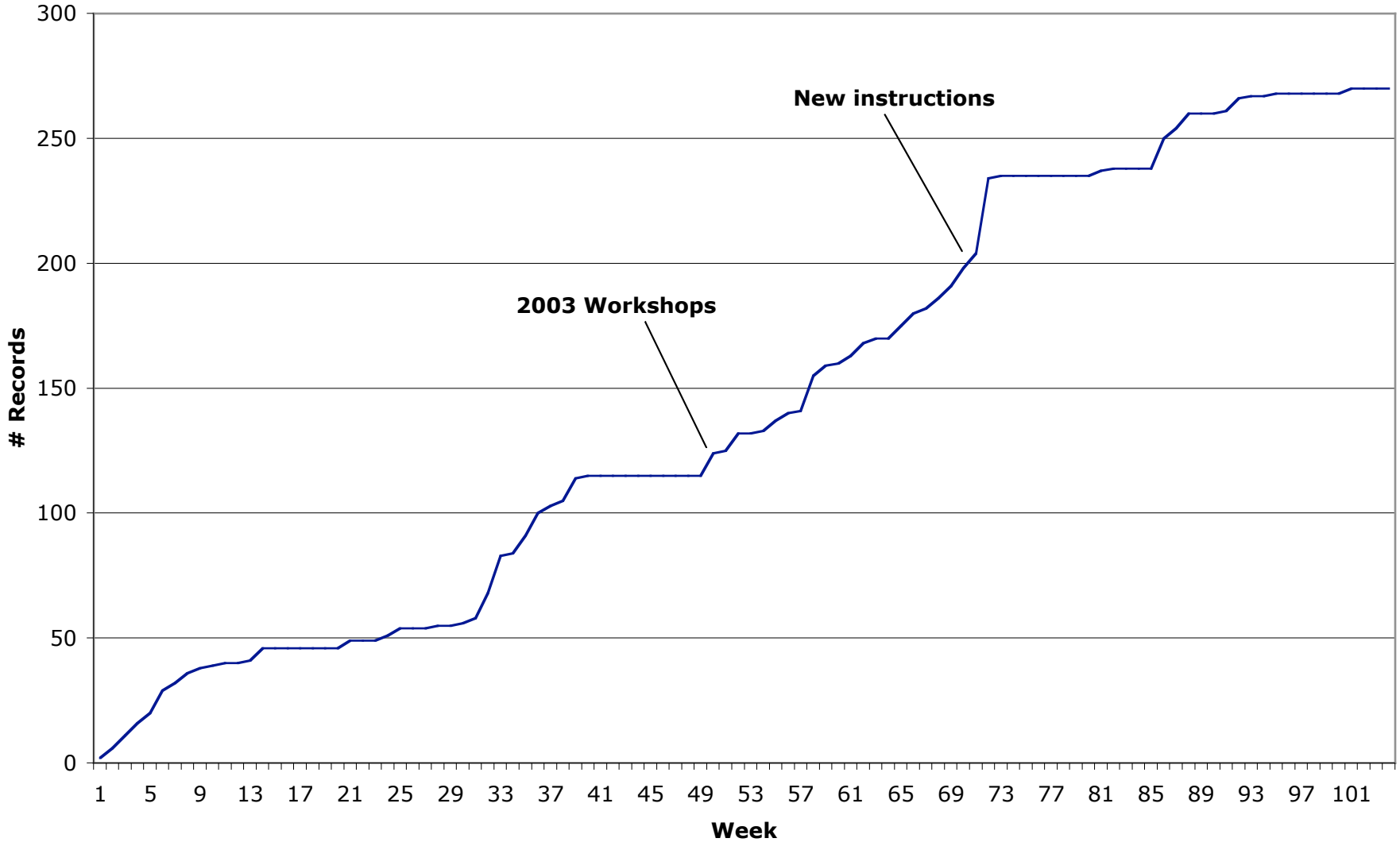
- DWEL WorkHub brought online November 2002
- Includes downloadable documentation and instructions
  January 2003: 2 sets of 2 day training workshops held in computer lab at CSU

6. Outcomes

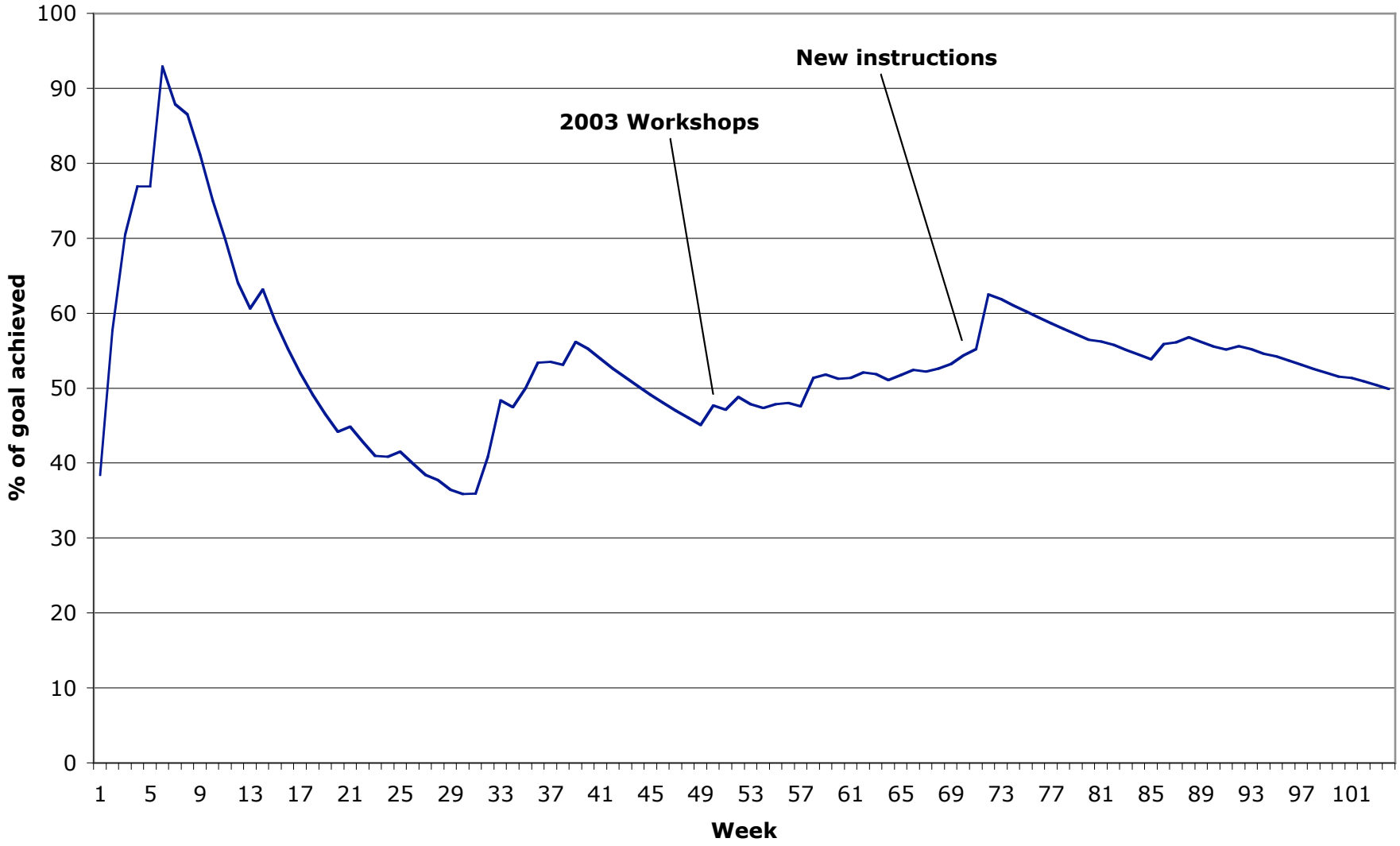
It seemed to work …

- … for a while
- Cataloguing did not show a huge improvement in productivity, but it *did* switch from 'boom and bust' cycle to a steady accumulation of records

DWEL Catalogue records, cumulative

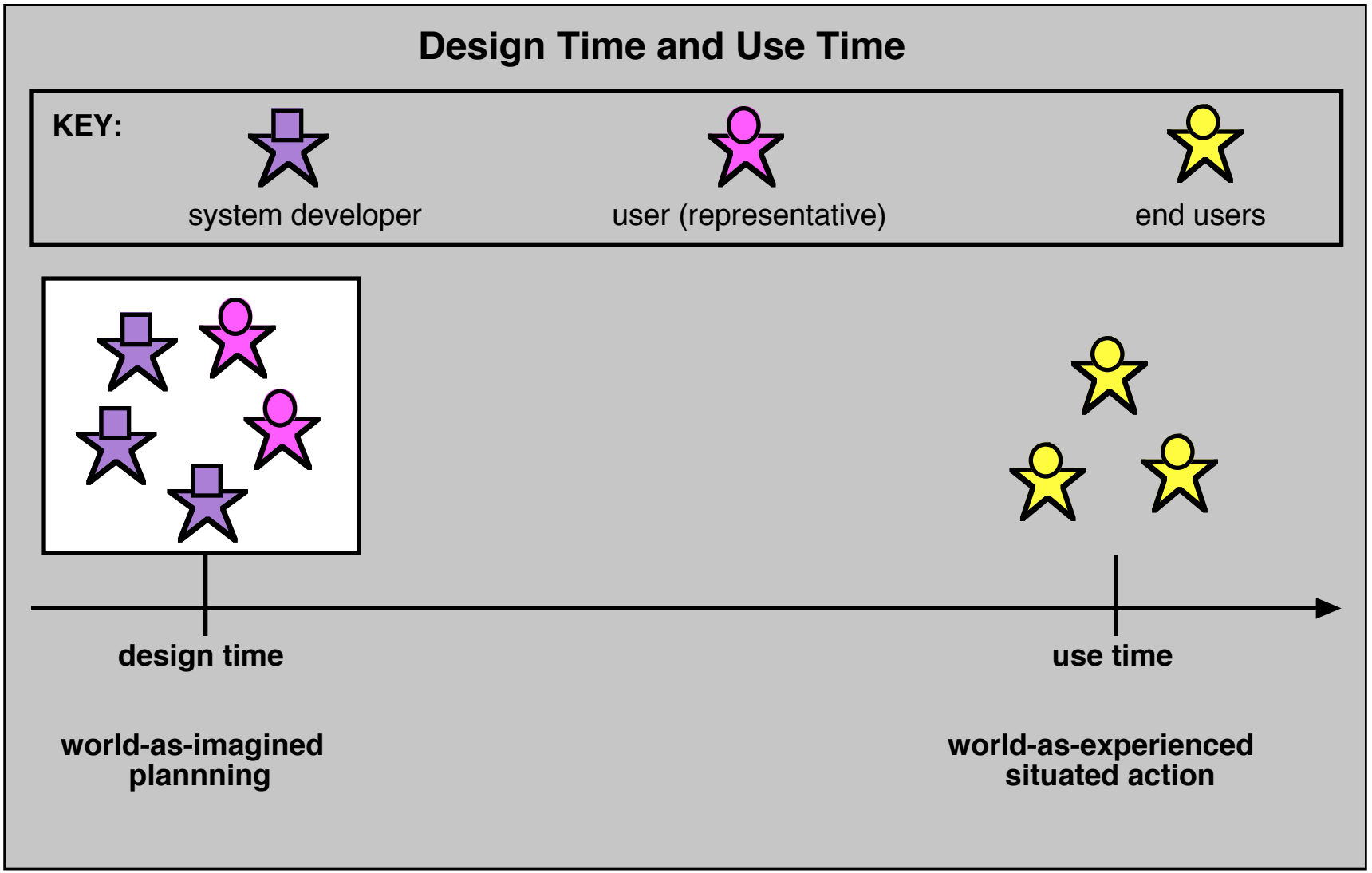


Records Catalogued as % of goal



Lessons Learned

- At the original workshops of January 2002, it was assumed that the tools required for the project were the cataloguing and discussion tools
- Regarding the necessity of scope documents and review criteria, it was assumed that communication had occurred between developers and user-developers; and that the user-developers had understood these necessities


Design Time and Use Time
KEY:
system developer
user (representative)
end users
design time
use time
world-as-imagined
plannning
world-as-experienced
situated action

Lessons Learned

- Such communication had not occurred however (see CRA), and the developer-users had not understood the importance of developing collection scope and review criteria prior to collecting
- This led to low project productivity
- CRA suggested that the developers and developer users thought of DWEL in different ways
- The DWEL WorkHub incorporated developer thinking regarding review and scope and made this accessible to the developer-users in the form of a structured online workflow tool

Lessons Learned

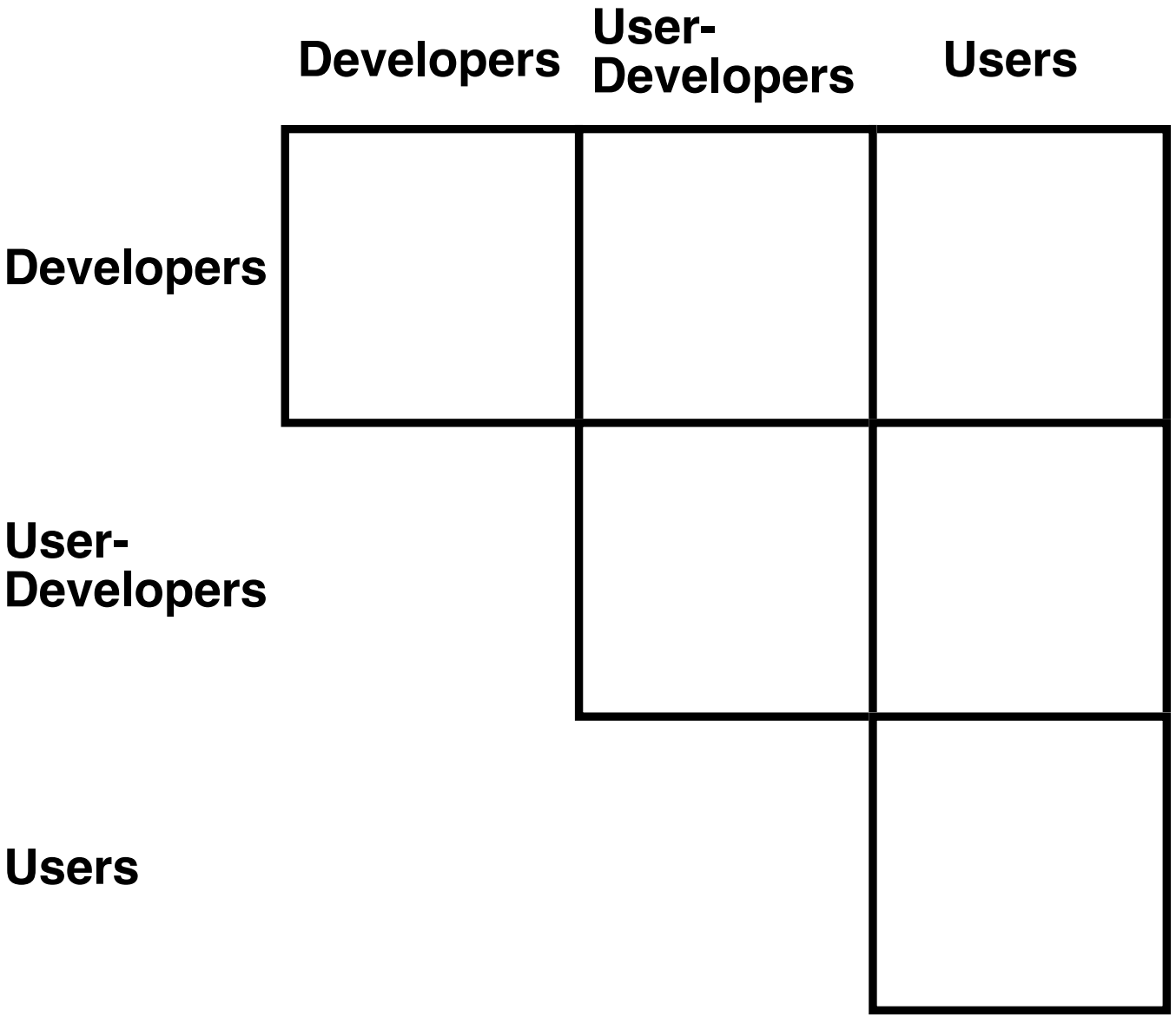
- It was a mistake to assume that the user-developers could come to a nuanced understanding of all dimensions of collection development on their own
- They had to be supported to come to such understandings by the tools (if indeed they developed such understandings at all … maybe they just wanted to do their jobs)

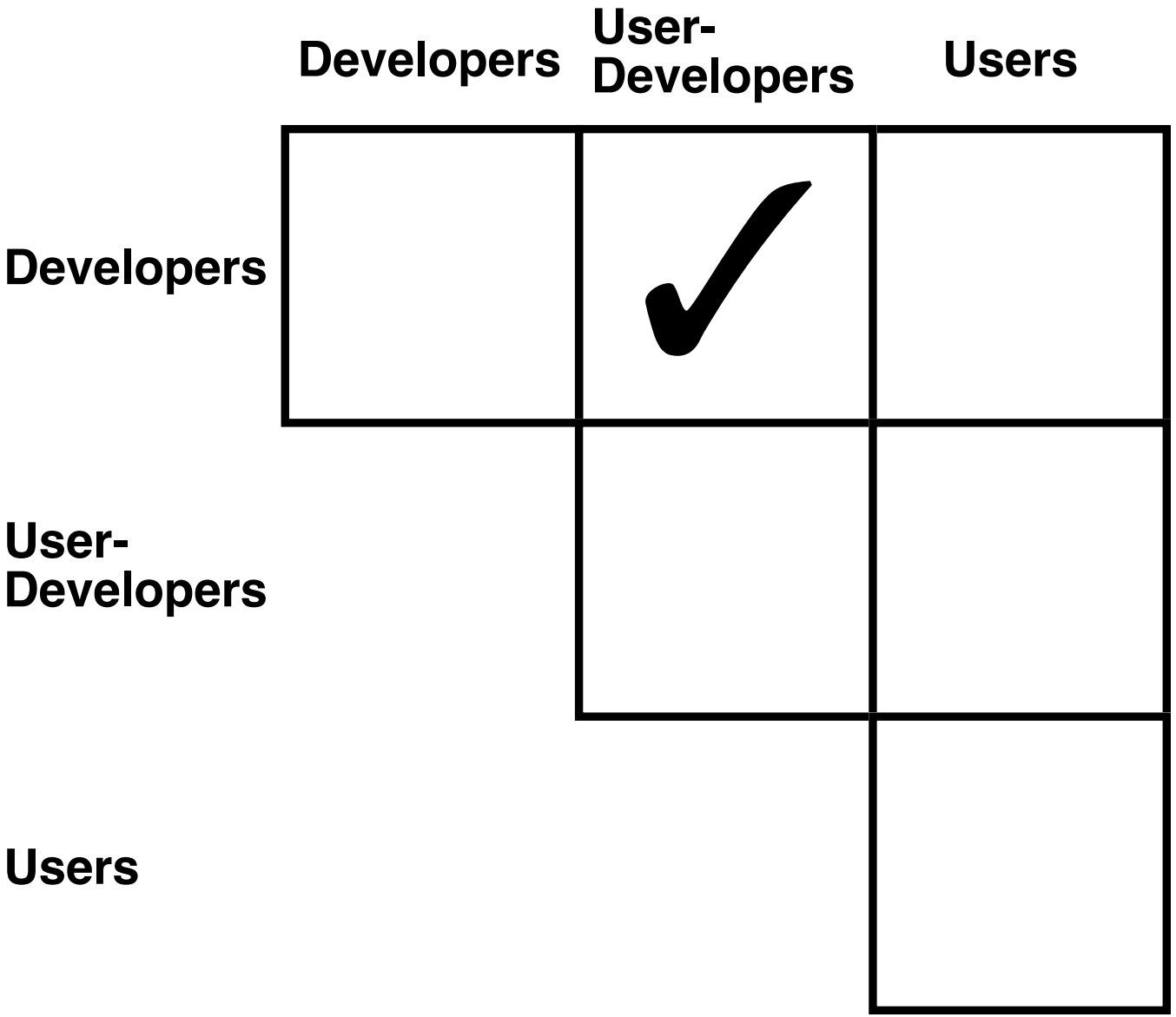
Conclusions

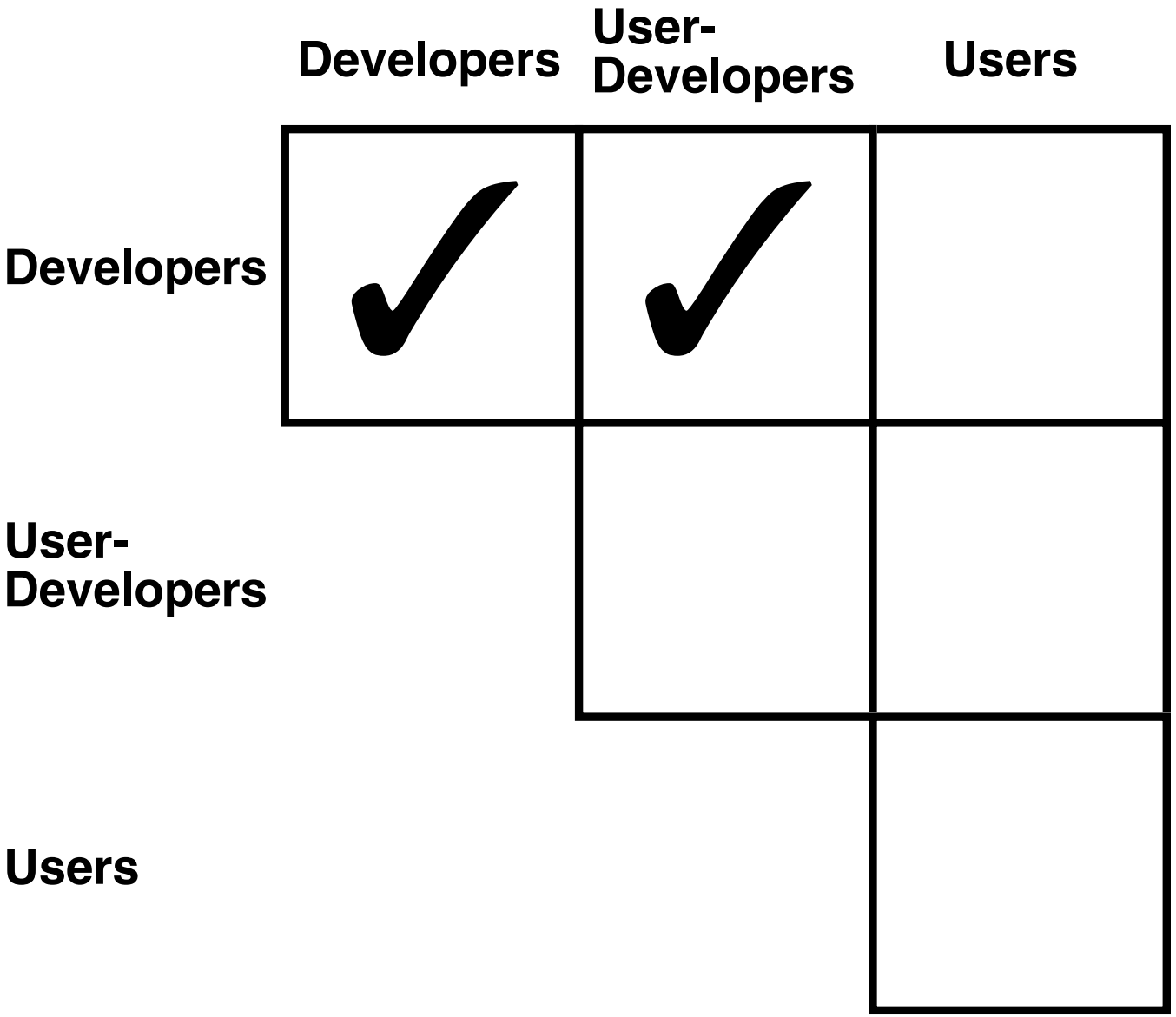
- Designers, users, and designer-users working together with the same technology, can embrace differing definitions of that technology
- In some cases these differences may not be readily apparent to these participants
- Meta-design can play a role in the design and support of communication between designers, users, and designer-users

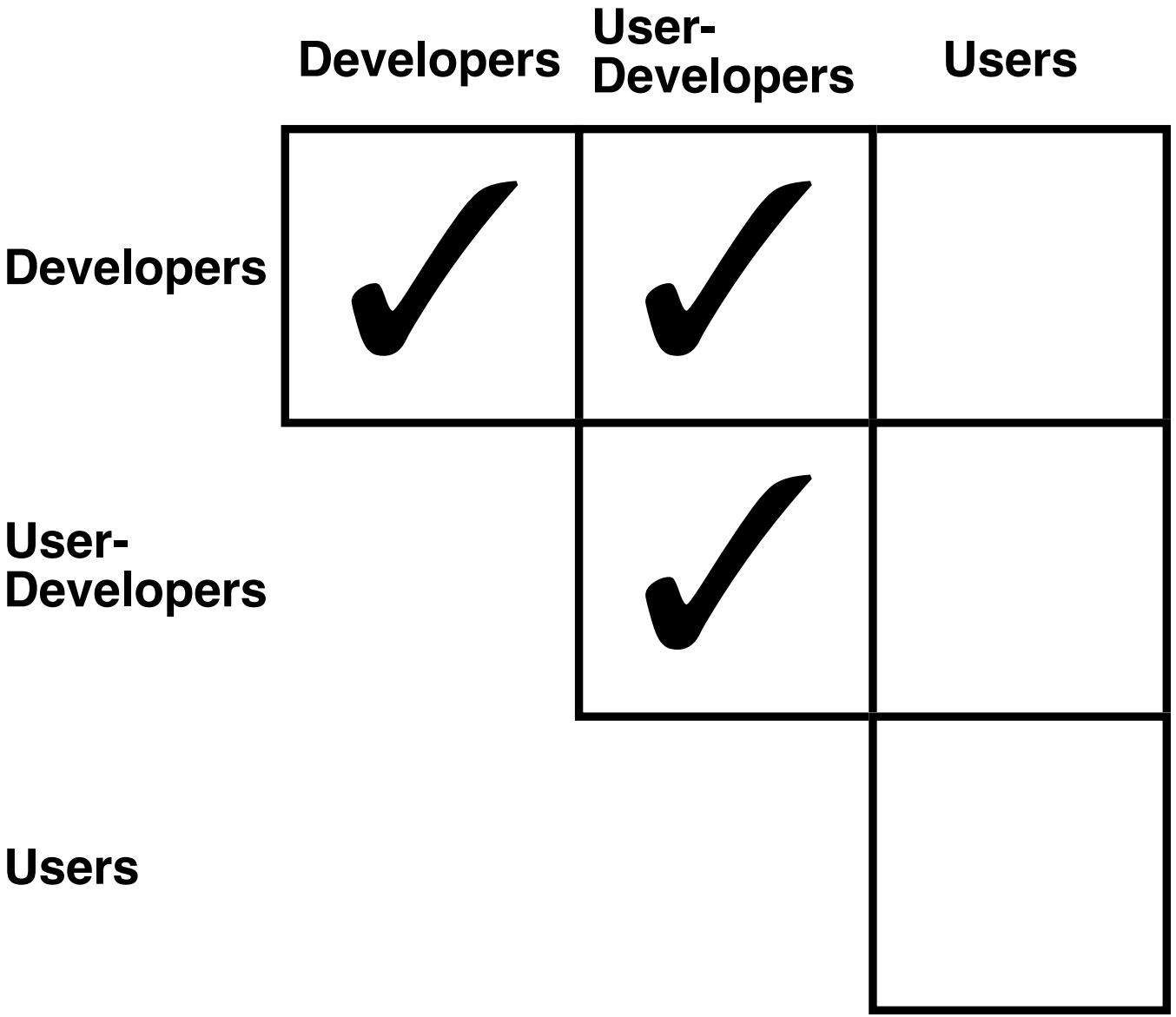
QUESTIONS?

DWEL workshops, January 2002


Developers
User-Developers
Users
Developers
User-Developers
Users


Developers
User-Developers
Users
Developers
User-Developers
Users


Developers
User-Developers
Users
Developers
User-Developers
Users


Developers
User-Developers
Users
Developers
User-Developers
Users