



OER World Map: Phase 1 Report

Institute for the Study of Knowledge Management in Education (ISKME)

April 17, 2014

ISKME: [CC BY 4.0](#)

About this Report

This report comprises ISKME’s written deliverable for the OER World Map project. The report describes ISKME’s development process and resulting prototype for the map—including its proposed data elements and sources, visualization solutions, and technical architecture—and describes how a mapping system developed from these foundations can be scaled. The report is divided into five sections:

- Section 1 outlines the **objectives** of ISKME’s proposed map project; this section also presents a concrete **roadmap** for the map development—spanning the pre-phase work, Phase 1 (current), and Phase 2 (next steps);
- Section 2 discusses the **development steps** in meeting the project’s objectives for the map prototype in Phase 1, and the **challenges** addressed along the way;
- Section 3 moves into ISKME’s Phase 1 **functional prototype**, and presents an example of how a typical user would engage with the map;
- Section 4 discusses how the proposed map will be **scaled and scoped** in Phase 2; and
- Section 5 provides the **conclusion** to the report.
- Finally, Appendix A details the **input and output flows** for the map’s data elements, and Appendix B provides an overview of the **database structure and API documentation** for the map prototype.

1. Project Objectives and Roadmap

The overarching aim of ISKME’s OER world map project is to create an interactive, dynamic, and scalable map to *support access to relevant OER* by teachers and learners globally, and to *inform decision-making* by and conversations among funders, policymakers, researchers and others toward enhanced teaching and learning and equitable education for all. ISKME’s key objectives for meeting these goals include:

- Identify the key user groups that the map will serve and their needs
- Identify the data sets that would be most useful to users, and that are available/updatable
- Develop ways to engage multiple user groups in the map based on use cases
- Develop pathways to support the continuous addition of new data by users
- Develop a mechanism for users to pull relevant data reports from the map
- Identify sustainable ways to build the map community, and to keep the map “alive”

The following roadmap depicts the full scope of this work, and how it builds on the community-wide effort to create an OER world map.

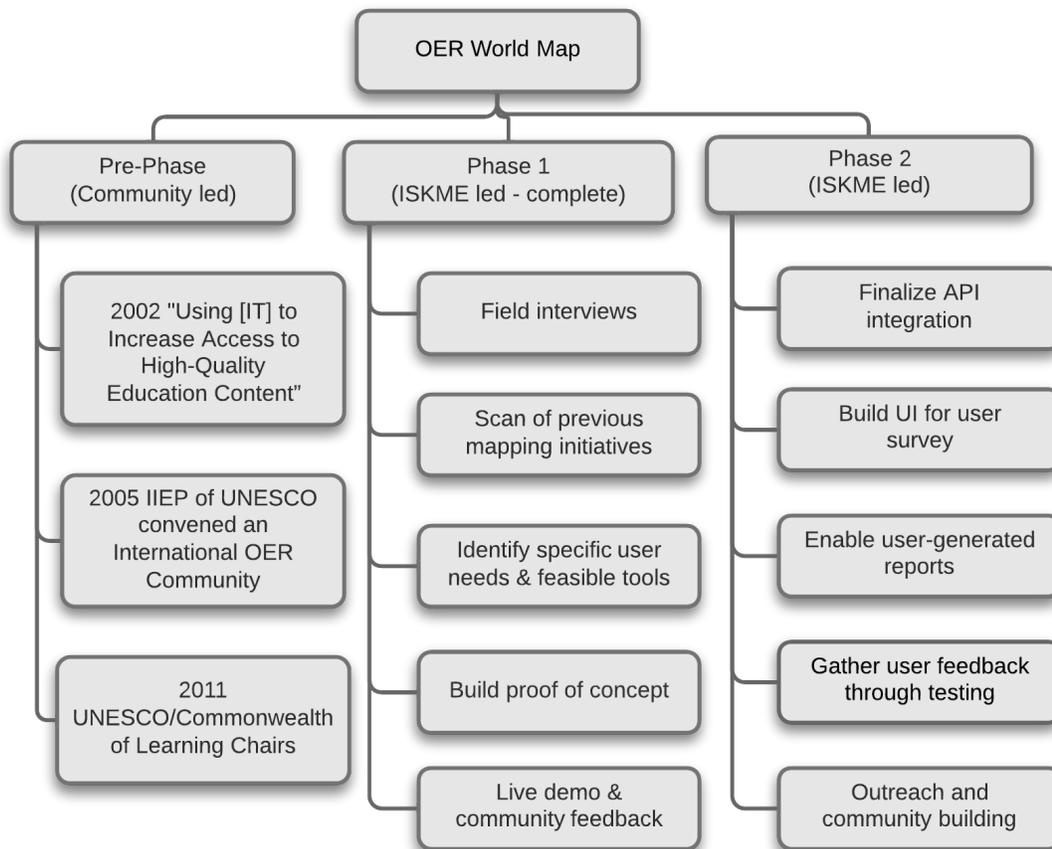


Figure 1. Development Roadmap: From the community-led “Pre-Phase” to ISKME’s Phase 1 and 2 activities

The section that follows outlines the concrete development steps for ISKME’s world map prototype in Phase 1, and the challenges addressed along the way. The final sections of this report outline our recommended next steps for Phase 2 of our work, as listed in the roadmap above.

2. Phase 1: Development Steps

Interviewed field experts

At the start of the project, ISKME conducted interviews with eight leaders in the OER space to identify ways to leverage prior efforts in the field, areas of need and potential use cases for the map, sources of data for the map, and considerations around community engagement. The interviewees were selected based on their involvement in global OER networks or projects and contributions to the field, their expertise in building OER technologies and tools, or their ability to represent the perspective of varied use cases for the map. The organizations represented spanned several geographic and project domains and included: 1) Educational Technology Department, International Christian University, Japan, 2) OER Research Hub, 3) PHeT, University of Colorado at Boulder, 4) Sugar Labs, OLPC, Yale University, 5) Centre for Education Technology, Interoperability and Standards, 6) University Carlos III of Madrid and Centre for Academic Practice and Learning Enhancement, 7) Innovation Thompson Rivers University, Kamloops, BC, Canada, and 8) OCW Consortium.

Key insights from the interviews include the importance of: a) enabling collaborative involvement in the map creation process from the start so that the work is not siloed; b) creating a dynamic map that grows through both automated mechanisms and through user contributions; c) offering “design layers” so that users can view the map through different lenses based on different needs; d) ensuring that the map offers data at a micro as well as a macro level (for example, country-level data as well as data on specific institutions); d) overall, providing tools and data that enable the field to build arguments for policy and other changes; and e) facilitating ways to connect communities or individuals to make those changes happen. This information, in conjunction with the learnings from the review of existing maps, discussed below, helped to shape our approach to the development of the OER world map prototype.

Reviewed existing maps

ISKME’s design team reviewed 15 existing maps to assess features and mechanisms for accessible design and display, for viewing and using data, and for engaging communities of users. The maps were identified for review through recommendations from the field expert interviews (above), through web searches of interactive, data-driven maps, and through ISKME’s knowledge of successful map projects within and outside of the education sector. Of the 15 maps reviewed, eight were within the education or OER sector and included: [Evidence Hub](#), [OER Research Hub](#), [Hewlett Insight Foundation Center](#), [Open Access Map](#), [OAI MAP](#), [National Coastal Data Development Center](#), and [Open Courseware Consortium](#). The remaining seven maps spanned other disciplines and topic areas and included: [The Refuge Project](#), [Wildlife Strikes](#), [Voltaire’s Correspondence](#), [Netflix Genre Movie Map](#), [Katrina Diaspora Map](#), [Block by Block: Brooklyn’s Past and Present](#), and [Tour Explorer](#).

From the review process, ISKME’s design team identified several approaches to potentially improve upon or replicate, as listed in Table 1.

Table 1. Features, functions and design: Approaches to consider based on map review

Design and Display	Data and Data Tools	Community Engagement
<ul style="list-style-type: none"> • Use of clean, uncluttered interfaces • Use of intuitive diagrams and symbols • Use of visual metaphors (e.g. circle sizes to imply comparisons) • Designing to meet the needs of multiple audiences without overwhelming users with options • Use of accessible language 	<ul style="list-style-type: none"> • Data sorting and filtering options • Options for users to view more than one data set at a time, so that relationships between data can be gleaned • Options for users to move smoothly between time periods, and to view changes over time 	<ul style="list-style-type: none"> • Feedback loops so that user groups can inform one another’s activities • Ways for users to add their own data to the map • Ways for users to download and access data sets from the map that they can manipulate

Based on the above, we identified nine core features to include our map. Due to the limited scope of Phase 1, we focused on the five features and design decisions most critical to meeting the needs of our identified user groups: a multi-dimensional, interactive info-graphic; simple, easy-to-use filters; a “share my map” tool; a timeline tool for viewing changes overtime for selected parameters; and a CSV data-export option. In Phase 2 of the project we will build out four additional features: a data sharing API; a direct update form, through which organizations could add or update their record; a short pop-up survey for gathering feedback from users; and multiple-format data export options.

Drafted use cases

In moving toward ISKME’s goal of supporting both access to OER and decision-making by key stakeholders around equitable, enhanced teaching and learning, ISKME identified the core user groups and associated user needs that the map prototype would serve.

In drafting the use cases, we first created a list of potential types of users based on the project’s overarching goal. For each type of user, we asked the following questions: What is their role in the OER community or in relation to OER, what is their level of technical proficiency, what type of device(s) are they using, do they have access constraints, and most importantly, why might they come to an OER world map and why would they return. Based on the answers to these questions and the identification of shared characteristics across them, we clustered the users into *three core user groups*, and created specific user needs, with related use cases, for each. Table 2, below, outlines each group and their potential needs.

Table 2. OER World Map: User Groups and User Needs

Educators and Learners	OER Providers	OER Advocates/ Funders
<ul style="list-style-type: none">• Find institutions and providers that offer OER in a specific language, subject area, and grade level• Discover institutions that offer needed OER-related services (e.g., professional development)• Learn about policies that impact a specific region• Explore education projections and demographics	<ul style="list-style-type: none">• View the spread and use of content or services• Identify gaps, future or current (e.g., where the need for OER is high, but availability is low)• Create infographics to support the promotion of OER and argue for more support• Get feedback on the quality of one’s content or service from the OER community• Identify and review policies that will impact OER offerings	<ul style="list-style-type: none">• View the spread/use of OER• Use the map tools to create infographics or data sets to support the promotion of OER• Promote an organization or initiative• Identify gaps, future or current (e.g., where funding is needed to meet current educational gaps)• Explore education data, and/or OER policy data to inform strategic decision-making

From the above, detailed use cases were developed. An example of a use case for an OER provider is presented below:

Why I am here: I am a curation expert for an OER provider. I come to the world map to gather data about where our Arabic language OER is being used and reused internationally, and to get aggregate feedback about our resources by region. I see that there are not many users accessing our resources in the MENA region. I also see that the reviews of resources from users in that region are low. It seems that my organization’s Arabic language resources could be improved.

Why I return: I work with my team to initiate a new project, the goal of which is to create new Arabic language resources and improve the Arabic translations of our existing OER. Once we have new resources to share, I return to the map, and let the community know about my project. To promote my project further, I find a few OER repositories with large Arabic language collections, and connect with their contact person, letting them know about the project, so that they can share the new content with their Arabic-language users.

Identified data sets to include

In line with the use cases and the project’s goals, we identified a range of relevant, available data sets through suggestions from the field interviews and through searches for online, publically available data. We then evaluated these datasets to determine accessibility (i.e., whether they were openly available for use and for download), feasibility of parsing their metadata structure, how often the data were updated, and whether they met the needs of our identified user groups. With regard to the latter, we considered ways that OER-specific data (i.e., data on resources and providers, and on OER policy) could be overlaid or combined with external education data to more deeply meet the identified needs of our user groups. We thus explored external education and workforce data through organizations like the U.S. Department of Labor, the World Bank, and UNESCO. The final data sets we selected for use in the prototype are listed in Table 3.

Table 3. Phase 1 Prototype: Data Sources and Types

Category	Data Source	Type/Description
Resources/Content	OER Commons	<u>Resource statistics</u> such as percent of resources by language, by subject, and by grade level; <u>Resource evaluations</u> from the OER Equip and Achieve rubrics grouped by geographic location and provider; <u># of OER users by region</u>
OER Providers	OLnet Evidence Hub	<u>List of Institutions</u> and providers by goals/objectives
	OER Commons	<u>Provider information</u> , including name, contact information, primary language of site interface, and brief description
Policy	TAACCCT	<u>List of OER Institutions supported by TAACCCT policy funding</u> ; includes contact information, URL, funding amount, and project description
Education Indicators	World Bank	<u>Multiple education indicators</u> by country and year, including percentage of population with a primary school education, enrolment rates, literacy rates, progression to secondary school, and expenditure per student
	UNESCO	<u>Enrolment by education program and institution</u> , 1970-2012 (most of UNESCO’s education data overlaps with World Bank Data)

Obstacles occurred when attempting to gather data from additional repositories and policy registries, beyond those listed above. In many cases, the data sets were not openly available for export. In some cases we had to request to gain access to the data. We considered creating a harvesting API to gather data from outside sources, but we abandoned the idea because we could not ascertain the openness of data procured in this way. We were able to smoothly integrate metadata from OER Commons on institutions and providers because OER Commons relies on the Open Archives Initiative Protocol for Metadata Harvesting, which facilitates export to external databases, outside of the Commons.

For Phase 2 of the project, we will focus efforts on establishing an API in order to pull in data from additional OER repositories and providers, including Open Michigan and the Open Arabic Initiative; we will also set up an API for accessing data from the Creative Commons Policy Registry. Finally, we plan to build the design capacity needed to display World Bank’s Education Projection Data, and specifically educational attainment distributions for 120 countries by age group and gender to 2050. Projection data is important for the purposes of supporting advocacy groups and funders, as well as content providers and institutions, in strategic decision making around future activities and investments.

Identified data input and output flows

Connecting user groups to the data they need entails creating input systems for gathering data and output systems through which data sets can be shared more broadly. In order to aggregate information from multiple sources, we would need a central database for storing and maintaining records. We wanted the data to be completely open and available to the community, and thus created an accessible, separate database from OER Commons for the OER world map. This database will integrate files gathered using three methods: 1) a direct API, which pushes data from the OER Commons database; 2) manual import of datasets; and 3) external APIs, which would be installed in the future by institutions and providers to push data from their sites to the map.

Appendix A provides a diagram of the data input and output flows for the map. One challenge we faced was how to integrate records from the various data sources without creating record duplication. Many of our data input sources contain records that overlap but also enrich one another when combined. Rather than creating new records from multiple sources, we needed an additive record maintenance system, which could identify and update existing records before creating new ones. An illustrative example of this was encountered in our development process when we discovered that the OLnet database contained records for OER institutions and projects, which could be matched to provider records contained in the OER Commons database. When combined, these records created a more useful and relevant record to our end users than they did in isolation.

OER Commons records contain information about the number, content, and quality of provider resources, as well as the location of users who are accessing these resources. The OLnet database contains contact, description, and geo-location data. This led us to add a new field to our metadata schema: `source_institution`. We used this field to track the input data by source. Then we added a reconciliation step to our database integration process, which would allow us to query existing database records, replace previous records from this source, and merge data fields from potential duplications into a single record. We also added a step to our API protocol, alerting API clients to possible duplications, and offering the option to either amend a previous record or create a new record on our database. This process requires manual review and reconciliation, which is described in more detail in data integrity section of this report. Appendix B outlines our basic database structure and documentation for our API.

Developed the design mock ups

We decided early on that an integral component of our design approach was to create a multi-dimensional, interactive graphical display that includes as much information as needed while maintaining visual and cognitive integrity. Our solution was to create a very clean design comprised of thin lines and contrasting colors. We selected a compound color scheme using bright colors to easily differentiate between content types. We chose Gills Sans Light, which is a modern, and web-safe font. Our iconography utilizes intentionally simplistic shapes that are easily layered and scaled. And we created multiple, intuitive scale-metaphors such as scalable circle and area shading, which could be layered without conflict.

We will need to conduct user testing to see if there are possible overlaps in our display as the map expands to capacity. As community involvement grows and our database expands we may reach a point at which the selection options begin to overlap one another, making it difficult for the user to select one entity for more information. For example, clusters of organizations or policies in one location might require a user to zoom-in several times to see all of the content in a particular area. Additionally, the

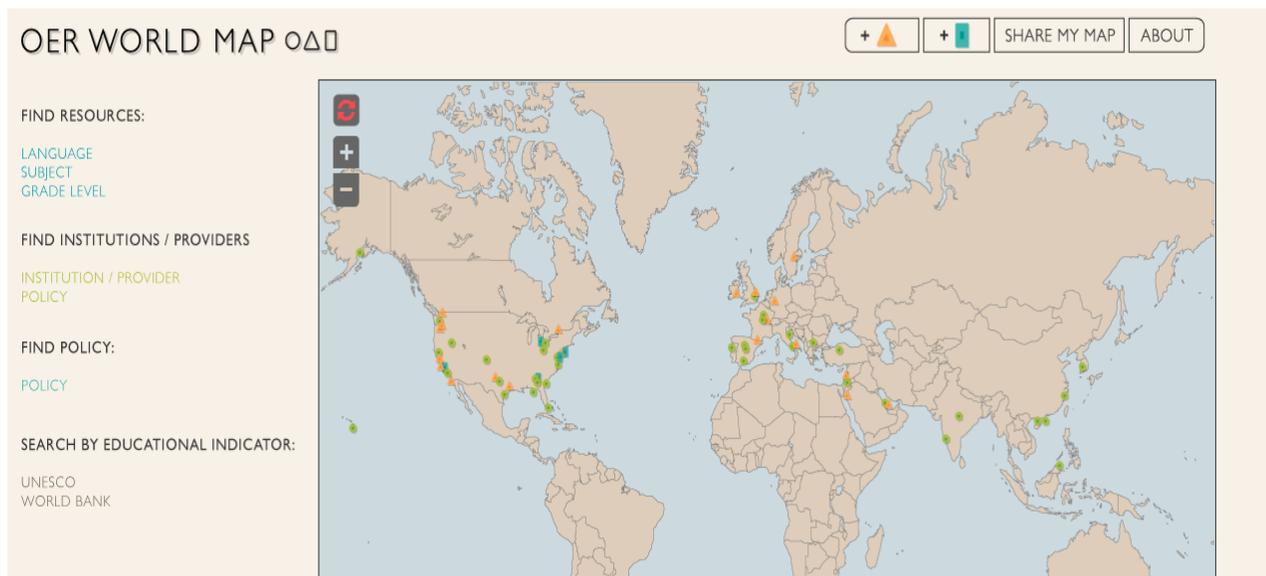
lines of connections between inputs may be so dense that they cover selection options, and we may find that we hide access points on the map with the tool tip display. Therefore, graphic design iteration, based on a combination of community feedback and user testing, would be a central tenant of Phase 2 development.

For the full set of design mockups, see: <https://www.dropbox.com/sh/slwe9kpx9y7ow7b/R2UrUUUmcp>

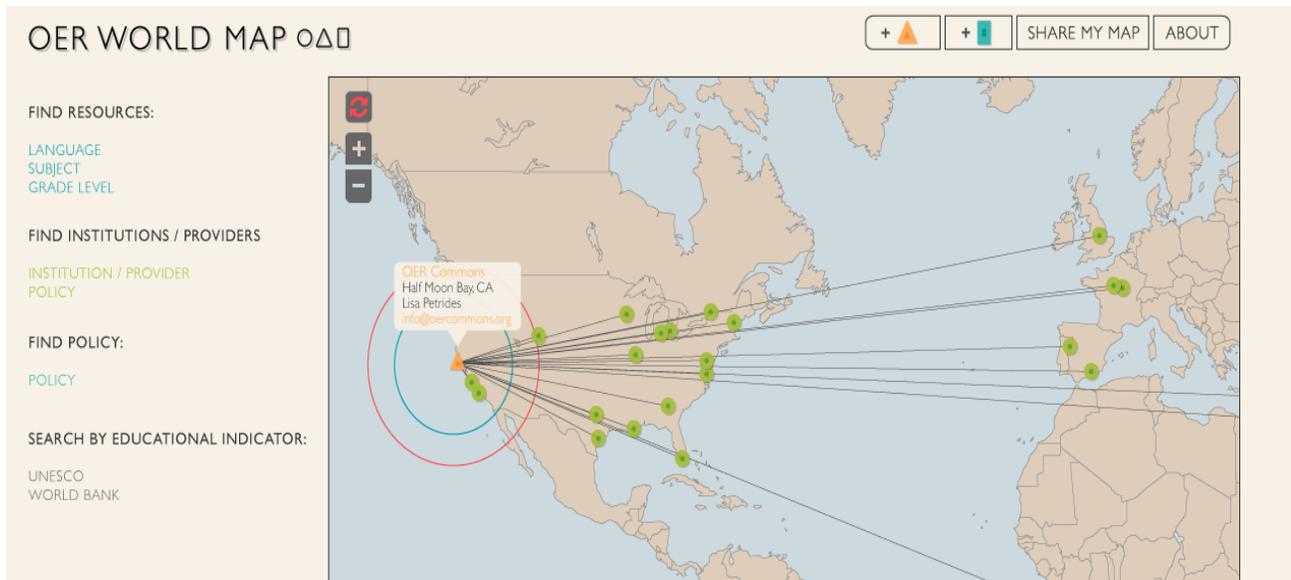
3. Phase 1: Prototype Detail

ISKME’s map prototype was designed to be interactive and allow users to guide their way through the process of setting the parameters and exploring relevant information that is particular to their needs. The following is a selection of screen shots from ISKME’s map prototype, with an example of how a teacher user (which represents just one of our user groups—see table 2 above) would interact with the map.

- a. A Pre-kindergarten teacher in the United States is searching for repositories or OER providers that offer English language resources for Pre-K science. She arrives at the OER World Map home page, and encounters the default view below:



- b. She opens the grade level filter and selects “Pre-K”. The map then shifts to display all OER Institutions and providers that offer Pre-K resources. She intuits that the size of the circle around the institution indicates the size of each institution’s Pre-K resource collection.
- c. From the map she selects one of the institutions, OER Commons. A box appears above the institution with a link to the site OER Commons. Other institutions disappear, and lines of connection are drawn between OER Commons and the OER providers whose collections appear in OER Commons.



- d. Below the map, a detailed display of OER Commons data appears, along with an option to “download data”. The data download option is a simple CSV list version of all the points she is currently viewing in the map. This list will include all the institutions and providers who offer the Pre-K science resources that she is looking for, along with details about the material types of those resources, and links to those sites.

2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

Institution: OER Commons
<http://www.oercommons.org/> Download Data

Half Moon Bay, CA
 Lisa Petrides
 info@oercommons.org
 President of ISKME

ISKME created OER Commons, publicly launched in February 2007, to support and build a knowledge base around the use and reuse of open educational resources (OER). As a network for teaching and learning materials, the site offers engagement with resources for curriculum alignment, quality evaluation, social bookmarking, tagging, rating, and reviewing.

Primary_Language: English, Arabic
 Resource_Languages: Arabic, Afrikaans, Catalan, Chinese, Finnish, French...
 Institution_Type: Non-Profit
 Institution_Services: Capacity building, Metadata - Content tagging and tech, OER Authoring/Publishing, OER Repository/Aggregator, Policy development/advising, Professional development, Research, Technology development
 Number_Resources: >50,000
 Number_Providers: 2690

- e. Finally, based on the data she sees about OER Commons, she may choose to open the link to that site and find here resources there. She can use her downloaded list as a reference point to explore other sites, or she could send this list to her teaching community. She might also choose to share this map, with the Pre-K and science filters active, on her preferred social media or teacher discussion forum.

4. Toward Phase 2: Scaling and Scoping the Existing Map

Modeling information architecture and data flows for incentivizing participation

Our strategy for engaging users is to provide information about OER providers, institutions and education indicators, as well as provide organizations with new information about how their resources are being accessed, used, and evaluated on a global scale. In Phase 1, we have focused on modeling scalable information architecture and data flows. We have designed the structure of our records and methods of contribution to encourage dynamic information flow that is additive in nature. This means that records are designed to accommodate information which is added via several sources, yet integrated in a well organized information architecture that is intuitively accessible to end users. Because we do not rely on a single source to update map records, we help to circumnavigate the problem of static outdated information.

Additionally, users will be able to download data from the map in document form, which will enable the pragmatic use of this data in reports, proposals, business plans, etc. Users wishing to develop applications or services based on the data will be able to interface with our prototype via API. This incentivizes returning visitors, ensures continuing relevance to the field as it evolves, and creates a feedback loop, which enables sustainability of the platform and the community that supports it.

Modeling contribution from diverse access points

We recognize that there are various barriers to contribution with initiatives that attempt to span an entire service space. Some of these barriers may be entirely technical in nature (i.e., application interoperability or records conformance issues). Others may face discomfort in sharing data openly or engaging with strategic competitors. ISKME seeks to give contributors flexibility in choosing comfortable, convenient, and efficient points of access

During Phase 1, we determined three data contribution methods (direct API, manual import, external API). This process has served as a way in which to seed the map with data, as well as to understand the structure and format of available data, and the processes by which contributors may wish to engage. Based on our experience in the field, we know providing an easy point of initial access is important for building new user contributions, while providing access for records maintenance and future development is important for building returning community of users. The data inputs and outputs outlined in previous sections support community scaling by providing flexibility for users in defining what an initial contribution can be, and what continuing contributions and future pay offs might look like. For example, an organization that has a dataset they would like to share immediately can provide a CSV file from which we can create initial records. Once initial records are created, the organization is able to update these records manually via a user interface on our map site, or can choose to integrate with our map API and update records automatically.

Maintaining data integrity while building records collaboratively

In Phase 2, ISKME will focus on conducting community outreach to engage contributors in creating new records as well as adding new information to already existing records.

ISKME will maintain the integrity of data and streamlined information architecture of the map by defining a standard schema to which records pushed via the MAP API and CSV files must adhere, and

by providing technical support for contributors who have existing APIs from which ISKME can harvest data. We will also expand the prototype's functionality to include a graphical user interface, where users can add or update data from the map itself.

At the same time, ISKME will engage new contributors in conversation around the data points which they would like to contribute as well as the data points they would like to gather about their organization from other members of the community. As noted above, overlap in contributor records was a key challenge encountered in building our map prototype. In our solution to this challenge, we recognized an opportunity to highlight the reciprocal value of contributing data to the map. Our system for accommodating several sources of information on a single record allows us to maintain data integrity, while also giving us the ability to build records collaboratively.

Gathering user feedback to inform map development

Finally, in Phase 2 of the project, we will explore efficient and engaging ways to capture feedback directly from users. For example, first time users might be asked to engage in a short pop-up survey, which asks questions around: “*What were you looking for when you visited the map?*” “*Are there data sets you were looking for but did not find?*” and “*How will you use the data on the map?*”

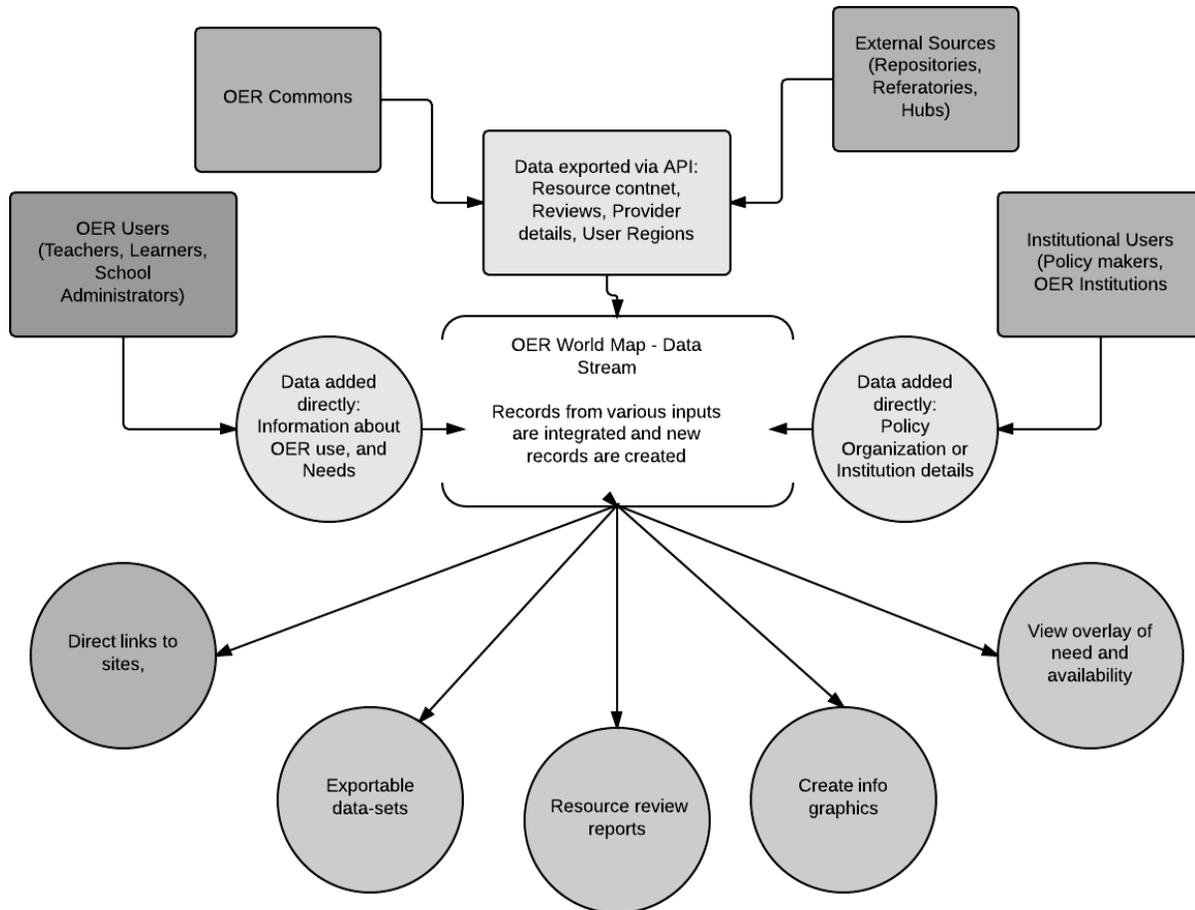
ISKME will use this initial feedback to begin designing in-depth user research. We will identify research questions, hypotheses, and user tests to assess design strengths and weaknesses. This will enable us to ground ongoing development in solid evidence gathered from the community. This is a methodology we have modeled in our own development process with great success.

5. Conclusion

ISKME's OER world map has been designed with a central focus on community engagement. Our process involved careful consideration of target users, informational needs of individuals and organizations in the field, motivation for use and contribution, and points of access for pushing and pulling data.

Our findings outlined in sections above have been addressed in the design of the current prototype and our roadmap for scaling of the platform. This holistic perspective is essential to ensuring successful growth and evolution of the prototype into an active, robust service platform.

Appendix A: Data Input and Output Flows



Data Inputs:

- Push data via API - Users can create new records, or update or add information on existing records
- Harvest data via API - Institutions who wish to provide information via APIs already in place. We can harvest this data and conform it to our schema.
- Manual dataset import - Conversion of datasets from RSS and other formats, mapping to our schema and creating our own records

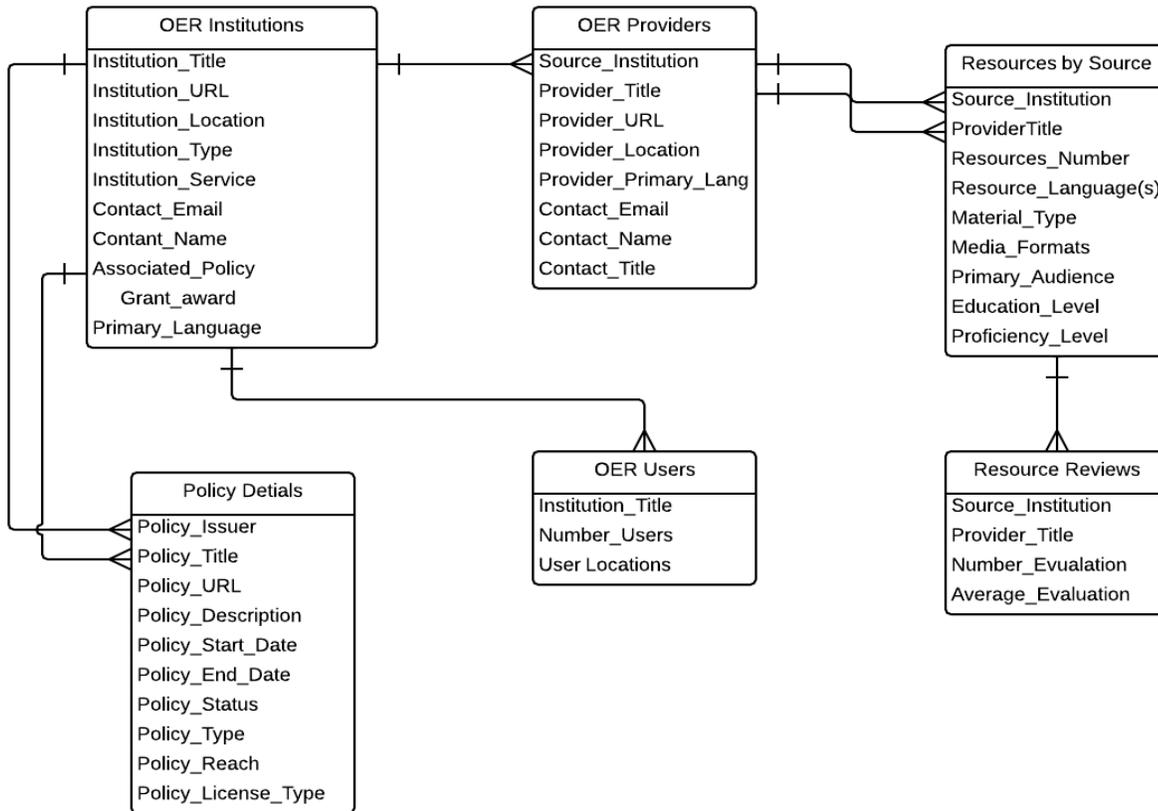
In Phase 2 we would like to add additional inputs:

- A direct add form, which allows users to submit new and update existing Institution, Provider, and Policy records
- A user survey, which allow ISKME to gather information directly from users about their OER needs and their experience with the world map.

Appendix B: Database Structure and API Documentation

OER World Map

Database Structure



OER World Map API Documentation

Providers

1. Get list of all providers: GET request to `/api/v1/resources/providers`
2. Get a record of individual provider: GET request to `/api/v1/resources/providers/123/` (123 is provider's ID)
3. Create new provider record: POST request to `/api/v1/resources/providers/` containing provider record in JSON format (see below)
4. Update existing provider record: PUT request to `/api/v1/resources/providers/123/` containing provider record in JSON format

Sample provider record

```
{
  "name": "MIT",
  "url": "http://web.mit.edu/",
  "description": "Massachusetts Institute of Technology",
  "primary_language": "EN",
  "location_street": "77 Massachusetts Avenue",
```

```

"location_city": "Cambridge",
"location_state": "MA",
"location_country": "US",
"location_coordinates": [42.359374, -71.093217],
"contact_email": "",
"contact_prefix": "",
"contact_first_name": "",
"contact_middle_name": "",
"contact_last_name": "",
"contact_suffix": "",
"contact_title": ""
}

```

Resource statistics

1. Get list of resource statistics for all providers: GET request to `/api/v1/resources/stats`
2. Resources stats for individual provider (from all sources): GET request to `/api/v1/resources/stats/123/` (123 is provider's ID)
3. Get resource stats for individual provider from certain source: GET request to `/api/v1/resources/stats/123/345` (123 is provider's ID, 345 is source ID)
4. Create new resource stats record for a provider: POST request to `/api/v1/resources/stats/123/` containing the record in JSON format (see below) (source is determined automatically from current API user)
5. Update existing resource stats for individual provider: PUT request to `/api/v1/resources/stats/123/` containing the record in JSON format (source is determined automatically from current API user)

Sample resource stats record

```

{
  "provider": {
    "id": 123,
    "name": "MIT"
  },
  "source": {
    "id": 345,
    "name": "OER Commons",
    "url": "http://www.oercommons.org"
  },
  "total_resources": 2000,
  "general_subjects": {
    "arts": 100,
    "business": 200,
    ....
  },
  "material_types": {
    "activities-and-labs": 100,
    "assessments": 200,
    ....
  }
}

```

NOTE: Provider and Source fields are read only. These fields are returned in provider records received with GET requests and should not be included in provider records sent with POST and PUT requests.