

# **EarthConnections Annual Evaluation Report**

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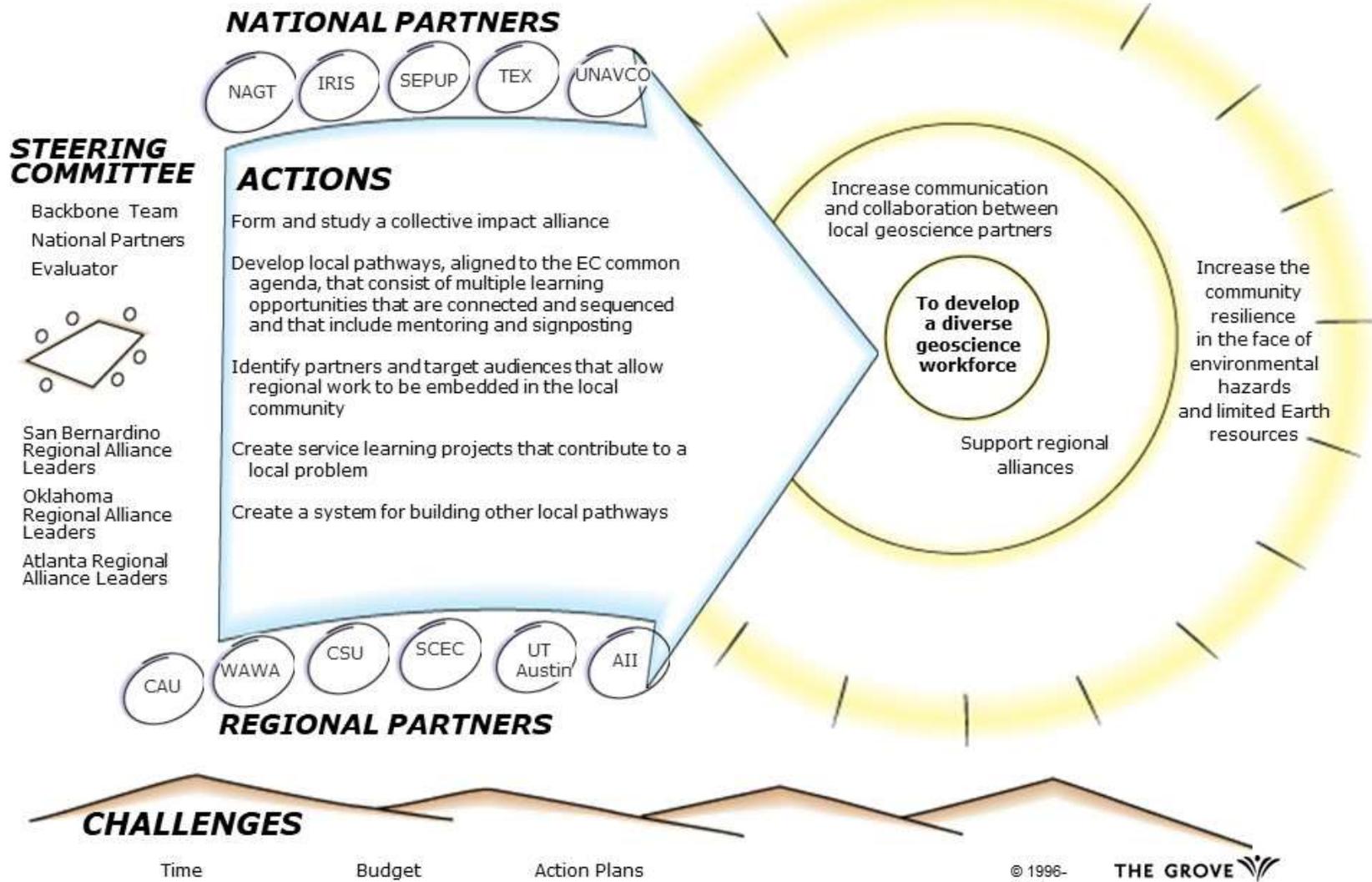
In 2016, Carleton College and a national team of partners were awarded one of the first National Science Foundation INCLUDES grants to begin a project called EarthConnections: Community Pathways to Geoscience Careers (referred to hereafter as EC). Like all projects in the first cohort of grantees, EC was designed to facilitate partnerships with the common goal of broadening participation in STEM education programs. More specifically, EC was funded as a two-year project designed to: (1) develop, test, and refine the elements of a collective impact (CI) alliance through work on three regional pilots that capitalized on collective expertise and resources, and (2) test the ability of the alliance to attract new partners and implement a scalable system for supporting locally customized pathway development. More information about the overall EC project, project leadership, and regional alliances can be found on the project's public website (<https://serc.carleton.edu/earthconnections/index.html>)

To achieve these goals, the first year of the project focused on establishing a shared vision for the alliance by creating working groups and information flows, supporting the initiation of three regional alliances, developing a shared measurement system, and identifying the constructs to be measured through longer-term evaluation efforts. The specific strategies used to achieve these goals are described throughout this report, organized by the five pillars of collective impact. A draft snapshot of the project is presented in the graphic on the next page.

Collective impact (CI) has been defined as the commitment of a group of important actors from different sectors to a common agenda for affecting social change (Kania & Kramer, 2011). This approach was of interest to the EC team because it provides a flexible framework that can support pathway development specific to local needs and context, while aligning the pathways to a common vision of quality and measuring effectiveness through common metrics. The project extends this definition to include proactive aspirational goals related to community resilience. Though many NSF INCLUDES projects were designed with this model in mind, EC is unique in that it includes both national and regional CI efforts. The regional alliances are both part of the EC's collective impact overall, and their success as a regional alliance also depends on them joining or leading regional collective impact efforts.

The purpose of this report is to summarize the evaluation results from the first year of the project. Given that EC is a new and evolving CI initiative, a developmental evaluation plan was used. As such, this report was designed to be a living document that will be updated

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throughout the remainder of the project as the initiative develops and more data become available.

Developmental evaluation is ideal for the kinds of emergent and dynamic environments that occur during the development of projects, programs, and/or policy reforms (Patton, 2011), and thus it is an ideal fit for evaluating the alliance during its initial formative years.

For the purposes of the EC evaluation, the developmental approach has been combined with guidance from leaders in the CI field (Preskill et al., 2015). More specifically, evaluation of a new CI initiative generally focuses on early indicators of whether core structures, processes, and relationships are established. The current evaluation is no exception. To date, the EC evaluation has focused heavily on the extent to which the five CI pillars are utilized to support the project's vision and objectives. The five pillars include backbone infrastructure, a common agenda, continuous communication, a shared measurement system, and mutually reinforcing activities. Using a developmental evaluation lens, the EC evaluation has focused on two questions in relation to each pillar. The questions are: *What is happening?* and *What still needs to happen?*.

EC is supported by both an internal evaluator and an external evaluator who both participate in the project's metrics working group, along with one of the project's national partners. The internal evaluator for the project is Ellen Iverson, who is based at Carleton College. Dr. Iverson is part of the backbone organization supporting the EC initiative. The external evaluator for the project is Karen Peterman Consulting, Co. (KPC). Barbara Nagle, from the Lawrence Hall of Science's Science Education for Public Understanding Program (SEPUP) rounds out the trio. This team served as the primary authors for this report.

This evaluation report was intended to serve as a reflection tool for the steering committee by framing the work conducted to date within the context of CI. An initial round of feedback has already been collected from the steering committee to ensure the accuracy of the results that follow. In the weeks ahead, the steering committee will continue to reflect on whether and how this report serves as a meaningful reflection point and/or a strategic method for identifying next steps in the development of the alliance.

## **Method**

The EC evaluation was designed to document the project's progress via both indirect and direct methods. Indirect methods have included the consistent and active participation of the metrics working group in the project (as both participants and observers), web analytics from the project's website, and a materials audit. Direct methods have included a brief survey and two rounds of interviews.

The materials audit serves as an embedded assessment in that it takes advantage of existing communication structures and processes established by the project to document that (a) the team is making satisfactory progress in creating key resources, and (b) resources are aligned to the CI pillars. The project's original proposal, website, monthly

meetings, and the team's annual NSF report each provided a plethora of evidence to evaluate the extent to which the program is both making progress and being developed to align with the CI model.

The project's public website pages were examined using NVivo qualitative analysis software. Web pages were converted to PDF documents and imported into the NVivo program. Nodes were created for each regional alliance and child nodes were created for each CI pillar. Similar information was collected by reviewing the EC proposal and annual NSF report.

Evaluation data have also been collected through direct methods. To date, these have included quarterly checkpoints that allow for an internal review of pathway development within each regional alliance, a real-time dashboard of alliance activity, and two rounds of interviews that have been conducted with each regional alliance team. Each of these sources were used to document progress toward one or more of the CI pillars.

Quarterly checkpoints take place as part of the project's steering committee meetings (described in more detail in the next section). The checkpoints are used to provide ongoing support for the development of regional alliance pathways, to promote reflection at both the regional alliance and steering committee levels, and to allow all members of the steering committee to provide feedback to the regional alliance team.

Traditional evaluation methods have also been used to document the project's progress in the first year, including a questionnaire and two rounds of interviews. The questionnaire was administered in November, 2016, to document the short-term value associated with the project's kick-off meeting. Wenger et al. (2011) presented value creation stories as a way to measure the influence of communities of practice and networks on their members. The November 2016 data were collected to begin documenting the value of the project. This work will continue in November 2017 and results will be presented in an evaluation report submitted in early 2018.

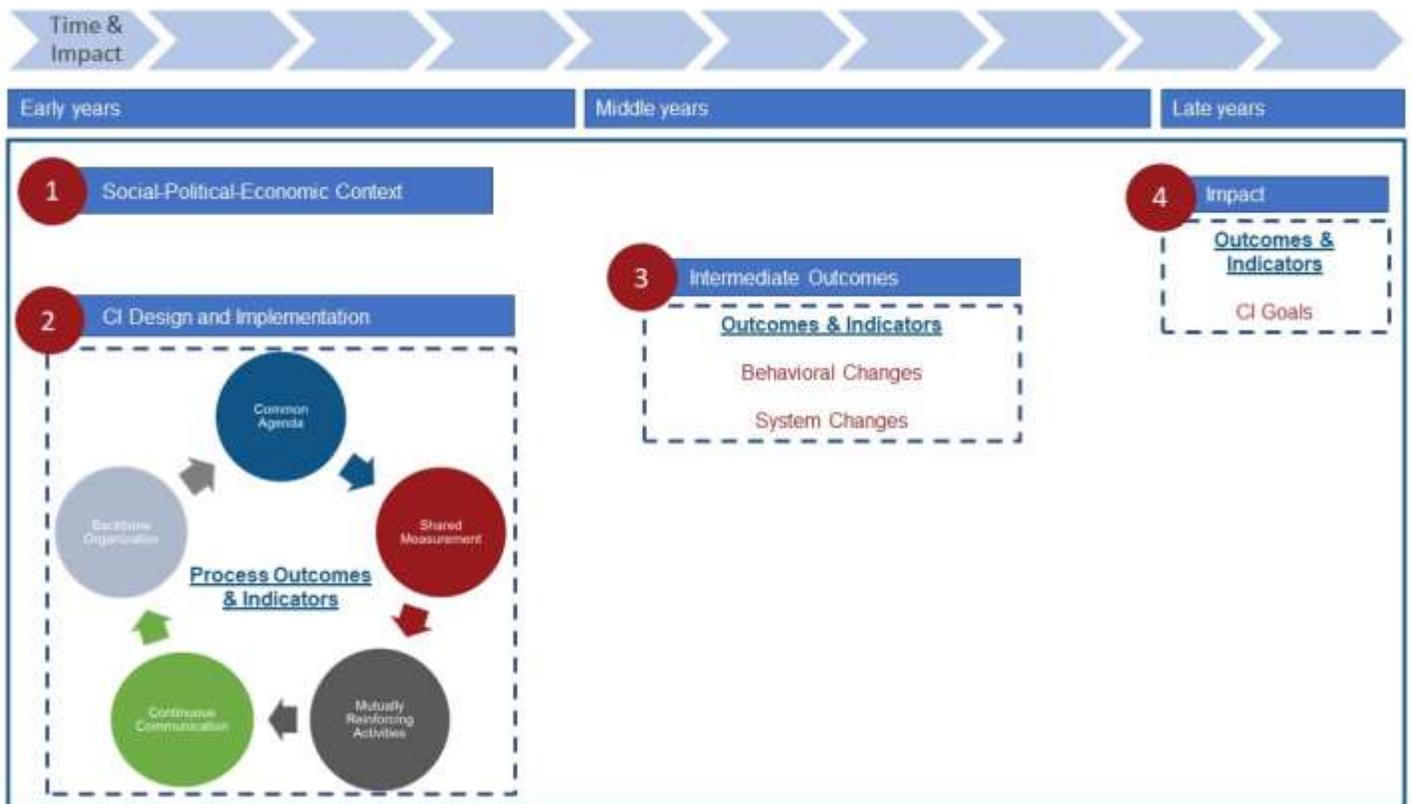
Interviews were conducted with each regional alliance team in late spring and September of 2017. A subset of the CI pillars were discussed during each interview. Interviews in the late spring focused on the common agenda, continuous communication, and shared measures. September interviews gathered updates on the first of these two pillars, and then documented the extent to which each regional alliance is working within a context that includes four prerequisites for successful CI initiatives (Collective Impact Forum, [http://collectiveimpactforum.org/sites/default/files/Is%20Collective%20Impact%20Right%20for%20You%20-%20Handouts\\_0.pdf](http://collectiveimpactforum.org/sites/default/files/Is%20Collective%20Impact%20Right%20for%20You%20-%20Handouts_0.pdf)), and the process used to create a local pathways map.

## **Results**

This section documents EC's progress toward creating a CI initiative. Most of the evaluation effort to date had focused on the question: How are the five CI pillars implemented within the context of EC? In their guide to evaluating CI, Preskill, Parkhurst and Juster (2014)

share a graphic that demonstrates the kinds of evaluation that are appropriate for different states of a CI initiative (see figure below). As shown in the graphic, and as stated earlier in this report, the early years of a CI initiative are expected to focus on the context in which the work occurs and on the process outcomes and indicators related to establishing each of the five CI pillars. Preskill and colleagues have created a list of indicators that can be used to document different stages in the development of a CI initiative in relation to each of the five pillars. (<http://www.fsg.org/publications/guide-evaluating-collective-impact>). For the purposes of the EC evaluation, these indicators have been used to guide the kinds of details that have been documented throughout the project with a focus on *What is happening?* and *What still needs to happen?*.

It is important to note that the indicators are conceptual in nature, and that they are not meant to be prescriptive. CI initiatives can take years to establish and the indicators are meant to serve as a guide throughout that process. We have quantified the number of indicators for each pillar to demonstrate the scope of work accomplished in the first year of the project, and to frame the potential for next steps.



Reproduced from Preskill, Parkhurst & Splansky Juster, 2014

The results in this section are presented by CI pillar. Each section begins with a summary of the work conducted to date. The indicators, as identified by Preskill et al. (2014), are presented at the beginning of each section in tabular form and the data used to support each summary then follow. Many indicators are multifaceted in that they require multiple

action steps to be achieved. These action steps are embedded in the text and presented in italics. Quotes from the materials audit and interviews are also used throughout.

## The Backbone Organization

The Science Education Resource Center at Carleton College serves as the backbone organization (BB) for EC. To support the growth of the CI initiative, they convened a kick-off meeting for the steering committee and have instituted the dashboard, checkpoint, and monthly check-in systems. They have also taken the lead role in building the national alliance by actively reaching out to similar INCLUDES-funded projects to identify synergies and possible partnerships. There are six short-term indicators of success related to establishing a BB; EC made strides in three of these areas during its first year and the BB is poised to achieve the remaining indicators in the second year of the project.

Backbone Infrastructure Short-Term Indicators	Achieved	In Progress	Not Yet Started
Steering Committee includes a diverse set of voices and perspectives from multiple relevant sectors and constituencies	X		
Backbone staff are respected by important partners and external stakeholders	X		
Partners look at the backbone infrastructure and steering committee for initiative support, strategic guidance, and leadership		X	
Backbone infrastructure provides project management support, including monitoring progress toward goals and connecting partners to discuss opportunities, challenges, gaps, and overlaps	X		
Backbone infrastructure convenes partners and key external stakeholders to ensure alignment of activities and pursue new opportunities		X	
Steering Committee regularly reviews data from the shared measurement system on progress toward goals and uses it to inform strategic decision making		X	

### What is happening?

As stated in the original proposal, the BB planned to lead EC in the first year by “creating a shared vision, highly functional working groups and information flows, supporting the plans for the three regional alliances, developing a shared measurement system, and identifying the constructs to be measured.” Several specific objectives were identified, and all have

been met. The BB initiated the project by hosting a kick-off meeting in Boulder, CO, in November, 2016. A total of 15 members from the steering committee attended the meeting. According to Preskill et al., there are two primary indicators for the BB to consider in relation to forming a steering committee: *Does the steering committee include a diverse set of voices?* and *Which sectors are included in the steering committee, and which sectors are missing?* The steering committee for the project was formed as the proposal was written to include national and regional leaders. At the national partner level, steering committee members were selected to include those who work with different education levels, who can engage the challenges of earthquake hazards and freshwater availability, and those in the position to help the team make use of research-based educational practices that capitalize on resources developed through previous federal, state, and local investments. At the regional partner level, leaders were selected based on their understanding of the assets in their local area and their ability to engage local communities around challenges related to earthquake hazards or freshwater availability.

Once a BB has identified the partners for a project, Preskill and colleagues state that it is crucial for the BB to *ensure alignment of activities across partners*. The EC has made progress toward this indicator by establishing a common repository of project resources and through regular communication of the steering committee. The BB had originally planned to extend the connections made at the kick-off meeting through quarterly meetings. These meetings have happened more regularly than planned initially; the steering committee met virtually seven times during the first year of the project.

Virtual meetings have been supported by a communications platform established by the BB to include private workspaces where the project's working groups and regional alliances can document project work. To date, the system has been used as a publishing platform for project results, including the project's common agenda, regional alliance plans and updates, process metrics, and national resources. The system also tracks email communication between leadership team members.

The project's website includes both a public website and a private website. Each regional alliance has its own page on the public website to document its goals, the local pathway being developed, and to name the local leadership team. The public website also includes profiles for all EC team members, and a page where the public can sign up to receive email updates about EC.

Another key role for BB organizations is *pursuing new opportunities* for the group. The BB has played an active role in this capacity since the beginning of the project. The BB shared its intentions to identify and partner with other groups across the country at the November kick-off meeting, and then moved forward with these plans by meeting with other projects that shared either the geoscience/environmental science focus or the interest in community-based problem solving at the INCLUDES PI meeting in January, 2017. Since that time, an INCLUDES Earth and Environmental Science Interest Group has formed. The EC BB has continued to play an active role in this group, while simultaneously sharing leadership with those from other INCLUDES projects.

The BB has also solicited feedback from the steering committee about the feasibility of pursuing new partnerships at this time. Given that EC is in its first year, the committee believed that any focus on new partners should be done in service of helping the existing regional alliances thrive. In response, the BB has begun to lay the groundwork to build additional partnerships when the time comes, by building a collaborator list with the steering committee and having initial conversations with other INCLUDES teams who are in proximity to EC partner institutions.

Through anecdotal occasions to observe members of the BB, it seems clear that the *BB staff are respected by partners and external stakeholders*. Examples from the steering committee include email exchanges of gratitude that celebrate the work detailed in the first annual report to NSF. The following email shares perspectives about leadership at both the national and regional levels:

“I feel this document [i.e., the annual report] captures the work as well as the progress. There is a whole lot packed in a little space. Darryl is providing excellent leadership and things are really moving. My tendency is to emphasize the challenges but we’re getting help in thinking in new ways. This is the essence of change so as a collective the alliances are truly amazing. Aisha got us started on the right track and Donna gently keeps Atlanta moving. For Atlanta she is the face of the national alliance. I keep reminding myself that if it was easy we wouldn’t be the ones to get it done. With that in mind please know that it is rewarding working to advance EarthConnections.”

At the external stakeholder level, one of the only active cross-project collaborative groups that we know of was catalyzed by PI Manduca, who played a leading role in seeking out and convening these project leaders (many of who had prior connections to the BB). Her initiative resulted in the creation of the INCLUDES Earth and Environmental Sciences Interest Group, whose web page is hosted on the EC web platform.

In addition, a working group was formed to target goals related to growing the national alliance. This team includes the PI and two national partners; the group met several times to develop a plan for alliance building. Efforts undertaken by this group include: facilitated virtual and in-person meetings with other INCLUDES pilot projects based in the Boulder, CO areas that were also focused on 2YC and on atmospheric science; spearheading the development of an EarthConnections video showcasing the project; submitting the video to two virtual showcases designed to build further interest in our alliance; presented the project at the Earth Educators Rendezvous and Geological Society of America meeting; organizing sessions at both the AGU and AAAS annual meetings to showcase the value of science/educator/community partnerships in building community resilience. Sally and Cathy are presenting in these sessions.

#### What still needs to happen?

As the second year of EC begins, the project’s focus is expected to shift to supporting initial implementation steps for each regional alliance, testing metrics, sharing the vision and

initial results from the project's work, and soliciting and evaluating a second round of proposals. The BB plans to support these efforts and will continue to foster success and growth through the established practices outlined above.

To date, the resources put in place by the BB have focused on partner communication rather than aligning the activities of the regional sites. As the project moves into its second year, and as partners implement a greater number of strategies, the BB might consider taking an active role in aligning strategies and activities at the national level.

In most cases, it is too early in EC's development for the BB to play a leading role in helping the steering committee and other partners review and reflect on data gathered through the shared measurement system (SMS; described below). One component of the SMS, a communications dashboard, has been launched. The BB has played an active role in sharing this system, and the data generated through it, during the project's monthly meetings. To date, the dashboard has not shown the growth or level of communication envisioned by the BB. These topics have been discussed briefly with the steering committee and are likely to be an area that is addressed in the second year of the project.

The remaining components of the SMS are also in place. As these systems are put in place, Preskill and colleagues note that the BB should plan to *review data from the shared measurement system to document progress toward goals, and to inform strategic decision making*. The BB might involve the steering committee in setting the schedule for reviewing these results to ensure that the *schedule meet the needs of the CI initiative* at both the national and regional alliance levels.

Evaluation efforts in the coming year can also be used to target the perceived success of the BB more directly by collecting data from steering committee members to document the success of the BB in relation to several indicators. These include the extent to which *partners believe that that BB provides (1) adequate support, (2) adequate strategic guidance, (3) strong leadership, and (4) adequate project management support*.

Both the BB and members of the steering committee have begun to highlight the financial support for the project as a possible concern. The annual report for EC states, "The work of establishing trust and of communicating across the alliance, while clearly valuable to all, is time consuming. This is one of the primary threats to our long-term success and something we would change in a model for supporting future regional partners." The time and resources needed to conduct this kind of work is also a concern for the regional alliance teams, and may be considered a limiting factor for achieving the project's vision. Comments from the September interviews included:

"With the limited budget for implementation there's just not, I don't have time to plan a lot of things."

"What constrains our activities is a lack of funding. So it's really, to my mind, important that there's some mechanism to get some level of funding for even one program or at least hands-on the drawing board to go forward."

“It would be great to have capacity building funds so that we have a way to sustain the work and to be able to record the work.”

Both the quote from the annual report and the final comments above are forward-looking in their orientation and acknowledge the need for additional financial support. Steering committee members have shared these concerns with the BB who then identified building capacity within the alliance for fundraising as a next step in their annual NSF report. Helping to pursue these opportunities is one way for the BB to continue to support the CI initiative in the second year of the project and beyond.

### Common Agenda

EC established a common agenda at the project kick-off meeting that has been used to guide steering committee conversations throughout the first project year. The common agenda has also guided the program choices of those who lead each regional alliance, including identifying the target audiences for these initiatives and the geographical boundaries of the work. It has not yet been a consistent communication topic with regional alliance stakeholders. There are five short-term indicators that document the success of a common agenda; EC achieved the primary indicator from this set in its first year and made progress toward three others. Successes to date have included indicators that can be accomplished at the steering committee level. Accomplishments related to other CI pillars will allow both the national and regional alliances to achieve additional indicators in the second year of the project.

Common Agenda Short-Term Indicators	Achieved	In Progress	Not Yet Started
The initiative’s Steering Committee (or other leadership structure) includes voices from all relevant sectors and constituencies	X		
Members of the target population help shape the common agenda			X
Partners and the broader community understand and can articulate the problem		X	
Geographical boundaries and population targets are clear for all partners		X	
Partners use data (qualitative and quantitative) to inform selection of strategies and actions		X	

### What is happening?

Successful CI initiatives are, by definition, formed with a common agenda that focuses on affecting social change (Kania & Kramer, 2011). Though the process of writing the INCLUDES grant solidified the broad topics of interest to the EC national alliance, the specific components of the alliance's common agenda were determined after funding had been awarded and as part of a kick-off meeting hosted by the BB organization.

Preskill and colleagues have identified several indicators that can be used to document the success of this development process. The first of these focuses on the extent to which a representative group of stakeholders informed the development of the common agenda: *Who helped shape the agenda?* and *Which key players did not help shape the agenda?*

In the case of EC, at least one team member from each partner organization and at least two team members from each regional alliance were included in the development process. The common agenda for EC was developed collaboratively via several interactive sessions at the project kick-off meeting. The sessions were moderated by members of the BB who shared a draft common agenda that had been prepared earlier in the meeting, and worked with the steering committee to revise its specific wording. The session ended with unanimous agreement from the group that the common agenda was an accurate reflection of the work to come. The EC common agenda reads as follows:

To develop a diverse geoscience workforce, the EarthConnections CI alliance is developing regionally focused, Earth education pathways. These pathways support and guide students from engagement in relevant, Earth-related science at an early age through the many steps and transitions to geoscience-related careers. Rooted in existing regional activities, pathways are developed using a process that engages regional stakeholders and community members with EarthConnections partners. Together they connect, sequence, and create multiple learning opportunities that link geoscience education and community service to address one or more local geoscience issues. By intertwining Earth education with local community service we aspire to increase the resilience of communities in the face of environmental hazards and limited Earth resources.

Within the CI evaluation framework, another set of indicators focuses on the content of the common agenda itself, including the level of agreement about the problem being solved among and across the various groups involved in the CI initiative. These include questions such as: *What is the problem being solved?* *Are partners in agreement about the problem that is being solved?* and *Who are the current and envisioned target audiences for the project?* When applied to the shared vision statement above, EC has identified the need to develop a diverse geoscience workforce as the problem to be solved. A diverse geoscience workforce results in a parallel goal, namely advancing community resilience. This second goal is often the motivating factor that frames pathway participation at the regional level. As stated earlier, the steering committee drafted the common agenda together and all were in agreement in naming this topic as the problem of interest to the CI initiative. The current

and envisioned audiences defined in the common agenda include students, regional stakeholders, and community members who are facing environmental hazards.

Progress has also been made at the regional alliance level as each group identified a local environmental challenge to target through its geoscience pathway, and identified the target audiences and geographical boundaries of the work. The Atlanta team, for example, has identified water quality as the environmental challenge that has been identified as an urgent need by the community. As stated on their EC project page, "Water is a major issue on the westside of Atlanta and the community experiences it from overflow and utility bills. The community is aware that water needs to be part of integrated solutions and the community is fighting to be included in considering solutions. Flooding, water quantity, and contaminated waterways are all problems." The *current and envisioned target audiences* for this group include students from an early age through high school, with a focus on those who attend West Atlanta schools in particular, and their parents. The *geographical boundaries* of this work are the Vine City and English Avenue neighborhoods. To date, meetings and programs have been hosted with the Vine City Community, Proctor Creek, and North Lindsay Street Park.

The neighborhoods involved in this regional alliance have long-recognized this environmental problem, as summarized by the following: "So the community....I'd say it's really appropriate revitalization of the community which is really the overarching [problem], and yet within that, water has been both a critical issue and also the rallying point for the community. It has attracted large resources. There's efforts underway by the city and even beyond and this has been a long-standing problem. But at the same time it's an underdeveloped area of the city. So overall the community would like to see positive change for the community. There are some blighted areas."

As stated on the Oklahoma team's EC project page, "A community listening meeting was held in March in Norman, OK, where 21 leaders in Native American education in Oklahoma identified high priority community issues. Leaders noted that "American Indian students in Oklahoma are quite aware of the unprecedented increase in earthquakes in the state, where the rate of magnitude 3.0 and greater earthquakes has recently been as high as 300 times what it was prior to 2008."

The Oklahoma team has identified American Indian students of all ages from several local tribal nations as their *target audience* and the *geographical boundaries* are the tribal lands of these groups. Meetings and activities have taken place in Norman and Hartshorne, OK. The Oklahoma team has identified fracking and associated deep disposal of wastewater and the relation to increased earthquakes in the local area as their environmental challenge. They shared, "The drilling...it's a very urgent problem and a lot of people are calling for change...they're actually suing. I think it's established, the urgency." Regional alliance leaders for this group also stated that community members recognize the need for a stronger geoscience pathway, saying, "I think they care about the pathway more because the people that we're bringing are basically the education people and they're interested in higher education for their students. They're interested in good careers for the students in their school."

The San Bernardino group is working with *target audiences* that include high school and undergraduate students who have demonstrated interest in geoscience, as well as educators for these groups. Families and communities of non-English speakers are also among the target audiences for this group. Students from Chaffey College and Etiwanda High School have been particularly involved. Educators to date have included those from California State University San Bernardino (CSUSB), Chaffey College, Etiwanda High School, Serrano High School, and University of California Riverside. The *geographical boundary* of the work is San Bernardino and Riverside Counties. To date, programs have taken place at the San Andreas Fault and CSUSB campus, and some regional alliance meetings have been held at Etiwanda High School.

With regard to the San Bernardino alliance, the focus on geoscience pathways has been more central than the environmental challenges. The focus on geoscience pathways is exemplified by this comment: "So I would say initially the critical problem in the community that I thought our alliance was designed to address was the lack of diversity in the geoscience workforce...I brought together people from the educational community and for them, there was urgency around that."

The environmental challenge of interest to this group is earthquake resilience. The sense of urgency related to this topic seems to vary in this community. As stated on their EC project page, "So far we have been focusing on earthquakes as the local problem. This is a serious problem, but is not necessarily perceived as urgent by the local community." This team has implemented a strategy to understand more about local interests and concerns in these areas. Their web page notes, "Student participants have surveyed their family and friends to discover the geoscience issues that are considered of highest importance within local communities." In addition, some local stakeholders are quite aware of the urgency of the issue; building owners and geotechnical engineers, for example, were cited among the multiple actors calling for improvement during the September interview with this team.

#### *What still needs to happen?*

During the kick-off meeting, the BB led conversations to help frame an indirect focus within the common agenda on environmental hazards being faced by communities. The steering committee decided on the current wording for the common agenda, with an intentional focus on pathways as a direct focus and a secondary and indirect focus on preparing communities to be resilient in the face of environmental challenges. In the most recent round of interviews with the regional alliance teams, each group talked about both the direct and indirect social problems being solved through EC. These conversations indicated that the priority placed on one problem compared to another may be likely to shift across time and region, as exemplified in the following comment: "I feel a little torn as to which critical problem am I supposed to be focusing on - the lack of diversity in the workforce or are we supposed to be finding some earth science problem in the local community that non-geoscientists care about and work on that."

There is still room to leverage the common agenda further to catalyze work in the second year of the project. The target audiences for the project have not yet engaged deeply with the common agenda, and thus the extent to which *the broader community is in agreement about the problem that is being solved* is unclear. One step in that direction might be to have the *common agenda revised based on the feedback of the target audiences*. To date, the target audiences have had minimal exposure to the common agenda, as summarized by regional alliance leaders in the following responses:

Useful for me to be...at least keep myself clear on what I'm trying to connect groups to. So yes they were valuable and fortunately they align well with the groups. Did I email people the website? Yes. Did we go through it? Not really, and I'd be curious as to how [we should do that] because from the local standpoint it really doesn't matter so much.

Having the vision statement there enabled me to say [to our teacher partners], "Yeah, here's where what you're proposing is in line with what our group is about, and here's where we'd really like to keep the emphasis rather than getting pulled off to the side on something that's also good but not part of the shared vision....And then also I think [a member of the steering committee] has been helpful to remind of us of the community service aspect of the shared vision. I think that's something we would naturally tend to forget about and so I was able to point that out to the teachers as well. We really are trying to do this in the context of using earth science issues that are relevant to the local community so that we can demonstrate the benefit of earth sciences to the local community.

This is really about bridging, making those connections from middle school to high school to college and beyond. And so [the shared vision] was woven into the [partner meeting] agenda. I mean that's the reason for having the meeting was to have the greater agenda in mind.

A final indicator related to the common agenda states that *quantitative data have been/will be used to inform strategies and actions*. Two regional alliances have taken initial steps in this direction by collecting community-level data to gauge interest in and concerns about the environmental challenges identified for the EC project. A group of students in San Bernardino, for example, surveyed their family and friends to discover the geoscience issues that are considered of highest importance within local communities. Similarly, the Atlanta Alliance has partnered with a local sociology professor who plans to collect data from youth in the project's partner communities to document their ideas about their local watershed. As EC moves into its second year, it would be ideal for these data to be interpreted and used to inform the work in each local area. Both the steering committee and regional alliance teams might also consider whether and how to collect needs assessment data from target audiences to support the strategies implemented in the second year of the project.

## Continuous Communication

A continuous communication structure has been established for the steering committee by the BB and monitored by the evaluators on a regular basis. The results indicate that some steering committee members attend and participate actively in each virtual meeting. Others do not participate regularly. Continuous communication has not yet been a goal at the regional alliance level. Instead, communication has been on an as-needed basis. There are four indicators of success related to continuous communication. EC has begun work to achieve three of four success indicators related to this pillar. Including external stakeholders at both the national and regional level will allow for additional indicators to be achieved in year two of the project.

Continuous Communication Short-Term Indicators	Achieved	In Progress	Not Yet Started
Working groups (or other collaborative structures) hold regular meetings		X	
Members of working groups or other collaborative structures attend and participate actively in meetings		X	
Partners communicate and coordinate efforts regularly (with and independently of backbone staff)		X	
The CI initiative engages external stakeholders in regular meetings and integrates their feedback into the overall strategy			X

### What is happening?

Continuous communication for the EC project occurs through regular meetings of the steering committee, through working groups, and through the work of each regional alliance. Relevant indicators related to this pillar include *how often these groups meet, whether all partners attend and participate actively in working groups, and whether some also do not attend or participate systematically.*

The steering committee was convened eight times during the first project year, including an in-person meeting and seven web-based meetings. The BB has played a leading role in establishing continuous communication during the web-based meetings by assigning national and regional members to play specific roles in how updates are reported and summarized in writing for the group. Each regional alliance has also shared updates on their progress during each meeting. These strategies have encouraged communication across groups and role types, and demonstrates success in *the BB's role to help partners communicate to coordinate efforts.*

With regard to contributions of the steering committee, all members attended and were actively involved in the kick-off meeting. Three national partners have also been particularly

active in the web-meetings thus far, attending and contributing to the conversation during the majority of these sessions. These three also serve as liaisons between the BB and at least one regional alliance.

At least one member from each regional alliance team has also attended and contributed to the majority of meetings. Attendance of individual members of the regional alliance teams has been slightly sporadic. Members who have been involved since the beginning of the project have attended between five and seven of the virtual meetings held thus far. Two members of the original steering committee have left the project this year, and two more have joined. These newer members have each participated in two of three virtual meetings that have been hosted since they joined the project.

The metrics working group has been actively involved in the project throughout the year, both in the context of the steering committee meetings and by working on their own. This group met 11 times during the first project year. All three members often met together, and pairs from this working group also met as needed to keep the work moving forward. This group met with the BB to communicate and coordinate efforts, and is in the process of coordinating metrics collection opportunities with each regional alliance. Though supported by the project's infrastructure, this group is *working independent of the BB* to coordinate these efforts. Having work that takes place independent of the BB is an indicator of success in the CI model.

The majority of the work conducted by each regional alliance is done locally and *independent of the BB*, as the leaders for each regional alliance coordinate efforts with their local stakeholders and partners. To date, communication at the regional alliance level has been on an as-needed basis and often in relation to the next activity that will be hosted.

#### *What still needs to happen?*

Looking ahead to the coming year, each regional alliance may need to consider whether and how to shift their own communication from an as-needed to a continuous communication structure. Moving in this direction would likely require time and resources that are not included in regional alliance budgets.

Other goals related to CI indicators might include *engaging external stakeholders in regular meetings* at both the national and regional levels and *integrating feedback from external stakeholders into the overall strategy of the CI initiative*.

Next steps for the evaluation might focus on gathering feedback to determine whether the current communication *schedules allow partners to support the needs of the CI initiative* and *allow external stakeholders to play an adequate role in the CI initiative*.

## Shared Measurement System

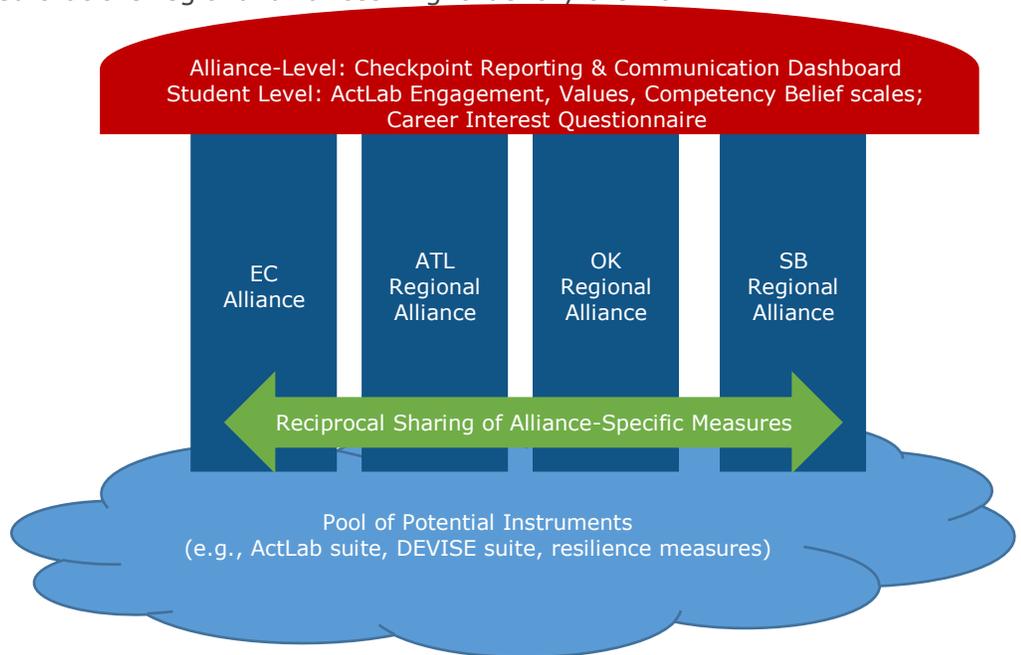
The metrics working group was formed at the November 2016 meeting to guide the development of a shared measurement system (SMS) for EC. To date, the SMS includes three components: a checkpoint process, a communications dashboard and a set of common measures to document student outcomes. The metrics working group has played an active role in establishing these measures and in gathering feedback from the steering committee to formalize these processes. There are five short-term indicators of success related to a SMS. EC has achieved two of these, and made progress toward achieving the three that remain.

Shared Measurement Short-Term Indicators	Achieved	In Progress	Not Yet Started
Partners understand the value of the shared measurement system		X	
Partners understand how they will participate in the shared measurement system		X	
A participatory process is used to determine a common set of indicators and data collection methods	X		
Partners agree to a data sharing agreement that supports ongoing collaboration	X		
The system includes a common set of indicators and data collection methods that can provide timely evidence of (a lack of) progress toward the CI initiative's outcomes		X	

### What is happening?

Having a shared measurement system (SMS) is a key component of CI initiatives that allows partners to monitor the progress of the group through a common and agreed-upon set of metrics. Success indicators related to this CI pillar include documenting those who were *involved in determining the common set of indicators* and the *common set of methods used to measure those indicators*, as well as *the way that feedback was used to guide the final decisions about SMS indicators and methods*. Four areas of interest were identified in the EC proposal as targets for shared metrics: (1) Ability of regional partners to identify shared goals related to supporting the movement of underrepresented students along the pathway toward the geoscience workforce, (2) Improved geoscience capacity within the regional partner institutions, (3) Student progress toward geoscience-related careers, and (4) Impact on regional capacity to increase resilience in the face of geologic hazards and limited geologic resources.

To date, the SMS includes three components: a checkpoint process for regional alliances, a dashboard, and common measures for students. The full and longer-term vision of the EC measurement system is presented in the figure below. Throughout the project, the BB and metrics working group will identify a pool of relevant and potential measures for the project. Over time, it is also expected that the regional alliances might identify their own instruments that could be shared across alliances. The SMS is the umbrella system that uses common processes and measures at both the alliance and student levels.



The development of each of the umbrella processes was initiated by the metrics working group in the first year of the project. Development of the checkpoint process, for example, was led by the BB team to focus on

five areas of pathways development that are an extension of the key themes in the common agenda: embedded in a community, use geoscience to contribute to a local problem, multiple learning opportunities connected and sequenced, service learning, and mentoring and signposting. Each theme includes a number of more specific indicators along the pathway elements that were drafted originally by the internal evaluator and then vetted by the metrics working group before being presented to the steering committee for feedback.

The current checkpoint review process includes three steps:

1. In response to a set of prompts that align to the areas of pathways development, each regional alliance reports progress. Updates to the pathway maps are collected as part of this reporting.
2. Then, the full steering committee provides comments and questions in advance of a virtual meeting using the discussion boards on the regional alliance reporting pages. In addition, the internal evaluator uses a checkpoint rubric to review each of the reporting pages based on strength of each of the pathways development elements of the rubric and four to six indicators for each element (see Appendix for the full rubric, and the latest graphic created by the internal evaluator to share updates on these results). The rubric was developed to include questions related to CI indicators, as well as items related to the essential elements that encompass an EC pathway.
3. At the virtual meeting, each alliance reports on progress and a leadership person moderates, synthesizes, and summarizes the discussion. The internal evaluator documents the checkpoint analysis through a pathway development web page that

includes a written and visual summary which provides another point of reflection and discussion by the full leadership team at the virtual meeting.

The steps outlined above position EC to be successful in relation to three SMS indicators: *How is each indicator and method aligned to EC outcomes? How are data shared?* and *In what ways does the data sharing plan support ongoing collaboration?* As stated above, the essential pathway elements were derived from the common agenda and thus are aligned to the goals of the project. Data are shared with the steering committee during both the second and third steps of the checkpoint process. Both steps also support joint reflection and collaborative thinking, in that feedback is offered and recorded in either the project's shared work space, via conversation during the virtual meetings, or both.

The second component of the SMS was developed by the BB and Carleton staff to create real-time web analytic dashboards. More specifically, the existing infrastructure technology system used in other Carleton projects was enhanced to automatically gather and generate visual displays of EC communication data, and to allow these dynamic displays to be embedded in public and private websites as a data dashboard. The dashboard draws from website usage statistics to show key engagement metrics over time at both the national and regional level. These metrics include monthly email list messages, monthly counts of views of internal workspace pages, number of email list members, and monthly page views of public website pages.

To date, the dashboard visually demonstrates how the usage of the BB website, email lists, and community membership corresponds to scheduled meetings of either the leadership or the regional alliance. The peak in usage before each meeting underscore the importance of meetings as a driving force for communication. The BB has used the dashboard to verify engagement patterns among steering committee members. The first year of the project has focused on ensuring that the dashboard system is poised to capture this growth as pathways begin to develop and more regional partners are identified to join their local alliance.

The process used to identify a SMS for student progress was ongoing throughout the first project year. The shared metrics team selected existing validated measures that could be used at various points within the pathway to understand students' attitudes and learning, and to explore mechanisms for measuring overall shifts in the number of diverse students moving through the pathway and from the pathway into the geoscience workforce. The metrics working group researched and reviewed several measures, restricting the review to instruments for which there has been significant testing in informal science settings to gather psychometric evidence of validity and reliability. Although setting up a baseline and procedures for tracking demographic statistics will be an important part of the metrics, the impact on student attitudes toward geosciences and student preparation for careers in geoscience provide a shorter-term measure. See the table on the next page for a list of the instruments reviewed and the recommendations made by the metrics working group to the EC alliance.

The results from this work were presented to the steering committee through the online workspace and via multiple virtual meetings. This process took longer than anticipated. The metrics working group worked iteratively to gather information about the needs and opportunities of the regional alliances and to identify instruments that were likely to meet those needs. Not surprisingly, sufficient progress had to be made to develop each pathway before regional alliance teams were able to share ideas about the constructs that would be meaningful to measure and data collection opportunities in their region. Working with the steering committee throughout the first year, the metrics working group was successful at narrowing the measures down. The Activation Lab's Engagement, Values, and Competency Beliefs surveys and the STEM Career Interest Questionnaire were shared with leadership from the three alliances. These leaders indicated interest in piloting the instruments.

#### *What still needs to happen?*

At the national level, next steps include the continued use of both the checkpoint and dashboard systems. Future evaluation efforts should collect data from steering committee members to determine whether and how they *value the data generated by the SMS* and whether they have begun *to believe the SMS is relevant to their work*.

At the regional level, the metrics working group is in the midst of hosting planning meetings with each regional alliance to select and pilot one or more instruments. The tentative plan is for all regional alliances to pilot the Engagement Survey during one or more activities, and to pilot at least one additional instrument during the current academic year. As these systems are established, the metrics working group will gather feedback to document the extent to which partners *know when to administer each measure* and that they *know all relevant target audiences for each measure*, and that they *have plans for when and how they will analyze data from each measure*.

In the second year of the project, metrics will be identified to document community capacity and community resilience. The metrics work group has already compiled a list of resilience metrics, and plans to use a similar iterative process to gather more information from both

Tools	Description	Recommendation for EC
<p>The DEVISE suite of instruments (Developing, Validating, and Implementing Situated Evaluation Instruments)</p> <p>Developed by the Cornell School of Ornithology</p>	<p>The DEVISE scales were created with NSF funding to measure outcomes in relation to citizen science projects and have been used extensively in a wide range of contexts including undergraduate courses, K-12 schools, informal science learning contexts, and non-profit organizations. Scales include items related to behavior and stewardship, skills of science inquiry, knowledge of the nature of science, motivation, self-efficacy, and interest in science and the environment.</p>	<p>These scales focus on citizen science, and may be useful in the future if regional alliances engage in significant citizen science activities. However, at this time the DEVISE scales do not address the breadth of activities across the three regional alliances.</p>
<p>The Activation Lab suite of instruments</p> <p>Developed by a collaborative group from the Lawrence Hall of Science, University of Pittsburgh, and SRI.</p>	<p>This project, funded by NSF and several private foundations, defines activation as a state composed of dispositions, practices, and knowledge that enables success in proximal learning experiences. Their work has included development of instruments for science. We reviewed their instruments for Engagement, Competency Beliefs, Values, and Fascination.</p>	<p>Our review of these instruments suggested that Engagement, Values, and Competency Beliefs apply across the age audiences and activities of the three regional alliances. In addition, there is evidence that these scales have predictive value related to student learning (Vincent-Ruz &amp; Schunn, 2017) and utility value of science (Bathgate &amp; Schunn, 2017).</p>
<p>The STEM Career Interest Questionnaire</p> <p>Developed by Tyler-Wood, Knezek, and Christensen (2011)</p>	<p>This survey has been used widely across the NSF Innovative Technology Experiences for Students and Teachers (ITEST) community. It measures attitudes related to STEM career interest, intent, and importance.</p>	<p>Because fostering student progress toward careers is a key goal of EC, this instrument applies across the range of activities in the three regional alliances.</p>
<p>The Common Instrument Suite</p> <p>Developed by the Partnerships in Education and Resilience (PEAR) Institute.</p>	<p>The Common Instrument was developed with funding from the Noyce Foundation by the Director of PEAR in collaboration with practitioners in out-of-school settings.</p>	<p>Using this suite of instruments requires working with the PEAR Institute and involves costs outside the scope of the project at this time.</p>

the regional partners and the leaders about the needs and opportunities for using such metrics.

### Mutually Reinforcing Activity

In its first project year, EC has created a foundation for the creation and use of mutually reinforcing activity across the alliance. Two specific examples of mutually reinforcing activities from the first year include the ways that the metrics working group has allocated tasks to its members based on areas of expertise, and the creation of a video by one of the national partners to showcase the EC project. Mutually reinforcing activities require an action plan. Though much work has occurred in the first year of EC, action plans have not yet been formalized in some cases. Pathways maps have been created by each regional alliance and hold promise as a key step in formalizing an action plan for the coming year. EC made progress in relation to four of the five indicators of success for this pillar.

Mutually Reinforcing Activities Short-Term Indicators	Achieved	In Progress	Not Yet Started
An action plan clearly specifies the activities that different partners have committed to implementing		X	
Working groups (or other collaborative structures) are established to coordinate activities in alignment with the plan of action		X	
Partners have clear approaches/goals for their own contribution to their working group		X	
Partners understand the roles of other working groups and how these support the common agenda		X	
Partners' individual activities are changing to better align with the plan of action			X

#### What is happening?

Relative to other CI pillars, EC has made less progress toward creating and implementing mutually reinforcing activities. Indicators related to this pillar include *establishing working groups to coordinate activities in the action plan*, *having partners identify approaches and goals for how they will contribute to their working group*, and *aligning the action plans and partner roles/contribution for each working group to the common agenda*.

The metrics working group may provide the best example of these success indicators to date. This group was formed at the kick-off meeting and met regularly during the first year of the project. Using the SMS and evaluation portions of the proposal as their action plan, this working group divided tasks throughout the year to accomplish key pieces of the work, building on existing expertise and resources. The internal evaluator, for example, took the

lead with creating and monitoring the checkpoint process while the external evaluator took the lead in gathering data to document the group's work in relation to the CI pillars.

The process used to identify student measures also serves as an example. Early meetings built on the expertise of multiple team members to identify possible measures. All team members reviewed the measures to provide feedback; the national partner agreed to take the deepest dive in her review and to lead this effort overall. Each team member was assigned specific roles in how to present the measures to the steering committee during virtual meetings throughout the year. Most recently, two members from the working group have started to host meetings with each regional alliance to identify which instruments will be pilot tested and to begin making action plans for those activities.

A second example of mutually reinforcing activity from the first year of EC comes from one of the national partners leveraged her organization's resources to create a video to document the EC project. Rather than creating a formal working group, the national partner communicated with all steering committee members to engage them in development of the video. First, she contacted the steering committee to determine members' interest in having her lead this effort. All were in favor of this plan. She then had the steering committee review a story board for the video, contribute materials, critique a draft video, and review the final video. The partner's home organization integrated the feedback and materials received from members throughout this process to create the video. To date, the video has been submitted to both the INCLUDES Video Showcase and the NSF STEM for All Video Showcase. The national partner just contacted the steering committee again to gauge interest in a second video and move that forward on a more proactive timeline.

Mutually reinforcing activities are also occurring at the regional alliance level, at the activity rather than action plan level. As stated in the NSF report, "The Atlanta alliance is growing out of community groups that are already engaged in solving water resource issues in west Atlanta. The alliance is helping to connect these groups to institutions of higher education and bringing new ideas for educational programming to their activities." One of the first programs hosted by the Atlanta regional alliance exemplifies this approach. As described on their project page, the "STEM in Our Park block party connected Kipp Ways Academy 8th Graders to existing geoscience content from several academic partners, including the Greening Youth Foundation, Georgia Institute of Technology Georgia State University and the Georgia Geography Alliance."

Similarly, the Oklahoma Alliance is working with partners to create connections between existing educational activities where geoscience can be added. As stated on their project page, "the Oklahoma Tribal Nations alliance started with a broad visioning activity with the tribal leadership. Its initial activities have brought new expertise in geoscience and seismology into established programs and the alliance is working to bring tribal groups together in new ways."

"The San Bernardino alliance is growing from the academic community connecting programming between area schools, colleges, and universities and building a community

engagement focus into these activities.” A recent opportunity, for example, will allow the San Bernardino team to partner with a local group that has a seismic simulator that they use for demonstrations. This group contacted the regional alliance to ask for their help in determining the size of the earthquake being simulated. In summing their reactions to this idea, one team member said, “Their seismic simulator would be a way of engaging students in real-world geoscience issues and letting them help to contribute to figuring out the question that the county’s asking about their simulator.”

EC is also poised to make a huge leap forward with regard to action plans in the coming year. The first year of the EC project was devoted to laying the groundwork needed to begin creating pathways within the context of each regional alliance. The idea of using maps to represent project pathways was born out of the November meeting and maps have since become a common documentation method used across the regional alliances. The maps themselves can be considered a mutually reinforcing activity, as one alliance responds to and builds on the approach of the other, as well as the first steps toward creating action plans for each regional alliance.

The maps also serve as iterative documentation of the work in each area, and by extension serve as a potential action plans for each group and thus a key artifact for the evaluation. Each regional alliance has used a different approach to structure their map. In some cases they show a planned pathway, while others show the broader local learning context related to geoscience. The story of how each was created is documented below, and key aspects of each map have been coded in relation to the CI pillars. The external evaluator will continue to code new iterations of each map as the work evolves, with the hope that the maps themselves can serve as an embedded assessment of project progress and success.

In addition, the evaluation team has combined the key components from each map and the relevant details presented throughout this report to create journey maps in a common format for all three regional alliances. These maps were designed to document the similarities and differences across alliances. Given that the work of each regional alliance is in its initial stages, there are some elements of each journey map that are unclear and/or undefined. The maps will serve as discussion points for the next round of interviews with each alliance to ensure that the evaluation team has interpreted plans accurately and to fill in any new details that have emerged.

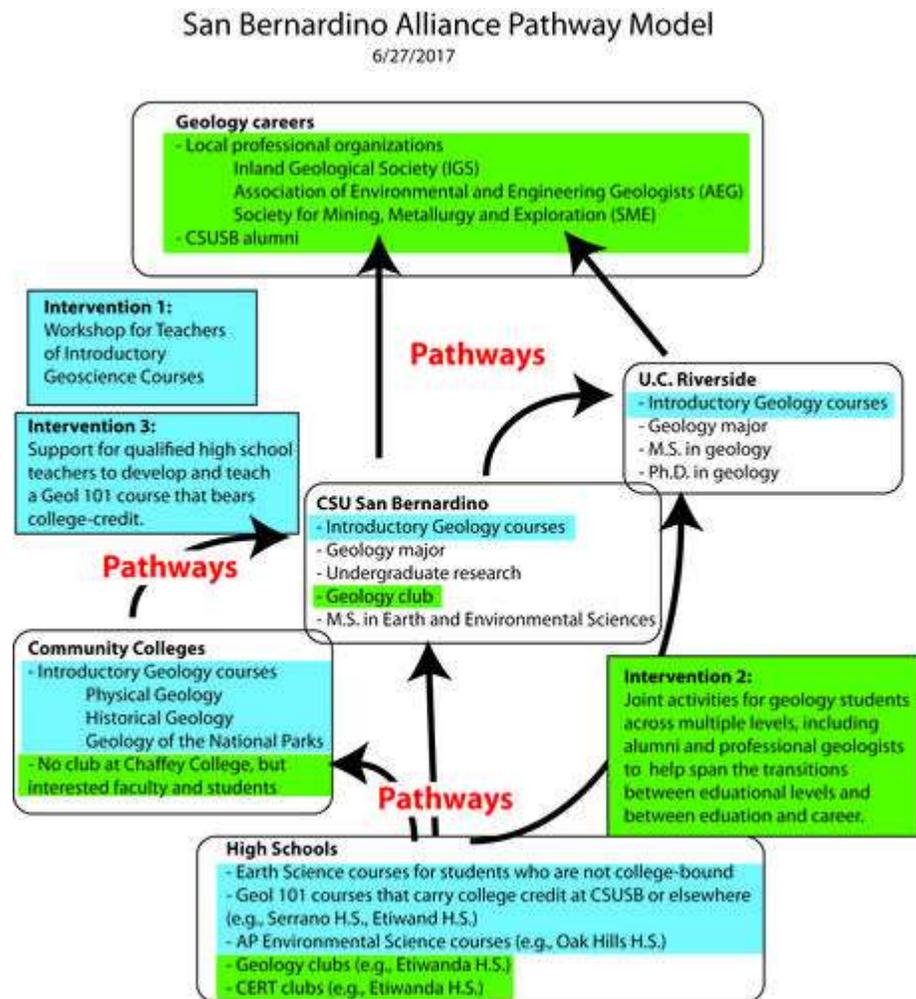
The San Bernardino team created the first regional alliance map. This team hosted a roundtable event in December 2016 and gathered community input from 35 local stakeholders from across a range of sectors. Stakeholders at the roundtable influenced the eventual creation of pathways by endorsing ideas by the leaders, and by suggesting pathways of their own. When summarizing the conversation, one Alliance leader said:

*The joint activities for geology students across multiple levels in intervention number 2, I think that was an idea I had when we were writing the proposal, so I sort of brought that to the roundtable event. And people there endorsed it and said they thought it was a good idea. The intervention number 3, support for qualified high school teachers to develop and teach the geology 101 course at the high school level*

*but for college credit, I guess that was one of my local educational champions. That was something she took the initiative on and she wanted to do that and I could see that it would fit into helping bridge that transition between high school and university.*

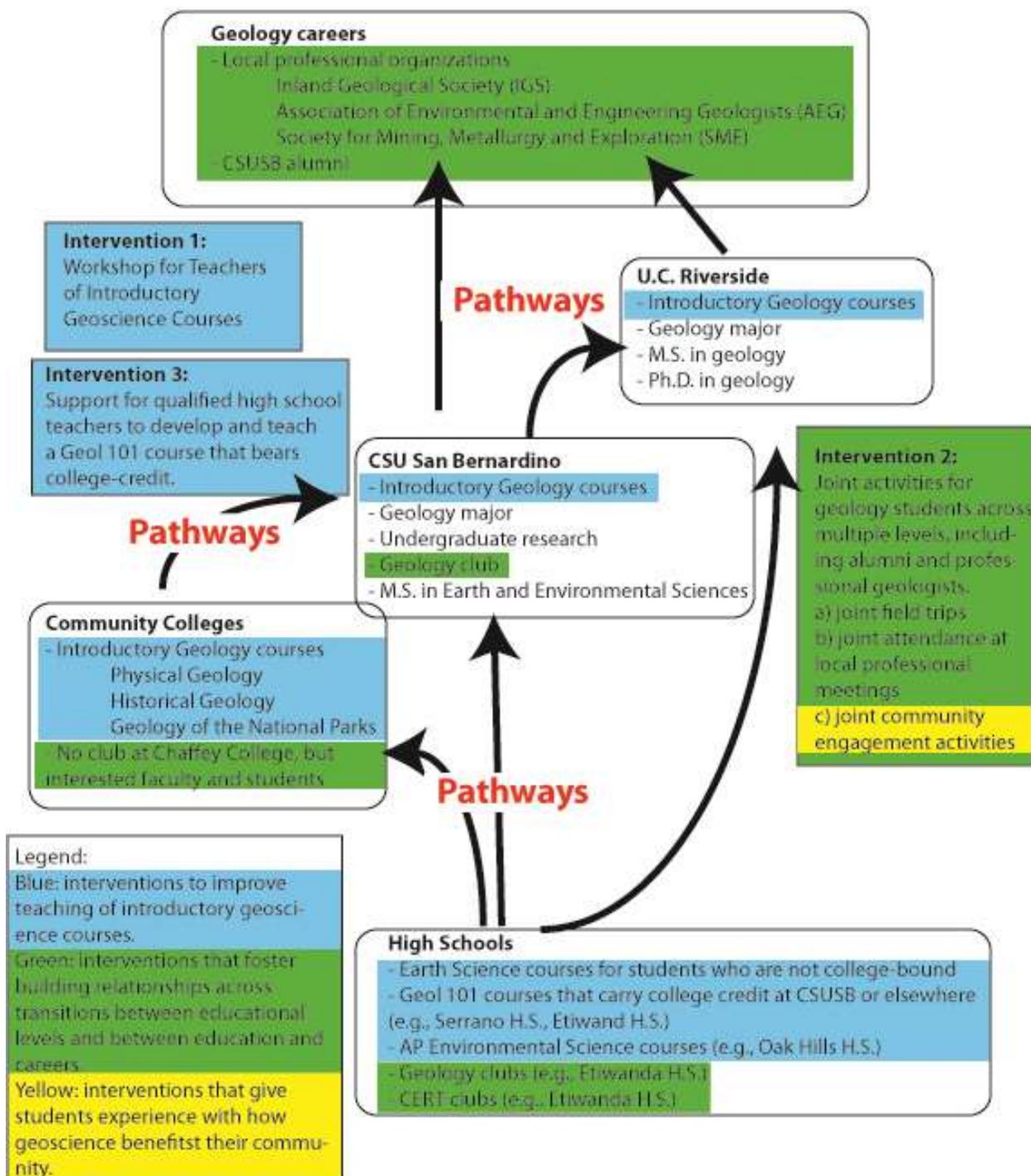
After the meeting, Alliance leaders created a map to document their local pathway, with a focus on the activities that could strengthen elements of the pathway and build connections between elements moving forward (shown at right). The map includes high school and college level programs/initiatives, and uses color coding to distinguish interventions that are aimed at improving the teaching of introductory geoscience courses at high schools, community colleges and universities (blue), those that are aimed at building relationships between faculty and students from institutions that represent different stages on the pathway, so as to help students navigate those transitions (green).

The latest iteration of this map has added a new set of programs, those that are aimed at helping students see the relevance of geosciences to their local communities (in yellow, see next page), such as the upcoming seismic simulator service learning project. The roundtable event also informed some of the specific programming choices that were made to begin populating the pathway, as summarized by the following alliance leader, "I did learn that we do have a number of alumni who are very interested in staying engaged and helping to mentor the next generation of students. And so I think that maybe helped me add to intervention number 2, the idea of not just joint field trips but taking students from the high school and community college level to these meetings of the professional geology societies."



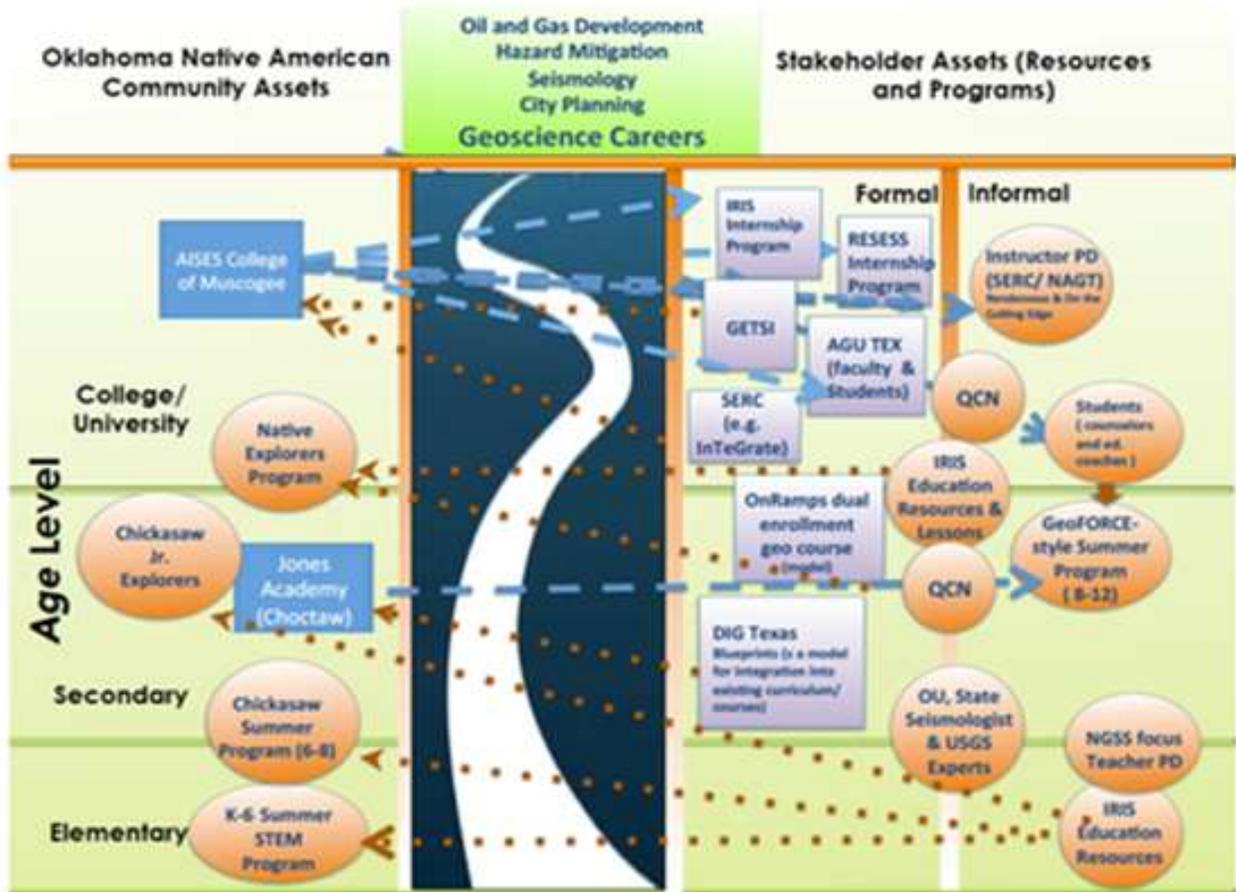
# San Bernardino Alliance Pathway Model

11/14/2017



The Oklahoma pathways map was created after a community listening meeting that was held in March 2016. Local stakeholders identified high priority community issues and how they intersect with the geosciences, discussed critical stages of the pathway from middle

school to tribal college to university, and developed an initial asset list. "By asking the community what they were interested in I think we learned a lot about what our strategies ought to be. So in that sense I think the meeting very much informed our strategy." Alliance leaders then used this information to create a pathways map that prioritized a subset of the assets and opportunities from the March meeting. As seen in the figure below, the initial pathways map included sections that documented existing learning opportunities for elementary, secondary, and college/university audiences across both formal and informal domains. The map indicates that the target audience for this pathway ranges from kindergarten through university students.

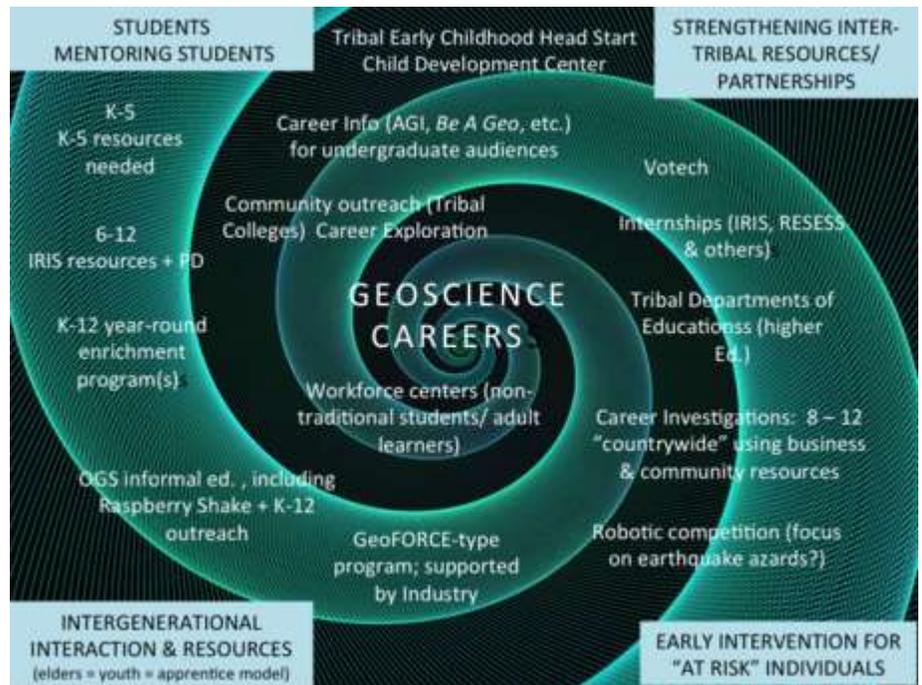


This first draft of the Oklahoma Alliance map was presented to local partners during an October 2017 meeting to gather their feedback and suggested revisions. When describing their vision for this meeting in their September interview, one team member said, *We will have to go through and describe what we have, and I hope that they won't be overwhelmed, but what I would like to see is for them to say, 'Yes, this calls out to us. We think we can implement these resources or we would prefer something else.'* So what we want is their feedback on what is going to work for them. So it's not pushing a solution on to them.

Indeed, the stakeholders did help expand the ideas in the original pathways map. Two groups of stakeholders created their own version of a pathways map during the October meeting. While the leadership team has not yet had the time to reconcile their existing map

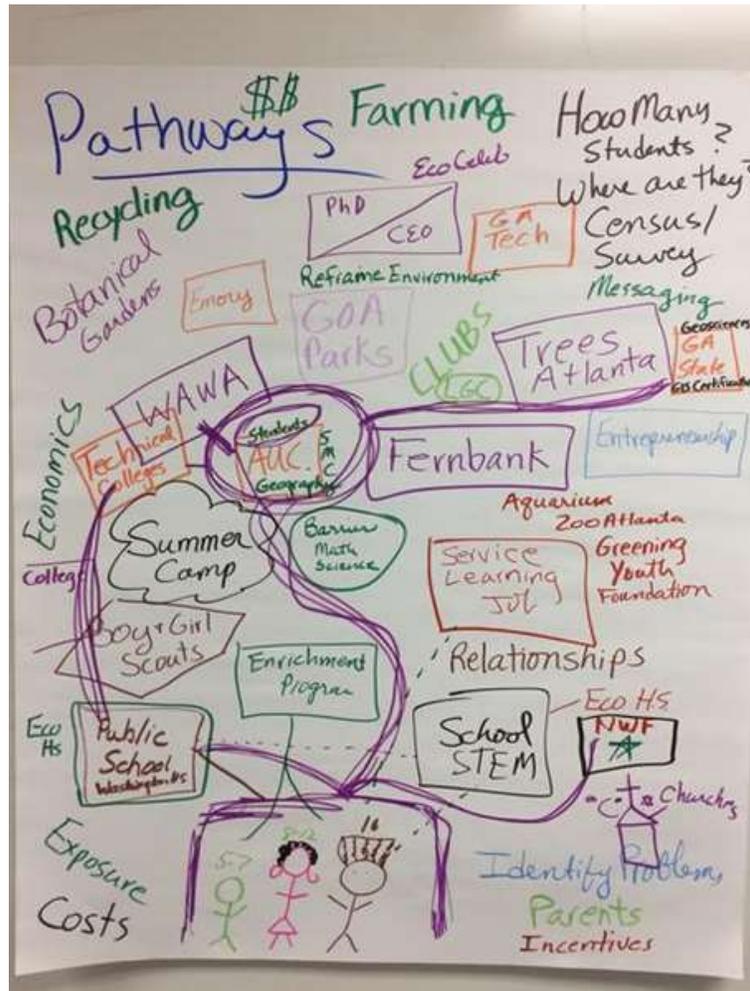
with these newer versions, the team agreed that “these maps are a more complete vision of potential pathways for participants than the original map, which focused more on the components.” One group used a trail map as their inspiration, beginning with elementary-aged audiences and then highlighting the traditional “stops” along the way to a vocation. This map also includes “stops” related to some informal learning opportunities and tribal knowledge.

A second group of stakeholders chose a spiral for their pathway, and this idea resulted in a second iteration of the Oklahoma Alliance pathway map (shown right). The current map includes four cornerstones, defined by the group, and a range of formal and informal opportunities that spiral in toward the ultimate goal of achieving a career in geoscience. The leader who worked with this group shared, “Their vision was to put the many resources that are available into a sequence, but then the spiral allows many different paths to be created.” The spiral also has meaning for Native American cultures and so provides a meaningful image to serve as a touchpoint.



The first iteration of the Atlanta pathways map was created collaboratively during a brainstorming session with partners in June 2016 (shown below). A wide range of partners contributed to this map, including the two neighborhood communities mentioned previously and the West Atlanta Watershed Alliance (WAWA) who serves as the lead community partner. Community members from the National Wildlife Foundation, Urban Ecology Center, Proctor Creek Stewardship Council, Chattahoochee Riverkeepers, and the Community Improvement Association also contributed to the pathways map.

Working together, this group identified three student audiences, a combination of both general and specific learning venues (including formal and informal), a range of topics that are related to geoscience, and potential barriers to student pathways. One Atlanta Alliance leader noted, "Important components of the pathway highlighted included connecting with STEM schools (none of which are local to the neighborhood), local HBCUs and state universities." At the time of the September interviews, the next steps in developing the pathway map were unknown.



What still needs to happen?

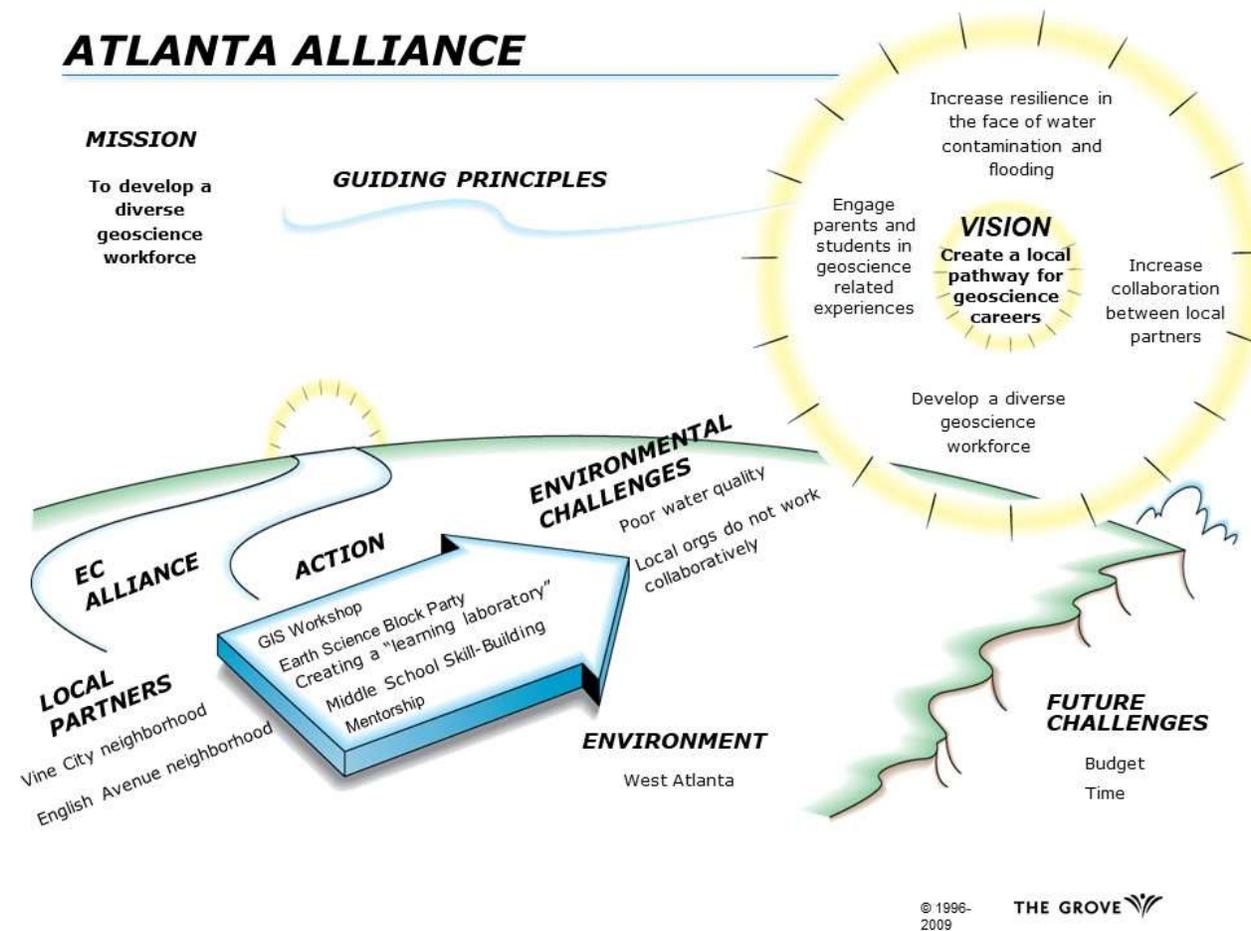
The NSF annual report states that, "The regional and national partners have very different skill bases and have been able to support one another effectively in the day-to-day work of creating the regional alliance." The EC project has an established common agenda and the proposal itself serves as a *collective plan of action* for creating pathways that is being followed. Each regional alliance developed a timeline for developing their pathway at the kick-off meeting in November 2016. Since that time, the regional alliances have worked to complete their timeline with support from the national partners on an as-needed basis. Now that these plans are underway, the steering committee might benefit from having a common timeline that integrates activities, in sequence, and across the national and regional levels.

The accomplishments in the first year of the project have positioned the EC team to begin taking steps in this direction. An immediate next step, according to the CI indicators, might be to identify the partners who are and are not going to be involved in creating the action plan. Once partners are identified, *the action plan should specify which partner has committed to which activity*. As stated earlier, the pathways have the potential to serve as action plans for each regional alliance, as they are connected to the vision. Once fully developed, the pathways have the potential to support and guide students from

engagement in relevant, Earth-related science at an early age through the many steps and transitions to geoscience-related careers.

A next step for the evaluation will be to use the journey maps below to extend the conversations that began with each group in September. Initial conversations focused, in part, on the prerequisites for success that are in place at the local level. Some of these details have been used to populate each of the maps below. Each journey map has been designed to highlight key concepts from the EC common agenda.

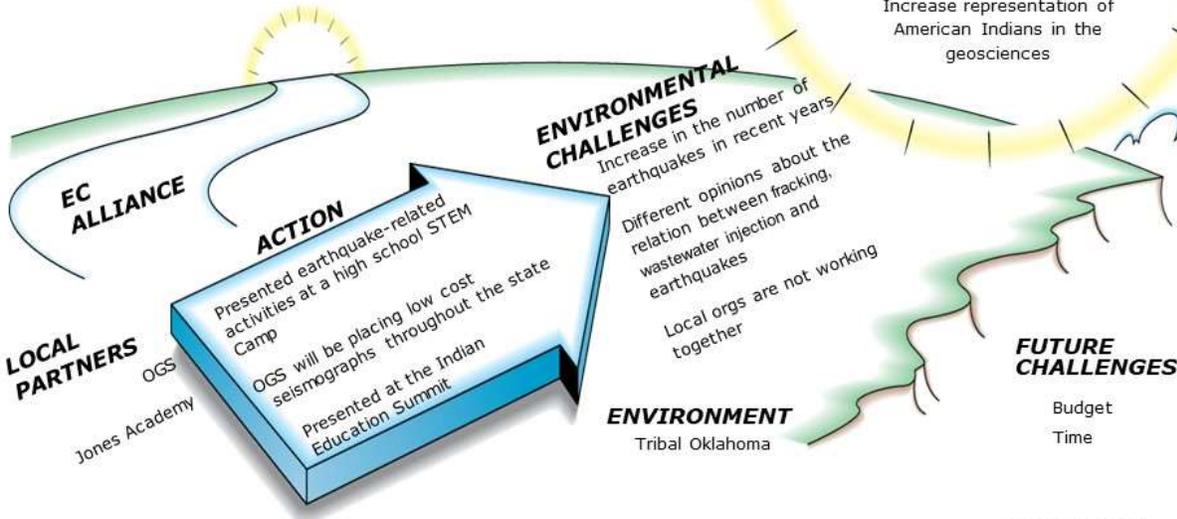
Initial feedback from the alliance reiterated the value of having a concrete example as a starting point. The steering committee agreed that a common graphic is helpful for organizing and presenting the defining elements of the alliance, and that the examples below include many of the categories needed to achieve this goal. Even so, steering committee members were not keen on the aesthetic of the current examples. The group plans to build from the first iterations presented below to develop a new graphic that can be used to present the common and unique elements across each regional alliance.



# OKLAHOMA ALLIANCE

**MISSION**  
To develop a diverse geoscience workforce

**GUIDING PRINCIPLES**



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# SAN BERNARDINO ALLIANCE

## MISSION

To develop a diverse geoscience workforce

## GUIDING PRINCIPLES

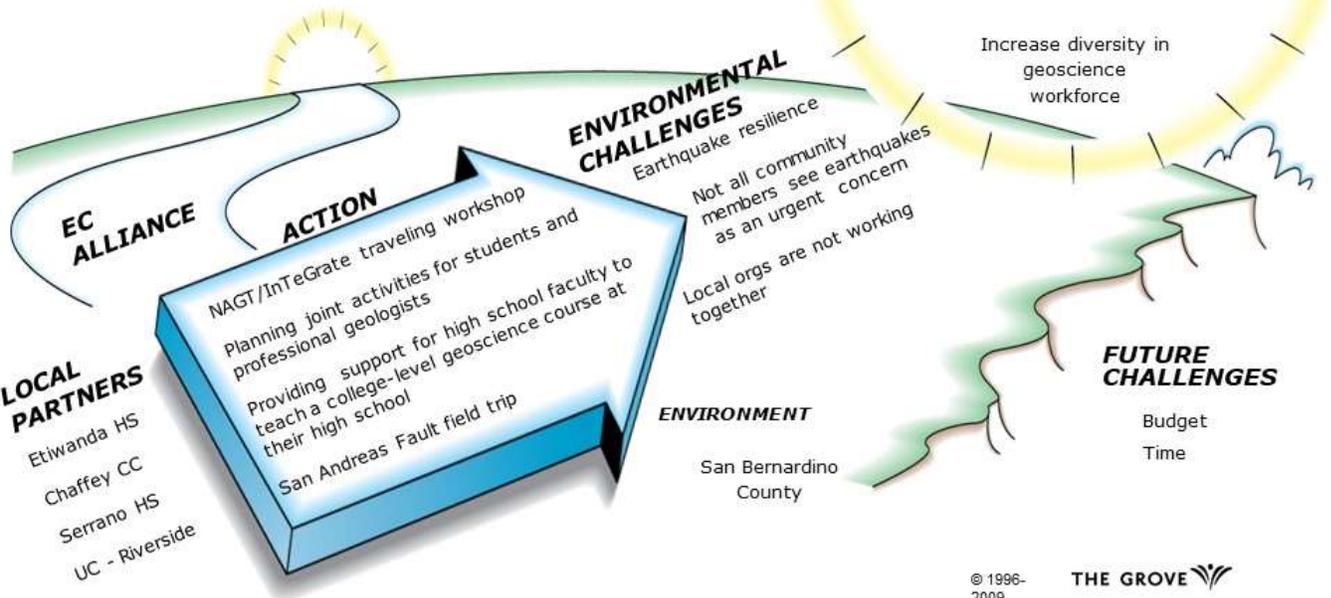
Increase resilience in the face of earthquakes

Develop connections between intro geoscience teaching in high schools and above

**VISION**  
Create a local pathway for geoscience careers

Improve geoscience teaching at the high school and college levels

Increase diversity in geoscience workforce



### LOCAL PARTNERS

- Etiwanda HS
- Chaffey CC
- Serrano HS
- UC - Riverside

### ACTION

- NAGT/InTeGrate traveling workshop
- Planning joint activities for students and professional geologists
- Providing support for high school faculty to teach a college-level geoscience course at their high school
- San Andreas Fault field trip

### ENVIRONMENTAL CHALLENGES

- Earthquake resilience
- Not all community members see earthquakes as an urgent concern
- Local orgs are not working together

### ENVIRONMENT

San Bernardino County

### FUTURE CHALLENGES

- Budget
- Time

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## Evaluator's Summary

EC was funded as a two-year project designed to: (1) develop, test, and refine the elements of a CI alliance through work on three regional pilots that capitalized on collective expertise and resources, and (2) test the ability of the alliance to attract new partners and implement a scalable system for supporting locally customized pathway development. As demonstrated in this report, the project has been successful at achieving many indicators related to a new CI initiative in its first year. Progress has been made in relation to each of the five CI pillars, with the greatest strides in relation to the BB and SMS

A goal of the materials review was to limit the primary data collection needed for the process evaluation. This strategy seems to have been successful overall, in that much of the data included in this report were collected through the materials review and then supplemented with interview data. This report's alignment to the CI framework has the potential to offer new insights. As the same time, a possible limitation is that it might be viewed as a re-packaging of the NSF report. The primary difference between these documents is in how the two reports are framed. The NSF report is broad, and structured around prescribed reporting questions. In contrast, the current report is aligned to the CI pillars. It is not clear whether this framing for the evaluation will add value for the EC team. A next step in the reporting process will be to gather feedback from both the BB and the regional alliances on the accuracy of this report, and whether the report adds value to their perceptions of the project's progress in the first year and informs next steps for moving the work forward.

The mapping templates used in this report do have the potential to provide value to the national and regional alliances moving forward. Blank templates were shared with the regional alliances during the September interviews, and seemed to be of interest to some. It is the hope that having a standard format for presenting this work will be useful at both the national and regional levels. A next step in the evaluation process will be to gather feedback to determine whether this is the case, and whether or how to move forward with similar graphic reporting tools in the next year of the project.

As stated in the project proposal, fundamental to the strategic plan for EC was the idea that both the national and regional alliances would function to: facilitate the exchange of information and the flow of ideas, advance the work of people who share the alliance vision while entraining new people, create a supportive environment for alliance activities, provide a venue for analysis and reflection on what works and for abstracting broader insights and approaches from the individual pathways, and build a peer group that can share effective strategies and troubleshoot issues for individual pathways. This report highlights the groundwork that has been laid by the EC project in its first year and hints at the potential to come.

The CI model has been an explicit focus of the external evaluation for the EC project. Evaluation of CI initiatives vary widely in the approach taken by the evaluator, and the extent to which this role remains "external" to the steering committee (. For the current project, the external evaluation has functioned to provide explicit reflection on the CI model with

steering committee members throughout the year. These connections have been presented during monthly steering committee meetings, have served to focus interviews with the regional alliances, and have guided the writing of this report and a subsequent review of the document by the steering committee. It is the hope that there is value in how the current report has aligned the alliance's first year of work with the CI model to document both the wide range of successes achieved, as well as target areas for the work that remains. Using the success indicators from the CI pillars also provides a conceptual path forward. EC is among the first cohort of INCLUDES projects that were designed, in part, to gather data on this conceptual model in a systematic way.

As with any evaluation, it is the hope that the data presented here can be used to guide the continued development of EC. The recommendations in each *What still needs to happen* section may or may not be developmentally appropriate for the EC project at this time. A primary role for the steering committee in the year ahead could be to determine which indicators the alliance hopes to achieve in the coming year. Developmental evaluation suggests that these types of choices might be made by asking, *What do we need to know to take the next step?* Understanding why particular indicators are targeted or discarded by the steering committee in the year ahead has the potential to provide additional nuance to the project's evaluation in the second year of the project and to contribute to the longer-term implementation of the EC alliance.

## Appendix

### DRAFT Revised Checkpoint Rubric (5/15/17)

#### **A) Embedded in a Community**

1. Leaders in Geoscience Education identified
2. Leaders in Geoscience Education invested
3. Leaders outside of Geoscience Education identified
4. Leaders outside of Geoscience education invested
5. Common agenda/area of overlap articulated and bought into by all leaders
6. One group identity emerges, replaces division inside and outside of Geoscience Education

#### **B) Use Geoscience to Contribute to a Local Problem**

1. Local problems articulated (this item is not truly complete until *Embedded in a Community* 1 to 5 are done)
2. Local problems connected to Geoscience
3. Single or set of problems to focus on is agreed upon (as part of common agenda)
4. Geoscience pathway that addresses local problem is designed
5. Implemented and evaluated in some way
6. Refined and ready to grow

#### **C) Multiple Learning Opportunities Connected and Sequenced (Worked on in parallel with *Embedded in a Community* and *Use Geoscience to Contribute to a Local Problem*)**

1. Understand existing levels, programs, and educational places where our alliance could have an impact
2. Decide on connections between levels on which alliance wants to focus
3. Develop plan for linking those levels
4. Pilot - alliance takes some small step so that they can learn what works
5. Alliance has early indicators that your transitions work
6. Refined and ready to grow: i.e., Ready to scale - alliance has strategy(ies) that work, alliance knows how to measure it, alliance is ready for more effort/investment (the only thing holding the alliance back is resources - you know what to do)

#### **D) Service Learning (dependent on making progress through *Use Geoscience to Contribute to a Local Problem* 1 to 3)**

1. Opportunities for service learning identified at each level and aligned with enhancing community resilience
2. Opportunities for service learning designed so that they are linked together across levels
3. Opportunities evaluated for impact on learning
4. Early indicators of future enhanced community resilience are demonstrated

**E) Mentoring and Signposting (we are struggling with when and how this happens)**

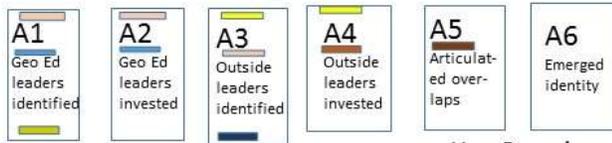
1. Skills students need to succeed on educational pathways are identified (not just geoscience skills but also community engagement skills)
2. Strategies for how to coach and mentor along pathway are identified and in scalable, level-appropriate ways (e.g., mentoring might be different for K-12 student than an undergraduate student)
3. Types of mentoring/signposting strategies are piloted
4. Early indicators of how mentoring/signposting approaches are working (most likely through student feedback related to the value of it in making decisions about the pathway and knowing how to enact those decisions)
5. Mentoring and signposting strategies are refined and ready to scale

**Regional Alliances Checkpoint 5**

(based on checkpoint 5 reporting pages 11/16/17)

Checkpoint	3	4	5
Atlanta			
Oklahoma			
San Bernardino			

Embedded in a community



Use Geoscience to contribute to a local problem



Multiple learning opportunities connected and sequenced



Classroom learning coupled with opportunities in community service



Mentoring and signposting supports students

