

Integrating Human and Machine Document Annotation for Sensemaking

Simon Buckingham Shum

Anna De Liddo

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Ágnes Sándor

Hewlett Grant Report Project

template

Hewlett Grantees Reports - template



Title of article and number: Not sure what the title is #2005 - 0246

Related URL: <http://www.etsi.edu/sams/ednotes>

Suggested main theme name: Sustainability

Name of person calling this: Euplia Makravanis

Information: 01 / 10 / 2010

Organization name and country of origin for bid (eg USA, UK etc): WGET USA

Country/area (geographical area served by bid): USA

Project Time Span (starting date, duration, ending date): February 2006 - January 2007

Objective (objective of the project as stated in the report): To encourage work and use of OERs at the level of foundations in this area as well as business plan for Eduteals

Target audience (see suggested list at the end of this document): Community Executives

Subject or discipline if appropriate (see suggested list at the end of this document): N/A

Level (see suggested list at the end of this document): N/A

Medium if appropriate (see suggested list at the end of this document): Webpages Documents

Brief summary of background information: The report covers two initiatives; the ad hoc more specifically for Sally Johnson, who describes the report or area of OER meetings, and activities representing a

cohere
 >>> make the connection



report

Hewlett Open Education Research! Draft Project Report

NARRATIVE

A. Description of an initiative/program

The primary goal of this project was to conduct an exploratory research study to determine if providing a professional development program using open education resources (OER) would help teachers begin to transform their curriculum and teaching through the use of technology. Our right-year Master Learning Technology Institute (MLTI) experience had shown us that while providing laptops to all middle school teachers and students had had many positive impacts on schools, classrooms and learning, many middle school teachers still had not fully integrated the laptop technology into their teaching. Accordingly, this research study was designed to determine the impact of helping a group of middle school and high school mathematics teachers, through professional development with mathematics OER, to teach targeted algebra topics using technology.

Several key activities were undertaken in this project over an 18-month time period. First, we attempted to conduct an environmental scan to determine the challenges teachers encounter in using OER. Although the use of OER has grown quite extensively in higher education and K-12 settings in developing countries, OER use by K-12 teachers in the United States appears to be limited. The purpose of this activity was to explore why the use of OER was not being used by teachers, and to develop strategies for overcoming these challenges through our professional development program and research. This environmental scan consisted of several activities, including interviews with leading OER experts and programs, surveys of teachers, and a limited number of focus groups. Through these activities we began to draw conclusions about the use of OER in K-12 school settings, and these conclusions are discussed below under Learning Lessons.

XIP-annotated report

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1 Publish ideas (and optionally add relevant websites)

Problem: Global Warming

Global Warming

www.abc.net www.xyz.org

2 Weave webs of meaningful connections between ideas: your own, and the world's

Global Warming

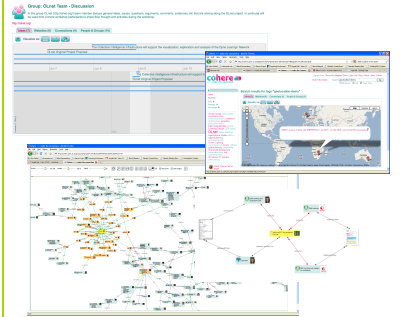
is an example of

Long-term problems of the 21st century

3 Discover new ideas and people



RESULTS




Discourse analysis with the Xerox Incremental Parser

Detection of salient sentences based on rhetorical markers:

BACKGROUND KNOWLEDGE:

Recent studies indicate ...
... the previously proposed ...
... is universally accepted ...

CONTRASTING IDEAS:

... unorthodox view resolves ...
paradoxes ...
In contrast with previous hypotheses ...
... inconsistent with past findings ...

GENERALIZING:

... emerging as a promising approach
Our understanding ... has grown
exponentially ...
... growing recognition of the
importance ...

NOVELTY:

... new insights provide direct
evidence we suggest a new ...
approach ...
... results define a novel role ...

SIGNIFICANCE:

studies ... have provided important
advances
Knowledge ... is crucial for ...
understanding
valuable information ... from studies

SURPRISE:

We have recently observed ...
surprisingly
We have identified ... unusual
The recent discovery ... suggests
intriguing roles

OPEN QUESTION:

... little is known ...
... role ... has been elusive
Current data is insufficient ...

SUMMARIZING:

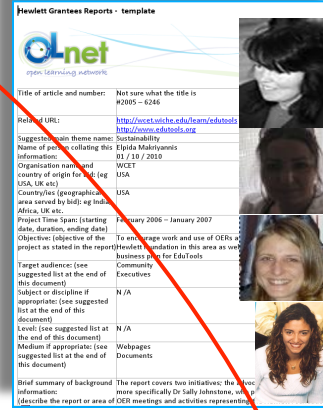
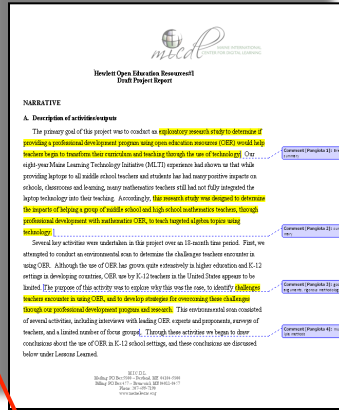
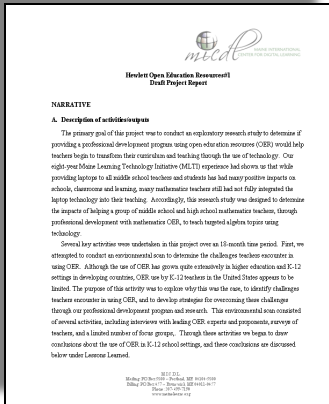
The goal of this study ...
Here, we show ...
Altogether, our results ... indicate

Human annotation and machine annotation

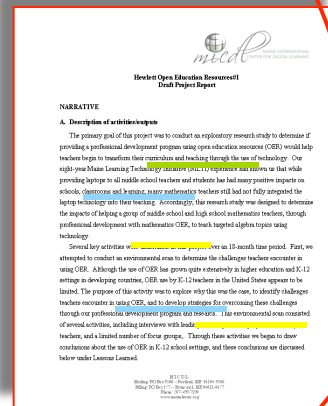
human-annotated report

template

report



XIP-annotated report



Human annotation and machine annotation

1.

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Comment [Panglota 1]: brief summary

Comment [Panglota 2]: summary

Comment [Panglota 3]: good arguments, rigorous methodology

Comment [Panglota 4]: multiple methods

~19 sentences annotated

2. 71 sentences annotated

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22 sentences annotated

11 sentences = human annotation
2 consecutive sentences of human annotation

59 sentences annotated

42 sentences = human annotation

Template and machine annotation

human-annotated report

template

report

Higher Open Education Research
Final Project Report

NARRATIVE

A. Description of activities/objectives

The primary goal of this project was to conduct an exploratory research study to determine if providing a professional development program using open education resources (OER) would help teachers begin to transform their curriculum and teaching through the use of technology. Our right-year Master Learning Technology Initiative (MLTI) experience had shown us that while providing laptops to all middle school teachers and students had had many positive impacts on schools, classrooms and learning, many mathematics teachers still had not fully integrated the laptop technology into their teaching. Accordingly, this research study was designed to determine the impact of helping a group of middle school and high school mathematics teachers, through professional development with mathematics OER, to teach targeted algebra topics using technology.

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XIP-annotated report

Template and machine annotation

Interesting questions raised within the article itself:	• There is no empirically based understanding of the challenges of using OER in K-12 settings	→	Human: ✓	XIP: ✓
	• No real value of expert panels, as it yields no empirical research on the topic and opinions expressed are not necessarily from K-12	→	Human: x	XIP: x
	• While at first blush it may appear K-12 teachers are not using OER, they are in fact using these types of materials (in the form of free resources over the internet), but there are issues with recognition and definition of what OER is	→	Human: x	XIP: x
	• While at first blush it may appear K-12 teachers are not using OER, they are in fact using these types of materials. So practices of modification happen, but they are either not shared or mediated openly	→	Human: x	XIP: x
	• Issues of confidence/time constraints: Even with mentoring and after the training, only a small percentage was motivated to share & publish openly, peripheral participation also persisted in online forums (teachers lurking, but not posting)	→	Synthesis	
	• Challenges remain and relate to the adoption of any new practice or the development of new curricular resources; here important issues about a) awareness; b) relevance of existing materials & c) expertise/confidence, time-constraints in making effective use of OER; d) framework for recognizing teacher concerns levels: self-concerns, task concerns, and impact concerns.	→	Human: ✓	XIP: ✓
	Partially answered question: Are teachers motivated enough to improve student learning? PD work was refocused on helping teachers gain greater expertise and confidence with the technology first, did we see teachers begin to use OER in changing their practice.	→	Human: ✓	XIP: ✓

Total report: 3 Human: ✓ 3 XIP: ✓

5 Human: x 5 XIP: x

2 Synthesis

The same field on the same report in 4 different templates

Interesting issues in the report:

1. An expert consultation was an effective way to refine definitions and develop a view of the emerging area of OER.
2. The 4 areas identified for the objectives of the project (i.e. sustainable cost/benefit models; intellectual property rights; incentives and barriers; and, Improving access to OER)

- Cost can be improved and cost of content development reduced by sharing and reusing
- That there is a risk in 'doing nothing', given that OER offers opportunities for institutions
- Imbalance between production and use of OER

- IPR issues,
- barriers to OER adoptions
- mapping of OER activities
- productions and use of OER
- institutional policies
- IPR and open content licenses;
- Models for sustaining OER programmes
- Motivations, benefits and barriers for institutions producing OER,
- Usability, quality and validation issues regarding the use of OER

(Because the summary report doesn't give any info in this area I had to look at the full report):

1. The risk of doing nothing. Universities and colleges should act and join the OER movement now. Stakeholders, policy makers, HE and other players will be affected by the growth of OER.
2. The increase in non-formal and informal learning will increase demand for assessment / recognition of competence outside formal learning settings.
3. HE grants seldom come with a requirement to share with the general public.
4. Promotion of public-private partnerships (at national and provincial level) to combine know-how and resources as well as sharing / reducing risks.
5. The existing copyright regime is the most serious barrier to faster growth of the OER movement.
6. The build-up of a better knowledge base on the production and use of digital learning resources.
7. Informal learning using OER can be expected to grow. Can be opportunity to promote lifelong learning and meet some of the needs of an ageing population.
8. Countries deciding on neutral stand towards open or commercial educational resources.
9. The need to rethink long-term preservation of digital data.
10. Increased awareness and clear policies should be high on the OER agenda.
11. Due to intensified competition for funding, OER initiatives are looking at ways to establish loyal user communities, strong brands, increased site usability and high quality resources.
12. Grant-receiving OER initiatives devoting percentage of amount to evaluation activities (example of [OpenLearn](#) devoting 12%).
13. Making it possible to search for resources across repositories on an international level (example of [GLOBE-SchoolNet](#)).

2 semi-structured interviews

Human

Abstraction:

re-phrasing, combining, ranking

Based on rhetoric + content

Rhetoric: sometimes commonplace,
advertisement

Unequal outcome: depends on
interest, availability, attention →
might overlook issues

Time-consuming

Length a problem

XIP

Extraction

Based only on rhetoric

Steady output, but omissions
due to parser errors

Rapid

Length no problem

2 semi-structured interviews

Human

XIP

The annotation has no correlation with the document structure

Intuitive for expert to understand XIP annotation

Would you use it?

What's your impression?

The machine helped me

To what extent would you trust XIP?

What's your impression?



To what extent can we combine results of

human distillation of knowledge and machine annotations

into a:

*unique **interactive map**,*

which any other participant can use to explore, make sense of
and enrich the results of analysis?

Viewed through the lens of contemporary social web tools, Cohere sits at the intersection of

- ✓ web annotation (e.g. Diigo; Sidewiki),
- ✓ social bookmarking (e.g. Delicious), and
- ✓ mindmapping (e.g. MindMeister; Bubbl)

using data feeds and an API to expose content to other services.

With Cohere, users can :

- collaboratively annotating the Web,
- Engaging in structured online discussions,
- leveraging lists of annotations into meaningful knowledge maps.

Integration and representation of machine and human analysis

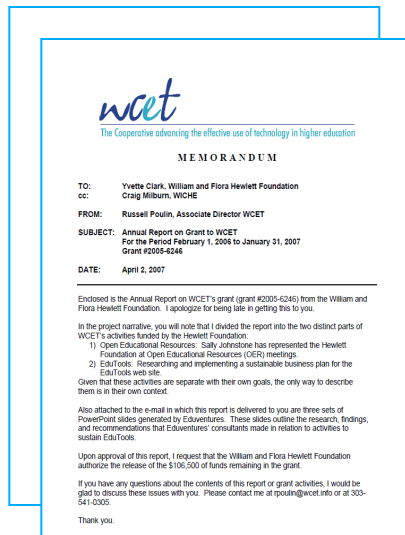
We plan to validate the integration of XIP and human analysis results (Web forms) into Cohere's maps. To do so we will:

1. Design and develop a ***Cohere import for XIP*** results
2. Design and develop a ***Cohere import for the Web Forms*** filled by the analyst
3. Create ***mash-up views*** of the results customizable by report, theme, geographical area, time etc,
4. Create specific HGR ***search and reporting interface***, to enable Hewlett to generate more traditional reports on the results of analysis.

1. Bringing XIP results into Cohere

Design and develop a Cohere import for XIP results

XIP:



1 Publish ideas (and optionally add relevant websites)



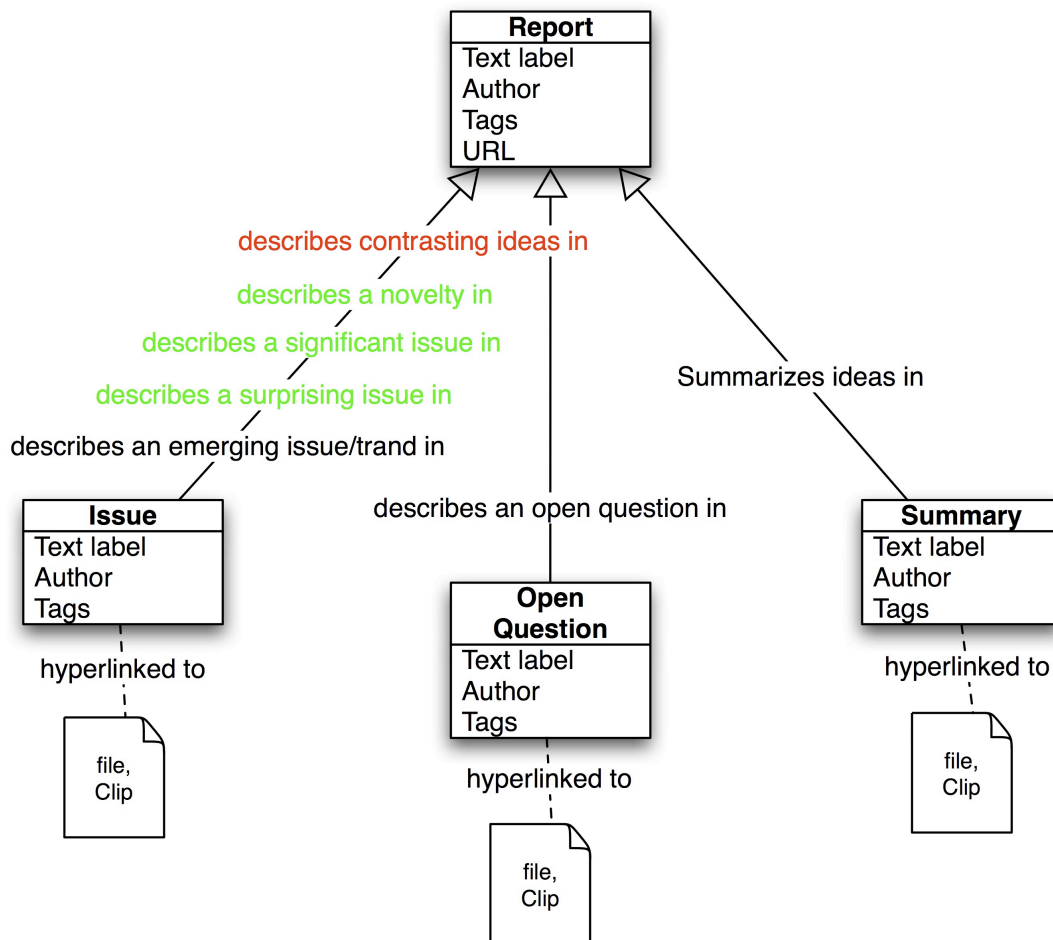
2 Weave webs of meaningful connections between ideas: your own, and the world's



3 Discover new ideas and people



Information schema for the import: what data we imported and how we visualized them



Legend

Main Classes (visualized as) Nodes types

Report
Issues
Summary
Open Questions

Sub Classes for Issue (visualized as) semantic connections

contrast = describes contrasting ideas in
surprise = describes a surprising issue in
novelty = describes a novelty in
significance = describes a significant issue in
generalization = describes an emerging issue/trand in

Noun Phrases (visualized as)

Tags

XIP annotations to Cohere

PROBLEM_CONTRAST_ First, we discovered that there is no empirically based understanding of the challenges of **using OER** in **K-12 settings**.

First, we discovered that there is no empirically based understanding of the challenges of using OER in K-12 settings.

10/11/10

Details + | URLs (1)+ | Groups (1)+ | Tags (6)+

T describes contrast...

Ed_08-2059_Final

10/11/10

Details + | URLs (1)+ | Groups (1)+ | Tags (93)+

Browsing annotations from text

The screenshot shows a web browser window with three tabs. The active tab is titled "Hewlett Open Education Resources#1 Draft Project Report". The page content is a document with the following structure:

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A second major activity in pursuit of our project goal was to design and deliver a professional development program for a sample of middle school and high school mathematics teachers. Teachers were solicited for participation through electronic communications, school site visits and conversations. We were looking specifically for teachers, who by their own admission, were using the computer technology on a limited basis in teaching mathematics. Applications were reviewed and 22 teachers from western and mid-coast schools were selected for participation in program. These teachers participated in a series of professional development activities over six months, including face-to-face meetings, online work, site visits, and peer observations.

The professional development was conducted separately for the two cohorts, and included two face-to-face days in August, site visits to each participating school in the fall, engagement in online discussions and activities with cohort specific groups in an online course environment that also served as an access point for resources (Moodle environment), a follow-up face-to-face day in November, follow-up school site visits in winter/spring, and on-going support in the use and creation of interactive tools and supporting resources through email, online, and during face-to-face visits.

The content of the professional development included assisting participants in creating a shared definition of OER, introducing participants to key OER repositories, resources and software to support mathematics learning and teaching (including GeoGebra) and engaging participants in the use of GeoGebra and

The left sidebar of the browser shows a list of annotations:

- Annotation 1: XIP, 10 Nov 2010, Connections: 2. Source: current page. (1) how may the necessary professional development and mediated support be effective... more
- Annotation 2: XIP, 10 Nov 2010, Connections: 2. More specifically, this project suggests to us three new strands of inquiry: more
- Annotation 3: XIP, 10 Nov 2010, Connections: 1. These lessons suggest additional research and study is needed before a more comp... more

Browsing annotations from text

Cohere

Logout My Data

Ideas (27) Clips (26) Connections (30) OERs (0)

Show: All My coheredev.open.ac.uk/HGR/Ed_08-2059_Final.php

Highlight: All My Pro Con Clear

(1) how may the necessary professional development... more

Ed_08-2059_Final

describes an open question in

(1) how may the necessary professional development... more

Ed_08-2059_Final

describes contrasting ideas in

More specifically, this project suggests to us thr... more

Ed_08-2059_Final

describes a novelty in

More specifically, this project suggests to us thr... more

Ed_08-2059_Final

describes contrasting ideas in

These lessons suggest additional research and stud... more

Ed_08-2059_Final

describes contrasting ideas in

types of materials. ♦ That is to say, K-12 teachers liberally use free and open resources on the Internet; they just do not know nor identify them as OER. ♦ Further, teachers do often modify the materials, but do not often post their new materials to a website, nor become active members of collaborative communities. Even in our project where teachers were actively encouraged to do these activities, teachers posting their own teaching resources only increased 9%. ♦ There was a large increase in the percent of teachers who joined an online collaborative group (from 14% to 71%), but only to view resources posted by others, not post resources themselves.

A third lesson learned about OER use was that the major barriers to teachers' expanded use of OER appears to be the same types of barriers teachers face in developing any new curriculum and/or changing their teaching practice. ♦ That is to say, evidence from our surveys and focus groups indicated that many teachers are unaware of OER materials. Others teachers are aware of them, but believe the OER of which they are aware do not fit their curriculum needs, or they report they lack the time and expertise in making effective use of OER.

A fourth key lesson learned was that the long standing framework for recognizing teacher concern levels is very applicable to integrating technology and OER into one's teaching. ♦ Fuller and Brown (1975) identified three levels of teacher concern for beginning teachers: self-concerns, task concerns, and impact concerns. We found that even though many of the teachers in our sample had the laptops available to them and their students for several years, most of the teachers were at the Task Levels of Concerns, not Student Impacts. ♦ Thus, our original plan of starting to work with the teachers using a student-centered problem focus turned out not to be the most viable entry point in helping reluctant technology users increase their use of OER in their classroom instruction. ♦ Only when the initial PD work was refocused on helping teachers gain greater expertise and confidence with the technology first, did we see teachers begin to use OER in changing their practice.

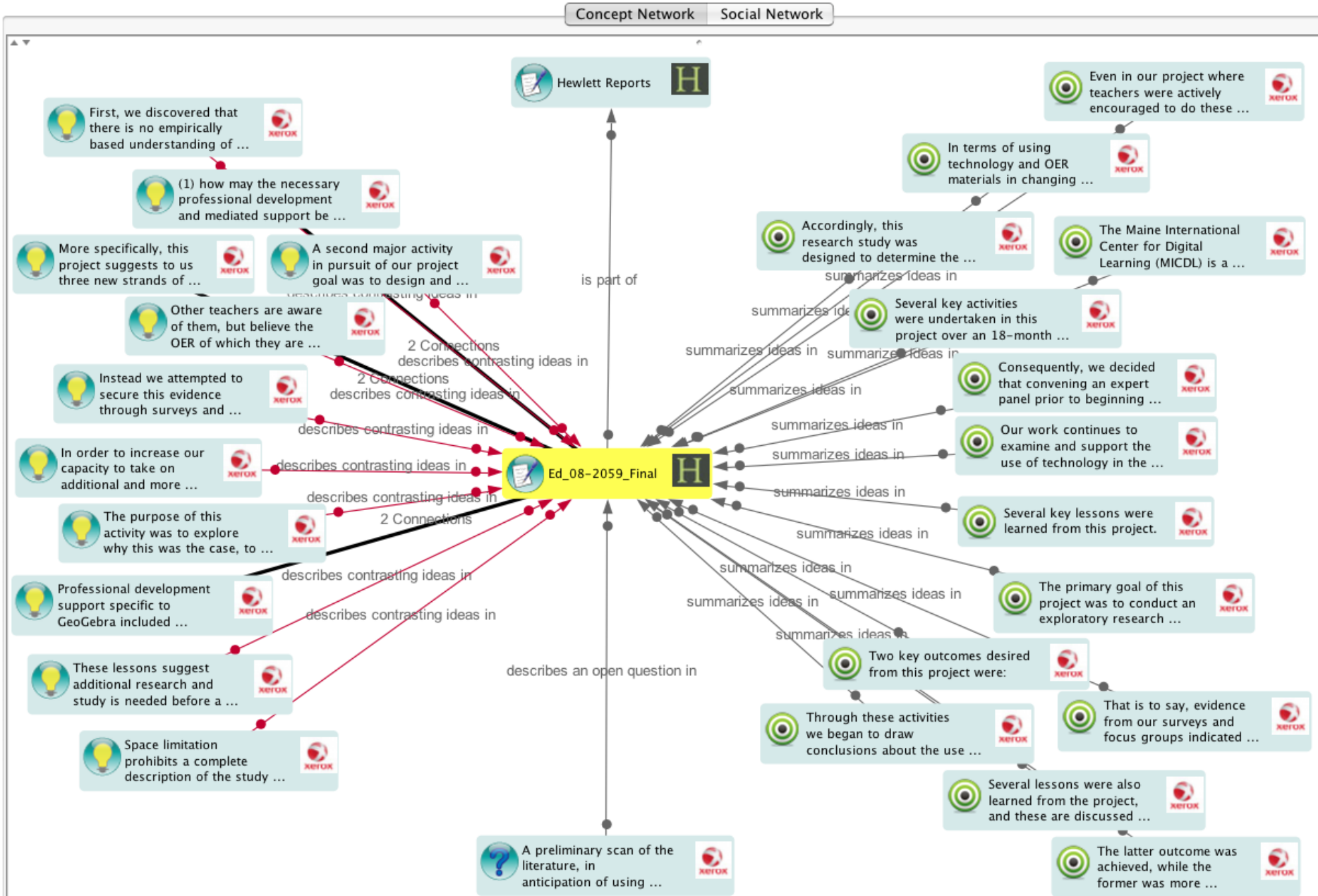
Another related key lesson was that merely introducing teachers to OER materials, even when matched to their curriculum and student needs, was not sufficient to create changes in teacher behavior and their instruction. ♦ Teachers needed some type of mediated support, both in terms of initial and ongoing professional development, in order to modify their behavior. Thus, merely removing the barrier of not being aware of the availability of OER will not insure widespread use of OER. Many teachers need help in translating OER into curriculum changes.

These lessons suggest additional research and study is needed before a more complete theoretical model may be developed for using OER, in conjunction with technology, to change teacher instructional practices. ♦ More specifically, this project suggests to us three new strands of inquiry: (1) how may the necessary professional development and mediated support be effectively provided in a more cost-effective fashion using technology; (2) what strategies are effective in helping teachers become active contributors to OER communities; and (3) what are the effects of using OER, in conjunction with technology, on student learning?

E. Description of dissemination plans

A description of the dissemination plans will be submitted with the final report.

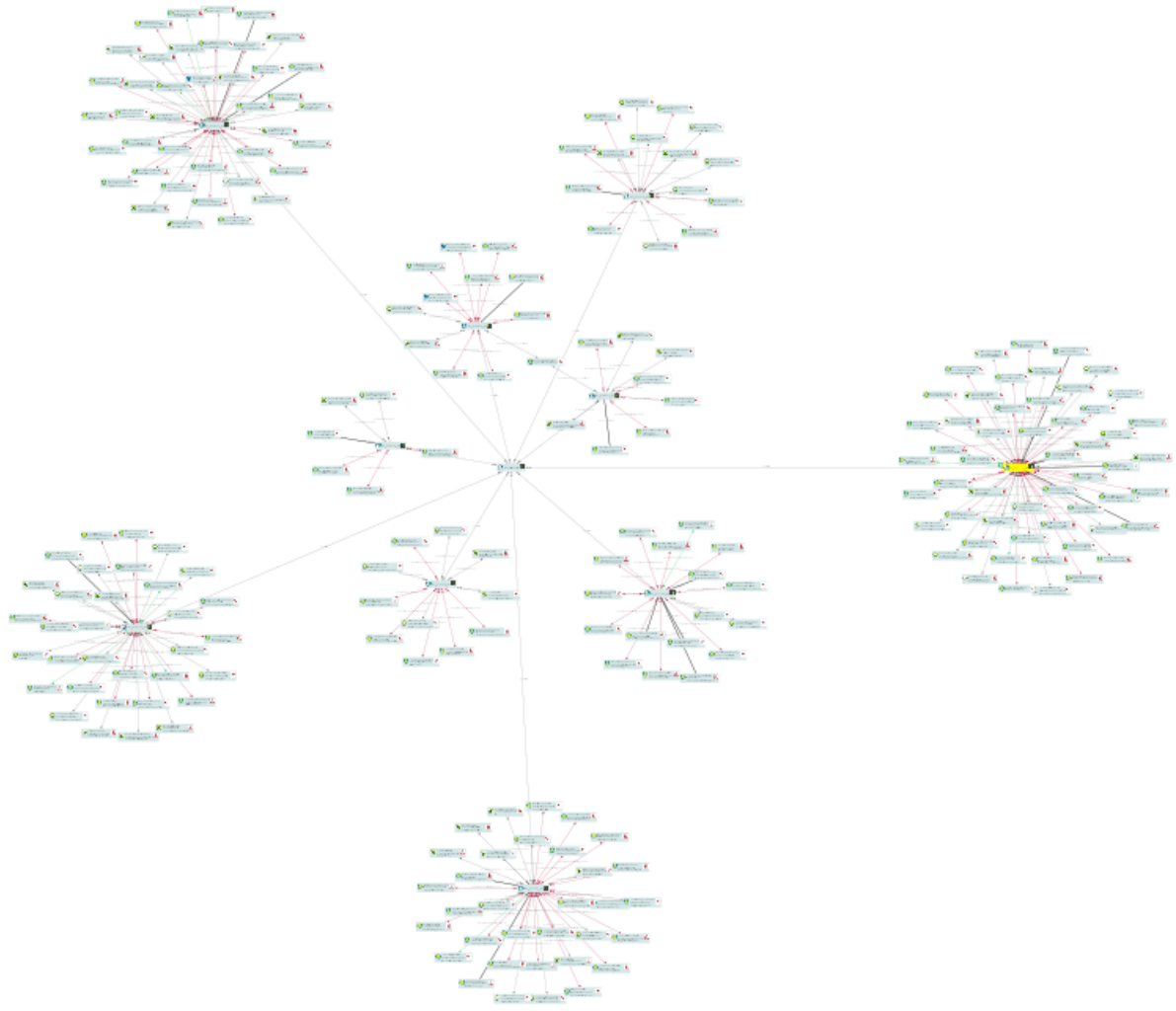
Cohere result



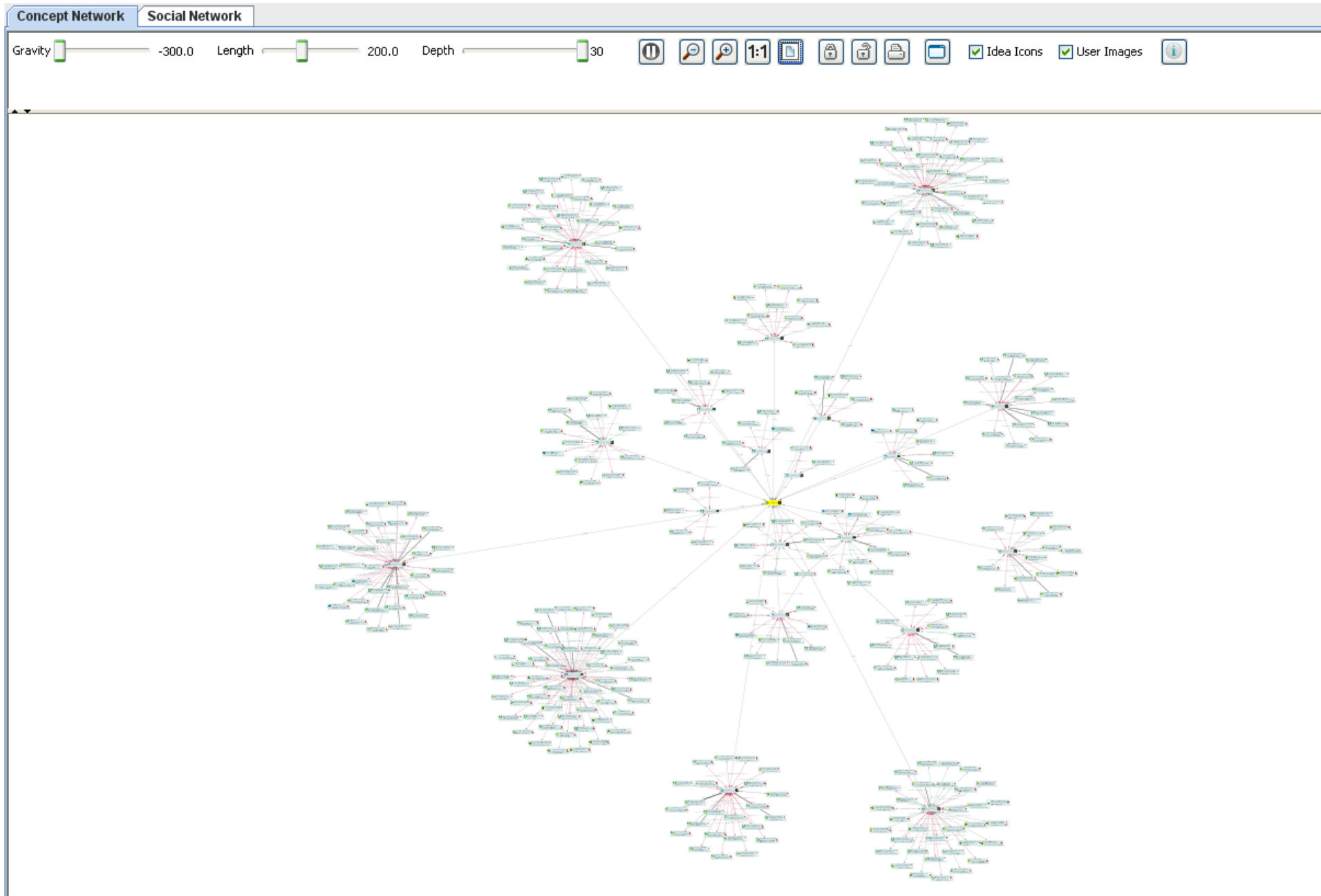
Cohere result: 10 reports

Concept Network Social Network

Gravity -300 Length 235.0 Depth 30



Cohere result: 20 reports



Automatic generation of tags to spot connections

Home
My Data
Add: ▶
Manage: ▶
My groups: ▶

My Tags:

climate change Cohere
Collective Intelligence
communities community action
community studies conference
eParticipation Gap Minder
geography hotels instambul
Internazionalization journal KMi
Learning Design OER

OER policy **OLnet**
Online learning
organizational studies politics
project 1 Project Proposal
regional planning
research question
rural development Screen Capturing
social dynamics society software
space spatial planning sustainability
Sustainable Development
sustainable future test trips
urban plannig

 Install Cohere Firefox plugin 0.6.5





Group: HGR Project



(stats)

For testing the HGR form and Xip imports etc

Ideas (409) Websites (413) Connections (475) People & Groups (4)

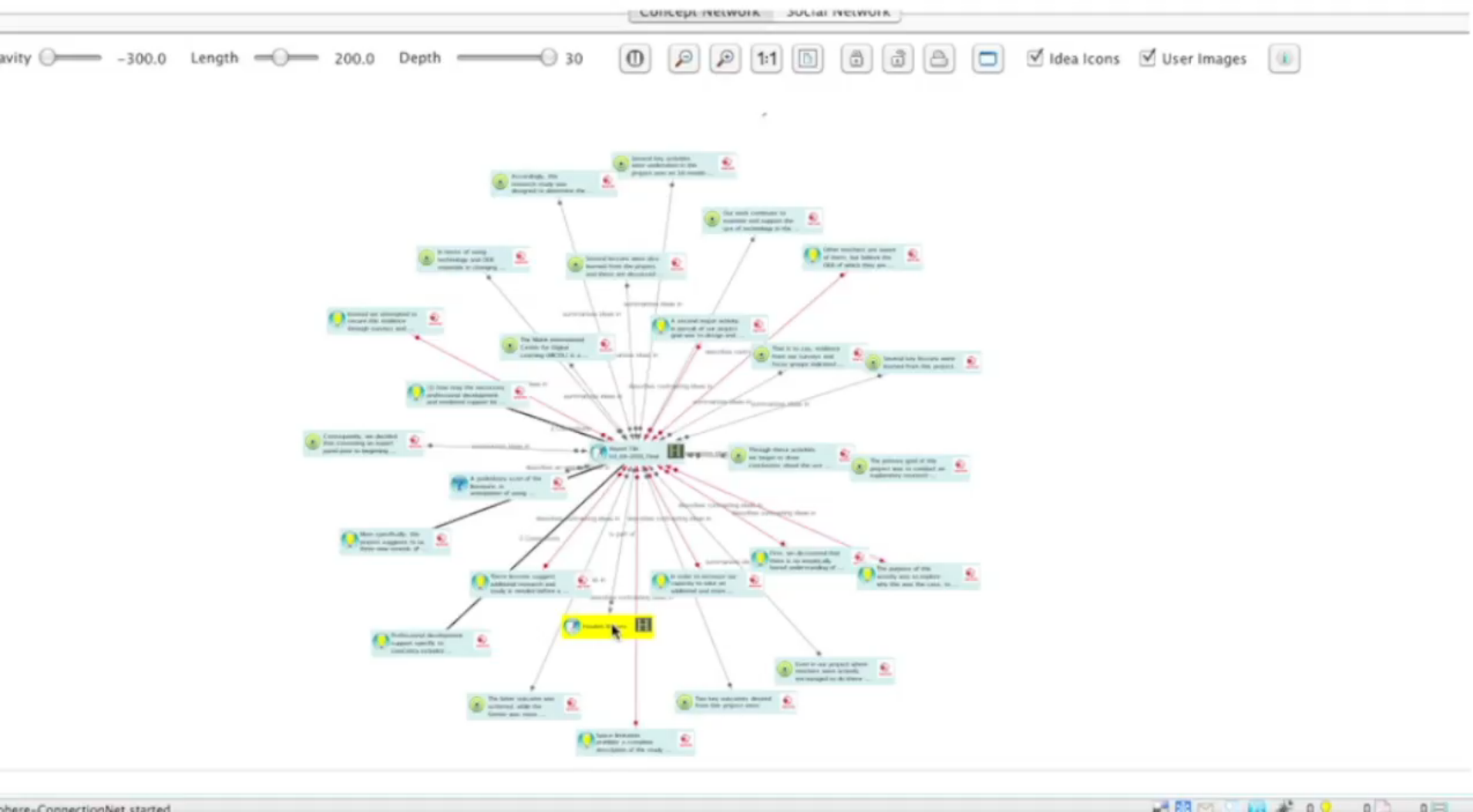
Visualize as:    Sort by: Create Date Descending Go 

Delete all none Go Filter by: Users Choose... Go

1 to 20 (409) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

-  **By examining the current initiatives being undertaken in furtherance of the above, and establishing the gaps that exist, the AVU intends to work systematically at creating an enabling environment for OERs to flourish across the continent in support of higher education and training.**  10/11/10
☆ Details + | URLs (1)+ | Groups (1)+ | Tags (12)+ 
-  **Yet OpenContent holds enormous potential for the African tertiary education scene.**  10/11/10
☆ Details + | URLs (1)+ | Groups (1)+ | Tags (7)+ 
-  **This work fuelled the development of the AVU Open Educational Resources Architecture whose implementation will now be supported by the Hewlett Foundation.**  10/11/10
☆ Details + | URLs (1)+ | Groups (1)+ | Tags (7)+ 
-  **In November 2004, the AVU convened a meeting of its Anglophone PI which sought to review what had been achieved through the current model of brokering degree and diploma programs from External Partner Universities (EPUs) outside Africa, and delivering them to select African Partner Institutions (PIs).**  10/11/10
☆ Details + | URLs (1)+ | Groups (1)+ | Tags (14)+ 
-  **It provided a testing ground and platform for the AVU's new paradigm within an arena of potential partners (educators, technical experts, donors) capable of contributing in ever more meaningful ways to the growth of the AVU.**  10/11/10
☆ Details + | URLs (1)+ | Groups (1)+ | Tags (15)+ 

Searching the network by semantic connection



Stats on Machine annotation results



Stats for XIP in group HGR Project

SUMMARY

Name	Item	Count	Action
Most Popular Link Type	describes contrasting ideas in	237	view all
Most Popular Node Type	Idea	253	view all
Most Connected Idea	Ed_04-4117_Final	63	view all
Most Connected User	XIP	908	view all

Link Types

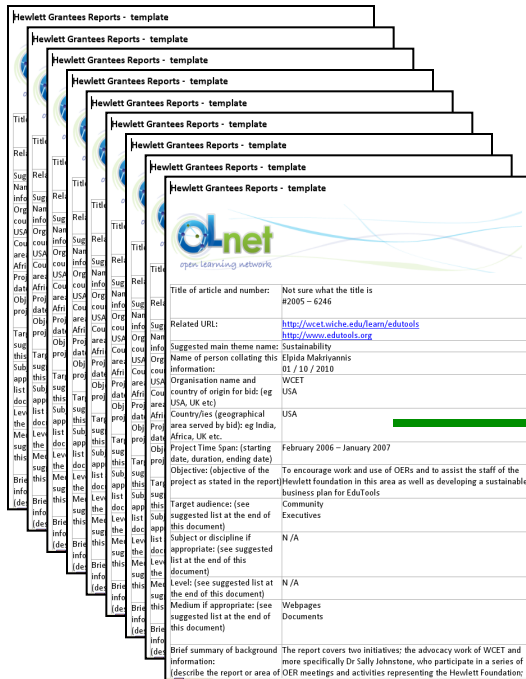
Name	Count
describes contrasting ideas in	237
summarizes ideas in	127
describes a significant issue in	43
describes a novelty in	26
describes an open question in	16
describes an emerging issue in	3
describes a surprising issue in	2

Node Types

Name	Count
Idea	253
Summary	126
Question	8

Next steps

2. Design and develop a Cohere import for the Web Forms filled by the analyst



1 Publish Ideas (and optionally add relevant websites)



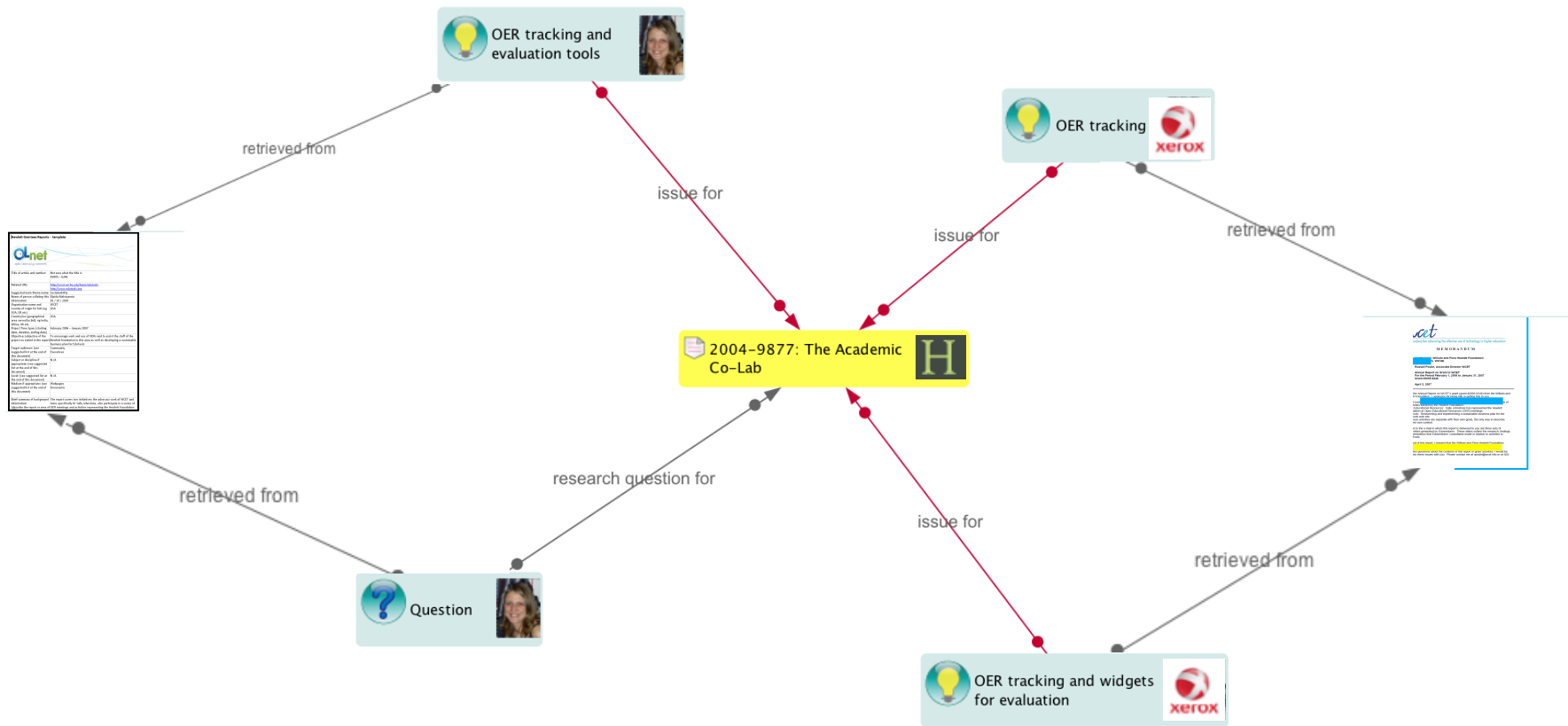
2 Weave webs of meaningful connections between ideas: your own, and the world's



3 Discover new ideas and people



What the Results will look like?



Creating mash-up views of results

3. Create mash-up views of results
4. Create specific HGR search and reporting interface

By Time

Group: OLnet Team - Discussion
In this group OLnet (<http://olnet.org/>) team member discuss general ideas, issues, questions, arguments, comments, evidences, etc that are arising along the OLnet project. In particular will be used from Cohere workshop participants to share their thought and activities during the workshop.

Visualize as: [Icons]

Date	Content
Jun 7	OLnet Original Project Proposal
Jun 8	The Collective intelligence infrastructure will support the visualization, exploration and analysis of the Opne Learning
Jun 9	The Collective intelligence infrastructure will support the visualization, exploration and analysis of the Opne Learning
Jun 10	The Collective intelligence infrastructure will support the visualization, exploration and analysis of the Opne Learning
Jun 11	OLnet Original Project Proposal

By Location

cohere
Search results for tags "geolocation-demo"

Visualize as: [Icons]

Map Satellite Hybrid

DEMO: A piece of Data with TIMEPERIOD 1 Jan 2010 - 12 May 2010, and LOCATION Johannesburg

By Theme

Search connection networks following links for topic: "Issues for OER research"

Gravity: -54.820 Length: 155.0 Depth: 30

Idea Icons User Images

Looking at OER ecosystems

How do we make OER research and practice sustainable?

Sustainability

How do we achieve economic sustainability and participation in OER initiatives?

Participation

How do we create incentives for participation in creating OER?

Effectiveness

What are possible measures of effectiveness of OER?

Share-ability

How do we make a OER research and practice sharable and scalable?

2004-2017: The Academic Co-Lab

OER tracking and widgets for evaluation

Question

How do we create incentives for participation in creating OER?

All Data

By Report

open learning network

The past 6 weeks

- Technical progress:
 - Adaptation of XIP analysis of scientific papers to project reports
 - XIP annotation of the reports
 - Design and execution of XIP import to Cohere
- Comparative observations (corpus study + interviews):
 - Similarities:
 - often similar basis for annotation: rhetoric
 - Differences:
 - analysts sometimes abstract – the machine extracts
 - analysts have attitudes
 - analysts overlook – the machine makes errors

The next 6 months

- Validate the integration of XIP into Cohere
 - Does Cohere visualization enhance XIP results?
 - Does it help in sensemaking of the analyzed text?
- Making sense of sensemaking...

Making sense of the sensemaking...

Concept Network Social Network

Gravity -300.0 Length 200.0 Depth 30

Idea Icons User Images

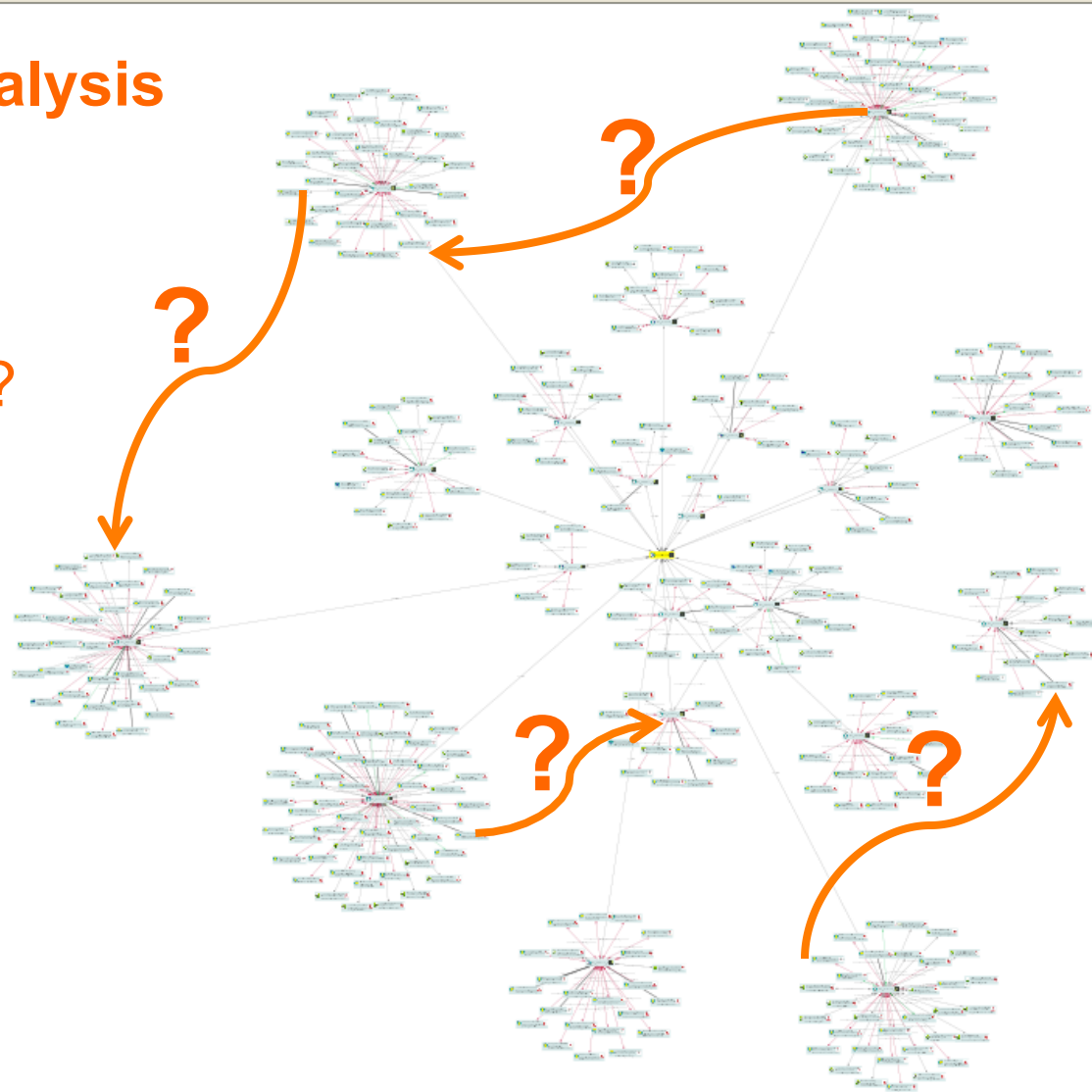
2nd phase analysis

Connecting?

Merging?

Re-tagging?

Summarising?



Theoretical questions for future work

- How to **evaluate** human and machine annotation and sensemaking? – no gold standard
- How to **make optimal use of both human and machine annotation**?
 - How to exploit machine consistency while reducing information overload and noise?
 - How to exploit the unique human capacities to abstract, filter for relevance etc.?
- How to **cope with visual complexity** (new search interface, focused and structured network searches, collective filtering)?

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