Introduction and Context

The Common Education Data Standards (CEDS) project is a national collaborative effort to develop voluntary, common data standards for a key set of education data elements to streamline the exchange, comparison, and understanding of data within and across P-20W institutions and sectors.

In addition to the standards, CEDS has multiple tools that allow stakeholders to use and integrate the standards into their work. Align is a web-based tool that enables users to import or input their data dictionaries, align their elements to CEDS, and compare their data dictionaries with those of other users in relation to CEDS. Connect is a tool that goes beyond Align and allows stakeholders to create use cases (such as federal reporting requirements) called "Connections" that employ unit-level data elements to perform applications across the P-20W environment. Using these tools together, users can enter a data source into Align and then apply it to a Connection (thus comparing the elements needed for any one Connection and evaluating whether they appear in their data source(s)).

 CEDS includes elements required for federal reporting requirements, including ED*Facts*. This allows Align and Connect to be utilized by states to map their data dictionaries to elements needed for ED*Facts*. The Elementary and Secondary Branch (ESB) office has begun the process of creating Connections for each of the ED*Facts* data groups. To accomplish this task, ESB worked with the program offices to determine which elements are needed for each data group, and therefore, their Connections.

Additionally, ESB supported a series of site visits during the 2012-2013 school year, which assisted seven states (Arizona, California, Georgia, Missouri, Oklahoma, Ohio, and Washington) in identifying, entering, and aligning into Align the state data dictionaries needed for the ED*Facts* files associated with the Common Core of Data (CCD), Adjusted Graduation Rates, and Assessments. This project also supported Georgia, Missouri, and Washington in creating Connections for the ED*Facts* data groups using Connect.

The purpose of this white paper is to assist readers in understanding the principles, success points, and organizational benefits of the seven-state ED*Facts* mapping project, and to provide practical and implementable steps to replicate that process within their own organizations.

Best Practices Using Align to Support the ED*Facts* Process

CEDS Align allows users to create "maps", in which they determine the alignment between the data elements and definitions that they have entered from their data sources and the CEDS elements. In some instances, users find that their elements align closely with CEDS, while in others their elements would require transformation to better map to CEDS. Finally, some user elements do not have corresponding elements in CEDS. By making their map public on the CEDS website, states can share data elements across state lines and among educational sectors. This

allows states to see not only their alignment to CEDS, but how their data sources correspond to those of other states, districts, or education entities. The following steps are used when mapping:

- identify data sources[1]
- input data sources;
- align elements;
- validate maps;
- publish maps; and
- maintain maps.

This document provides best practices and usage tips for each step of this mapping process.

Identify Data Sources

When using Align to support the ED*Facts* process, the first step in mapping is to identify the data sources used by the state for ED*Facts* reporting. Key staff members should use this as an opportunity to review each element and its related data source(s), and ask critical questions regarding its origin and source for ED*Facts*, including but not limited to:

- What is the origin of this data element?
- Based on the inclusion of this element, what data sources are needed for this map?
- Does this element appear in more than one data source?

States should also identify the purpose of using particular data sources. Comparing across multiple mapped data sources can help users reduce duplication and work towards consolidated efforts on data collection.

States often use multiple data sources for their ED*Facts* reporting; as a result, multiple maps should be created so users can see the differences and similarities among the data sources. For example, a state may need to create six separate early learning maps if the data are not consolidated at the state level (i.e., if the state has six different early learning data collections, databases, etc.). By creating separate maps for each source, a state can compare the data sources more effectively and consider possible adjustments.

Multiple users can be added within Align to assist in creating a map and aligning it to CEDS. For any map, there are two user roles: map administrator and authorized user. Map administrators are the "owners" of a map and have access to all views and map-related tasks, while authorized users have access to only the "Add/Modify Elements" and "Manage User Access" selections in the menu.

Regardless of the roles team members play, reviewing and discussing the data sources as a group ensures that many perspectives are being considered prior to mapping to CEDS. Working together allows different levels of data staff to see the myriad ways that the elements are used or needed by the various users, which helps them identify where data sources need to be modified or expanded.

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[1] The data sources uploaded by many states to CEDS include those that are used to compile and report the data required by ED*Facts*. The ED*Facts* initiative includes demographic information about schools and districts, program eligibility numbers (e.g., Free and Reduced Lunch), enrollment and absentee data, graduation and dropout rates, assessment data, and accountability data such as AYP and assessment participation rates.

Input Data Sources

After the data sources have been identified and a map has been created, there are two ways a user can add elements into Align: 1) by putting the data source into the Excel template and uploading into the tool or 2) by manually adding elements via the CEDS website (see Figures 1 and 2). Using the Excel template provided on the CEDS website can help a user add element information more quickly if their data source is already in Excel or easily transferable to Excel. With Excel, a user can use the copy/paste shortcut to transfer information for the same system, database, and table name rather than typing it in manually for each new element item. Alternatively, users can type in each element directly into the CEDS website if the data source is small or not easily compatible with Excel.

Depending on a user's situation, one method may be more or less preferable than the other. In most situations, using the Excel template provided is an efficient method when uploading a data dictionary or data source. However, this option is not possible if the data source being entered is not in an Excel format (and cannot be easily transferred to one). In these cases, the elements would need to be entered individually via the website option. When using this method, users should be careful to avoid any potential of increased error due to human manipulation.

Figure 1. Uploading elements for a map via Excel template

Figure 2. Adding elements for a map individually

Align Elements

Once the elements are loaded into Align, the user can begin aligning the state's data sources to CEDS. Aligning to CEDS involves reviewing the definition and option set for each source element and then determining if any CEDS elements relate (align). The user who works on aligning the maps should be knowledgeable on how the element is collected and used, so that clear judgments can be made on its correspondence to CEDS elements.

When the user aligns an element, two questions appear (See Figure 3):

- What is the alignment of the definitions? and
- What is the alignment of the option sets?

These questions evaluate how closely the element relates to the chosen CEDS element, both in how it is defined in the data source and in the choices an individual has when using the element to provide data (that is, the option set). The responses to these two questions will be useful when creating a report and allow the user to understand the similarities and differences between the state's element and the CEDS element.

Figure 3. Possible responses when aligning an element to CEDS

The first question has six possible options. The user is asked to judge if the definitions of alignment are:

- Identical in wording. The user should select this option if the definition is exactly the same as that of the CEDS element.
- Identical in intent, with wording differences. States can use this option if the definitions have the same underlying purpose but have differences in wording (e.g., a state element, "Address City," and the CEDS element "Residential Address City Name" share the same intention of use. See Figure 4 below.)

Figure 4. California example of "identical in intent with wording

- Identical in intent when aggregated or disaggregated. In some cases the user's data source may include elements that can potentially be mapped to a CEDS element but need to be either broken up or combined to

match it. For example, California's STAR Assessment Compressed Student Data Layout file breaks down the element "Asian" into specific country groups: Chinese, Korean, Cambodian, Japanese, Vietnamese, Laotian, etc., to accommodate the state's large and diverse Asian population. In order for the state to align to CEDS, the state would have to aggregate all of those into "Asian". If a state collects "race" as a single element, then the state's element would be disaggregated to be compatible to the CEDS element, since CEDS collects "race" as individual elements.

- Similar in intent, with wording differences. States may select this option if the definitions have closely related underlying purposes (but not exact), and the wording of the definitions is similar. In this case, a user may include elements that are specific to a given data source that do not have an exact match in CEDS, but can be shown to be similar to a particular CEDS element. In Figure 5, "ESOL" and CEDS' "Title III Limited English Proficient Participation Status" would perform similar functions in that each is a unique student identifier for identification and record keeping.

Figure 5. Georgia example of "similar in intent, with wording

- Related only at a concept level, with differences in the intent. A user may select this if the underlying purposes of a data source element and a chosen CEDS element can be related conceptually, but the actual usage of the element by an education entity would not be the same as that of the CEDS element. For example, if a state collects the element "age," and is aligning to the CEDS element "birthdate," the elements are only related on a concept level but have differences in intention.

- <u>No element definition available in the stakeholder data dictionary</u>. A user should select this when the data source does not provide a definition for a given element. While it may be easy to infer a definition from certain element names (e.g., First Name), for the alignment to be truly accurate, users cannot align a definition that does not exist.

The second half of the alignment of an element relates to the its option set. The user now compares the option set of the element to that of the aligned CEDS element.

The second question also provides six options. The user must now determine if the option sets have:

- <u>Exactly the same codes and definitions</u>. The user should select this option if the codes are exactly the same as those of the CEDS element (see Figure 6).

Figure 6. California example of "exactly the same codes and definitions"

- <u>The same number of codes, but would require transformation on value to align with CEDS option set</u>. In some cases, the two elements have the same codes generally, but provide the options in a slightly different way. For example, the state element "GENDER" provides the codes "M" for Male and "F" for Female. The CEDS element, "Sex," has "Male" for Male and "Female" for Female. To align the element to the CEDS element, it would require transformation from "M" to "Male" and "F" to "Female."
- <u>The same concepts, but would require aggregation or disaggregation of codes to achieve compatibility</u>. This occurs when the user's element has more or fewer codes than the CEDS element and the user needs to combine them or separate them to align them with the CEDS element's codes. For example, some states collects "race" as a single element with multiple codes (e.g., African American, Asian, American Indian, Native Hawaiian, White). CEDS, on the other hand, has separate elements for race with "Yes", "No", and "Not Selected" as possible codes. States would need to disaggregate their element and codes in order to match the CEDS element.
- <u>Very few or no codes that relate; e.g. one has more than the other and cannot be aggregated/disaggregated to make them the same</u>. In some circumstances, the state or other education entity views the element

differently enough that its codes are entirely different from those of the aligned CEDS element. Any sort of combination or separation of the codes would not result in alignment with the codes in the CEDS element.

- Not Applicable (Element does not contain an option set). The user should choose this option when an element does not contain an option set. Examples of this are "first name" or "student identification number." These are elements for which an option set would not exist.

Specific Tips for Identification and Race

When aligning to an identification number (such as LEA ID or student ID), look in CEDS for both the Identification Number element and the Identification System element. The system is the element used to express the source of the ID (such as whether the ID is federally assigned, state assigned, district assigned or school assigned).

Additionally, any element related to K12 federal reporting or collection that has the "Race\Ethnic" element should include a map to all seven CEDS elements (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islanders, White, Demographic Race Two or More Races, Hispanic or Latino Ethnicity).

Validate Maps

There are several reports built into Align that allow the user check and review the information entered before publishing the map. These reports were built to help prepare maps prior to making them public, to ensure accuracy and consistency.

Reports can be accessed via the Align Home page, using the button "Explore Maps". Users than select to create either a map-based report or an element based report.

Reports can be created about published maps whether or not a user is logged into the CEDS website. In addition, users who are logged in can view reports about their own maps not yet published. When not logged in, users are restricted to maps that have been published.
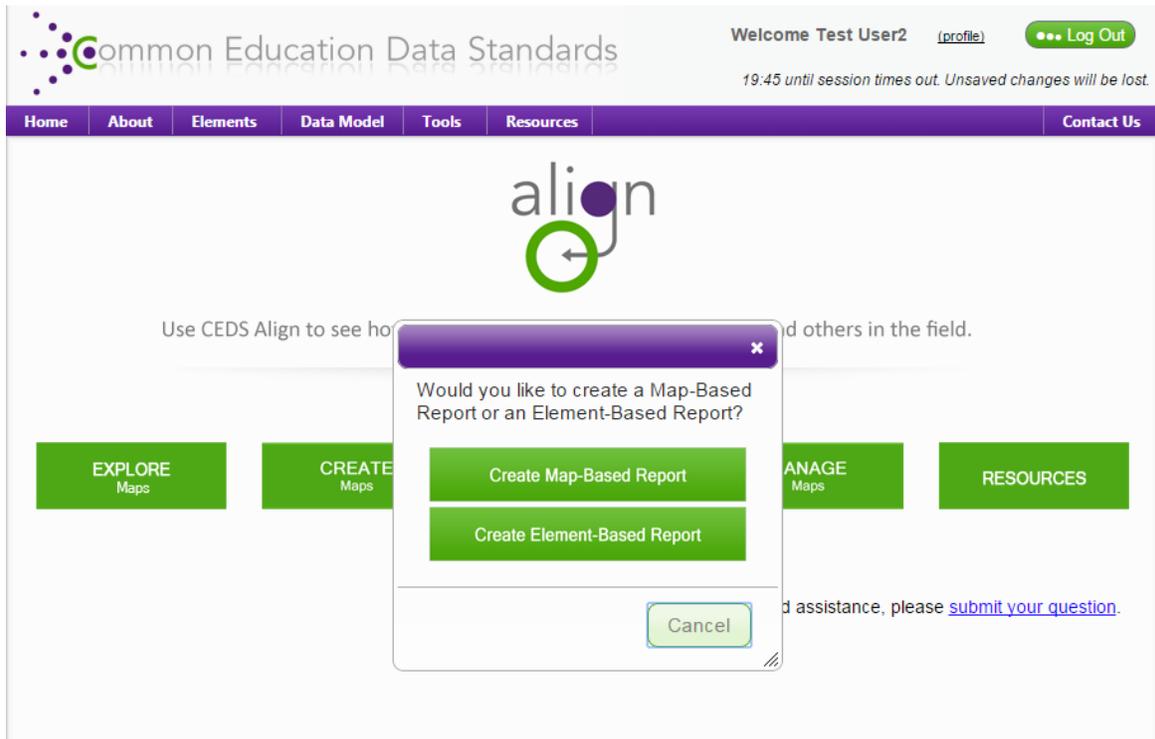
Figure 7. Element-Based Reports

Element Based Report

Element-based reports are those reports that allow the user to first select one or more CEDS elements and then generate reports based on those elements. The Element Impact Analysis Report allows the user to see all published maps that have aligned to the selected CEDS elements.
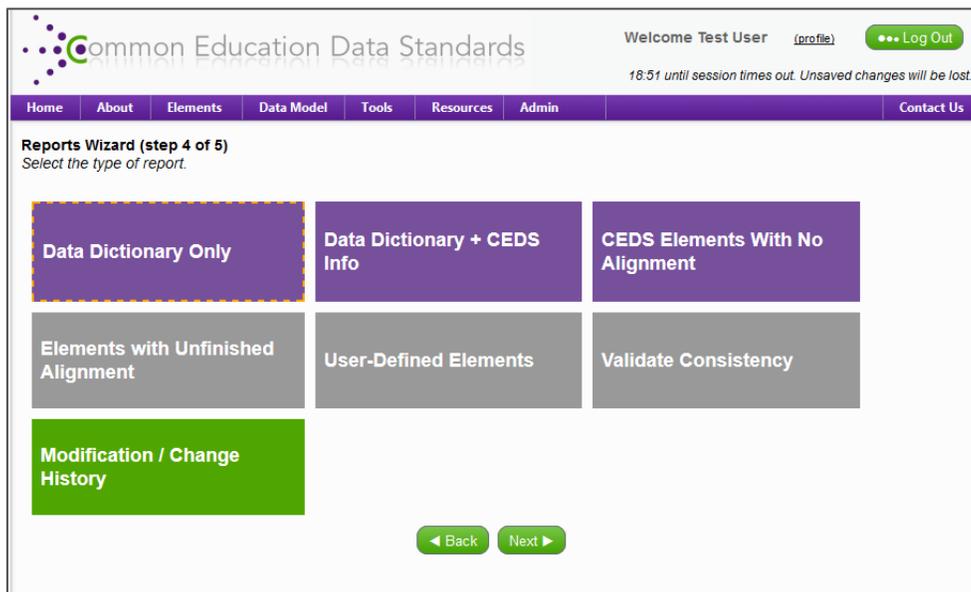

Figure 8. Map-based Reports wizard for Align where a user can select the type of report.

Figure 8 shows the map-based reports that can be viewed when logged in. The purple reports can be viewed by any user, the gray report can be viewed by Map Administrator and Authorized Users, and the green report can be can only be viewed by Map Administrator on their own maps.

- <u>Data Dictionary Only Report</u>. This report will display the element information for the selected maps. When comparing maps, this is a "clean" version for quickly scanning across multiple maps. CEDS is the underlying bridge between maps and can easily be viewed by selecting "Show CEDS Alignment."

- <u>Data Dictionary + CEDS Info Report</u>. When this report is run, the user can see the CEDS elements to which an element has been aligned and the two alignment options. This report is the same as when a user selects the Data Dictionary Only report and chooses "Show CEDS Alignment." A user can choose this report without having to go through the Data Dictionary Only report. This report is useful during the validation process as it displays all elements in a tabular format, rather than having to scroll through each element individually.

- <u>CEDS Elements with No Alignment Report</u>. This report shows all CEDS elements within a selected domain that were not aligned to the map. If no domain was selected in step one of the Reports wizard, CEDS elements from all domains will be listed.

- <u>Elements with Unfinished Alignment Report.</u> This report lists out the data source elements that have neither (1) been aligned to at least one CEDS element, nor (2) been marked "Element Could Not Be Located in CEDS". This is an excellent method for verifying that a user has completed alignment for a map list of all elements.

- <u>User Defined Elements Report</u>. This report lists all elements in the selected maps that were marked as "Element Could Not Be Located in CEDS." Beyond its usefulness to the individual user, this report is used by the CEDS Stakeholder group to determine if there are common elements across users that should be considered during the next iteration of CEDS.

- <u>Validate Consistency Report.</u> This report allows users to check the consistency of the alignment of elements that have multiple instances within their map.

- <u>Modification/Change History.</u> This report is only available to Map Administrators and allows the user to view the list of modifications made to a map during a specified time frame and/or for a specified user.

Publish Maps

Publishing a map is the most critical step in the process. Once the user publishes a map, other states and organizations have the opportunity to access information about that organization. Align users can view other maps to see how their data sources align with maps from within their state (e.g., the student information system versus the assessment system or the early learning system) as well as with those of other states and organizations.

Maintain/Revisit Maps

Once a map is published, a user should revisit it on occasion to ensure that the information and data elements contained still reflect the most recent elements and definitions for the data sets. When updates are made to the state's data elements or to CEDS, it is important to revisit and update any maps that were created with that information to ensure that it remains accurate.

State Recommendations from ED*Facts* Site Visits

The following are state recommendations when using Align to publish maps:

- Elements may show up in a data source where they did not originate. For example, a user may have a School ID element in a program data source but the element originates from another source (ex. the directory data source). In such cases, a user can add the original source name in the element title or notes.
- There are cases in which the state enters elements from a data source into Align but does not include the complete source. For example, the state source for Title I is a large consolidated program data source and a user may only put the applicable Title I data elements into Align. Users should consider renaming sources to indicate the original source plus the subset of items included (e.g., Title I Items of Consolidated Data Set).
- Utilizing the Excel versions of reports to quickly review maps is an easy way to pass the reports around between state users and can provide an easier way to view the map and alignments.

Best Practices Using Connect to Support the ED*Facts* Process

The CEDS Connect tool allows users to apply specific and relevant maps to a growing pool of CEDS "Connections," which are metrics, indicators, and policy questions based on the required CEDS element. States can use the tool to identify policy questions and related elements, define analytic approaches, calculate metrics and indicators, address reporting requirements, etc.

By establishing the data elements necessary to answer a given question, as well as recommended logic and routines for analysis, Connect is designed to help states work together towards standard definitions and methodologies that will provide common, comparable data measurements and reporting that can cross districts, states, and educational agencies. Below are best practices gathered while working with the states in creating Connections. Many of these best practices may be incorporated to improve a state's ED*Facts* collection and reporting processes.

There are three main ways to use Connect:

- find an existing Connection;
- create a Connection or;
- suggest a Connection.

Find an Existing Connection

Many research/policy questions and derived values already exist within Connect. When the user clicks on the "Find Existing Connection" icon, he or she arrives at a search screen. The user may select a Connection category or

search by keyword (see Figure 9). Category searches can be further refined through the use of descriptors. The user can click on the Connection name to view a specific Connection.
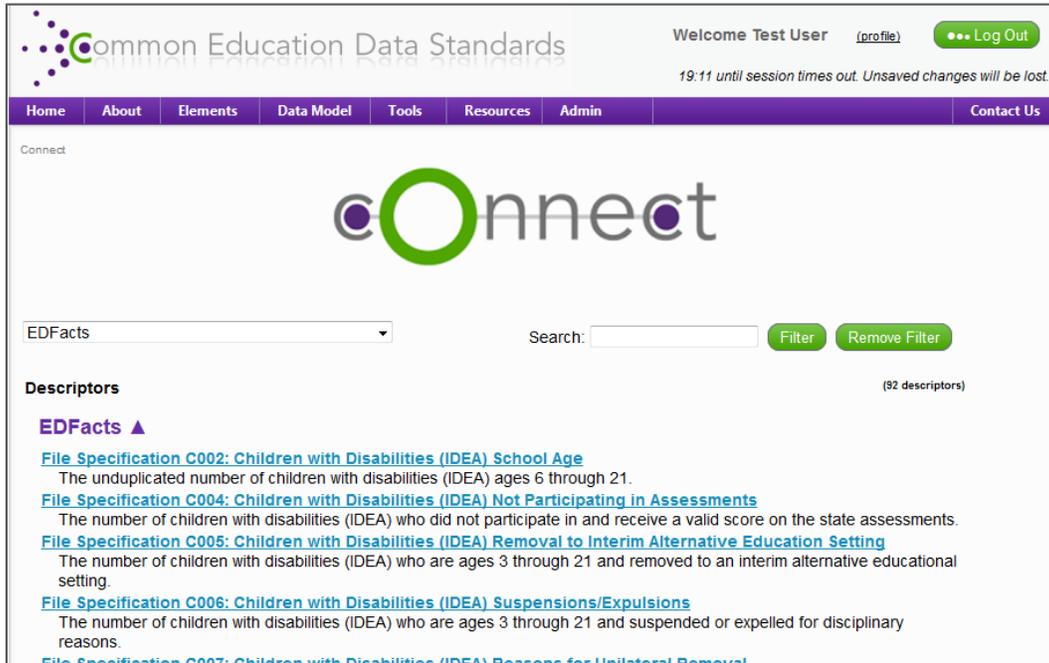
Figure 9. CEDS users can find and select an existing Connection

Create a Connection

In some cases, a user may find that CEDS Connect does not yet address his or her particular need. Connect enables the user to create a new, which is available both to a user and to the community of Connect users. Users can create a Connection by creating it manually or by uploading a Connection using an Excel file.

Suggest a New Connection

In some cases, a user may visit CEDS Connect and not find any Connections related to his or her question, but not feel prepared to create an entirely new Connection for the tool. This user has the option to suggest a new Connection, which can then be created by the CEDS team or other users.

Suggesting a new Connection is simple: after clicking the "Suggest a New Connection" button on the main screen, the user is taken to a page that asks him or her to enter a contact email address, choose from a drop-down menu to indicate the role or organization type most appropriate to him/her, and enter the Connection topic. The email address is optional, but is requested so that the CEDS team can contact the user for clarification, if necessary.

Framing the Connection

Prior to using Connect, it is important for the user to frame each Connection like a research question, considering the elements required to build the Connection. When creating a Connection, the user should consider the following questions:

- What do I want my Connection to show?
- How do I want others to use my Connection?
- Which elements do I need to make my Connection?
- Do I need elements that are not part of CEDS?
- Which option sets do I need? Will I be using full or partial sections of the option set?
- Which metrics do I need to consider (e.g., ED*Facts*)?

Choosing a Data Steward

When using Connect, it is important to choose a "data steward," a user whose role includes, but is not limited to, the following responsibilities:

- decide which Connections to create or add;
- monitor and maintain any Connections created; and
- provide any business rules, analysis, recommendations, sources or notes for Connections.

When creating a Connection, a data steward (as well as other members of the team) should understand and distinguish the difference between the "author" and "source," which are both required fields. The "author" of a Connection is the individual creator(s), or the user who is pulling the information together for a Connection. This section should be filled in with the user's name. This field is pre-populated when a Connection is manually created, but can be changed if needed. The "source" is the community or entity that the author is part of (e.g., Statewide Longitudinal Data Systems Grant Program, Illinois Department of Education, etc.).

Analysis Recommendations

This section allows users to enter relevant information needed for creating a Connection. Depending on the specifics for the Data Group or File Specification in question, different information will be entered in this section.

For Analysis Recommendations, states should focus on creating a clear narrative that details how staff can build a particular file. To do that, users should focus on boiling the process down into sections that accurately capture the steps required.

When creating sections for the Analysis Recommendations, it is important to start with the first step of a user's recommendation. Because the sections are added in a bottom-up fashion and cannot be rearranged, users should keep in mind the specific sequence that may need to be created within this Connection. A good tip when adding any Analysis Recommendations is to add several sections first with placeholder text so that it is easier to copy and paste sequenced recommendations.

Multiple Analysis Recommendations can be added with a Connection (this is also the case with adding multiple Data Labels or groups of CEDS elements). Utilizing this aspect of the functionality of this tool remains crucial to explaining the Connection.

Community Feedback

Users have the opportunity to provide feedback by rating a Connection by clicking the stars, and typing in additional comments (see Figure 10). Feedback helps in creating future Connections and creates an opportunity

for a dialogue within the CEDS community. For example, a state users can provide comments regarding a specific ED*Facts* connection and provide some alternatives used in their state.

Figure 10. CEDS users can provide feedback and ratings on a Connection

Related Connections

When a user is creating a Connection, the user can list any related published Connections. For states creating Connections related to ED*Facts*, users should review the published ED*Facts* Connections to relate to their Connection. This will allow a user to provide more information for the reader.
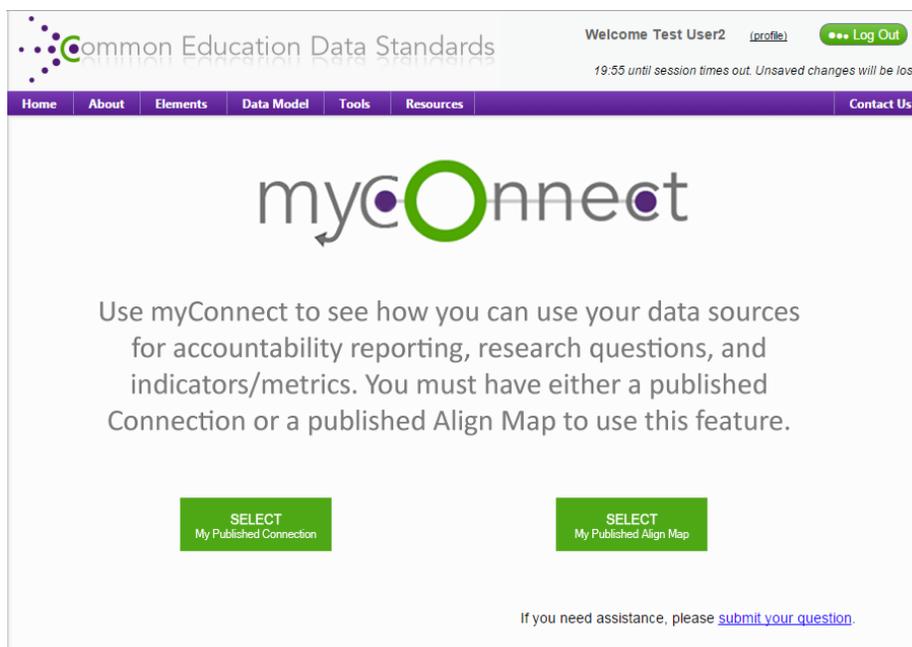
Figure 11. myConnect tool home page

myConnect

MyConnect is a tool for users to join their public maps in Align with public Connections (see Figure 11). It allows users to see which of their elements from Align are associated with the Connection and which elements are still needed for that Connection. When a signed in user is looking at a public Connection they can click on the myConnect button and the system will bring up a list of all of their public Align maps. The user may choose one or more Align maps and then click "View myConnect". The Connection will now show the CEDS elements needed

for the Connection as well a corresponding element in the state's data source. If there is no corresponding element in the state's data source then "No Corresponding Element Available in this Map" will appear.

States may use this to determine which elements they have that correspond with the Connections for the specific ED*Facts* data groups. States can open the ED*Facts* Connection, choose their public map that they want to use as a source for the ED*Facts* Connection and use myConnect to find the corresponding elements.

Creating Multiple Connections

If the user is considering creating multiple Connections, it is a good idea to create Connections with a similar look and feel. Users should consider the following when creating multiple Connections:

- Data elements should be grouped to make them easier to understand. Grouping can be used to explain important filtering or aggregating steps a user takes to create the data file.
- For the Connection Title/Question, do not enter any symbols that cannot be used in a file name as the text entered in this section can be copied and used to name a file when a PDF download of the Connection is created.
- Select as many categories as possible to increase the opportunity for users to find the Connection they are searching for.
- When possible, use the same titles for data groups as used for analysis recommendation sections. That makes it easier for the end-user to see which elements belong with which parts of the analysis.

Using Connect to Improve ED*Facts* Reporting

Within Connect, a user can locate the data elements required to report ED*Facts* data. Users can also create their own Connections, such as policy questions or relating to the ED*Facts* data collection. These Connections include the associated CEDS elements, any elements not currently in CEDS, and may include the business rules used to create the Connection. Prior to being shared, users should review these elements and processes.

State Recommendations and Feedback from ED*Facts* Site Visits

The following are state recommendations and feedback provided while using Connect:

- State connections would be useful for passing along information to new ED*Facts* coordinators within their state and to communicate to various staff who currently have limited visibility into these files.
- Frequently "save" work while creating a Connection since the system does not automatically save.
- The labels under CEDS elements and the ability to add specific new groupings under analysis recommendations need further clarification.
- Several states have expressed interest in "publishing" without going public, which would allow the opportunity for states to share connections internally prior to publishing.

Checklists Using Align and Connect

Below are checklists that summarize effective steps states can take when using both CEDS tools:

Align Checklist

- ✓ Determine all relevant data sources to be mapped
- ✓ Determine who will do mapping
- ✓ Determine who will own map
- ✓ Determine if mapping will be into one singular map or multiple maps
- ✓ Gather items/categories/variables, including
    - System Naming Convention
    - Explanation of Structure (i.e., Database/Table structure, XML structure, ERD or other diagram explaining system structure). This data source is only necessary if the naming structure is not obvious with the data dictionary.
    - Element Name
    - Element Definition
    - Element Length
    - Element Code Set
    - Element Data Type

Connect Checklist

- ✓ Determine the question to be asked
- ✓ Review existing Connections to see if a Connection has been created already and might need to be modified. To do this, check published Connections.
- ✓ Look at a published Connection to see what information is needed
- ✓ Consider what elements are needed. See if they are in CEDS or if they need to be author-defined
- ✓ Group context around elements the same way you group the elements to make it easier for readers.
- ✓ Provide URLs of examples to go with the Connection.

Summary

Through the efforts and support of ESB, the CEDS team was able to assist states in identifying, entering, and aligning the data sources needed for their ED*Facts* files, as well as in creating Connections for the ED*Facts* data groups. Using information drawn from site visits conducted with several states, this white paper presented a series of best practices and useful tips for current and future users to successfully utilize Align and Connect. Future CEDS users will be able to replicate the process within their own state or organization. As more users create maps and Connections, there can be an increased dialogue about data elements and sources and how SEAs and LEAs can move data within and across borders.

This paper was last updated January, 2015.

White Paper Sources

This list includes the major sources what was used for this white paper.

1. Interviews with State Teams
2. Experience of AEM team that aligned and connected
3. CEDS publications

ED*Facts* File Specifications

Category	File Specification	File Specification Name	Data Group(s)
Common Core Data	#2	Children With Disabilities (IDEA) School Age	74
Common Core Data	#29	Directory	1, 4, 5, 7, 8, 9, 10, 11, 16, 21, 27, 453, 458, 529, 531, 551, 559, 570, 669, 683, 743
Common Core Data	#32	Dropouts	326
Common Core Data	#33	Free Reduced Price Lunch	565
Common Core Data	#39	Grades Offered	18
Common Core Data	#40	Graduates/Completers	563
Common Core Data	#46	LEP Students in LEP Program	123
Common Core Data	#52	Membership	39
Common Core Data	#59	Staff FTE	528, 644
Common Core Data	#89	Children with Disabilities (IDEA) Early Childhood	613
Common Core Data	#129	CCD School	22, 24, 573
Regulatory Grad Rate	#150	Regulatory Four-Year Adjusted-Cohort Graduation Rate	695, 697, 755
Regulatory Grad Rate	#151	Cohorts for Regulatory Adjusted-Cohort Graduation Rate	696, 698, 756
Assessment	#175	Academic Achievement in Mathematics	583
Assessment	#178	Academic Achievement in Reading (Language Arts)	584
Assessment	#179	Academic Achievement in Science	585
Assessment	#185	Assessment Participation in Mathematics	588
Assessment	#188	Assessment Participation in Reading/Language Arts	589
Assessment	#189	Assessment Participation in Science	590