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Data Management and Analytical Reporting Needs Analysis Report

WYOMING COMMUNITY COLLEGES

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Final Report

For Wyoming Community College System Internal Use Only

Submitted By:

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Executive Summary

The Wyoming Community College Commission (WCCC) contracted with Dynamic Campus Solutions, Inc. to perform a needs analysis for the state of Wyoming's seven community colleges and their contributing agencies to determine solution recommendations for governing data management and reporting for the Wyoming Community College System (WCCS). As used throughout this report, this term - "Wyoming Community College System (WCCS)" - refers to the Commission and all seven of the state's community colleges. As has been the case with past usage of this term, it is used primarily for the sake of brevity, and does not imply authority of the Commission any greater than what is provided for in statute. The Commission is recognized as a coordinating commission, as opposed to a governing commission, and the seven college boards are recognized as locally-elected, independent tax districts within the state of Wyoming.

The seven community colleges include: Casper College (CC), Central Wyoming College (CWC), Eastern Wyoming College (EWC), Laramie County Community College (LCCC), Northern Wyoming Community College District (NWCCD), Northwest College (NWC), and Western Wyoming Community College (WWCC).

Contributing agencies include: the University of Wyoming (UW), Wyoming Department of Education (WDE), Wyoming Department of Workforce Services (DWS), and Wyoming Enterprise Technology Services (ETS).

Assessment Approach

First, the Dynamic Campus project team reviewed the documentation provided by the Commission, colleges and agencies. Next, the team interviewed representatives from the participating institutions. Existing systems and processes were reviewed to gain a broad understanding of the data and reporting architectures in place to support the institution's mission and goals for student achievement. Finally, the team analyzed the findings and developed recommendations based on the unique requirements and expectations of each of the participating institutions coupled with industry standards, best practices, and collective subject matter knowledge and expertise.

Current Environment

Institutions of higher education in other states have taken various approaches to preparing data for strategic reporting. The Wyoming Community College Commission and seven community colleges have made a great deal of progress toward standardizing their data and have the advantage of utilizing the same Enterprise Resource Planning system (ERP), Ellucian Colleague, as well as the associated Operational Data Store (ODS), and Colleague Reporting and Operating Analytics (CROA) software. The current reporting environment at the colleges is focused on the operational needs of the institution. Listed below are key goals followed by primary challenges that the Wyoming Community College System is facing.

Goals

- Support student achievement and program effectiveness, and facilitate informed decision-making for the community colleges, Governor, and the Legislature;

- Define KPIs at the college and Commission levels;
- Strengthen strategic and analytical skills of college institutional research personnel;
- Position the Wyoming Community College System (WCCS) for eventual integration into the future Wyoming Statewide Longitudinal Data System (SLDS);
- Select appropriate data collection, storage, management, structure, and reporting tools for the Wyoming Community College System;
- Increase data quality focus within existing governance structure;
- Complete work begun by the Commission and the Wyoming community colleges to identify common data elements and standardize common codes.

Challenges

- Minimal reporting available for strategic analysis to support decision-making at the college, Commission, and State levels;
- Availability of technical and functional resources necessary to successfully implement and maintain a data warehouse;
- Maintaining current Ellucian Colleague functional knowledge;
- Limited ability to attract qualified replacement personnel resources;
- Alignment of data consistency and processes across the colleges;
- Loss of the institutional knowledge base due to the retiring workforce;
- Redundant and manual processes.

Understanding Data Warehousing

Data Warehouse and Business Intelligence tools referenced in this report are briefly summarized as follows:

A Data Warehouse is a central repository for logical and strategic ordering and storage of data gathered and integrated from multiple sources. This system is subject-oriented and supports strategic planning, decision-making and time-variant reporting. A successful data warehouse implementation requires data governance rules for transactional source systems to ensure data quality and accurate reporting. Business Intelligence tools are utilized to create reports and dashboards, or extract data from the data warehouse.

Recommendations

The following recommendations are designed to meet the current challenges and bring the WCCS to its desired future state.

- Select a third-party partner to provide ongoing strategic data management, analytical reporting guidance and assistance to the community colleges and the Commission;
- Enhance the WCCS Data Governance Framework by implementing a Strategic Data Governance Council and adding data quality stewardship responsibilities;
- Procure and implement a commercial data warehouse toolkit to plan, design, and build a centralized dimensional data warehouse for collection of community college data;
- Implement project management and establish project plans to achieve implementation goals;
- Promote data consistency and process alignment across the community colleges;
- Implement formal data quality processes;

- Institute a business intelligence reporting tool for data analysis including strategic reports, KPIs, and dashboards;
- Create data marts of simplified, smaller slices of specific data warehouse data, for sharing with agencies;
- Provide professional training programs for data research analysts;
- Participate in the National Student Clearinghouse transcript service and utilize the Ellucian eTranscript solution.

Future Environment

The formation of an enhanced data governance structure with a data quality and data warehouse/business intelligence focus which is driven by a Data Management Policy and defined by the Executive Council will support the data management and reporting goals of the state, Commission, and colleges. This framework will provide needed data that can be used for making strategic decisions, creating aggregated reports, and answering complex questions.

Disparity in business processes, code tables, and how data is entered in college transactional systems will affect the meaning of data in many ways. Cleaning and aligning data and business processes in each community college minimizes the need to transform data to establish the conformity required to make it meaningful when combined into a centralized data warehouse. In addition, common implementations of the Colleague ERP system and associated software at all the colleges provides a solid foundation on which to build a robust, centralized data warehouse.

The centralized data warehouse will give the state, Commission, and community colleges the ability to proactively assess student performance and build strategies to improve student success. Strengthened strategic and analytical capabilities of institutional research departments will provide the opportunity to report accurate and timely key performance indicators allowing officials at all levels to make data-driven decisions for improving programs. Some examples are the ability to track and compare performance of student cohorts by college, academic program, major, ethnicity, and other factors and plan course offerings to facilitate student degree completion.

The success of Wyoming's future Statewide Longitudinal Data System (SLDS) is dependent on the execution of these recommendations and structure. A centralized data warehouse provides a single repository to retrieve comprehensive, meaningful, and clean community college data which will feed into the SLDS. Also, the dimensional data warehouse architecture is easily extensible to accommodate new data elements as the requirements for the SLDS change and grow in the future.

Finally, data warehouse and applicable governance, data quality, and process alignment recommendations provided for the Wyoming Community College System can be used as models by the contributing agencies to facilitate their future integration into Wyoming's SLDS.

Introduction

The Wyoming Community College Commission and Wyoming community colleges desire systems to more effectively manage college and aggregate data for operational, compliance, and strategic reporting and decision-making.

Background

Two years ago, the Wyoming Community College Commission and Wyoming's community colleges set objectives to clarify reporting requirements and standardize common reporting elements. The work completed to satisfy the objectives led to the creation of a data dictionary and an updated "Data and Reporting Handbook." However, questions regarding the best approach for comprehensive data management systems and analytical reporting tools remained outstanding.

To address the outstanding need, the Wyoming Community College Commission contracted with Dynamic Campus Solutions, Inc. to perform a needs analysis for the state of Wyoming's community colleges and their contributing agencies.

The project objective is to provide a comprehensive data roadmap which includes recommendations detailing responsive and agile data governing and reporting solutions. These solutions will provide necessary information to guide all of the Wyoming Community College System stakeholders to a data systems design capable of producing timely, accurate, strategic, and operational reports. The data roadmap will provide a meaningful delivery method allowing the stakeholders to adapt in a timely manner. Recommendation outcomes will serve to meet the Wyoming Commission, colleges, and constituent requirements to accurately evaluate student achievement and program effectiveness, and result in informed decision-making by the Governor and the Legislature.

Project Approach & Scope

To achieve the required needs analysis activities, Dynamic Campus, Inc., was given the opportunity to visit the Wyoming Community College Commission, all seven Wyoming community colleges and their contributing agencies. Outlined below is a high-level overview of the steps performed to accomplish the assessment tasks.

- Project Kickoff
  The project kickoff occurred on February 2, 2015 in Cheyenne, Wyoming at the Wyoming Community College Commission. The purpose of this informational phase of the needs assessment was to raise awareness among participants about the assessment goals, scope, and anticipated outcomes. Information was given to the participants regarding the various processes in which they would be participating, and details to help set expectations of their involvement.

- Visit Schedule
  The Dynamic Campus project team completed onsite and conference call visits between February 16, and March 19, 2015. See Meetings Itinerary in Appendix D for the visit schedule and travel details and Appendix E for a complete list of meeting attendees. The Wyoming community colleges completed a Colleague Questionnaire and provided supporting documentation prior to the onsite team visits. The information received from the stakeholders

provided necessary insight to the visiting teams about each site. See Appendix F for a complete list of documentation provided for review. Please note, documents listed therein, often contain links and references to additional information that fulfill the documentation requested by Dynamic Campus.

- Assessment of Current Environment & Expectations
  The primary goals established were to gain a broad understanding of the current data reporting architecture from multiple perspectives, including principles, systems, data, tools, technology, and infrastructure; ascertain met and unmet information needs; and develop an understanding of the priorities for each college and agency. This was accomplished by visiting campuses and agencies and also through conference calls. Each onsite visit lasted approximately one day in duration and consisted of a series of meetings described below.

  1) Campus President or Contributing Agency Leadership Meeting
     This meeting provided the college president or agency leadership a summary of the day's planned activities, and the invited meeting participants. The president or agency leadership was given the opportunity to ask questions and provide vision and insight specific to their institution.

  2) Executive Vice Presidents Meeting
     The executive vice presidents were given the opportunity to ask questions and express their viewpoint of the existing data warehouse and business intelligence solutions at their college or agency. They also had the opportunity to describe their institution's use of the resources provided by the Wyoming Community College Commission and state of Wyoming agencies. Additionally, their insight regarding the pros and cons of statewide versus decentralized data warehouse solutions and potential barriers, provided valuable information for consideration regarding the final recommendations.

  3) Director of Institutional Research Meeting
     The director of institutional research was given the opportunity to review current successes and challenges regarding institutional data and reporting.

  4) IT Director and Staff Meeting
     The IT director and select IT staff were given the opportunity to review the technical readiness of their institution relative to possible data warehouse solutions. They described reliability and cleanliness of current data and defined the IT skillset for extracting and transforming existing data into a data warehouse. Additionally, discussions encompassed a review of an optimal infrastructure for a data warehouse solution, and any issues between their existing data systems and a future data warehouse.

  5) Wrap-Up Meeting
     The Dynamic Campus team provided the president or agency leadership with a brief, high-level summary of the day's meetings and any necessary follow-up activities.

Dynamic Campus Team & Roles

The team assembled to perform the data management and analytical reporting needs analysis consisted of Dynamic Campus executive management, core, and extended on-demand members. Team biographies can be found in Appendix C.

- Executive Management
  The Dynamic Campus executive management team is responsible for monitoring the assessment project on an ongoing basis to ensure the goals of the Wyoming Community College Commission's scope of work for the needs analysis are met resulting in a successful, timely completion of the needs analysis deliverables. Also, executive team members participated in a number of the assessment visits.

  Mike Glubke – President & CEO
  Richard Middaugh – Executive Project Director
  Joe Redwine – Vice President
  Andrea Savas – Vice President for Professional Services

- Core Project Team
  The core project team participated in the assessment on-site and teleconference visits.

  Shawn Walden – Regional Vice President
  Donna Alexander – Solutions Architect & Project Manager
  Don Sullivan – Senior Colleague Technology Architect
  Diane Horner – Senior ERP Specialist

- Extended On-Demand Project Team
  The extended on-demand team of professionals listed below as well as numerous additional Dynamic Campus subject matter experts worked in concert with the Executive and Core team members, to research information, review findings, analyze details, assemble documents, and develop recommendations.

  Dan Clawson – Director of On-Demand Services
  Eric Larsen - Database Administrator/Data Warehouse Architect

Participating Institutions

Institutions participating in the assessment included the Wyoming Community College Commission, community colleges, and contributing agencies listed below. Dynamic Campus met with over 200 Commission, college, and agency personnel. A complete list of participants from each institution can be found in Appendix E.

- Wyoming Community College Commission (WCCC)
- Wyoming Community Colleges
  - Casper College (CC)
  - Central Wyoming College (CWC)
  - Eastern Wyoming College (EWC)
  - Laramie County Community College (LCCC)

    - Northern Wyoming Community College District (NWCCD)
    - Northwest College (NWC)
    - Western Wyoming Community College (WWCC)
- Contributing Agencies
    - University of Wyoming (UW)
    - Wyoming Department of Education (WDE)
    - Wyoming Department of Workforce Services (DWS)
    - Wyoming Enterprise Technology Services (ETS)

Key Recommendations

Data Warehouse System Structure and Design

Overview

Each Wyoming community college currently has the same implementation of the Ellucian Colleague ERP system. The colleges use the Operational Data Store (ODS) product to extract and transform local data daily. In addition, Colleague Reporting and Operating Analytics (CROA) software is used across the colleges for operational reporting needs. The Wyoming Community College Commission has established an ODS database with a common structure that is currently used by each community college to provide data to the Commission. It is recommended this structure should remain in place and be expanded to include more strategic data.

Architecture and Tools

The recommended architecture for the Wyoming Community College System would consist of a centralized dimensional data warehouse with a commercial load processor and toolkit. Data from each college ODS would be loaded into the data warehouse on a nightly schedule using secure, parallel loads performed centrally by the load processor. Recently, West Virginia Network (WVNET) successfully implemented a rebuild of its data warehouse which was made possible by using a commercial data warehouse product and associated processing tools.

The recommended design architecture consists of the following:

- Community College Colleague ERP Systems. This is the transactional system of record at each community college used for demographics, admissions, curriculum management, academic records, registration, finance, human resource, and other administrative functions.
- Community College Colleague ODS databases. Data is extracted daily from the Colleague ERP system and transformed into this database for staging and operational reporting by the colleges.
- Centralized Enterprise Data Warehouse. This system would contain agreed upon data from each community college. Data would be loaded nightly over secure tunnels from each college ODS. The centralized data warehouse would be designed with fully conformed dimensions across subject areas such as admissions, enrollment, registration, and finance to name a few.
- Secondary Data Marts. Data marts are access layers of the data warehouse for a specific data need. They can consist of small slices of the centralized data warehouse which are more condensed and focused on specific data sets. Data marts would be built for dedicated business functions or to share data on a more limited basis. Data marts can be used to provide a very simplified structure to make end user report development easy using reporting tools. Data marts can also be used to share identified data sets, excluding sensitive information, with specific users or outside agencies.

The dimensional model would be designed based on the facts required by the business area. This provides a model which is intuitive, optimal in performance, and extensible. This is a common model

employed in the majority of data warehouses known as the Kimball Method.[1] See Appendix H for more information on dimensional modeling.

The benefits to the architecture include:

- Reduced software costs by centralizing a single data warehouse and leveraging existing ODS processes currently in place;
- Ease of upgrade and expansion by using one central toolkit;
- Operational continuity protection, in the case of staff turnover, provided by the vendor support, training, and documentation associated with a commercial data warehouse toolkit;
- Centralized load processing that validates data compliance and immediately identifies load issues or bad data trends;
- Dimensional modeling provides:
    - An understandable model grouped in business categories for easy reading and interpretation by users;
    - Optimized performance of dimensional models for data queries;
    - Scalability to easily accommodate new data which does not require reprogramming of previously developed queries, reports and dashboards;
- Standardized model for comparing metrics between colleges;
- Consistent logic and interpretations of community college data.

Defined Data for Ease of Design and Use

It is recommended the centralized data warehouse use metadata to define all data fields. Metadata is simply data about data. This would consist of a business definition of each field, data type, source and destination for extraction processes. The metadata is further used to define the entire extract, load and transform (ELT) process to include error reporting when data does not meet the defined requirements set.

Reporting, Performance Measures (KPIs), and Dashboards

It is recommend that strategic reporting, Key Performance Indicators (KPIs), and dashboards be developed and stored centrally. The proposed centralized data warehouse allows for the utilization of industry standard SQL compliant BI tools to build dashboards, reports, pivot tables, etc. The development of reports, KPIs, and dashboards centrally will ensure consistent standards and increase utilization of the system by contributors. Wyoming community colleges have common strategic data needs that can be addressed by developing reports and metrics centrally with community college input. Examples of accountability metrics for community college use have been developed by the Voluntary Framework of Accountability (VFA) facilitated by the American Association of Community Colleges (AACC).[2] The Commission's development of selected and agreed upon common state and federal reporting centrally reduces the workload required for the colleges. Colleges and agencies can also be provided with access to develop ad hoc or specialized reporting for specific data sets.

[1] For more information see http://www.kimballgroup.com/data-warehouse-business-intelligence-resources/books/data-warehouse-dw-toolkit/.
[2] See http://vfa.aacc.nche.edu/Documents/VFAMetricsManual.pdf.

Benefits to centralized strategic report development are:

- Centralized report libraries can be available for colleges, the Commission, and agencies as designated;
- Reduced development time and resources required for creating common metrics;
- Pooled resources for report development reducing the need for BI experts at all colleges.

Sharing with Agencies

Agencies use community college data to perform analytical studies. The recommended centralized data warehouse architecture provides the means to share data securely and in a limited manner. This architecture provides security and limited access by consolidating access controls to a single source as opposed to multiple systems located at the individual colleges. Agencies will have varying data needs requiring different levels of access to data sets. Access to data can be provided by the following methods:

- Report Layer. Data can be shared with individual agencies via reports by establishing report-level permissions for secure access to pre-developed reports.
- Relational Data Layer. Database views or schemas can be created to limit access to data subsets or secondary data marts that are local to the agency.
- Analytics Layer. Multidimensional cubes deployed on top of the centralized data warehouse sources can be tailored to the specific security requirements of a contributing agency. This includes cell level security.

The centralized model provides a single point of limited and secure access to all community college data for contributing agencies.

Sustainability

To ensure sustainability, management of the data warehouse architecture must be centralized and consistent. Information regarding the architecture should be documented and easy to understand so knowledge transfer can occur when personnel are added or turnover occurs.

The recommendation of a commercial toolkit for developing and managing the data warehouse ensures consistency and provides for expert support when needed. A commercial toolkit has a minimal learning curve for developers and BI professionals versed in dimensional design topics. The toolkit provides self-documenting processes and metadata. Vendor support helps to ensure better sustainability of the data warehouse through continuous updates providing enhancements and bug fixes.

Future Integration into Wyoming SLDS

The proposed data warehouse solution provides a central source for the extraction or querying of community college data. In the proposed architecture, all data is cleaned, transformed, and updated daily from all community colleges. In the future, data marts can be developed to provide the Wyoming Statewide Longitudinal Data System with selected data from all the community colleges generated from a single, reliable source.

Benefits

State:

- Consolidated community college data from a single, central source can be used to provide the public, state representatives, and agencies with aggregated strategic information;
- Provides for expedient implementation and helps to control costs related to development tools and technical personnel;
- Future development will give lawmakers the capability to retrieve aggregated information online;
- Information will be available from agencies who adopt this data warehouse design allowing them to provide current, complete, and accurate data for the Wyoming SLDS.

Commission:

- Centralized model provides for the alignment of data and processes to ensure data quality for producing state and federal reports;
- Centralized, metadata model allows for easy expansion of the data warehouse.

Community Colleges:

- Delivers access to common strategic data for planning purposes due to centralized development of reports, dashboards, and KPIs;
- Provides community colleges with access to point-in-time data for analysis;
- Allows the community colleges access to data via current reporting tools and/or other tools of their choice;
- Reduces community college workload by centralizing development of selected and agreed upon state and federal reporting.

Agencies:

- Provides for accurate and secure data sharing with agencies;
- Opportunity for agencies that work with the Commission to add data to the data warehouse for combined reporting;
- Agencies face similar data challenges and can use this data warehouse structure and design to serve as a guide for their future integration into the Wyoming SLDS.

Data Governance

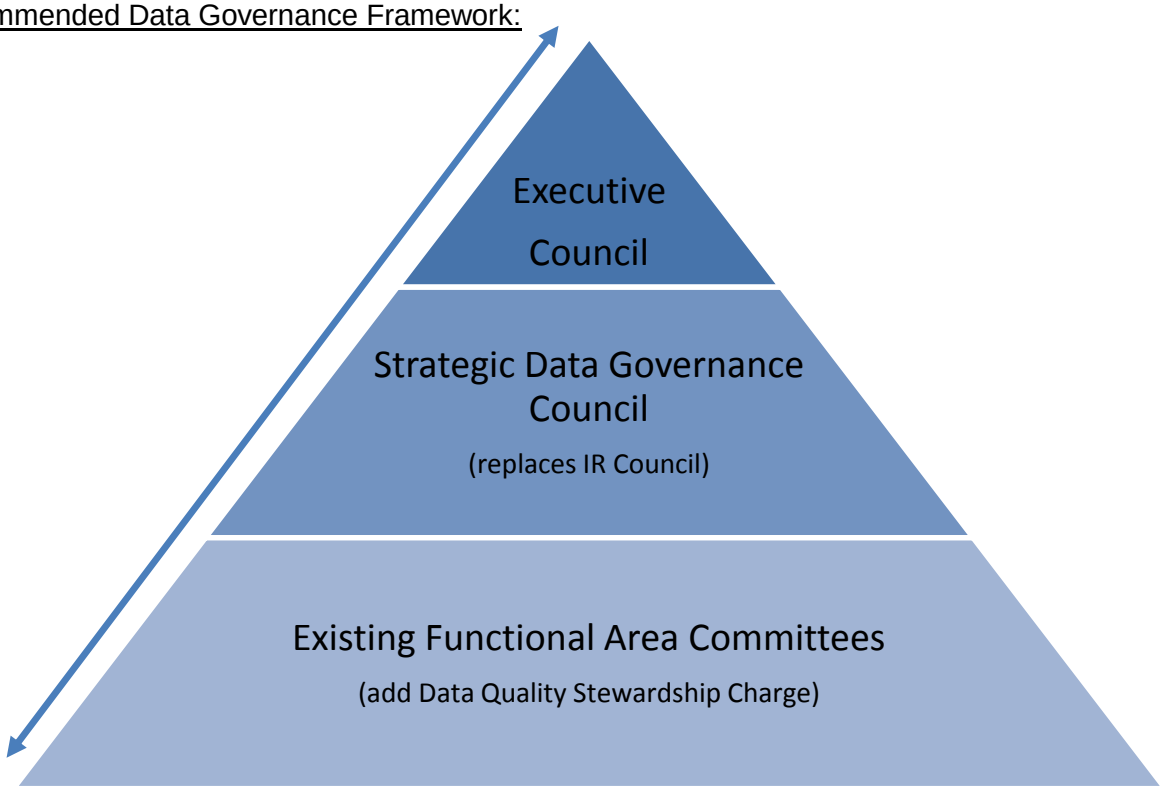
The formation of an additional data governance structure within the Wyoming Community College System will streamline standardization of data definitions, rules, and processes to ensure data consistency, quality, and reliability. It will provide the framework for secure and more fully automated reporting and sharing of select community college data. This additional governance structure, in support of the recommended centralized data warehouse, will position the Wyoming Community College System for eventual integration with the Statewide Longitudinal Data System (SLDS).

Data governance structures vary based on the specific needs of the institution.[3] The proposed data governance model has a dual focus of data quality and data warehouse/business intelligence. The new structure shifts from a technical perspective to a functional perspective. It brings additional emphasis to data quality initiatives and promotes the use of data for strategic decision-making.

[3] See http://www.datagovernance.com/category/guidance-by-gwen/focus-areas-of-data-governance/.

Building on the significant work already accomplished by the Community College Data System Committee[4] and sample governance models provided by the National Center for Education Statistics,[5] the following hierarchical model suggests several changes to the existing structure to more seamlessly effect communicative, sustainable, and proficient data governance for the Wyoming Community College System.

Recommended Data Governance Framework:



- Tier 1 (Bottom): Functional Area Committees – Data Quality Stewardship Charge
  Assign the data quality stewardship charge to the existing functional area committees, e.g., Admissions, Registration, Financial Aid, etc. Data governance programs with a focus on data quality identify data quality stewards. Data quality stewards are individuals recognized as business definers, producers, and users of data with ultimate responsibility for the definition, management, control, integrity and maintenance of a data resource.

  Suggested membership:
  Functional experts from each of the community colleges at the director or manager level, and technical representation from several colleges.

  Responsibilities:
  - Focus attention on the college data detail including definition, purpose, and use;
  - Establish system-wide consistent data coding standards;

[4] See WCCC provided documentation, WCCC Data Gov Framework.pdf, Appendix G.
[5] See https://nces.ed.gov/programs/slds/pdf/brief4_P_20W_DG.pdf.

- Continue the work already in progress for standardizing data elements between colleges. If the data element is not in use by any of the colleges it can be flagged as "not needed" and skipped. Future use of any "skipped" data element would need to be approved by the appropriate council;
- Clean and validate college data as approved by the Strategic Data Governance Council.

Members of the Functional Area Committees will need the following to be successful:

- Enhanced Colleague expertise at the college functional level to improve efficiencies and adherence to best practices in higher education;
- Alignment of operational business processes across the colleges.

- Tier 2 (Middle): Strategic Data Governance Council

  The Strategic Data Governance Council expands and renames the Institutional Research Council. This approach is taken to avoid creation of another council with membership similar to the existing IR Council. It expands the responsibilities of the IR Council to provide additional focus on strategic research and analysis. The Strategic Data Governance Council is the final authority for data governance issues, unless issues require escalation, and also governs the proposed data warehouse. This council provides governance oversight of the community college Data Management Policy (see Data Management Policy description below). Detail tasks involving data element review and standardization are shifted to the Functional Area Committees.

  Suggested membership:

  IR professionals from each community college, WCCC Business Analytics and Support Section team.

  Responsibilities:

  - Strategic data research and analysis;
  - Identification, compilation, and analysis of education data to address critical research and policy questions serving community colleges and legislative interests;
  - Communicate needs to the Functional Area Committees who enter and maintain the data;
  - Establish accountability checks and balances both at the community college and Commission levels;
  - Govern the proposed data warehouse, its effectiveness and continual process improvement;
  - Approve/ Deny all data governance issues and change requests received from the other councils, and committees not currently reporting to another council e.g., Complete College Wyoming (CCW);
  - Control data sharing and integration processes for data to/from the contributing agencies.

Members of the Strategic Data Governance Council will need the following to be successful:

- Strategic training and mentoring programs for IR professionals to further develop research and analysis skills and stay current with analytical best practices in higher education;
- In-depth understanding and guidance in best practices for data warehouse governance, performance measurement, and continual improvement.

- Tier 3 (Top): Executive Council
  This council has ultimate authority on issues escalated from the Strategic Data Governance Council. It makes recommendations to the Legislature as necessary to help ensure the goals and objectives of the Strategic Data Governance Council are achieved.

Data Management Policy

The recommended first task after the formation of the Strategic Governance Council is to establish a Data Management Policy (DMP). This policy serves as the foundation of data governance across the colleges by explicitly outlining the requirements of the Executive Council for governance, accountability, and management of community college data. Included in the policy are details for how the DMP is communicated, accessed, used, enforced, monitored, followed, etc. Specific Data Management Policy statements should address: data ownership, data modeling, maintenance, security, access, metadata, and accountability.[6]

Data Consistency and Process Alignment

Data consistency and process alignment is essential to the creation and ongoing operation of an effective data warehouse and consistent, accurate reporting. Also, the alignment of data and business practices across the community colleges is essential so that comparison of colleges is possible.

Data consistency and process alignment across multiple institutions is consistently noted by higher education bodies in other states as a key factor and fundamental issue they face with their data collection and reporting efforts. The state of Montana is working toward a single instance of their administrative software hosted by the main campus of each geographical area. Similar to Wyoming, standardization and sharing of transcripts between institutions is a focus of the Montana University system.

Wyoming is in a good position with the Colleague ERP system and associated data management and reporting tools already in place at the community colleges. However, interviews with each of the colleges revealed significant variations in the system use and interpretation of system generated reports. Also, discovered during the campus reviews was the significant amount of manual and redundant effort required across the colleges to create needed reports and, in some cases, match them with reports produced by the Commission.

Following is an analysis of common business practices versus diverse business practices.

[6] More information and example policy statements can be found at http://www.tdan.com/view-articles/5280/.

Common Business Practices:

Pros:

- Ensures each college's data has the same meaning when compared or combined with like data from other colleges;
- Promotes sharing of business practice knowledge between colleges;
- Reduces processing time and workload when the most efficient practices are established across colleges;
- Decreases development time for new or updated processes;
- Streamlines implementation of new business processes across colleges and supports sharing of technical resources;
- Provides the opportunity to centrally share collective documentation of business processes;
- Eases staff effort required at each college.

Cons:

- Requires additional effort, commitment, and collaboration to achieve consensus;
- Unique requirements of each college must be taken into consideration;
- Changing business processes across all colleges may take more time;
- Initial implementation can be time consuming.

Diverse Business Practices:

Pros:

- Quicker to implement or change business processes;
- No consensus required;
- Can be customized to suit individual institutions.

Cons:

- Knowledge of business processes is proprietary to each college;
- Difficult or impossible to share business practices;
- Hard to compare or combine data because like data can have different meanings.

Examples:

- Diverse business practices can complicate data comparison.
    - College A: Program enrollment is ended when the student does not attend for two consecutive semesters. A count of enrolled students by academic program can be accomplished with a simple query.
    - College B: Program enrollment is not ended. A report query to count enrolled students by academic program would be complex and require more advance analysis to produce.
    - Result: To produce comparable numbers between institutions, College B would need to apply logic to check for registration over the past two semesters.
- Different policies or business processes can affect the active employee count.
    - College A: Employment remains active for adjunct faculty who are not currently working at the college, pay is discontinued when their contract ends. Payroll data must be used to determine who is currently working at the institution.

    - College B: Employment is changed to inactive when the contract ends. Position records can be queried to determine who is currently working at the institution.
    - Result: College A would likely show inflated numbers in reports of active employees due to counting adjuncts who are not currently teaching.
- Diverse business practices require queries unique to each college to answer common questions.
    - College A: A zero dollar financial aid award is used to code the student as "in-state".
    - College B: The student type variable is used to indicate a student is "in-state".
    - Result: College A and B would need to use very different queries to determine the number of in-state students.

Regardless of the specific data management approach applied, it is vital that steps be taken to ensure data consistency and process alignment across the community colleges. The alignment of data and processes will reduce manual and redundant efforts required and minimize the need to transform data to ensure data quality and consistency for producing local, state, and federal reports. This report summarizes the need to align those business processes that impact the data included in the proposed data warehouse. To fully align enrollment and business processes, Wyoming will need to acquire additional assistance that is considered outside the scope of data warehouse development.

Data Quality Control

A key to the recommended governance structure for the Wyoming Community College System is the emphasis on data quality control. This is why data quality stewardship practices are included in the data governance structure. Data quality stewards are individuals in the organization recognized as business definers, producers, and users of data with ultimate responsibility for the definition, management, control, integrity and maintenance of a data resource. Each institution would continue to be responsible for the control and quality of their data. However, most of the community colleges currently lack the resources to fully achieve this successfully.

Wyoming is not unique to this challenge. North Dakota University System faced similar concerns regarding data integrity and recognized the need for standardization of data elements and institutional validation of reports. While building their data warehouse, North Dakota worked toward standardizing business processes and defining data elements amongst campuses.

Continuing the work on data consistency during data warehouse implementation is also the approach recommended for Wyoming. An excellent resource on data quality is the Data Quality Campaign (DQC). The DQC is an organization formed in 2005 devoted to assisting with refining education data quality for the purpose of improving student achievement. A high-level list of actions to improve data quality is shown below. Wyoming will need to acquire additional assistance to accomplish these actions.

- Implement formal data quality processes;[7]
- Establish use of Colleague duplicate record reporting processes;
- Complete review and documentation of cross-college metadata for all required data elements;[8]

[7] Reference the Data Governance Institute http://www.datagovernance.com and the Data Quality Campaign www.dataqualitycampaign.org for data quality information and examples.
[8] See Common Education Data Standards http://ceds.ed.gov.

- Institute cross-college processes for regular validation of data.

Benefits

State:

- Provides validated, consistent data available to answer legislative questions quickly;
- Positions the Wyoming Community College System as a future feed into the Wyoming SLDS.

Commission:

- Data quality standards and error checking are regulated by the Strategic Data Governance Council;
- Data and processes are aligned to ensure accurate state and federal reporting.

Community Colleges:

- Empowers the functional users facilitating buy-in for improvements, and encourages key personnel to be champions for change;
- Centralizes documentation of metadata for all data elements;
- Facilitates comparison between colleges to collectively build on successes and learn from challenges.

Agencies:

- Data quality is improved by a formalized data governance structure.

WCCS Needs Analysis Requested Deliverables

The following report deliverables address the concerns and questions of the Wyoming Community College System detailed in the Scope of Work for Needs Analysis.

Deliverable #1 - Other States

1. What software solutions are other states using, and is it more cost-effective to leverage an existing solution, or to develop a custom, albeit unproven, solution?

Other states are using a variety of database collection techniques. The states included in this review have similar population sizes to Wyoming, with the exception of Colorado, Indiana, and Maryland. The states with smaller populations provide a realistic comparison of what states with similar population sizes to Wyoming are doing to satisfy data needs. Inclusion of Colorado, Indiana, and Maryland reflects the contrast between larger populated states and smaller populated states when working to satisfy data and reporting needs and are also included due to their relative successes with data collection and management systems.

Colorado

Population Estimate: Over 5 Million
Thirty-one (31) Public Colleges and Universities: Thirteen (13) 4-year, Eighteen (18) 2-year
State Higher Educational Data Governing Body: Colorado Department of Higher Education
Website: http://highered.colorado.gov/

Data Quality Campaign[9] 2014 Status:
The state of Colorado has completed 8 of the 10 Data Quality Campaign State Actions. Actions in progress are: #1 Link data systems, # 5 Provide timely, role-based access to data.

Background:
The Colorado Commission on Higher Education works to offer Colorado residents quality, affordable education and is separate from the Colorado Department of Higher Education that is the agency responsible for data collection and reporting. In 1985, Colorado began development of a system for collecting data from all their public postsecondary educational institutions in a database known as the Student Unit Record Database System (SURDS). Actual data collection began in 1988. Similar to the Wyoming Student Identifier (WISER ID), Colorado began using a student assigned ID or SASID (State Assigned Student Identification) in 2009. The SASID is used to connect the high school student data and follows a student throughout their college education. The Colorado Workforce Development Council also leverages the SASID to maintain tracking of the students into the workforce.

Data Systems Structure:
The Student Unit Record Database System (SURDS) is now a data warehouse that collects in excess of 300 data elements following necessary FERPA requirements.

[9] Data gathered from the Data Quality Campaign website http://www.dataqualitycampaign.org.

Purpose:
The primary goals of Colorado's data warehouse system is to improve student performance through data-driven changes to programs and services. It is used to collect and report on enrollment, undergraduate applicant/assessment, degrees awarded, financial aid, remedial courses, teacher education and accountability, and cohort data. The system also feeds into the Statewide Longitudinal Data Systems (SLDS) information for the state.

Audience:
The Colorado Department of Education has a web-based dashboard interface which provides data from their public institutions of higher education to the general public for viewing. Users can select from a number of variables to generate, sort, and download reports. Longitudinal data reports are also available online and instructions on how to run the reports are available to users. Users include parents, students, educators, policymakers, and researchers.

Benefits:
- State: Enable the secure and efficient sharing of educational data for educational research and policy making.
- Colleges & Universities: Timely data to drive informed decisions to support improvement of student performance.
- Agencies: Share and exchange P-20 student focused data collected across district, state, and federal agencies including HR, K-12, higher education, labor, and corrections.

Indiana

Population Estimate: 6.6 Million
Seven (7) Public Colleges and Universities: Six (6) Universities, One (1) Community College, Forty (40) campuses
State Higher Education Data Governing Body: Indiana Commission for Higher Education, Indiana Career Council
Websites: https://www.in.gov/che/, https://www.in.gov/icc/

Data Quality Campaign 2014 Status:
The state of Indiana has completed 9 of the 10 Data Quality Campaign State Actions. Action in progress is: #9 Policies & practices to build educators' use of data.

Background:
Indiana's system to collect and report Indiana student data, known as the Indiana Workforce/Education Intelligence System, was established in 2007. A formal partnership between the Indiana Department of Workforce Development, the Indiana Commission on Higher Education, the Indiana Department of Education, and the Indiana Business Research Center controlled management and governance of the system. Then in 2013, oversight of the system was assigned to the Indiana Career Council.

Data Systems Structure:
Indiana's data warehouse is built on SQL Server 2012 Enterprise with staging areas, a report table area, and an online analytical processing multi-dimensional cube structure for ad hoc querying. Separate servers exist for development/staging and production. Public-facing web reports are

made available with data from a separate data warehouse containing non-identifiable records for the purposes of transparency and research.

Purpose:
Link all levels of educational data with workforce data for the purposes of offering public educational programs that effectively provide students with the knowledge and skills required for employment; ensure policy-makers, and educators have the data-driven information needed to continually make program improvements that support student lifelong success; make available, reliable K-12, post-secondary education, and workforce data for research and analytical requirements.

Audience:
Secured access is available to Indiana educational departments, state agencies, and researchers, to develop K-20 reports and conduct research. Also, educational information is available for use by the public.

Benefits:

- State: Provides access to information concerning the trends of Indiana's educational system.
- Colleges & Universities: Relieves time intensive manual processes and protocols required to link data.
- Agencies: Provides more complete understanding of an Indiana student profile.

Maryland

Population Estimate: 6 Million
Twenty-eight (28) Public Colleges and Universities: Sixteen (16) Community Colleges, Twelve (12) Universities
State Higher Education Data Governing Body: Maryland Higher Education Commission, Maryland Association of Community Colleges, University System of Maryland
Websites: http://www.mhec.state.md.us, http://mdacc.org http://www.usmd.edu

Data Quality Campaign 2014 Status:
The state of Maryland has completed 8 of the 10 Data Quality Campaign State Actions. In progress are: #5 Provide timely, role-based access to data, #9 Policies & practices to build educators' use of data.

Background:
Maryland Higher Education Commission began collecting data in the 1970s. The state of Maryland committed substantial resources toward the redesign of the Commission's collection systems which feed into the statewide P-20 data warehouse along with data from warehouses maintained by the Maryland Department of Education, Labor, Licensing and Regulation. The redesigned system began collecting data in 2013 making available PreK-12, postsecondary, and workforce data for analysis. A cross-agency Data Advisory Group is charged with continually improving data definitions, quality, policy, and guiding data dissemination.

Data Systems Structure:
Four (4) primary data warehouses are used in the state of Maryland to gather and house P20W data. The University of Maryland, Baltimore County is using Blackboard Analytics data warehouse solution.

Purpose:
Provide an open, collaborative environment of quality postsecondary data for communication, policy analysis, review of program and practice effectiveness, informed decision-making, and achievement of Maryland State goals.

Audience:
Maryland postsecondary data is available to the public and other interested parties.

Benefits:

- State: Advanced dashboards for policy decision makers.
- Colleges & Universities: Relieve increasing burden on institutional research offices and reduce ad hoc data collections. Availability of data-use training and professional research development.
- Agencies: Improved data continuity.

Montana

Population Estimate: Over 1 Million
Sixteen (16) Public Colleges and Universities: Two (2) flagship universities, Four (4) regional universities, Ten (10) 2-year colleges
State Higher Education Data Governing Body: Office of the Commissioner of Higher Education
Website: http://mus.edu/

Data Quality Campaign 2014 Status:
The state of Montana has completed 6 of the 10 Data Quality Campaign State Actions. Actions in progress are: #1 Link data systems; #5 Provide timely, role-based access to data; #6 Student-level progress reports for educators, students, and parents; #9 Policies & practices to build educators' use of data.

Background:
In 2012, the Montana Office of Public Instruction launched the Growth and Enhancement of Montana Students (GEMS) system to track K-12 and higher education student data. The GEMS data warehouse houses data collected from multiple database sources including Montana public college and university information systems and associated agencies. The Montana University System (MUS) tracks student information for Montana's postsecondary colleges and universities.

Data Systems Structure:
The Montana Office of Public Instruction houses the K-12 data warehouse (GEMS) and the Montana University System (MUS) houses the postsecondary data warehouse. The intent is to link the two data warehouses. As part of this plan, the Montana University System is moving toward a single instance of their administrative information software, Banner by Ellucian, hosted by the main campus of each area including the community colleges and tribal colleges of the area.

Standardization of the transcript for all units of the Montana University system is another key initiative in their approach. The effort is governed by Montana's interagency K-20 Data Governance Council which is responsible for guiding data collection, sharing, and use.

Purpose:
The goals of the system are to track student data over multiple years and schools to provide information for educators and agencies allowing them to make data-driven decisions to facilitate Montana student growth and achievement. The system is to facilitate transcript exchange between K-12 and postsecondary entities. Another primary purpose is to report data and outcome metrics.

Audience:
System users include parents, school administrators, analysts/researchers and teachers. Vetted reports are readily available to the public through the web-based interface on the Montana University System website.

Benefits:

- State: Enterprise-wide data architecture and governance providing complete, accurate information and consistent results to information requests.
- Colleges & Universities: Standardized codes, data elements, and alignment of business rules and practices.
- Agencies: Ability to share and exchange data with the statewide (GEMS) and higher education (MUS) data warehouse systems.

Nebraska

Population Estimate: Less Than 2 Million
Ten (10) Public Colleges and Universities: Nine (9) State and Community Colleges, one (1) State University
State Higher Education Data Governing Body: Nebraska Coordinating Commission for Postsecondary Education
Website: http://www.ccpe.state.ne.us/PublicDoc/Ccpe/

Data Quality Campaign 2014 Status:
The state of Nebraska has completed 5 of the 10 Data Quality Campaign State Actions. Actions in progress are: #1 Link data systems; #5 Provide timely, role-based access to data, #6 Create progress reports with student-level data for educators, students, and parents; #9 Policies & practices to build educators' use of data; #10 Promote strategies to raise awareness of available data.

Background:
Nebraska Student and Staff Record System is Nebraska's K-12 data system which began collecting data in 2007. The Nebraska Coordinating Commission for Postsecondary Education is responsible for serving as the voice for the state of Nebraska public colleges and university and for maintaining extensive databases for producing regular and comprehensive reports. In 2011, Nebraska launched their web-based Data Reporting System for public access to aggregate K-12 student data.

Data Systems Structure:
Nebraska maintains multiple databases. A number of reports available on the Coordinating Commission for Postsecondary Education site report statistics using IPEDS, National Center for Education Statistics and/or other higher education surveys as the data source. Online links allow schools to upload their local data to the Coordinating Commission for Postsecondary Education. Requests for Nebraska data involve submitting a formal request that can take weeks to generate.

Purpose:
Conduct research and publish reports on higher education issues. Provide access to quality Nebraska data and factual reporting by way of transparent processes.

North Dakota

Population Estimate: Less Than 1 Million
Eleven (11) Public Colleges and Universities: Two (2) research institutions, four (4) regional universities, five (5) community colleges
State Higher Education Data Governing Body: North Dakota University System
Website: http://www.ndus.edu/

Data Quality Campaign 2014 Status:
The state of North Dakota has completed 7 of the 10 Data Quality Campaign State Actions. In progress are: #5 Provide timely, role-based access to data, #9 Policies & practices to build educators' use of data, #10 Promote strategies to raise awareness of available data.

Background:
In 2010, the North Dakota University System faced similar concerns as Wyoming regarding data integrity and recognized the need for standard data elements and institutional validation of reports. While building their data warehouse North Dakota worked toward standardizing business processes and defining data elements amongst campuses. North Dakota's data warehouse is being strengthened by linking postsecondary and K-12 education, and also postsecondary and workforce data.

Data Systems Structure:
The North Dakota University System leverages a data warehouse for data collection and reporting and emphasizes the importance of implementing a dashboard solution. In 2013, iDashboards was purchased as the system-wide solution. To meet capacity requirements, two instances of the iDashboards software are needed, one for the two-year colleges and the other for the remaining institutions. The North Dakota University System plans to leverage building out standard queries for all colleges, thereby sharing user knowledge amongst the institutional user base.

Purpose:
Provide data rich systems capable of generating answers to varying policy and research questions concerning postsecondary, K-12 education, and workforce data.

Audience:
Parents, school administrators, analysts/researchers, and teachers with expansion underway to include public, legislature, and other state officials.

Benefits:

- State: Use of dashboards to monitor North Dakota's Key Performance Indicators relative to applicants, enrollment, retention, graduation, and finance.
- Colleges & Universities: System-wide dashboard software allows sharing of standard queries across institutions.
- Agencies: Postsecondary linkages to employment data.

West Virginia

Population Estimate: Less Than 2 Million
Nine (9) Public Colleges and Universities: Twenty-seven (27) campuses
State Higher Education Data Governing Body: West Virginia Higher Education Policy Commission, Community and Technical College System of West Virginia
Website: http://www.wvhepc.edu/, http://www.wvctcs.org/

Data Quality Campaign 2014 Status:
The state of West Virginia has completed 7 of the 10 Data Quality Campaign State Actions. In progress are: #1 Link data systems; #5 Provide timely, role-based access to data, #9 Policies & practices to build educators' use of data.

Background:
West Virginia Network (WVNET) service center provides computing and networking support for most of the colleges and universities in West Virginia. WVNET recently rebuilt a data warehouse and various strategic reports after discovering the original data warehouse had flaws. WVNET used software from WhereScape to rebuild the data warehouse. Using WhereScape RED meant having the ability to do what was necessary quickly without the project becoming costly and complex. It is important to note that this was a 'rebuild' so the complications of determining business processes and aligning business practices were resolved during the original build of the data warehouse.

Data Systems Structure:
Most West Virginia colleges and universities participate in a centralized data warehouse created using the WhereScape RED data warehouse software.

Purpose:
Provide data and data-analysis tools to support decision-making to facilitate student achievement and school system improvements. Reports, which disclose data such as enrollment, graduation and retention, are available on the West Virginia Higher Education Policy Commission website. The reports are not interactive; however, users can download the tables.

Audience:
The West Virginia Department of Education is working toward a new web-based portal for teachers, school leaders, parents, researchers, and state agency representatives.

Benefits:

- State: Cost savings and efficiencies of utilizing a centralized support service center for data warehouse requirements.

- Colleges & Universities: Reduced requirement for staffing and systems support at each West Virginia college and/or campus.
- Agencies: Central point of contact for data exchange.

Cost Effectiveness of Buy versus Build

The cost-effectiveness of leveraging a current solution versus building a new solution contains a number of variables and can be subjectively based on the Commission's ultimate goals. Building an internal solution using a data warehouse-building tool can provide immeasurable knowledge to the development team. Gaining insightful information and training regarding building dimension and fact tables can prepare the functional and IT teams for sustainable support of the data warehouse and dashboard reports long-term. A delivered solution may not offer the type of in-depth understanding of data warehouse development and maintenance therefore causing additional fees for training and software support long-term. Refer to Sustainability Plan, deliverable #11, for additional information relating to sustainability and cost estimates.

Deliverable #2 - Recommended Architecture

2. Provide a recommended architecture, along with the pros and cons of decentralized versus centralized versus hybrid models.

Background:

Analysis of the data mart architecture in use by WCCC has revealed that many of the processes currently implemented should remain in place along with the addition of a centralized data warehouse solution that does not rely on customized programs to transform and load data.

Each Wyoming community college has the same implementation of the Colleague ERP system and utilizes the Ellucian Operational Data Store (ODS) product to extract and transform data at scheduled intervals. The ODS, integrated with CROA, is a critical platform for current reporting, especially for operational reporting needs at each college.

A centralized data warehouse architecture and load process can simplify the current process that compresses a copy of each ODS for transfer to the WCCC. This option will provide a mechanism to extract data from each college ODS database in a timely manner as reporting requirements and timeliness of data becomes more critical.

Best Practices:

An ideal architecture consists of a centralized data warehouse with a commercial load processor and toolkit that performs parallel loads directly from each college ODS via a secure tunnel. Centralized reporting and BI solutions could leverage the data warehouse to provide a consistent view of data to each college as well as state agencies. The data warehouse can also provide data from secondary data marts for use by certain organizations to provide more control over security and content.

Preserving the ODS at each college provides the ability to perform ad hoc, operational reporting without affecting the performance of the respective Colleague ERP system. It also leverages existing transformations and code translation that happen in each ODS load process.

Recommendation:
The WCCC should implement a centralized dimensional data warehouse, and procure a commercial solution for the dimensional design and load processing. The basic design architecture should include:

- Colleague ERP (transactional system of record);
- Colleague ODS and CROA (staging and operational reporting);
- Centralized Enterprise Data Warehouse built with a commercial, metadata-driven developer toolkit, not custom SSIS packages;
- Fully conformed dimensions across subject areas;
- Star schemas for each subject area;
- Nightly load processing over secure tunnels to each college to retrieve only the data necessary for processing;
- Centralized report libraries and dashboards sourcing from the data warehouse;
- Support for other BI architectures via the data warehouse, such as Business Objects Universes;
- Secondary data marts, as needed, for different data contexts and security requirements fully sourced from the data warehouse.

Recommendation Rationale:

- Reduced software licensing cost by centralizing a single data warehouse and leveraging existing ODS processes;
- Manages change more easily by using a commercial, metadata-driven data warehouse toolkit rather than custom SSIS development;
- User knowledge sharing increases via the use of standard, automated development tools;
- Lowers the bar for data warehouse management so an SSIS developer is not required to execute changes;
- Avoids reporting vendor dependency by focusing on a transparent data platform rather than bundled tools and dashboards from a single vendor;
- Manages changes regarding staff growth and turnover with a commercial data warehouse toolkit by always having vendor support, training, and documentation;
- Simplifies processing by eliminating ODS copy, compression, and transfer steps;
- Bundled BI or data warehouse packages from a single vendor often require the need to be retrofitted to serve the needs of the organization or institution. These “out of the box” solutions may appear to contain all that is necessary for rapid implementation, however, most require significant modifications and enhancements.

Pros and Cons:
Centralized Data Warehouse Model

Pros:

- Reduced software licensing cost;
- Centralized load processing ensures data is compliant and immediately identifies load issues or bad data trends;
- Best for mid-sized data warehouse with a capacity of 20 to 60 TB;
- Ease of upgrade;
- Central resources for reporting can be utilized by multiple organizations;

- Master Data Management (MDM) is in one place;
- Development standards are enforced centrally;
- Easier to change or expand dimensional model;
- New data sources added easily.

Cons:

- Growth over time will require periodic hardware upgrades;
- Larger data sets may hamper performance data sets, i.e. accounts receivables or student academic credits. Archiving plan may be necessary for larger data sets in the future;
- Backup and recovery can take several hours to complete;
- Requires centralization of data and processing standards to ensure all data sources deliver equivalent data.

Decentralized and Hybrid Data Warehouse Models

Pros:

- Performance of load processing is increased due to smaller data sets;
- Better suited for very large organizations in distant locations such as multinational companies;
- Smaller data footprint for backup and recovery;
- The data warehouse can be expanded or customized to suit the needs of individual entities;
- Performance of queries, dashboards and reports;
- Staggered implementation;
- Transactional data transfers are local.

Cons:

- Less control. As centralized reporting is required, formal master data management still must occur to produce accurate reporting. Enforcement of rules and data integration is more cumbersome;
- Requires data warehouse management skill sets in all locations;
- Integration development is constant;
- Conformity can be difficult to manage;
- Increased cost for vendor support and software licenses;
- More systems and databases to manage and maintain.

Deliverable #3 - Data Warehouse

3. Should members of the WCCS use a data warehouse? Should a portion of the analytical process be centralized, or is it advantageous to leave it as a decentralized model?

Background:

Currently, WCCC has developed a database that loads databases from each individual community college's Ellucian Operational Data Store (ODS). The ODS product extracts and transforms data at each college. Each college produces its own analytical reports using CROA. Most colleges produce analytical or strategic reports or data in an ad hoc basis upon request from college executives.

Interviews with executives and IR Directors at each college revealed there is very little strategic reporting currently available. Currently, report development resources at most of the colleges focus solely on the development of operational reports.

Best Practices:
The colleges have common strategic data needs regarding admissions, enrollment, curriculum management, graduation, etc. This data is also of interest to WCCC.

The implementation of a centralized data warehouse would provide the Commission and each college with the ability to access strategic data. Centralized development of strategic reports, Key Performance Indicators (KPIs) and dashboards would provide each stakeholder with strategic data for planning with limited development.

Recommendation:
The implementation of a centralized data warehouse should benefit all stakeholders. Each college can leverage the data warehouse for strategic data resources. Additionally, centralizing the development of strategic reports, KPIs, dashboards, and other resources will reduce work redundancy and ensure consistency among reports.

Each college should participate in the design of analytical solutions to ensure the solutions are useful to each institution.

Recommendation Rationale:

- Reduced development time and resources for creating common metrics;
- Provides a standard and consistent model for comparing metrics between colleges;
- Consistent logic and interpretations of data;
- Centralized reporting and BI solutions could leverage the data warehouse to provide a consistent view of data to each college as well as state agencies.

Currently, colleges lack the technical resources to develop the strategic reports necessary for planning and decision-making. The current ODS architecture at each college lacks the point-in-time data necessary to produce accurate strategic reports.

Deliverable #4 - Data Warehouse Alternatives

4. If a data warehouse or data mart is not implemented, describe all alternatives along with the associated pros and cons.

Background:
A centralized data warehouse is the recommendation for the WCCS. This solution, implemented by the WCCS, will be of benefit to all stakeholders. Each stakeholder will have the ability to obtain and analyze strategic data for planning and decision-making purposes. Although alternatives do exist, the primary investment of time already spent aligning data serves the centralized data warehouse recommendation.

Alternatives:
Alternatives range from maintaining and expanding on the current data mart implemented by WCCS, to implementing methods of querying each college's Operational Data Store (ODS), and combining data as needed using tools or manual processes.

The following is a list of alternatives to implementing a data warehouse or data mart:

- Query individual community college ODS databases. It would be possible to grant access to the Commission and other agencies to ODS databases at each college to obtain needed data. Alignment of data and processing would still need to continue to ensure consistency of data in each institution. The community colleges can share developed reports for specific needs. Dashboards can also be developed for use with the ODS database.

  Pros:
  - No requirement for personnel to build, manage, and maintain an enterprise data warehouse. This solution would require fewer technical resources centrally;
  - No new software costs. CROA software is already in place at colleges and can provide the data;
  - No new systems or infrastructure is required;
  - Eliminate the Extract, Transform, and Load (ETL) process requiring fewer resources and effort.

  Cons:
  - The combining and aggregation of data for several or all colleges would require special development, a specific reporting product, or a manual solution. Development of this nature is usually difficult and time consuming;
  - Currently, each ODS is somewhat unique. Common reports would either need to account for unique issues requiring the need to tailor reports at each individual college; or the ODS databases would need to be created to be common at each institution;
  - Each institution would be responsible for the control of the quality of their data. Currently, most community colleges lack the resources to fully achieve this successfully. Without centralized control of data quality, error and inconsistencies are likely to be more common than in a centralized model;
  - The ODS database lacks the ability to preserve history on individual records outside of Colleague's limited method of providing status, add and change dates. This means there is no ability to extract data from a specific point-in-time.

- Continue with current model. The current model in place by the WCCS is similar to a data mart or data warehouse; however, it lacks many of the features of an enterprise system. There has been limited success with the current solution in developing aggregated reporting for specific purposes. Expanding on the current solution, new reports can leverage the data added as it becomes available. Granting access to the colleges or other agencies is also an option so they can retrieve necessary data.

Pros:

- Implementation is already in place. The expansion and development of the current system can continue as planned;
- No new software costs involved;
- No new systems to implement;
- Proven success. Reports from this system currently exist.

Cons:

- Development is custom, no vendor support available when solutions are custom. The current custom developed solution lacks sustainability since only a few people who developed it can change it, if necessary;
- Requires more custom development to continue to expand;
- Limited point-in-time reporting available;
- There will be an extensive implementation timeline. Because this solution is custom, expansion and adding new features will take more time and be less sustainable than a vendor solution.

Deliverable #5 - Sharing Information

5. What alternatives to a data warehouse exist that provide a means to share information and necessary reporting mechanisms between agencies?

Background:
Agencies require community college data to perform analytical studies for the state and provide information to legislators. The delivery of all data must be secure and be accessible using common tools.

Although it is recommended WCCC implement a centralized dimensional data warehouse and use this solution to share data between agencies, alternatives exist. The alternatives generally require more resources to produce, manage, and maintain the shared data. Alternative solutions also require agencies to manage the data received that may require additional storage and reporting solutions.

Best Practices:
Security is critical when sharing data between agencies. Encrypting all shared data is an important element to consider with any solution. Any data shared should be encrypted. Additionally, the solution must allow the development of data to be reproducible to ensure accuracy and limit development. Data is routinely shared between entities by extracting required data sets into delimited files or spreadsheets in an agreed upon format. Data can also be provided in the form of a database file, if desired.

Providing agencies access to databases to develop reports, as needed, is another optional solution. If this method is selected, the agencies would need to be familiar with the database structure. Alternatively, another optional solution may be to allow agencies access to specific reports developed for their use.

Shared data should be limited to specific needs of requesting entities to ensure data security. Additionally, each entity should receive a data dictionary providing explanations of the shared data,

data types, and code translations. The data dictionary will help support consistent data interpretation and coding practices. Transmitted data should be encrypted for security purposes.

Alternative Solutions:

- Develop required data extracts or spreadsheets for sharing on demand and securely transmit the data via Secure File Transfer Protocol (SFTP) to the agencies as needed. Alternatively, create a shared area for these extracts or spreadsheets and produce the data on a periodic basis for end user consumption.
- Provide limited access to CROA where agencies can access or develop reports.
- Develop targeted databases using the Ellucian Operational Data Store (ODS), back up the data, and send it to the agencies upon request. Alternatively, create a shared area for the ODS back-up databases and share the data on a periodic basis for end user consumption.

Deliverable #6 - WCCS Research and Analysis Staffing

6. Does the WCCS have the appropriate level of staffing to do research and analysis?

This question addresses whether the community colleges and the Wyoming Community College Commission currently have the appropriate level of staffing, with the required knowledge and skillsets, to perform research and analysis. The goal is to provide accurate and timely community college specific and aggregate data reporting as requested/required to make strategic decisions both at the college and state levels.

Background:
There are 17 existing Wyoming Community College System (WCCS) staff involved in research and analysis. An estimated seventy-nine percent (79%) of their aggregate time is focused on compliance, operational, and routine reporting for the institution and the Commission. Approximately ten percent (10%) of their aggregate time is dedicated to research and analysis for strategic decisions (this percent may be inflated due to estimated personnel time devoted to these functions at LCCC.) The remaining 11% of their aggregate time is devoted to responsibilities unrelated to the research and analysis focus of this question. Additionally, limited functional understanding and/or reporting assistance is available for IR initiatives from the IT staff of the colleges.

Institutional researchers at each college understand the need for more in-depth statistical research and analysis training to support their respective institutions. Time to commit to such education and training is a challenge for all of the institutional researchers.

Four of the seven colleges (CWC, EWC, LCCC, and WWCC) have personnel with the most extensive understanding of their respective college's data who are either retired (EWC), scheduling retirement (CWC), or planning their retirement within the next several years (LCCC, WWCC). Loss of institutional research employees will mean the loss of significant institutional knowledge.

A detailed review of existing research and analysis personnel at the Commission and each of the colleges can be found in Appendix A.

Best Practices:
Research and analytical staff must have foundational characteristics and skills to fulfill the requirements of the position. This includes the ability to convert data into clear and concise management information. In the higher educational environment, this is accomplished by collecting and interpreting data for use by the college or university, as well as other governmental and accreditation agencies involved in the planning, policy formulation, decision-making, assessment and administration. Thorough knowledge of a variety of data collection, data verification, data analysis, sampling instruments, and measurement techniques is essential. In addition, the research and analytical professional must be familiar with survey tools and techniques, time series analysis, multiple regression, modeling, trends analysis, sampling techniques, and cost analyses.

Recommendation and Rationale:
Currently, the WCCS does not have the level of staffing and skills required to perform the desired research and analysis that will support data-driven decisions and result in improved Wyoming student achievement and lifelong success. Each community college expressed a need for additional assistance in the IR area, which also supports this finding. For the WCCS to achieve the goal of effectively utilizing existing and future analytical and data warehouse tools for research and analysis, third-party expertise, guidance, and assistance is required. The Commission and community colleges will need the following:

- Skill in designing and building data warehouse solutions at the community college and Commission level;
- Expertise of Colleague enrollment and fiscal processes;
- Understanding of IPEDS, Title IV and other federal reporting requirements and regulations;
- Knowledge of National Student Loan Data System compliance;
- Know-how related to ODS and CROA;
- Experience building and implementing performance metrics in higher education.

The following actions are recommended to address the limited resources available for institutional research across the community colleges and the Commission.

- Select a third-party partner to provide research and analysis guidance and assistance.
    - Facilitate strategic research analysis and reporting to meet the expectations of the state and the Executive Council in coordination with the Strategic Data Governance Council (see Governance, Deliverable #12). Examples are:
        - Key Performance Indicators (KPIs);
        - Dashboards;
        - Strategic Reports.
    - Facilitate college level strategic reporting coupled with secured access to the centralized data warehouse giving colleges the ability to run strategic reports on their data. Examples are:
        - Admissions Funnel;
        - Retention Reporting;
        - Student Enrollment and Registration by Program, Major, Minor;
        - Degree Progress;
        - Course Section Planning Reports;
        - Student Success:

        - Complete College Wyoming Metrics;
        - Voluntary Framework of Accountability Metrics.
- Centralize selected IR services at the Commission. A review of the existing resources shows that centralizing select IR services at the Commission will both benefit the colleges and ease the pressure on the already overburdened college IR personnel. This approach will provide the time and opportunity for additional training of college IR staff. Focusing these functions at the Commission is in alignment with the implementation of the centralized data warehouse and would be made possible with additional third-party assistance. An example would be selected and agreed upon standardized routine reporting.
- College IR staff. Many existing IR staff at the community colleges were promoted from previous positions held at the college which affords the advantage of extensive institutional background and knowledge. But there has been little or no opportunity for formal institutional research and analytical training. The following responsibilities and practices will best utilize the knowledge and expertise of the existing IR staff at the colleges.
    - IR Staff Development Practices
        - Additional training in the use of CROA, Universes, and SQL;
        - Keeping current with research methods and assessment procedures in higher education. This can be in the form of relevant association membership and seminar attendance;
        - Participate in IR mentoring programs;
        - Bi-Annual training from the Department of Workforces Services. Several research training sessions have been provided to the colleges by the DWS but additional training is required;
    - IR Staff Responsibilities
        - Provide college level functional/operational reporting;
        - Collaborate with third-party partner for strategic research and reporting assistance;
        - Train college functional super users.

Deliverable #7 - Deleted

7. This deliverable was deleted upon request of the Commission and not included in the assessment project.
   Provide an inventory of development entities with both the interest and the capability to work with the WCCS and contributing agencies as a whole, and have the domain knowledge and experience in building LDSs, as well as the ability to answer the inevitable technical and educational questions arising along the way.

Deliverable #8 - High-Level Plan

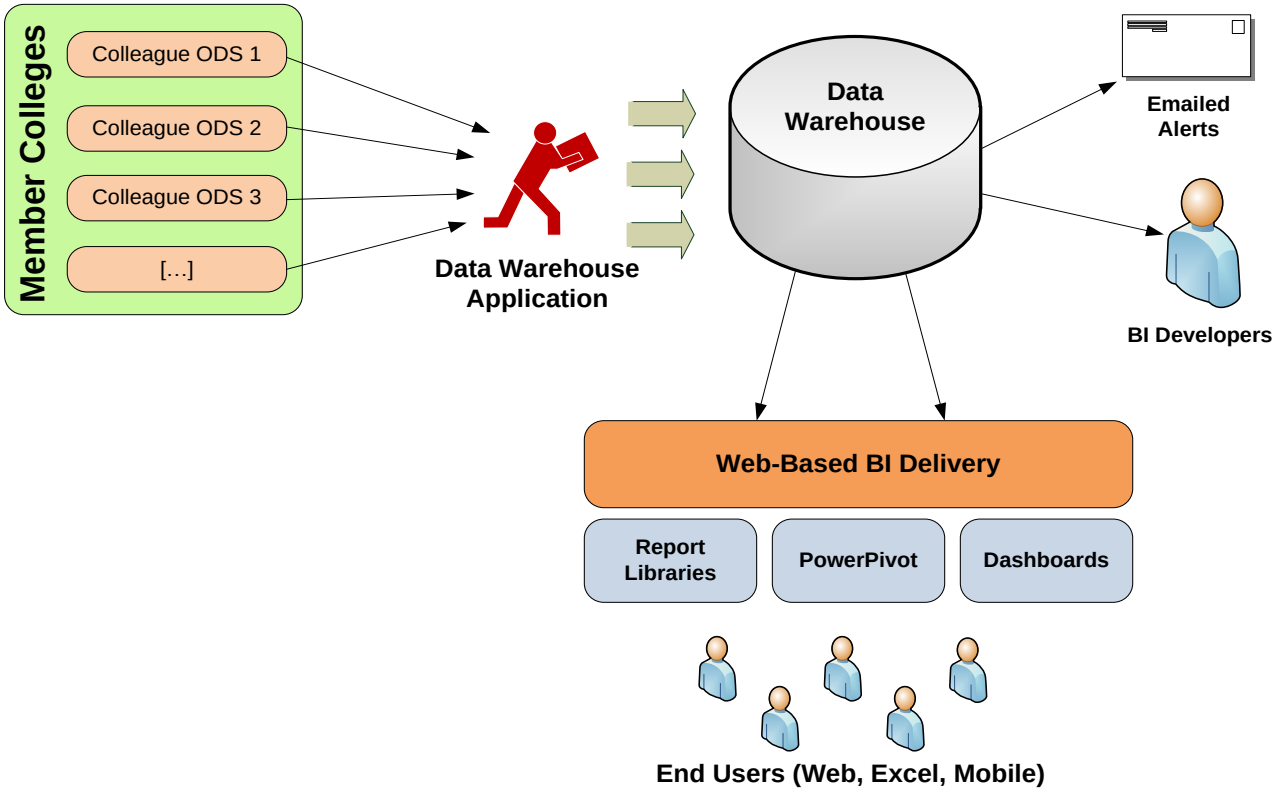
8. Provide a high-level plan of when the first shared report could be generated with input from the WCCS and the contributing agencies.

Background:
The first shared report will consist of a summary-level view of enrollment by term across all community colleges, with breakdowns along college, gender and ethnicity lines. It is often a theme across reporting deliverables, including IPEDS, to begin with a high-level headcount by term. The ability to

compare this metric across colleges is valuable in addition to reporting it by college. The architecture must enable this comparison overall.

The first shared report will be the result of a new finalized centralized data warehouse with the core dimensions and fact tables in place. Core dimensions and facts are a known quantity that will factor into a high-level plan, growing to support future deliverables in an agile fashion. The basis for core dimensions and fact tables derived from Colleague data is well understood. The unique, collaborative nature of the consortium means that typical metrics must also divide along college lines in the dimensional model while providing an overall, aggregate view.

High-Level Architecture:



The alignment of business processes and data at the community college level is essential so comparison of colleges is possible. The Commission and community colleges have already attempted to achieve consistency in code translation through the ODS implemented at each site.

The above diagram does not depict data marts. Business and reporting requirements will define their creation as necessary. Each will source from the data warehouse.

Plan:
The project begins with the implementation of the first Windows 2012 server that will run an instance of SQL Server 2014 Enterprise At the same time, the Commission and community colleges will work together to align data and processes required to ensure data is consistent and correct.

Data Warehouse Build Tasks	Time Estimate
Selection and procurement of Data Warehouse toolkit solution	30 days
Data Warehouse toolkit training	10 days
VM provisioning (Windows Server 2012 Enterprise)	1 day
SQL Server installation and configuration (SQL Server 2014 Enterprise)	1 day
Commercial Data Warehouse toolkit installation and configuration	2 days
ODS connection definitions, testing, and implementation per college	14 days
Design/conform time and reporting term dimensions to support the Commission, legislators, and multiple colleges	21 days
Dimension load table implementation to support conformity across each college ODS	30 days
Dimension table finalization (supports expirations from source system deletions)	30 days
Fact load table implementation to support conformity across each college ODS	30 days
Fact staging tables development	30 days
Slowly-changing fact table management and testing (supports expirations from source system deletions and composite business key changes)	14 days
Fact table implementation and testing	14 days
Load schedule activation and testing	14 days
Setup security for tables and reports	21 days
Review data to ensure compliance with state and federal regulations	14 days
Development of a cross-college enrollment report that supports filters to the individual college level	30 days
Report testing and verification	14 days
Develop and provide user training	30 days
Total days to first report:	**350 days**

Deliverable #9 - Technical Direction

9. Provide technical direction for the best way to share information between the WCCS and identified contributing agencies.

Background:
Agencies desire to have community college data to perform analytical studies and produce reports for the federal government and the state and provide information to lawmakers. The desire of the Commission is to have the ability to receive this data without creating extra work for Commission staff. The delivery of all data must be secure but accessible using common tools.

Best Practices:
Secure data access must be the priority when sharing data between agencies. Well-established mechanisms for granting access to data and ensuring encryption during transmission must exist. A centralized architecture minimizes the threat landscape by consolidating access controls and monitoring data usage.

Different constituents will have varying data needs with different levels of access. The benefit of a centralized architecture is the ability to offer fine-tuned, granular access to users through a number of methods:

- Report layer
  - Apply report-level permissions for secure access to reports.
- Relational data layer
  - Create database views or schemas to limit access to data subsets or secondary data marts that are local to the agency or college. Local data marts are part of the centralized load process even though they are local in nature.
- Analytics layer
  - Multidimensional cubes deployed on top of centralized data warehouse sources can be tailored to the specific security requirements of a contributing agency. This includes cell level security.

Recommendation:
The enterprise data warehouse becomes the hub for all efforts and where data is conformed and fed back into secondary data marts or analytics solutions. The recommended model for sharing data starts with a centralized data warehouse as the source and consists of the following methods:

- Report development to address clearly defined data needs;
- Dashboard and KPIs for executive stakeholders to receive strategic summary data;
- Data warehouse star schemas or data marts provide controlled access to report developers outside of the Commission.

Recommendation Rationale:
Access control is of critical importance especially if the data pertains to personally identifiable information (PII) or financial information. A centralized model easily provides auditing mechanisms such as logging report execution, user authentication, and queries.

By granting access using a layered approach, access can be limited to the data necessary for the customer without compromising data security.

Deliverable #10 - Data Marts Recommendation

10. Provide recommendations regarding the creation and potential use of a data mart.

Background:
A data mart is a subset of a data warehouse that is oriented to a specific subject area. It organizes data in a way that makes sense to customers for targeted reporting and analytical needs. Reporting frequency for a subject area may also be one of the drivers for splitting it from the data warehouse for direct access by customers.

Data marts are essentially subsets of a larger enterprise data warehouse and benefit from the centralized management of the architecture.

Best Practices:
Data marts improve end-user response time by providing data consumers access to the specific types of information they use most often, in the perspectives they require. The targeted data is smaller in volume because it meets a specific requirement and can deliver dimensional models that are distinct from the larger warehouse.

Data marts also offer the ability to limit user access. This enhanced data security layer is set up to support ad hoc reporting. It controls restricted access to ensure sensitive personally identifiable information (PII) is not included when not required.

Data mart creation is a consideration when common summarized data is necessary for specific subject areas. It can also hold detailed data depending on requirements. Because the data mart sources from the data warehouse, consistency is ensured and processing is streamlined and centralized.
End-users often have various data needs with different levels of access. The development of data marts can be a useful tool to deliver data and simplify access and security models.

Recommendation:
Depending on the requirements of the data mart, two approaches are recommended.

- Normalized, non-aggregated data sets for use with a reporting application. This may be useful for common data extracts or limited detail reporting.
- Dimensional star schemas optimized for specific reporting needs and analytical tools. This directly targets business requirements and optimizes reporting performance.

Potential uses of a data mart to be considered.

- Summarized or aggregated admissions data;
- Stand-alone departmental budget reporting and forecasting;
- Provide enrollment data while keeping individual PII data protected;
- Allow course registration data to be accessible by certain users without revealing grades or GPAs;
- Provide a particular agency a unique view of a subset of demographic information without revealing contact information or certain levels of history.

Recommendation Rationale:
Data marts should be a consideration when increased performance and access control is required. Simplifying data sets and creating smaller slices of the data warehouse can be very useful in several circumstances to solve certain analytical problems or provide targeted data.

Deliverable #11 - Sustainability Plan

11. Provide a sustainability plan and associated costs for the recommended solution.

Background:
The recommended solution is that WCCC implement a centralized dimensional data warehouse, and procure a commercial solution for dimensional design and load processing. Management of the architecture must be centralized and consistent, as well as enabling consistent knowledge transfer among WCCC staff.

A core data warehouse team will be responsible for data integration and build-out of the dimensional model. It is critical to ensure that staff turnover and individual or departmental knowledge does not affect the architecture's sustainability. Custom-developed solutions, such as through SQL Server Integration Services (SSIS), have a higher learning curve and risk. Support of custom solutions requires change management by the database administrators or developers. Managing customer work is time consuming and prone to error. Customizations also limit key knowledge to the role of a single developer, which has inherent risk for a number of reasons.

- Load processing visibility is affected by the primary developer going on leave;
- Junior or inexperienced developers are unable to respond to load processing failures in a timely or reliable manner;
- Change is delayed or not possible due to a single developer's bandwidth or availability;
- Staff turnover means knowledge of processes can be lost when documentation is insufficient or out of date;
- The departure of a custom solution's primary developer often freezes the architecture in time and it becomes obsolete.

Best Practices:
The use of a commercial toolkit for developing and managing the data warehouse provides a consistent and supportable process. A commercial toolkit also has a minimal learning curve for developers and BI professionals versed in dimensional design topics. Self-documenting processes deliver rich metadata and a robust training curriculum. Vendor support is also crucial to the longevity of the data warehouse and provides continuous updates for enhancements and bug fixes.

The process of training business intelligence (BI) professionals who will be involved in data warehousing follows a streamlined approach.

- A seven (7) to ten (10) day on-site training course is sufficient for learning the toolkit and processes. This can be vendor-guided or self-paced;
- Existing BI professionals continue to mentor new hires in the established architecture. However, there are no unknowns because all processes, including customizations, are fully visible and documented by the tool;

- Commercial solutions automate change tracking thereby continually updating information for reference. When senior BI professionals are unavailable, backup personnel can rely on the data warehouse documentation, as well as vendor support;
- Commercial solutions bring a community of other professionals who are outstanding resources in forums. This is not possible with a single developer's custom solution.

Recommendation:
The recommendation for a data warehouse solution is to purchase and implement a commercial data warehouse toolkit. The toolkit is effectively a workbench to manage the development of the data warehouse, which resides on a SQL Server. The SQL Server platform provides more seamless integration with the existing ODS and Colleague instances at each community college.

Recommendation Rationale:
A commercial data warehouse toolkit has the advantage of lower long-term costs. It can be accessed by most reporting tools, including high-end products such as Tableau or Business Objects. For example, a Business Objects created Universe that relies on a dimensional model in the centralized data warehouse or a secondary data mart (or both) is possible.

The recommendation for the database platform is SQL Server. Colleague and ODS environments currently use SQL Server; additionally, client expertise exists with this platform. Interoperability currently exists and server maintenance is a well-understood variable for both software updates and backups. It also carries a lower cost than Oracle-based solutions.

The core vision places an urgency on implementing a reliable and comprehensive data warehouse that does not limit the use of reporting or analytic tools. It also insulates reporting environments from underlying change in the source system by placing load and staging layers between each ODS and the dimensional models. Data warehouse history preserves change history, including deletions in the source system, so the reproducibility of prior metrics is possible. Additionally, point-in-time reporting in a data warehouse gets around the problem of backdated statuses when attempting to reproduce prior census reports.

Deliverable #12 - Governance

12. Provide a recommendation and rationale for the makeup of a data management council for quality control, as well as any other appropriate governance structures.

Background:
In January 2013, the Community College Data System (CCDS) Committee comprised of Commission representatives, together with IR and IT professionals from each community college, submitted to Dr. Jim Rose, WCCC Executive Director, an approval request for a Community College Data Transfer Path and a Data Governance Framework. Building on the significant work already accomplished by the CCDS Committee the following hierarchical model recommends several changes to more seamlessly effect communicative, sustainable, and proficient data governance for the Wyoming Community College System.

Best Practices:
The CCDS committee sited the "Data Governance" definition as defined by the Data Governance Institute, an excellent reference for data governance best practices. Additionally, the following best practices for governing higher education institutional data include:

- Create a data governance structure with a dual focus on data quality and data warehouse/business intelligence that achieves the following results as outlined by the Data Governance Institute:[10]
    - Enables better decision-making;
    - Reduces operational friction;
    - Protects the needs of the data stakeholders;
    - Provides management and staff training for adoption of best practices approach to data issues;
    - Builds standard, repeatable processes;
    - Reduces costs and increases effectiveness through coordination of efforts.
- Establish a Data Management Policy (DMP). This policy serves as the foundation of data governance across the colleges by explicitly outlining the requirements of the Executive Council for governance, accountability, and management of community college data. Included in the policy are details for how the DMP is communicated, accessed, used, enforced, monitored, followed, etc. Specific Data Management Policy statements should address: data ownership, data modeling, maintenance, security, access, meta-data, and accountability;[11]
- Include data quality stewardship practices in the data governance structure. Data governance programs with a focus on data quality identify data quality stewards comprised of individuals and management recognized as business definers, producers, and users of data with ultimate responsibility for the definition, management, control, integrity, and maintenance of a data resource.

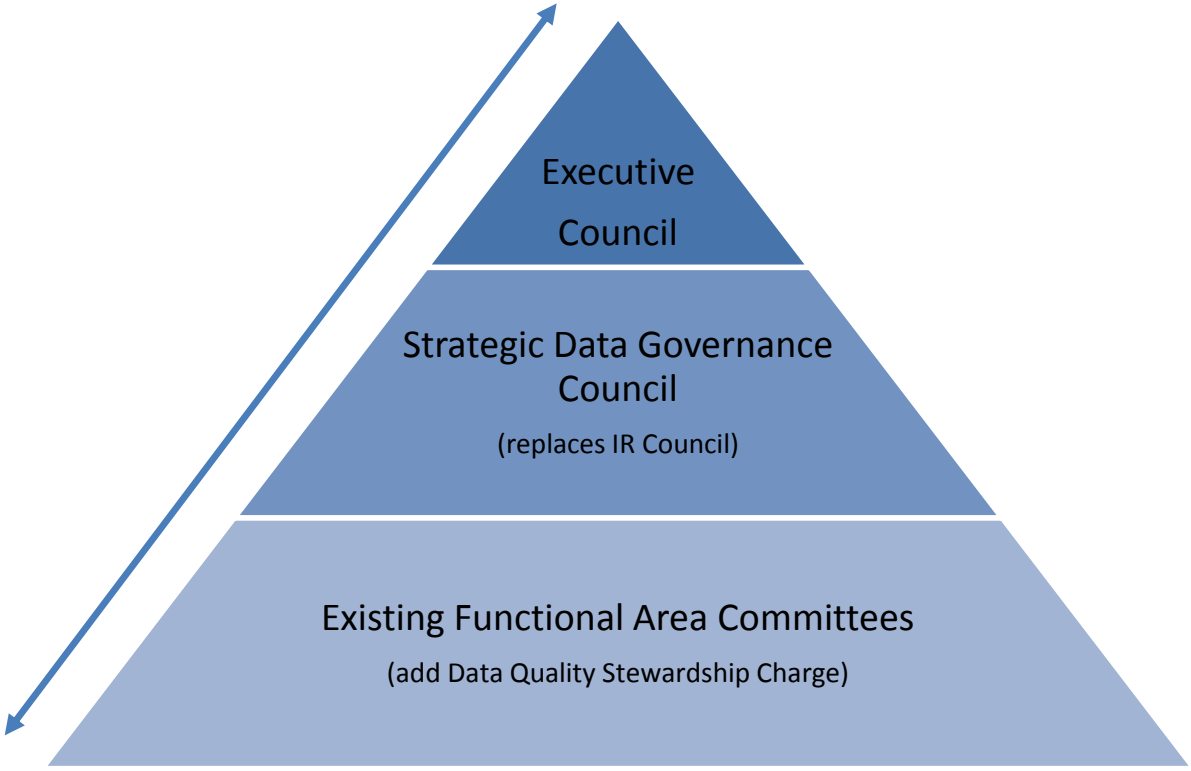
Recommendation:
The proposed data governance structure for the Wyoming Community College System benefits each of the community colleges, the Commission and the Legislature. The new structure shifts the focus from a technical perspective to a functional perspective. It brings additional emphasis to data quality initiatives and promotes the use of data for strategic decision-making.

- Tier 1 (Bottom): Functional Area Committees – Data Quality Stewardship Charge
  Assign the data quality stewardship charge to the existing functional area committees, e.g., Admissions, Registration, Financial Aid, etc. Functional area committees will provide the following:
    - Focus attention on the college data detail including definition, purpose, and use;
    - Establish college wide consistent data coding standards;
    - Continue the work already in progress for standardizing data elements between colleges. If the data element is not in use by any of the colleges it can be flagged as "not needed" and skipped. Future use of any "skipped" data element would need to be approved by the appropriate council;
    - Clean and validate college data as approved by the Strategic Data Governance Council.

[10] See http://www.datagovernance.com.
[11] More information and example policy statements can be found at http://www.tdan.com/view-articles/5280/.

- Tier 2 (Middle): Strategic Data Governance Council
  The Strategic Data Governance Council expands and renames the Institutional Research Council. This approach is taken to avoid creation of another council with similar membership as the existing IR Council. It expands the responsibilities of the IR Council to provide additional focus on strategic research and analysis. The Strategic Data Governance Council is the final authority for data governance issues, unless issues require escalation, and also governs the proposed data warehouse. This council provides governance oversight of the community college Data Management Policy (see Best Practices in this section). Detail tasks involving data element review and standardization are shifted to the Functional Area Committees. This council will focus on the following:
  - Strategic data research and analysis;
  - Identification, compilation, and analysis of education data to address critical research and policy questions serving community colleges and legislative interests;
  - Communicate needs to the Functional Area Committees who enter and maintain the data;
  - Establish accountability checks and balances both at the community college and Commission levels;
  - Govern the proposed data warehouse, and its effectiveness and continual process improvement;
  - Approve/Deny all data governance issues and change requests received from the other councils, and committees not currently reporting to another council e.g., Complete College Wyoming (CCW);
  - Control data sharing and integration processes for data to/from the contributing agencies.
- Tier 3 (Top): Executive Council
  This council has ultimate authority on issues escalated from the Strategic Data Governance Council. It makes recommendations to the Legislature as necessary to help ensure the goals and objectives of the Strategic Data Governance Council are achieved.

Recommended Data Governance Framework:



Additional description of the proposed redefined council and committees is detailed below.

	Strategic Data Governance Council	Functional Area Committees
Description	Strategically driven statewide data governing body.	These are existing committees by function i.e., admissions, registrar, financial aid, etc. with a new data quality stewardship charge.
Authority	Final authority for data governance. Escalate issues, as needed, to the Executive Council.	Make recommendations for data and process change to parent council of the committee.
Membership	IR professionals from each community college, WCCC Business Analytics and Support Section team (BASS).	Functional experts from each of the community colleges at the director or manager level, with data element understanding and insight and college level authority. A technical representative from several colleges, rotating appointments for multi-year terms.
Chair	IR representative rotated from each community college for multi-year appointments.	Functional representative rotated from each community college for multi-year appointments.

	Strategic Data Governance Council	Functional Area Committees
Purpose	Govern statewide sustainable data policy, standards, and data quality processes; Govern centralized data warehouse practices; Ensure community colleges, Governor and Legislature are equipped with data required for informed, timely decision-making.	Focused on functional specific data, i.e., admissions, registrar, etc.; Monitor data quality data against criteria for completeness, correctness, and integrity; Reconcile gaps, overlaps, and inconsistencies in data locally and between the colleges; Make corrections as appropriate and recommend data changes and process improvements to Strategic Data Governance Council.
Goals	Establish and administer the community college Data Management Policy; Provide complete, timely, accurate data and reporting to support the information needs of the community colleges, Governor and the Legislature; Ensure compliance, security, and privacy of data; Manage data complexity and achieve clarity across all community colleges and the Commission; Manage the release of data to the Statewide Longitudinal Data System (SLDS).	Validate data entry procedures: • Data entry personnel training • Data entry standards documentation Identify/merge duplicate records; Correct data codes to conform to approved standards, (i.e., Gender: M= male, F=female, etc.); Ensure data accuracy.
Meeting Frequency	Monthly	Monthly

Deliverable #13 - Dimensional Models

13. Identify dimensional models that could be used, and the reports the models would support.

Background:
Dimensional models are subject areas within a centralized data warehouse or secondary data marts.

The essence of a data warehouse is a collection of information subject areas optimized for reporting and analysis. A subject area is a star schema with a series of fact tables focused on a particular business realm or objective. Dimensions are conformed and shared across subject areas and incorporated into fact tables.

Best Practices:
The implementation of a data warehouse should be agile and iterative. This approach allows quick release of new subject areas and reporting capabilities without having to wait for the entire system to be complete. Enrollment and demographics are the primary subject areas where most higher education data warehouses begin. Beginning with enrollment establishes the core academic data along with demographics and all else required for official census reporting. Subsequent subject areas are then built as reporting requirements dictate.

Recommendation:
Key subject areas and reporting focuses.

- Enrollment
  - Registered and active students along with their academic programs, majors, minors, specializations, and certificates;
  - Useful for enrollment headcounts, academic progress, and outcomes;
  - A cornerstone of the IPEDS reporting cycle, including 12 month reporting requirements.
- Recruitment and Admissions
  - A robust and mature admissions funnel;
  - Supports strategic analysis of recruitment efforts and targets along demographic, academic, economic, social, and geographic lines.
- Student Success
  - Complete College Wyoming metrics;
  - Voluntary Framework of Accountability metrics.
- Human Resources
  - Faculty and staff statistics and census reporting;
  - Review and analysis of faculty load and contracts;
  - Components of employee data are used in official IPEDS reporting.
- Financial Aid
  - Student debt analysis.

Recommendation Rationale:
The recommendation reflects where most institutions start with the development of their dimensional models. Enrollment is not only the primary focus area for higher education data warehouses it also poses the most challenges. Due to its complexity and importance for state, federal, and strategic institutional planning, it is the recommended place to begin.

Deliverable #14 - Tracking SCD0, SCD1, SCD2

14. Provide a written explanation of the criticality of tracking SCD0, SCD1 and SCD2.

Background:
Slowly Changing Dimensions (SCD) are one of the mechanisms by which data warehouses can provide point-in-time reporting. This becomes critical for IPEDS or state reporting when submitted data must be reproducible in later years, or a report must contain descriptive values that existed on a date in the past.

Best Practices:
The types of SCDs commonly used in higher education data warehouses are 1 through 3. Type 0 is not frequently used because a Type 2 dimension provides the same view of each member at the time of its initial insert.

- SCD Type 1: Overwrite. As change to a member occurs, the record is overwritten, losing history. This dimension type is suitable for time dimensions, such as the date or term dimension.
- SCD Type 2: Versioned history. As change to a member occurs the prior record is given an end date and the new version inserted. Individual member versions are joined via their surrogate key. This type is useful for person demographics and descriptive attributes.
- SCD Type 3: Prior value. As change to a particular member attribute occurs, the prior value is retained in a separate column. This type of dimension gives you a direct way to always view the prior value of an attribute.

Explanation:
In higher education data warehouses, many facts about students are calculated in the transactional system and are included in nightly extracts. Some examples of these include cumulative grade point average (GPA), term GPA, and total completed credits. At any given time in the academic cycle, reporting must be able to reproduce values such as completed credits as they were on a prior date. This is common for census reporting such as IPEDS. Another example of this is back-dated statuses, which are a reality in most institutions. A back-dated status will alter report output for a prior term if point-in-time reporting was not available.

In order to provide true point-in-time reporting such as this, a Type 1 dimension would commonly provide the reporting term while Type 2 dimensions are joined for person demographics, academic programs, and majors. A fact table with a grain such as “Student, Term, Academic Program” would either be managed with a type of snapshot or be slowly changing itself. Slowly Changing Fact Tables are a powerful tool in this type of reporting and have been used with great success at other institutions.

The end result is that a user could reproduce a report or dashboard for a date in the term, weeks or months in the past, and see report output exactly as they did previously. This increases confidence in the reproducibility of data in reports over periods of time, even years later.

Deliverable #15 - Current Data Mart Value

15. Can the community colleges use WCCS's current instance of a data mart as part of their reporting solution, given that it keeps track of slowly changing dimensions (SCD2).

Background:
The Wyoming Community College System (WCCS) has implemented a data mart with some slowly changing dimensions (SCD2). This solution exists today; however, the community colleges do not have access. This review examines whether the current data mart is a feasible solution to meet the community colleges' reporting requirements.

Best Practices:
When discussing reporting capabilities with data consumers, the conversations should focus on topics such as the "enrollment subject area," or the "financial aid subject area," all of which incorporate conformed slowly changing dimensions.

A fully-realized business intelligence (BI) architecture should focus on a developer toolkit that enables reporting requirements to drive build-out. Custom solutions, such as SQL Server Integration Services (SSIS) transformations and data flows, are extremely cumbersome in which to manage change and lack the ability to emit metadata automatically for data dictionaries.

Recommendation:
Although community colleges could use the WCCS's current data mart it is not advised due to the incomplete nature of the solution.

Existing, slowly changing dimensions, and data flows should be used as guidance for a future data warehouse implementation.

The recommended architecture considers a centralized data warehouse to be the foundation for all efforts. The data warehouse will be metadata-driven using a commercial developer toolkit, not development on the SSIS canvas. As subject areas are planned and prioritized, driven by reporting requirements, build-out is incremental and will need to respond quickly to change. Secondary data marts can be deployed using the same developer toolkit and source from the data warehouse.

Recommendation Rationale:
While slowly changing dimensions are core to a successful data infrastructure, the solution is incomplete unless it is based on fully evolved subject areas. Tracking history along certain dimension lines does not automatically create optimized star schemas that will power a rich ecosystem of reporting and analysis tools.

Deliverable #16 - College Reporting

16. With the community colleges' recent migration from Unidata to Microsoft SQL, there has been some difficulty reporting and having confidence in those reports at some of the colleges. Provide those colleges with an assessment of whether they can extract and report accurate information from their environments.

Background:
The initial migration to the Ellucian Colleague ERP system (previously Datatel) for all seven community colleges was in 1992, 23 years ago. Since that time, the software has undergone numerous changes and upgrades affecting data format and functionality. All seven community colleges migrated from the Unidata database, originally delivered with the Datatel system, to a Microsoft SQL database in 2013. Each college focused attention on cleaning their data as part of the preparation for migration.

The recent SQL migration fostered an environment of increased collaboration between the seven colleges. However, since the SQL migration, the community colleges have struggled with transitioning to new reporting tools and data structures. Some are better positioned than others, however, none are at the level of capability desired. The business of higher education is increasingly more data driven and requires greater technological proficiency.

All Wyoming community colleges own Ellucian's Colleague Operational Data Store (ODS) and Colleague Reporting and Operating Analytics (CROA) products. The ODS is refreshed nightly at the colleges.

Two data issues were examined at each college: 1) Is the data accurate? 2) Can the data be extracted into meaningful reports? Issues common to all the colleges are listed below followed by a detailed review of each college.

Issues Common to All Colleges

A number of data accuracy and reporting issues were found to be consistent across all the colleges, they include:

- Upper management lacks confidence in the integrity of system data;
- Administrators cannot always get requested reports;
- Extensive Hathaway processes and reporting issues;
- Inconsistent recording and reporting of workforce data;
- Executives, IR staff, and end-users expressed confidence issues in reports generated via CROA:
    - CROA was not implemented consistently across the colleges;
    - There is an impression that CROA data is not consistent with Colleague data;
    - CROA reports cannot be shared between colleges due to differences in CROA implementations (ODS structure, field names) between colleges;
    - Business Objects training and help understanding CROA Universes are needed.
- Data and reporting is focused primarily on operational and compliance requirements, not strategic issues;
- Colleague delivered duplicate record reporting processes have not been fully implemented;
- Integration issues between Colleague, the LMS or other 3rd party software;
- Error reporting is minimal or non-existent;
- Canned reports are not useful;
- No point-in-time reporting capabilities;
- Dashboards have not been successfully developed or implemented and those provided with CROA are not useful;
- Limited personnel resources are available for data validation and reporting.

Assessment by College:

Casper College

Casper College		
Data Related	*Reporting Related*	*Other Points*
IT believes the data is clean with the exception of dates on some very old records; Employment and wage information is incomplete and there is no electronic storage method identified for data that is collected.	Tableau reporting tool, purchased two years ago, is in the implementation phase; No IT support assistance is available for reporting; Significant dependence on Excel spreadsheets to store and report data (less so in HR area after Ellucian training); Often unable to provide reports requested by the Legislature.	Reporting is done by super users within each functional area; 3rd party contractor (Adam) provided CROA training; Business Objects is being used for most reports; Datatel Users Round Table (DURT) - Monthly Colleague user group meetings are conducted.

Central Wyoming College

Central Wyoming College		
Data Related	*Reporting Related*	*Other Points*
IT believes the data is clean and the differences are likely due to inconsistencies between colleges; Pathways, scholarship, and alumni data is incomplete; Non-credit courses are tracked manually; Administrators are unable to use data to determine what is	Not able to combine disparate pieces of data into any meaningful story.	No shadow systems exist in the finance area; SQL and functional area expertise in IT, as well as, four power users in the functional areas; One position short in IT, which they have not been able to fill for over a year.

Central Wyoming College		
Data Related	*Reporting Related*	*Other Points*
working or not working for the students; Mapping a significant number of data elements (50+ out of 256) to the staging database; Integration issues between Astra Schedule and Colleague.		

Eastern Wyoming College

Eastern Wyoming College		
Data Related	*Reporting Related*	*Other Points*
Integration problems between Campus Cruiser (email and LMS) and Colleague; Possible problems with the transforms to CROA; WCCC validation report not reviewed or any associated corrections made; Known issues with the HR data which are being addressed; A retired employee, on a consulting basis, is providing data knowledge transfer; No standardized data validation routines;	Since the SQL migration, Admissions and Financial Aid reporting is limited; Difficulty extracting information from CROA; Data manipulation using Excel is required; Data is not validated prior to reporting to the Commission; IR director is tasked with most of the reporting; Plans are for the IR director to provide report training to the functional super users, however, this may not	All data is entered directly into Colleague, there are no shadow databases; Possibly understaffed college-wide and a significant decrease in future funding is anticipated; EWC's internal data integrity group formed approximately 4/5 years ago meets once a semester but needs increased activation; SQL training is planned for IR and key IT personnel.

Eastern Wyoming College		
Data Related	*Reporting Related*	*Other Points*
Many duplicate records, especially with continuing education students.	be realized due to availability constraints.	

Laramie County Community College

Laramie County Community College		
Data Related	*Reporting Related*	*Other Points*
Starfish data doesn't match CROA data; One way integration, Colleague to Starfish, via flat files; Schedule information is dumped into Adobe which may be corrupting the data; Online admissions application is manually entered into Colleague; Faculty/student advising relationship never end-dated; PCard integration is manual via a massaged Excel file; HR data is not in Colleague correctly; Employment applications are entered manually.	Meaningful reports are not available so LCCC is generally working blind; Unable to get reports, examples include list of active employees, yield rates; Unable to measure benefit of changes made to programs or processes; Excel is predominate reporting tool; Minimal reporting assistance available from IT; Dependence on WCCC state payroll reports; No SQL expertise; Update to CROA 4.1 not completed; Time/effort is required to make internal reports match the state reports.	Benefited from 3rd party contractor assistance with CROA reporting; Established a Data Standards Oversight committee; Three IR personnel share data and reporting responsibilities; Considering the purchase of Ellucian Recruiter, with existing data and integration problems the timing may not be optimal.

Northern Wyoming Community College District

Northern Wyoming Community College District		
Data Related	*Reporting Related*	*Other Points*
Financial aid data integrity is in question, Perkins data is not entered into Colleague; Payroll at NWCCD is unique and there are multiple problems with the HR data; Spreadsheets are used to track endowments; Not all outreach locations are included in facilities data which effects state funding; Ellucian Colleague Recruiter allows entering of duplicate SSN; Ellucian Colleague Recruiter integration is not working correctly; CROA universe is missing some elements for Finance and HR; CROA field names do not match Colleague field names; CROA refresh cycle doesn't always run properly.	SQL migration was a set-back in terms of reporting, only 2 users can generate reports; CROA users don't understand table joins to allow for correct report building; Unable to get answers to "what if" types of questions; State Perkins report was incorrect the past two years; IT does not understand functional areas so cannot assist with reporting; Biggest challenge is student data ad hoc reporting; Cannot get an active student count using CROA; Inability to use save lists; Takes from a week to a month to report on legislative questions; Reporting not available for Ellucian Student Planning module;	Need to develop power users in the functional areas and shift data responsibility away from IT; Scrubbing data for admissions, advising, financial aid is in progress; KPIs are provided to VPs on paper; A new employee in IT is being trained to assist with reporting; Colleague has not been customized; Billing data is mapped for consistency with other colleges.

Northern Wyoming Community College District		
Data Related	*Reporting Related*	*Other Points*
	Problems with Financial Aid CROA reporting.	

Northwest College

Northwest College		
Data Related	*Reporting Related*	*Other Points*
Budgeting done using Excel; Ellucian Recruiter is not being used sufficiently; Data accuracy issues in cases where entry is performed by students; Data not always validated before sharing with WCCC; Ellucian Student Planning module is not being used effectively; Lack data entry consistency rules for addresses, etc.; Colleague updates are not always tested before going into production; CROA doesn't always refresh correctly overnight; HR shadow database is used for the master employee list;	Problems getting adequate reporting from the registrar area; Reporting is channeled through IR which is overwhelmed; IT handles reporting request overflow from IR but it is less efficient use of resources; Dependence on Excel and SPSS for statistical analysis and reporting; KPI's have not been defined.	IR efforts have improved over past 4/5 years; Minimal Colleague customizations so few transforms are required; Three IT personnel have SQL proficiency; Both IR and IT work at cleaning data; IR provides CROA training to functional super users; A additional personnel resource is requested by IR; Active Datatel (Colleague) users group exists; IR is developing Dashboards.

Northwest College		
Data Related	*Reporting Related*	*Other Points*
Financial aid awards are handled manually; Duplicate records are merged once a year.		

Western Wyoming Community College

Western Wyoming Community College		
Data Related	*Reporting Related*	*Other Points*
HR and Workforce information is not entered into Colleague; Business Offices are using shadow databases; Many local customizations exist in Colleague; CROA for student areas is not working; Received minimal Ellucian assistance with CROA implementation; ACT is manually entered into Colleague; Duplicate records are being created in Recruiter.	Unable to get accurate list of employees; Report generation is taking much longer (5 hours vs 5 minutes); SQL is the only reliable reporting tool but only a few personnel have SQL reporting abilities; No support is available from IT for reporting; Budget reports are not available through CROA.	Implementing Blackboard Analytics data warehouse software; Using Pyramid for some reporting; SQL expertise exists in IR; IR personnel are attending SQL training 10/2015; Ellucian assistance with Recruiter has been scheduled.

Best Practices:

Listed below are common best practices for data handling and reporting in the higher education environment.

- Top level direction and support providing clear definitions of what is important for reporting and decision-making;
- Established project plan and governance for data management;

- Industry standard data security practices;
- Provide limited access to live data when there is an operational necessity other than report development;
- Regular, formal systems and report training;
- Elimination of paper-driven processes and shadow systems for housing and reporting data;
- Data dictionary and process documentation;
- Collaborative user interaction, e.g., user groups;
- Embrace transparency.

Recommendation:

- Implement data governance and policy standardization across all the community colleges:
    - Establish leadership and authority;
    - Standardized data validation routines and error reporting to locate data issues;
    - Processes to sustain data alignment and consistency between the colleges;
    - Pool resources to assist with reporting.
- Data and process alignment across the colleges;
- Re-implement CROA Universes consistently across the colleges;
- Establish use of Colleague duplicate record reporting processes;
- Consider standardization of reporting tools used at all seven community colleges;
- Continue data consistency efforts between colleges;
- Enhance training initiatives:
    - Formal Colleague and reporting training;
    - Training on statewide selected reporting tools;
    - CROA, SQL training grouped by functional area.

Recommendation Rationale:

- Empowers community colleges to be responsible for the accuracy of their respective data;
- Maximizes reporting knowledge base;
- Increases ability to share reports between institutions;
- Builds on collective reporting successes;
- Shares lessons learned from reporting areas that need development;
- Enables accurate state level reporting and associated appropriation of funding;
- Communicates a single truth for all Wyoming community colleges.

Deliverable #17 - Contributing Agency Data

17. Provide written assumptions regarding the quality of the data received from all contributing agencies.

It is important to understand the data challenges on a college level to understand the affect those challenges may have regarding the contributing agencies. Discussions with personnel within each institution revealed institutional differences regarding operations and common collection practices. One significant difference is the capturing of the Wyoming Student Identifier (WISER ID). Some colleges charge the collection of the WISER ID as an admissions responsibility, and others assign the Financial Aid Office. Some colleges are consistent with obtaining and logging the WISER ID for every student and some colleges admitted that WISER ID's do not exist in Colleague for all students. Enrollment policies also differ among the colleges. Some colleges end the program for students who stop-out for a period; other colleges do not regardless of the amount of time a student is gone from the college. The Hathaway Scholarship presents many challenges for all of the colleges. Much of the work to determine eligibility and award the scholarship is manual. Some colleges use one specific code in the Colleague financial aid module to identify the Hathaway scholarship; other colleges use multiple codes. The codes reflect specific information about the scholarship, such as the scholarship level and term awarded.

Interviews with the WCCC staff offered insight as to the consistency of data from the colleges. The SQL migration revealed data integrity challenges that continue to cause struggles for the colleges today. The WCCC often provides scripts for the colleges to run to produce the data necessary for reports. The data extracted by the colleges may have filters changed by the colleges when running reports, or data scrubbed prior to data submission to the WCCC, which often leads to incorrect or missing data. The Department of Workforce Services (DWS) has the responsibility of tracking Wyoming students throughout their education and into the workforce. An integral part of having the ability to track student progress is having the WISER ID assigned at the college level. If the WISER ID is missing or incorrect, it can cause difficulties matching students in reports. Another challenge for DWS is the inability to gather accurate data from the colleges because of varying business rules on the college level. Variable data definitions prevent data comparability. College personnel experience frustrations trying to obtain career information from DWS so the colleges can track pathways for graduates. The Wyoming Department of Education supports the Hathaway scholarship. The WISER ID is also important for the Wyoming Department of Education (WDE) for its processes. However, colleges may or may not send the WISER ID to the Department of Education; often times the college provides the college student identifier in its place. The WDE is responsible for updating the Hathaway eligibility database. Colleges access the database to review student eligibility; however, the last update to the database is for summer 2012. This makes the job of identifying student eligibility increasingly manual for each college awarding the scholarship.

The meeting with Enterprise Technology Services (ETS) revealed that ETS does not and will not in the future SLDS system own the data. Each college and the Commission owns the data. The University of Wyoming (UW), is an agency for the purposes of this report and does not provide data to the WCCC. Discussions with UW involved transcript information between colleges. The recommendation regarding transcripts is available as a response to Transcript Processing (Deliverable #19). The alignment of

college business operations and common collection practices will not only support the WCCC's goals and initiatives, but it will also improve process workflow and lead to consistent clean data.

Deliverable #18 - Common Glossary

18. Identify the data elements that must be shared between the WCCS and contributing agencies and create a common glossary of terminology so that confusion can be minimized. These documents will be used to answer research questions outlined by DQC, as well as the associated values that should be stored in the fields.

The following data elements glossary represents information that the WCCS and contributing agencies may need to share to meet reporting and research needs. The list includes standard terms as defined by the National Center for Education Statistics and terms previously defined by the Wyoming Community College Commission (WCCC) in Chapter 1 Definitions, Wyoming Statutes 21-18-201 through 21-18-225. The WCCC terms are denoted as (WCCC) following the definition.

Glossary	
Data Element	Definition
Academic Level	The academic level code representing the status of a student.
Academic Program	Program for which an admitted student may be granted a degree or certificate upon completion of required coursework.
Academic Term or Term	An academic term is a subset of time of an academic year. Postsecondary education generally defines terms as fall, spring, summer or fall, winter, spring, and summer terms.
Academic Year	An academic year is the portion of time in a year during which students attend an educational institution.
Admitted Student	An applicant admitted into a college degree-granting program.
Applicant (First time, first-year)	An individual who has fulfilled the institution's requirements to be considered for admission (including payment or waiving of the application fee, if any) and who has been notified of one of the following actions: admission, non-admission, placement on waiting list, or application withdrawn (by applicant or institution).
Annualized Headcount	Includes attendance in summer, fall and spring terms. Total credit hours attended by students divided by 12 which is the state standard for full-time attendance. Students auditing courses are included in the calculation.
Annualized Full-Time Equivalence	The sum of the number of credit full-time equivalent students for the summer, fall, and spring semesters (final report), divided by two. (WCCC)
Census Date	The official date for reporting enrollment data and is the date immediately following the twelve percent (12%) completion date of the instructional period. For open entry/exit courses, the census date is fifteen (15) working days after the student initiates the course. (WCCC)

Glossary	
Data Element	Definition
Certificates, Credentials, Degrees (CCDs)	Term used specifically in the Colleague SIS to identify certificates of completion which can be in addition to earned degrees or earned individually. (WCCC)
CIP Code	The U.S. Department of Education's six-digit classification code that identifies postsecondary instructional program. (WCCC)
College ID	Value assigned by the WCCC to each college to distinguish it from another. (W71 – Casper College, W72 – Central Wyoming College, W73 – Eastern Wyoming College, W74 – Laramie Community College, W75 – Northwest College, W76 – Northern Wyoming Community College District, W77 – Western Wyoming Community College).
Colleague Student ID	The 7-digit Student ID that is auto-generated by Ellucian Colleague for each student in the Colleague database. (WCCC)
Completer	A completer is a student who receives a conferred certificate, degree or diploma, or other formal award from a post-secondary institution.
Concurrent Enrollment Course	A college course section taught by high school faculty approved by the community college to serve as adjunct faculty teaching said course as part of their duties as a school district employee. The college courses simultaneously satisfy high school graduation requirements. The community colleges have approved the coursework as having equivalent course content, learning objectives and work assignments as an existing college course. Course content and learning objectives are equivalent to the related community college course as determined and defined by community college faculty. (WCCC)
Concurrent Enrollment Student	Students enrolled in high school take college-credit bearing courses taught by college approved high school teachers.
Contact Hour	A unit of measure that represents an hour of scheduled instruction given to students. Also referred to as clock hour.
Cost of Attendance	The average cost to attend for the student's period of enrollment. It includes tuition and fees, books and supplies, room and board, transportation, loan fees, and personal expenses. Colleges adjust the COA yearly to reflect changes to these costs.
Course Completion	A measure expressed as the percentage of enrollees who earned a grade of 'C' or better out of all non-audit enrollees on or after the census date. The numerator includes student course enrollments completed with grades A, B, C, S and P. The denominator includes student course enrollments completed with grades of A, B, C, S, P, D, F, U, W, and WI. Courses with a grade of 'Incomplete' are excluded from the denominator. (WCCC)

Glossary	
Data Element	Definition
Course Information	College coursework student is taking or has taken towards the completion of a certificate or degree (including remedial coursework).
Course Section Credit Type	The Colleague code that identifies whether coursework is considered institutional or remedial.
Course Section Division	Division code assigned to a course section denoting the division for which the course is assigned (i.e. a division code of 'CE' attached to a course would reflect the course section is a continuing education course).
Credit Certificate	A title conferred upon a student by a community college district upon completion of a coherent list of academic courses, which is less than the number of academic courses necessary to obtain an Associate's Degree. (WCCC)
Credit Hour	The unit by which course work is measured as a defined by the Higher Learning Commission's Credit Hour Policy No 3.10(a). (WCCC)
Cumulative Grade Point Average	The numerical average of all of the student's grades achieved during the period of study at an institution.
Degree	A title conferred on a student by a district on completion of a defined academic program of study approved by the local board of trustees and the Commission. (WCCC)
Degree-seeking Student	Students enrolled in courses for credit who are seeking a degree or formal award. Includes students enrolled in vocational or occupational programs.
Drop	Term used when a student withdraws from a course.
Dual Enrollment	A program through which high school students may enroll in college courses while still enrolled in high school. Students are not required to apply for admission to the college in order to participate. Classes are taught by college faculty and the school district allows high school graduation credit.
Dual Degree	Program of study in which a student receives two degrees from the same institution.
Duplicated Headcount	A student may be counted more than once depending on what is being reported.
Ethnicity	Ethnicity with which admitted student self-identifies ("Hispanic or Latino" or "Non-Hispanic or Latino").
Financial Aid Award Code	Code assigned to a specific financial aid award to indicate specific financial aid money awarded to students.
Financial Eligible College	The college determined to be eligible to award federal financial aid to a student in a case where a student is concurrently enrolled at two or more colleges during the same semester or term.

Glossary	
Data Element	Definition
First-Generation Student	Neither parent has a bachelor's degree at the point in which a prospective student applies for college. TRIO definition includes the following: a student neither of whose natural or adoptive parents received a baccalaureate degree; a student whose sole custodial parent did not receive a baccalaureate degree; a foster care youth; an individual who is homeless; a veteran of the US military.
First-time Student	A student attending any institution for the first time at the level enrolled. Includes students enrolled in the fall term who attended a postsecondary institution for the first time at the same level in the prior summer term. Also includes students who entered with advanced standing (college credit earned before graduation from high school).
First-time, First-year (freshman) Student	A student attending any institution for the first time at the undergraduate level. Includes students enrolled in the fall term who attended college for the first time in the prior summer term. Also includes students who entered with advanced standing (college credits earned before graduation from high school).
First-year Student	A student who has completed less than the equivalent of 1 full year of undergraduate work; that is, less than 30 semester hours (in a 120-hour degree program) or less than 900 contact hours.
Full-time Enrollment Status (Enrollment Perspective)	A student enrolled for 12 or more semester credits, 12 or more quarter credits, or 24 or more contact hours a week for each term. Unless otherwise stated in a survey, this is the definition to use when providing enrollment type numbers.
Full-time Enrollment Status (Financial Aid Perspective)	A degree-seeking student, enrolled in an eligible degree/certificate program, attending 12 credit hours (or its equivalent) or more in a term.
Grade	The final grade assigned a student for a course.
Grade Level	Level for student based on credit hours completed. (0-29 - Freshman (01), 30-59 - Sophomore (02), 60-89 - Junior (03), 90+ Senior (04, 05).
Grade Point Average (May also be known as Term GPA)	The average of grades earned in all courses taken during a term divided by the number of credits.
Graduation Date	Date admitted student graduated from a certificate or degree program.
Graduation Rate	The graduation rate reflects the percentage of students who graduate from a certificate or degree program within 150% of normal timeframe for a program.

Glossary	
Data Element	Definition
Half-time Enrollment (Enrollment Perspective)	A degree-seeking student, enrolled in an eligible degree/certificate program, attending 6 to 11 credit hours (or its equivalent) in a term. Unless otherwise stated in a survey, this is the definition to use when providing enrollment type numbers.
Half-time Enrollment (Financial Aid Perspective)	A degree-seeking student, enrolled in an eligible degree/certificate program, attending 6 to 8 credit hours (or its equivalent) in a term.
Hathaway Honors scholarship	Student must have 4 years of math which must include Algebra 1 & 2, Geometry and an additional math; 4 years of language arts; 4 years of science; 3 years of social studies (five content areas must be covered in 3 years); 2 years of sequenced foreign language (i.e. Spanish 1 and 2); 3.5+ GPA and a composite score of 25 or above on the ACT. All Hath = WCCC
Hathaway Performance Scholarship	Student must have 4 years of math which must include Algebra 1 & 2, Geometry and an additional math; 4 years of language arts; 4 years of science; 3 years of social studies (five content areas must be covered in 3 years); 2 years of sequenced foreign language (i.e. Spanish 1 and 2); 3.0 GPA and a composite score of 21 or above on the ACT.
Hathaway Opportunity Scholarship	Student must have 4 years of math which must include Algebra 1 & 2, Geometry and an additional math; 4 years of language arts; 4 years of science; 3 years of social studies; Foreign language – Demonstrate proficiency on the state standards for the foreign cultures and languages common core of knowledge; 2.5 GPA and a composite score of 19 or above on the ACT.
Hathaway Scholarship-Provisional Opportunity	Students must meet current high school math graduation requirements, must include two of the three Algebra 1, Algebra 2 and Geometry; Language arts – current high school graduation requirements; Science – current high school graduation requirements; Social Students – current high school graduation requirements; Foreign language – Demonstrate proficiency on the state standards for the foreign cultures and languages common core of knowledge; 2.5 GPA and a composite score of 17 or above on the ACT or 12WorkKeys.
High School Cumulative Grade Point Average	The numerical average of all of the student's grades achieved during the period of study in a Wyoming High School. (WCCC)
K12 Unique Student Identifier	WISER ID assigned to Wyoming public school attendee students; Non-Wyoming attendee students should have an alternate ID assigned to indicate they are not a Wyoming public school attendee and therefore do not have a WISER ID. (Required element to provide the ability to match student records between the pre-K-12 and postsecondary systems.) (WCCC)

Glossary	
Data Element	Definition
Less Than Half-Time Enrollment (Enrollment Perspective)	A degree-seeking student, enrolled in an eligible degree/certificate program, attending 1 to 5 credit hours (or its equivalent) in a term. Unless otherwise stated in a survey, this is the definition to use when providing enrollment type numbers.
Less Than Half-Time Enrollment (Financial Aid Perspective)	A degree-seeking student, enrolled in an eligible degree/certificate program, attending 1 to 5 credit hours (or its equivalent) in a term. Unless otherwise stated in a survey, this is the definition to use when providing enrollment type numbers.
Matriculated Student	A student enrolled in a certificate or degree program.
Non-Matriculated Student	A student enrolled in a course or courses but not in a program leading to a degree.
Part-Time Student	A student enrolled for fewer than 12 credits per semester or quarter, or fewer than 24 contact hours a week each term. (If a survey calls for 'Part-time' students this definition may be used. If more specific information is required, consider using the definition for 'half-time' and 'Less than Half-Time' to further break out attending populations.
Persistence	Persistence is a student's post-secondary education continuation behavior that leads to graduation. (i.e., did a student who attend in the fall term also attend in the spring term?)
Prospective Student	An individual considering attending college but has not officially enrolled to attend a particular college.
Race	Category used to describe groups to which individuals belong, identify with, or belong in the eyes of the community. A person may be counted in only one group. Groups: White, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian, Pacific Islander.
Race/Ethnicity Unknown	Category used to classify students or employees whose race/ethnicity is not known and whom institutions are unable to place in one of the specified racial/ethnic categories.
Registered Credit	The number of credits for a course with an active current status (A (add) or N (new).
Registered Credit Date	The date the registered credit status was added or changed.
Residency	The student’s original home residency.
Retention	The percentage measurement showing how many students re-enrolled at an institution that they attended the previous year.
Three-Quarter Time Enrollment (Financial Aid Perspective Only, Does	A degree-seeking student, enrolled in an eligible degree/certificate program, attending 9 to 11 credit hours (or its equivalent) in a term.

Glossary	
Data Element	Definition
Not Apply to Enrollment Perspective)	
Transfer Student	A student entering the institution for the first time but known to have previously attended a postsecondary institution at the same level (e.g., undergraduate). The student may transfer with or without credit.
Unduplicated Headcount	A student is counted only once when a report calls for an 'unduplicated headcount'
Western Undergraduate Exchange (WUE)	A regional tuition-reciprocity agreement that enables students from Western Interstate Commission for Higher Education (WICHE) states to enroll in participating two and four-year public institutions at 150 percent of the enrolling institutions' resident tuition rate. (WCCC)

Deliverable #19 - Transcript Processing

19. Deliver functional and technical recommendations on electronic post-secondary transcript exchange, including initial and ongoing costs, potential vendors, and timeline for completion.

Background:
Wyoming community colleges and the University of Wyoming commonly exchange transcripts via paper or PDF files. All transcripts currently exchanged must be printed or downloaded and sent to the requested institution manually. Additionally, all transcripts must be manually input into the receiving institution's student Enterprise Resource Planning (ERP) system. This process includes verification of transfer equivalencies upon entry.

Best Practices:
Several higher education institutions nationwide exchange transcripts electronically. This process usually consists of the requesting institution or student using a service to request a transcript be sent to another institution. This service can be in place locally at the institution where the transcript is desired or through an online exchange service.

The best scenario for this process would be for the requesting institution to receive the transcript and have it automatically uploaded directly into their Student Information System (SIS). This scenario requires an API or load process to import the data. This data is usually exchanged securely in XML or sequential format.

It is suggested that processing of transcript requests and importing transcripts utilize methods or processing currently in place in the SIS system to ensure proper record creation and processing such as transfer equivalency evaluation. Custom development implementation of transcript exchange has been successful in some cases, however, the maintenance and compliance with changing SIS processes can make these solutions difficult to sustain.

Recommendation:
It is recommended that Ellucian customers participate in the National Student Clearinghouse transcript service and utilize the Ellucian eTranscript solution. This solution is due to be available in an Ellucian general release in the next few months and is at no cost. Since all community colleges and the University of Wyoming use Ellucian ERPs (Colleague and Banner respectively) this vendor supported solution makes the most sense. No custom development is required by institutions and future enhancements and modifications to the SIS system will support this solution.

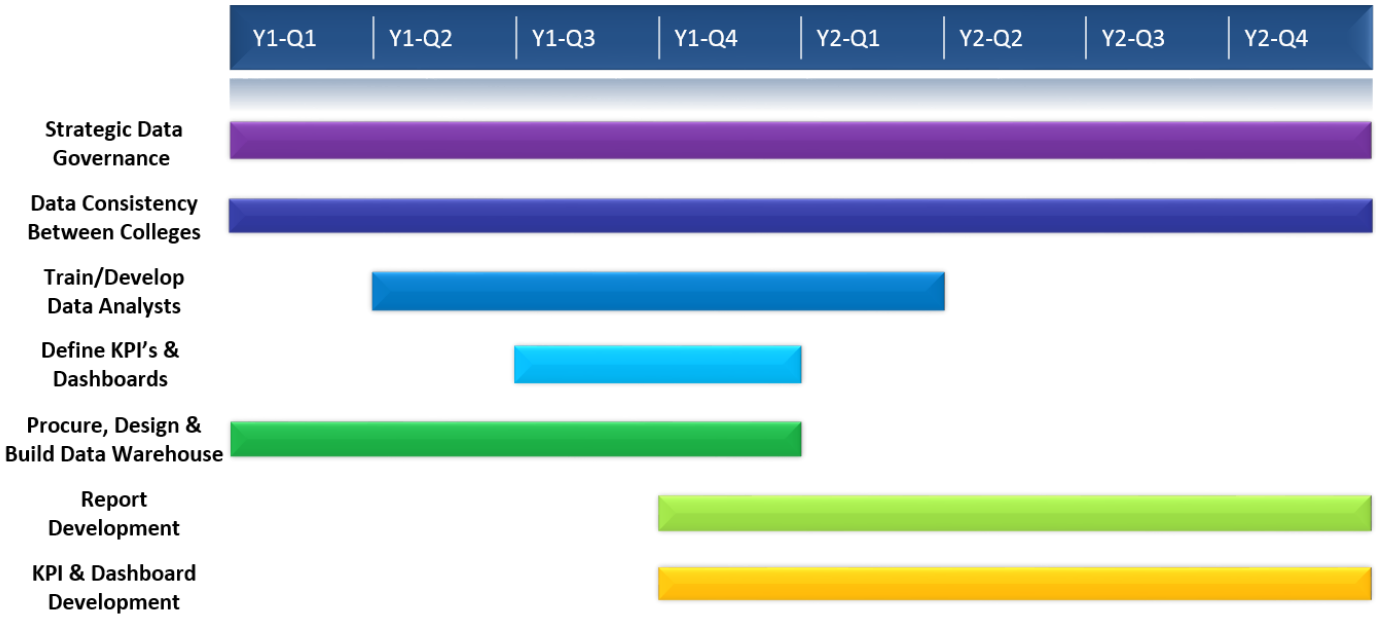
Recommendation Rationale:
Custom development and implementation of a solution of this nature is costly and requires extensive testing and personnel resources to achieve success. Maintaining custom development for this process plus maintaining the system requires specialized resources most colleges do not have. When entering and updating academic and demographic records into an SIS many factors must be considered to ensure data integrity and duplicate record resolution. Other non-vendor supported solutions exist. However, without vendor support there is no guarantee these solutions will continue to function as the SIS systems change.

Summary Roadmap & Budget Considerations

The following is a summary of recommendations derived from the Data Management and Analytical Reporting Needs Analysis. The purpose of the recommendations is to enable the WCCS to implement a successful centralized data warehouse that satisfies the needs of the key stakeholders across the community colleges, Commission and the state. Ultimately, these recommendations when assembled over time will achieve the desired results.

- Select a third-party partner to provide ongoing strategic data management, analytical reporting guidance, and assistance to the community colleges and the Commission;
- Enhance the WCCS Data Governance Framework by implementing a Strategic Data Governance Council and adding data stewardship responsibilities;
- Procure and implement a commercial data warehouse toolkit to plan, design, and build a centralized dimensional data warehouse for collection of community college data;
- Implement project management and establish project plans to achieve implementation goals;
- Promote data consistency and process alignment across the community colleges;
- Implement formal data quality processes;
- Institute a business intelligence reporting tool for data analysis including strategic reports, KPIs, and dashboards;
- Create data marts of simplified, smaller slices of specific data warehouse data, for sharing with agencies;
- Provide professional training programs for data research analysts.

The schedule below shows a proposed sequence for implementing the WCCS centralized data warehouse recommendations.



Strategic Data Governance:
Having the proper data governance structure in place will streamline standardization of data definitions, rules, and processes to ensure data consistency, quality, and reliability. Data governance should also address data ownership, data modeling, maintenance, security, access, metadata, and accountability.

- Implement New Data Governance Framework;
- Establish Data Management Policy;
- Define Cross-College Data Integration Strategy;
- Implement Formal Data Quality Processes.

Data Consistency between Colleges:
Data consistency and process alignment is essential to the creation and ongoing operation of an effective data warehouse and consistent, accurate reporting. Each college, if left to operate in an independent manner, may only see as far as its individual interests regarding the centralized data warehouse. It is essential that the community colleges come together to review and align processes of not only their Colleague ERP systems but also other enterprise systems such as Learning Management Systems (LMS) used at the colleges. There are four different LMS's used by the community colleges: Moodle, Blackboard, Desire2Learn, and CampusCruiser.

- Development of a data dictionary for use by the Commission and the community colleges;
- Analysis of processes producing data for use in the data warehouse (Ellucian Colleague, Learning Management System, and other enterprise solutions);
- Development of procedures, rules, edits, and processes to enforce data definitions as close to the moment of capture as possible, thereby creating data consistency within the data warehouse;
- Training and documentation of aligned enrollment and business processes to sustain data reliability within the data warehouse;
- Process alignment will focus on creating data consistency within the data warehouse and does not constitute business processing reengineering at the individual community colleges.

Train/Develop Data Analysts:
Research and analytical staff must have the ability to convert data into clear and concise management information. In the higher education environment, this is accomplished by collecting and interpreting data for use by the college, as well as, other governmental and accreditation agencies involved in planning, policy formulation, decision-making, assessment, and administration.

- Engage third-party expertise, guidance, and assistance during centralized data warehouse deployment;
- Provide additional training for current IR staff in CROA and SQL so the colleges can create additional data elements as needed by the data warehouse;
- Create and institute an IR mentoring program.

Define Reports, KPIs and Dashboards:
WCCS has common strategic data needs that can be addressed by the centralized development of reports, KPIs, and dashboards that are defined by stakeholders through the Strategic Data Governance Council. There are several resources available to jump-start the definition of metrics such as the Voluntary

Framework of Accountability (VFA) facilitated by the American Association of Community Colleges (AACC), Complete College Wyoming, Complete College America, and the Data Quality Campaign.

- Coach the Strategic Data Governance Council on defining metrics for reports, KPIs, and dashboard development;
- Determine questions to be answered through KPIs;
- Create logical groupings of metrics for dashboards;
- Create data modeling and demonstration of metrics for review.

Procure, Design & Build Data Warehouse:

The implementation of a centralized data warehouse will benefit all stakeholders. Each college can leverage the data warehouse for strategic data resources. Additionally, centralizing the development of strategic reports, KPIs, dashboards, and other resources will decrease work redundancy and ensure consistency among reports. Each college will participate in the design of analytical solutions to ensure the solutions are useful to each institution. The implementation of a centralized data warehouse will position WCCS as a leader in preparedness for the Statewide Longitudinal Data System (SLDS).

- Select and procure of data warehouse toolkit solution;
- Train on data warehouse tools;
- Establish the computing environment and infrastructure for a centralized data warehouse;
- Design time and reporting dimensions to support colleges, Commission, and legislators;
- Develop and deploy security roles for the data warehouse;
- Develop cross-college reports;
- Testing and validation of data, reports, metrics and dashboards;
- Develop and provide training for the Commission and college staff.

Report, KPI, and Dashboard Development:

The definition and development of reports, KPIs, and dashboards is separated on the above timeline because it is important to delineate between metrics needed by various stakeholder groups and the technical development of reports, KPIs, and dashboards. There is obvious overlap when defining and developing reports, KPIs, and dashboards but it is essential to first satisfy the strategic and functional aspects of strategic reporting.

- Work with Strategic Data Governance Council on the definition of metrics for reports, KPIs, and dashboards;
- Create data modeling and demonstration of metrics;
- Develop detailed algorithms and routines to produce metrics;
- Deploy iterative development processes with stakeholders;
- Validate developed reports, KPIs, and dashboards with cross-functional teams.

Turning recommendations into reality will require additional funding from the state and/or other funding sources. The following is a budgetary estimate of total price including expenses over a two-year period. Ongoing support costs can be found in Appendix I.

Budget Consideration	Low	High
Strategic Data Governance	$ 145,000	$ 160,000
Data Consistency*	$ 725,000	$ 800,000
Train/Develop Data Analysts	$ 145,000	$ 160,000
Procure/Design/Build Data Warehouse	$ 1,015,000	$ 1,120,000
Report Development	$ 435,000	$ 480,000
KPI/Dashboard Development	$ 435,000	$ 480,000
Consulting & Solution Development**	**$ 2,900,000**	**$ 3,200,000**
Hardware & Software	$ 500,000	$ 750,000
Total	**$ 3,400,000**	**$ 3,950,000**

*Process alignment will focus on data consistency within the data warehouse. This does not include business process reengineering at the individual community colleges.

**For WCCS centralized data warehouse. Assumes the Commission and each community college owns and maintains Ellucian ODS and CROA.

Consulting expertise in the budgetary estimate includes the following:

- Project Leadership;
- Data Warehouse development including:
  - Implementation of new data governance framework;
  - Development of data definitions;
  - Process alignment creating data consistency within the data warehouse;
  - Select and implement data warehouse toolkit;
  - Design and build centralized dimensional data warehouse;
  - Develop and provide training;
- Business Intelligence Technical Services;
- Business Intelligence and Colleague Reporting Services;
- Comprehensive Functional Area Services.

Conclusion

The postsecondary landscape is increasingly more data-driven. Timely, comprehensive, and accurate data is required by policymakers, educators, and the public. Building on a foundation of data quality provides the key to forming effective policy, measuring program effectiveness, and developing short-term and long-term plans. The Wyoming Community College Commission is making great strides in helping the community colleges develop data standards and build reporting systems to this end, but there is more work to do.

An enhanced data governance structure, as outlined in this report, will ensure that the state, Commission, and colleges have representation, and input into the oversight of the data management solution while retaining ownership of their respective data.

Completion of data coding standardization and process alignment across the colleges allows the development of strategic, operational, and dashboard reports that will serve all institutions without the need for customization or data transformation to accommodate the unique requirements of each institution.

Development of enriched research and analysis skills will give institutional researchers the ability to deliver high-quality data to meet the research and statistical analysis requirements of the state and colleges.

Recommendations in this report are designed to produce a secure, sustainable data warehouse solution resulting in reliable, linked, education data capable of supporting business intelligence tools to achieve Wyoming's postsecondary student success goals. Centralizing the data warehouse builds on the substantial work already completed and is also less costly, more easily documented, and easier to sustain.

The future success of Wyoming's Statewide Longitudinal Data System (SLDS) requires the Wyoming community colleges adopt the governance, data quality, and process alignment recommendations of the data management and analytical reporting needs analysis and fully participate in the proposed centralized data warehouse. Implementation of these recommendations will mutually benefit the colleges, protect their data, address scarce resource challenges, and provide the reporting needed to support making the right decisions that will sustain the future success of each institution and their students.

Successful accomplishment of these tasks and the supporting recommendations in this report, requires additional resources as well as data warehousing tools. Forming a partnership with an accountable, and results driven firm will provide the needed assistance to bring the Wyoming Community College System into its desired future state and serve the ultimate goal of providing exceptional education to Wyoming's students and contributing dynamic, talented, successful, fulfilled, individuals into the Wyoming workforce.

Appendices

Appendix A – Wyoming Community College System Research and Analysis Staff

WCCS Research and Analysis Staff
April 2015

Dynamic Campus

Name	Title	Comments	Count	% Routine	% Strategic
Wyoming Community College Commission (WCCC)					
Nicole Anderson	Research/Policy Analyst	Devoted to research & analysis	1	0.50	0.50
Geir Solvang	SLDS Coordinator	Primarily focused on technical aspects of research & analysis	1	0.75	0.25
		WCCC Totals	2	125%	75%
Casper College (CC)					
Lynn Fletcher	Institutional Researcher	Wants CROA training, compliance reporting focus	1	1.00	0.00
		CC Totals	1	100%	0%
Central Wyoming College (CWC)					
Martha Davey	Assoc. VP for Academic Services	Retiring the summer of 2015	1	1.00	0.00
Xiaoying Liu	Institutional Researcher	Relatively new, being trained by Martha Davey	1	1.00	0.00
		CWC Totals	2	200%	0%
Eastern Wyoming College (EWC)					
Kimberly Russell	Director Institutional Research & Data Author	Overwhelmed and not comfortable with SQL & CROA tools	1	1.00	0.00
Jim Maffe	Colleague Consultant/Special Projects Programmer	Retired, providing assistance on a consulting basis	1	0.67	0.00
		EWC Totals	2	167%	0%
Laramie County Community College (LCCC)					
Ann Murray	Manager, Institutional Research	Excel dependence, not using current reporting tools, potentially retirin	1	1.00	0.00
Sarah Smith	Data Analyst	*Capabilities unclear, not available for interview	1	0.50	0.50
Stephen Soltesz	Research Analyst	*Capabilities unclear, not available for interview	1	0.50	0.50
		LCCC Totals	3	200%	100%
Northern Wyoming Community College District (NWCCD)					
Sharon Elwood	Dean of Enrollment Services	**Focused on daily functions and compliance reporting	1	0.50	0.00
Steffie Rawlings	Institutional Research Assistant	IT background, 3 years at NWCCD, problems with CROA & SQL	1	1.00	0.00
		NWCCD Totals	2	150%	0%
Northwest College (NWC)					
Lisa Smith	Instructional Researcher	Proficient in CROA & SQL, overwhelmed, 1 add'l IR staff requested	1	1.00	0.00
		NWC Totals	1	100%	0%
Western Wyoming Community College (WWCC)					
Dr. Jackie Freeze	VP for Student Success Services	**In-depth data knowledge, potentially retiring	1	0.50	0.00
Dianna Renz	Director of Planning & Improvement	Questions WWCC data quality	1	1.00	0.00
Russ Bates	Data Analyst	IT background, in IR 1 year	1	1.00	0.00
Kay Cooley	Planning & Improvement Office Assistant	**Relatively new to this responsibility	1	0.50	0.00
		WWCC Totals	4	300%	0%
		Grand Totals	17	79%	10%

*Percentages split 50/50 (may be generous on the strategic %), no information provided for evaluation.
**Percentages may not add up to 100 as some positions have other responsibilities unrelated to research and analysis.

Appendix B – Glossary of Terms and Acronyms

Glossary of Terms and Acronyms

Glossary	
Acronym or Term	**Definition**
BI – Business Intelligence	Business Intelligence is an umbrella term that includes the applications, infrastructure, tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance. http://www.gartner.com/it-glossary/business-intelligence-bi
Business Objects Universe	A Business Objects Universe is the semantic layer that resides between a database and the end user. It is a business representation of a data warehouse or transactional database. It allows the user to interact with their data without having to know the complexities of their database or where the data is stored. The universe is created using familiar business terminology to describe the business environment and allows the user to retrieve exactly the data that interests them.
Database	Systematically organized or structured repository of indexed information that allows easy retrieval, updating, analysis, and output of data.
Data Mart	An access layer of the data warehouse environment used to provide targeted data to the users. A data mart is a subset of the data warehouse that is usually oriented to a specific business area. Data marts are small slices of the data warehouse.
Data Warehouse	A data warehouse is a relational database with combined data from one or more transactional systems that is designed for query and analysis rather than for transactional processing.
Dashboard	A dashboard or business intelligence dashboard is a visual tool that displays defined metrics or key performance indicators (KPIs). Dashboards are used to consolidate and arrange numeric data and show visual performance in the form of charts or graphs.
DQC – Data Quality Campaign	A nonprofit organization formed in 2005 that focuses on assisting the education industry with improving data quality, accessibility, and use for the purpose of improving student achievement.
CROA – Colleague Reporting and Operation Analytics	Colleague Reporting and Operating Analytics combines ad hoc reporting and dashboards. The CROA environment consists of the Colleague Operational Data Store (ODS) and Business Objects reporting and analysis tools.

Glossary	
Acronym or Term	**Definition**
Cubes – Cube or OLAP	Cube is a multidimensional dataset that allows for accelerated analysis, reporting or measurement.
ETL – Extract, Transform, Load	A process used to collect data from various sources, transform the data depending on business rules/needs and load the data into a destination database.
ERP – Enterprise Resource Planning System	This is a suite of integrated business applications used to collect, store, and manage data. Higher Education ERP systems usually consist of, at least, bio-demographic and a student information system to manage admissions, curriculum management, registration and academic records.
FERPA - Family Educational Rights and Privacy Act	(FERPA) (20 U.S.C. § 1232g; 34 CFR Part 99) is a Federal law that protects the privacy of student education records. The law applies to all schools that receive funds under an applicable program of the U.S. Department of Education. http://www.ed.gov/policy/gen/guid/fpco/ferpa/
IPEDS - Integrated Postsecondary Education Data System	A system that collects statistical data and information on postsecondary institutions run by the National Center for Educational Statistics (NCES) https://necs.ed.gov/.
KPI – Key Performance Indicator	A KPI is a performance metric used to evaluate factors that are critical to success.
MDM – Master Data Management	Method of linking all critical data for an organization in one file that provides a common point of reference.
Metadata	Metadata is a set of data that contains descriptions and information on other data. Simply, metadata is data about data.
ODS – Operational Data Store	A type of database that is often used as an interim and temporary area for storing segments of data separate from the production or live system data. Use of an ODS is usually in preparation for transfer to a data warehouse for long term storage.
OLAP – Online Analytical Processing	OLAP performs multidimensional analysis of business data and provides the capability for complex calculations, trend analysis, and sophisticated data modeling. http://olap.com/olap-definition/
P-20	Pre-School to Master's Degree.
PII- Personally Identifiable Information	Information that can be used on its own or with other information trace an individual's identity.
Schema or Database Schema	A schema is the structure of the database described in a formal language supported by the database management system. This is a blueprint or how a database is constructed.
SLDS – Statewide Longitudinal Data System	A storage system capable of tracking student information over multiple years and multiple schools and integrating with multiple source systems.
SIS – Student Information System	Software application used in higher education to manage student data and processes such as admission, registration, academic records, curriculum, and graduation.

Glossary	
Acronym or Term	**Definition**
SSIS – SQL Server Integration Services	SQL Server Integration Services is a platform, offered by Microsoft, for building enterprise-level data integration and data transformations solutions. You use Integration Services to solve complex business problems by copying or downloading files, sending e-mail messages in response to events, updating data warehouses, cleaning and mining data, and managing SQL Server objects and data. Integration Services can extract and transform data from a wide variety of sources such as XML data files, flat files, and relational data sources, and then load the data into one or more destinations. https://technet.microsoft.com/en-us/library/ms141026.aspx
SQL – Structured English Query Language	SQL is a standardized query language for requesting or querying information from a database.
TB – Terabyte	Multiple of the unit called byte used for storage of digital information. One TB is one trillion bytes.

Appendix C – Project Team Biographies

Data Management and Analytical Reporting Needs Analysis Project

Dynamic Campus Project Team Members

Executive Management – Monitor progress and ensure successful completion of project goals.

Mike Glubke is the Founder, CEO and President of Dynamic Campus. Over his long career working with institutions of higher learning, Mike realized that one of the challenges most college and university leaders face is that their technology solutions providers seem more interested in selling them software or hardware than they are interested in helping them solve their problems. So when he started Dynamic Campus, the company was born from the realization that higher education needed a technology advocate focused on their needs, their interests, and their satisfaction. This remains the company's focus today. Mike has extensive experience in providing technology solutions for higher education. Prior to founding Dynamic Campus, he served as Vice President at Jenzabar™, an administrative software firm dedicated to the higher education marketplace, and he filled various top executive roles at CARS Information Systems, where he was responsible for leading the product development, product marketing and sales divisions. He has also held technology-related positions at Kalamazoo College, Wayne State University and Kalamazoo Valley Community College. Mike received his BS in Computer Science from Western Michigan University.

Richard Middaugh, Executive Project Director, offers customers an unwavering commitment to finding technology solutions that fit. During his tenure with the company, he has personally helped more than 30 higher education institutions select and deploy technology solutions. Before joining Dynamic Campus, Richard was the President of technology solution provider NBH Solutions, and his successes there include ERP project management and supervision at the University of the Virgin Islands, the design of a state-wide longitudinal data system for the Governor's P-16 Council of New Hampshire and a state-wide IPEDS reporting system and Cognos Business Intelligence solution for the Board of Higher Education, Commonwealth of Massachusetts. Richard's also served as Area Vice President at Jenzabar, a leading technology provider for higher education, and General Manager for National Sales Support at Collegis, a technology management firm also focused on higher education. Earlier in his career, he was Chief Information Officer at Daytona Beach Community College. Richard holds an MA in Education and a BA in Psychology from the University of South Florida, as well as an AA from Hillsborough Community College.

Joe Redwine, Executive Vice President of Dynamic Campus, ensures seamless integration between all operational aspects of the company, from human resources to client delivery, ensuring customers get the best talent and service on the market. Joe's background as a services company executive and military officer give him unique perspective on big-picture strategy and detailed tactical execution. Prior to joining Dynamic Campus, Joe led the national network services division of Collegis, a technology management firm specializing in higher education. At Collegis, he was responsible for new client start-up technical directors, the professional services staff for new and existing accounts, the corporate information technology infrastructure and corporate telecommunications, the network operations center, managed hosting services, disaster recovery, security planning activities, and business development assessments. During much of his career, Joe also served as an officer in the United States Air Force and the Florida Air National Guard, where he retired with the rank of Lieutenant Colonel in 2008. Joe received his MBA from the University of Phoenix and his BS in Electrical Engineering from the University of Oklahoma.

Andrea Savas, Vice President of Professional Services, leads and directs the teams responsible for delivering, deploying and managing Dynamic Campus' technology solutions including Business Intelligence. With a passion for delivering best-in-class services that help clients become more efficient and effective, Andrea actively engages with the entire customer community to ensure Dynamic Campus consistently outperforms expectations. Prior to joining Dynamic Campus, Andrea served as the Director of Student Services for Rasmussen College, where she led the team for all student support services, with a special focus on student retention. Andrea also served as the Director of User Services for higher education technology provider Collegis, where she developed and deployed the Central Help Desk for the company's client base. She also led user services activities at the University of Central Florida for more than 10 years. Andrea received her BS in Vocational Education and Industry Training from the University of Central Florida.

Core Project Team - Participate in assessment visits.

Shawn Walden is a Regional Vice President for Dynamic Campus. Shawn has over 23 years of Higher Education leadership experience and has helped more than 50 institutions successfully advance their institutional goals by strategically deploying technology. Prior to joining the team at Dynamic Campus Shawn served as Vice President of New Campuses for Rasmussen College where he had responsibility for all aspects of opening new campuses including enrollment management, instructional delivery, financial management and federal compliance. Prior to Rasmussen Shawn was with Sungard Higher Education (formerly Collegis) for 9 years serving in different capacities including CIO for 4 institutions, General Manager and Vice President. During this time he was responsible for the strategic and tactical delivery of managed services for over 35 institutions. Shawn's Higher Education technology background includes the management and oversight of IT staffing and organizational models, enterprise systems, Learning Management Systems (LMS), campus network infrastructures and various other administrative solutions. Shawn received his Bachelor's degree in Business Administration and Management Information Systems from Emporia State University.

Donna Alexander, Solutions Architect for Dynamic Campus and Assessment Project Manager. In her role at Dynamic Campus she has performed CIO responsibilities and conducted needs analysis projects. Before joining Dynamic Campus, Donna served over thirty years in higher education beginning her career as a programmer/analyst and steadily advancing to the position of vice president. Donna naturally exhibits integrity and accountability with a proven record of exceeding expectations in all situations. Her core competencies in higher education include technology vision and leadership; strategic planning; partnerships and negotiations; budgeting and cost control expertise; organizational optimization and change control; policy and procedure development; technology security and resource protection; enterprise systems management; staff training and development; process, time and resource optimization; communications and reporting; and disaster recovery and business continuity planning. Donna achieved a Master of Business Administration (MBA) degree, and a Bachelor of Science (BS) cum laude degree in Management Information Systems both from The University of Tampa and an Associate of Science (AS) degree in Business Applications Programming from Hillsborough Community College.

Don Sullivan is a Senior Colleague Technology Architect who provides technical support and integration for all Dynamic Campus clients. Don has over 17 years of experience in higher education information technology. Don has very deep experience in the analysis, implementation and improvement of Colleague Student, HR, and Financial Systems and possesses a wide array of experience implementing data integration between ERPs and various ancillary systems. Don also has extensive experience with Colleague Systems Administration to include the design, implementation, of Colleague SQL environments and the migration from Unidata and Oracle to SQL Colleague environments. Don is Colleague development specialist who has developed numerous process enhancements for Colleague ERP clients.

Don also served as Director of Application Services at Seattle University with SunGard Higher Education and prior to SunGard, Don was a Senior Programmer Analyst at Collegis and Duquesne University. Don received his B.S. in Computer Science from the University of Pittsburgh. Prior to pursuing a career in higher education technology, Don served honorably for 7 years in the U.S. Marine Corps.

Don's experience related to this needs analysis includes:

- Broad Understanding of Ellucian Colleague Reporting and Operating Analytics (CROA)
- Colleague Student, HR and Financial Systems implementation and Support
- Colleague Reporting and Data Analysis
- Extensive Knowledge of the Colleague ERP Database
- Development of Data Warehouse Extracts for Colleague Student, HR, and Finance data
- Colleague Application Development Specialist
- Colleague Operational Reporting and Process Enhancements
- Development of Colleague data extracts for Enterprise Data Warehouses

Diane Horner is a Senior ERP Specialist for Dynamic Campus with over 15 years of higher education experience serving as an Associate Director of Financial Aid and a Financial Aid ERP specialist. During her tenure with Dynamic Campus, she has provided expertise for several key Student projects for several clients. Most recently, her expertise was utilized in the re-implementation of Financial Aid at West Virginia University at Parkersburg. She also provides functional expertise on Financial Aid projects for several other Dynamic Campus clients. Her background includes the oversight of centralizing financial aid operations for a 13-campus school while serving as the implementation co-chair. Diane's knowledge base crosses various enterprise applications and includes background with additional products such as DegreeWorks, Schedule 25, Workflow, SQL Developer, and Business Intelligence Tools. She is known as a positive, proactive, and motivational leader who excels in seeking win-win solutions! Prior to joining Dynamic Campus, Diane served as the Enterprise Solutions Analyst for Spelman College where in addition to multiple ERP responsibilities; she served as the point person for all new third party project implementations. Prior to Spelman, Diane served as a User Liaison for Sungard Higher Education for nine years. During this time, she was responsible for leading multiple Financial Aid upgrades and participated in many third party application implementations. Diane received her BS in Information Technology from the University of Phoenix.

Extended On-Demand Project Team – Additional Dynamic Campus professionals and subject matter experts.

Dan Clawson serves as Director of On-Demand Services for Dynamic Campus with over twenty years of higher education experience working for and collaborating with colleges and universities. Some of Dan's recent projects successes include financial aid and registration business process assessments and registration priorities, waitlist, workforce development and business intelligence implementations at Dynamic Campus clients. Dan began his higher education career working in the Johnson and Wales and Boston University financial aid offices. Later, he joined Datatel as a financial aid higher education student system consultant and quickly became proficient in other key areas of the Colleague Student Information System. Dan has also worked in IT and has served clients as a Manger of Professional Services and later a Manager of Client Success at Nolij Corporation. While at Nolij, he had the opportunity to work with institutions implementing document management and ETL solutions with integration to varying ERP solutions. From these various experiences, Dan has gained a global understanding of institutions as well as their functional areas. A hallmark of his career has also been his understanding of client needs and working with them to identify winning solutions to nurture future success. Dan holds 3 summa cum laude degrees, a BA in history from the University of Pittsburgh, an MA in higher education administration from the Indiana University of Pennsylvania, and an MBA in international business from Johnson and Wales University.

Eric Larsen is a Database Administrator/Data Warehouse Architect with over 8 years of experience developing, implementing, and managing data warehouse and reporting technology in higher education. Recently, Eric implemented an Enterprise Data Warehouse and Business Intelligence solution for the Jenzabar ERP at the University of Mary. Currently, Eric is

developing an Enterprise Data Warehouse and Business Intelligence solution for the Colleague ERP at the College of Western Idaho. He also brings 13 years of operational experience managing Microsoft SQL Servers, data integration, user security, and web applications. Prior to joining Dynamic Campus Eric served as the Web Services Team Lead and DBA at Seattle University with Ellucian. Eric's responsibilities at Seattle University included support of web applications and integration, reporting and SQL administration. His in-depth knowledge of tables, stored procedures and functions enabled him to effectively design and implement the university's Data Warehouse solution. Eric planned and guided the implementation of a large-scale enterprise Content Management System, student portal, and hundreds of reports built against the institution's data warehouse.
Eric's experience related to this needs analysis includes:

- Colleague SQL Server Administration Support
- Design and implementation of data warehouse and business intelligence solutions
- Experience with Ellucian Colleague Reporting and Operating Analytics (CROA)
- Extensive Knowledge of the Colleague ERP Database
- SQL Database development and solution design
- Development of data extraction, transition, and load processes for ERP and ancillary systems

Appendix D – Meetings Itinerary

Wyoming Community College Commission Project
Meetings Itinerary

February 17 – March 19, 2015

Week 1: Andrea Savas and Core Team

Day 0: **(Monday, 2/16)**
Travel to Cheyenne
(spend night in Cheyenne)

Day 1: **(Tuesday, 2/17)** Completed
Meet with **Wyoming Community College Commission** (WCCC) - 1 day
(spend night in Cheyenne)

Day 2: **(Wednesday, 2/18)** Completed
Meet with **Laramie County Community College** (LCCC) – 1 day
(spend night in Cheyenne)

Day 3: **(Thursday, 2/19)** Completed
Meet with **Wyoming Department of Education** (WDE) - .5 days
(Fly out of Cheyenne)

Week 2: Dan Clawson and Core Team

Day 4: **(Monday, 2/23)**
Travel to Casper
(spend night in Casper)

Day 5: **(Tuesday, 2/24)** Completed
Meet with **Casper College** - 1 day
(Spend night in Casper)

Day 6: **(Wednesday, 2/25)** Completed
Meet with **Department of Workforce Services** (DWS) - .5 days
Drive to Torrington: 2h 10m, 143 miles (Casper >Torrington)
(spend night in Torrington)

Day 7: **(Thursday, 2/26)** Completed
Meet with **Eastern Wyoming College** (EWC) - 1 day
Drive to Denver: 2h 49 m, 183 miles (Torrington > Denver)
(Spend night in Denver)

(Friday, 2/27 fly out of Denver)

Week 3: Andrea Savas and Core Team

Day 8: **(Monday, 3/2)**
Travel to Sheridan

Day 9: **(Tuesday, 3/3)** Completed
Meet with **Northern Wyoming Community College District** (NWCCD) - 1 day
Drive to Billings, MT: 1h 58m, 131 miles (Sheridan > Billings) – route taken due to weather
(spend night in Billings)

Day 10: **(Wednesday, 3/4)** Completed
Drive to Powell: 1h 39m, 94 miles (Billings > Powell)
Meet with **Northwest College** (NWC) - 1 day
Drive to Riverton: 2h 43m, 159 miles (Powell > Riverton)
(spend night in Riverton)

Day 11: **(Thursday, 3/5)** Completed
Meet with **Central Wyoming College** (CWC) - 1 day
(spend night in Riverton or Casper)

OR drive to Casper: 1h 56m, 121 miles (Riverton > Casper)
(spend night in Casper)

(Friday, 3/6 fly out of Riverton or Casper)

Week 4: Core Team

Day 12: **(Monday, 3/9)** Completed
Travel to Rock Springs
Meet with WWCC President and VP for Student Success Services
(spend night in Rock Springs)

Day 13: **(Tuesday, 3/10)** Completed
Meet with **Western Wyoming Community College** (WWCC) – 1 day
Travel to Laramie: 3h, 207 miles (Rock Springs > Laramie)
(spend night in Laramie)

Day 14: **(Wednesday, 3/11)** Completed
Meet with **University of Wyoming** (UW) - 1 day
Drive to Denver: 2h 26m, 143 miles (Laramie to Denver)
(spend night in Denver)
(Thursday, 3/12 fly out of Denver)

OR
(Shawn & Donna fly to Cody)
(spend night in Cody)

Day 15: **(Thursday 3/12)** Completed
Shawn Walden and Donna Alexander
Meet with NWC President and VP of Academic
(spend night in Cody)

Week 5: Core Team & WCCC

Day 16: **(Thursday, 3/19)** Completed
Meet with ETS
1:00-1:30 p.m. MST
Via conference call: 605-562-0020 ID# 495 336 956
Meet with Flint Waters, State Chief Information Officer

1:30-2:00 p.m. MST
Via conference call: 888-532-0211
Meet with WCCC and **Enterprise Technology Services** (ETS) – 1/2 hour

Appendix E – Meeting Attendees

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Meeting	Attendee Name	Title	Notes
WYOMING COMMUNITY COLLEGE COMMISSION			**Meeting Date - February 17, 2015**
Primary Contact			*WCCC One Day Meeting Schedule - Actual. docx*
	Andy Corbin	Business Analytics Manager	
Senior Management			
	Dr. Jim Rose	Executive Director	
	Larry Buchholtz	Fiscal Team Manager	
	Dr. Joe McCann	Programs Team Manager	
	Matt Petry	Deputy/CFO	
Information Technology			
	Andy Corbin	Business Analytics Manager	
	Nicole Anderson	Policy/Research Analyst	
	Tully Holmes	Systems Administrator	
	Geir Solvang	State Longitudinal Data Systems Coordinator	
Information Technology/Institutional Research			
	Andy Corbin	Business Analytics Manager	
	Nicole Anderson	Policy/Research Analyst	
	Dr. Joe McCann	Program Teams Manager	
	Geir Solvang	State Longitudinal Data Systems Coordinator	
Wrap-up			
	Matt Petry	Deputy/CFO	
	Andy Corbin	Business Analytics Manager	
	Tully Holmes	Systems Administrator	
	Geir Solvang	State Longitudinal Data Systems Coordinator	
PARTICIPATING COLLEGES			
CASPER COLLEGE			**Meeting Date - February 24, 2015**
Primary Contact			*Casper College-One Day Meeting - Actual. docx*
	Dallen Griffith	Enterprise Data Coordinator	
President			
	Dr. Walt Nolte	President	
Vice Presidents			
	Kim Byrd	VP for Student Services	
	Lynnde Colling	VP for Administrative Services	
	Laura Driscoll	Executive Dean, Continuing Education	
	Trevor Mahlum	Dean of Educational Resources	Attended for Dr. Tim Wright, VP for Academic Affairs
	Dr. Tim Wright*	VP for Academic Affairs	Unable to attend
Institutional Research			
	Lynn Fletcher	Institutional Researcher	
Financial Aid			
	Darry Voigt	Exec. Dir. Of Enrollment Services	
	Laurie Johnstone	Scholarship & Enroll. Serv. Systems Coord.	
	Lisa Goss	Veteran & Hathaway Scholarship Coord.	
Information Technology			
	Kent Brooks	Director of IT	
	Joe Dutro	Enterprise Systems Administrator	
	David Dutton	Enterprise Software Coordinator	
	Dallen Griffith	Enterprise Data Coordinator	
	Don King*	Enterprise Database Administrator	Unable to attend
Enrollment Services			
	Darry Voigt	Exec. Dir. of Enrollment Services	
	Kyla Foltz	Dir. of Admissions Services	
	Linda Nichols	Registrar	

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Dynamic Campus

Meeting	Attendee Name	Title	Notes
Financial Services			
	Robyn Landen	Director of Financial Services/Controller	
	Terri House	Assistant Director, Financial Services	
	Chauncy Johnson	Director of Human Resources	
	Scott Miller	Assistant HR Director	
	Marilee Pickering	Payroll	
	Karen Trohkimoinen	Payroll Specialist	
Wrap Up			
	Dr. Walt Nolte	President	

CENTRAL WYOMING COLLEGE

Meeting Date - March 5, 2015

CWC One Day meeting Schedule - Actual. docx

Primary Contact			
	John F. Wood	CIO	
President			
	Dr. Cristobal Valdez*	President	Unable to attend
	Ron Granger	Interim Executive VP / Student & Academic Services and VP for Administrative Services	Attended for Dr. Cristobal Valdez, President
Vice Presidents			
	Cory Daly	Assoc. VP for Student Services	
	Ron Granger	Interim Executive VP / Student & Academic Services and VP for Administrative Services	
	Lori Ridgway*	Director Marketing and Public Relations	Unable to attend
	Jamie Seigel	Digital Content and Marketing Specialist	Attended for Lori Ridgway, Director of Marketing & Public Relations
Institutional Research			
	Martha Davey	Assoc. VP for Academic Services	
	Xiaoying Liu	Institutional Researcher	
Financial Aid			
	Jacque Burns	Assistant Dean for Enrollment Services	
Information Technology			
	John F. Wood	CIO	
	Paul Branham	IT Support and Development Technician	
	Jeremy Hughes	SW Apps Developer	
	Ross Johnson	Senior Technician IT Enterprise Services	
	Craig Kucera	Senior Technician User Support	
Enrollment Services			
	Jacquelyn Burns	Asst. Dean for Enrollment Services	
	Martha Davey	Admissions	
	Debbie Lively*	Student Recruiter	Unable to attend
	Connie Nyberg	Assistant Registrar	
Financial Aid			
	Lindy Paskett	Director of Finance	
	Jennifer Rey	Executive Director for HR	
	Pam Roberts	Budget Analyst/Payroll Supervisor	

EASTERN WYOMING COLLEGE

Meeting Date - February 26, 2015

EWC One Day meeting Schedule - Actual. docx

Primary Contact			
	Dr. Dee Ludwig	CIO & Vice President for Learning	
President			
	Dr. Richard Patterson	President	
Vice Presidents			
	Dr. Rex Cogdill	VP for Student Services	
	Ron Laher*	VP for Administrative & Financial Services	Unable to attend
	Dr. Dee Ludwig	CIO/VP for Learning	
	Karen Parriott	Director of the Business Office	Attended for Ron Laher VP for Administrative & Financial Services

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Meeting	Attendee Name	Title	Notes
Institutional Research			
	Kimberly Russel	Director Institutional Research & Data Author	
Financial Aid			
	Vicky McAlester	Financial Aid Specialist	Attended for Susan Stephenson, Director of Financial Aid
	Susan Stephenson	Director of Financial Aid	*Unable to attend
Information Technology			
	Dr. Dee Ludwig	CIO/VP for Learning	
	Erin Bahmer	Instructional Tech	
	Chuck Kenyon	Network Administrator/IT Administrator	
	Jim Maffe	Colleague Consultant/Special Projects Programmer	
	Chris Urbanek*	Network Support	Unable to attend
	Tyler Vasko	Colleague Administrator/IT Administrator	
Enrollment Services			
	Dr. Rex Cogdill	VP for Student Services	
	Mai Lee Olsen	Admissions Coordinator	
	Sue Schmidt	Administrative Specials	
	Zach Smith	Director of Enrollment Mgt & Head Golf Coach	
Financial Services			
	Ron Laher	VP for Administrative & Financial Services	
	Lori Moore	Payroll Clerk	
	Stuart Nelson	HR Director	
	Karen Parriott	Director – Business Office	
Wrap Up			
	Dr. Richard Patterson	President	
	Dr. Dee Ludwig	VP for Learning & CIO	

LARAMIE COUNTY COMMUNITY COLLEGE — **Meeting Date - February 18, 2015**

LCCC One Day meeting Schedule - Actual. docx

Primary Contact			
	Chad Marley	Chief Technical Officer	
President			
	Dr. Joe Shaffer	President	
Vice Presidents			
	Dr. Kim Bender	Assoc. VP of Institutional Effectiveness	
	Nicole Bryant	Interim Dean, School of Arts & Humanities	Attended for Jose Fierro
	Pam DeMartin	Supervisor, Accounting & Payroll Services	Attended for Carol Hoglund
	Dr. Jose Fierro*	VP, Academic Affairs	Unable to attend
	Dr. Judy Hay	VP, Student Services	
	Carol Hoglund*	VP, Administration and Financial Services	Unable to attend
Institutional Research			
	Ann Murray	Manager Institutional Research	
	Sarah Smith*	Data Analyst	Unable to attend
	Steve Soltesz*	Research Analyst	Unable to attend
Financial Aid			
	Julie Wilson	Director of Financial Aid	
Information Technology			
	Chad Marley	Chief Technical Officer	
	Ken Bunya	Director, Systems & Technology Support	
	Jerome (Sammy) Espinoza	Data Base Administrator	
	Edie Miller	Project & Application Support Mgr. / Colleague	
	Ted Wickham	Network Manager / Supervisor	
Enrollment Services			
	Sarah Hannes	Director, Admissions & Welcome Center	
	Julie Gerstner	Business Analyst	
	Stacy Maestas	Registrar	

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Meeting	Attendee Name	Title	Notes
Financial Services			
	Herry Andrews	Director, Accounting Services	
	Peggie Kresl-Hotz*	HR Director	Unable to attend
	Dennis McAllister	HRIS Manager	
	Jayne Myrick	Director, Budget	
	Amy Stinson	Assistant HR Director	
Wrap Up			
	Dr. Joe Shaffer	President	

NORTHERN WYOMING COMMUNITY COLLEGE DISTRICT — **Meeting Date - March 3, 2015**

NWCCD One Day meeting Schedule - Actual. docx

Primary Contact			
	Brady Fackrell	Director of IT (CIO)	
President			
	Dr. Paul Young	President	
	Brady Fackrell	Director of IT (CIO)	
Vice Presidents			
	Susan Bigelow	VP of External Relations & Economic Development	
	Sharon Elwood	Dean of Enrollment Services	
	Dr. Mark Englert	VP of Gillette College/CEO	
	Dr. Richard Hall	VP of Academic Affairs	
	Cheryl Heath	VP for Administration/CFO	
Institutional Research			
	Sharon Elwood	Dean of Enrollment Services	
	Steffie Rawlings	Institutional Research Assistant	
Financial Aid			
	Kristen Gast*	Director of Financial Aid Services	Unable to attend
	Aaron Odom	Financial Aid Coordinator	Attended for Kristen Gast, Director of Financial Aid Services
Information Technology			
	Brady Fackrell	Director of ITS (CIO)	
	Michael Brown	Information Systems Administrator	
	Mark Naus	Technical Director	
	Millie Serna	Information Systems Developer	
Enrollment Services			
	Sharon Elwood	Dean of Enrollment Services	
	Joe Mueller*	Executive Director of Admissions Services	Unable to attend
	Micah Olsen*	Director of Admissions Services, Gillette	Unable to attend
	Steffie Rawlings	Institutional Research Assistant	
	Christina Rigdon	Associate Registrar	
Financial Services			
	Karen Burtis	Director of Finance/Controller	
	Jennifer McArthur	HR Director	
Wrap Up			
	Dr. Paul Young	President	

NORTHWEST COLLEGE — **Meeting Date - March 4, 2015**

NWC One Day meeting Schedule - Actual. docx

Primary Contact			
	Casey Dearcorn	Computing Services Director	
President			
	Dr. Stefani Hicswa	President	Met on March 12, 2015
Vice Presidents			
	Dr. Sean Fox	VP of Student Affairs	
	Dr. Gerald Giraud	VP of Academic Affairs	Met separately on March 12, 2015
	Mark Kitchen	VP of College Relations	
	Lisa Watson	VP of Administrative Services	

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Meeting	Attendee Name	Title	Notes
Information Technology			
	Casey Dearcorn	Computing Services Director	
	Damian Dicks	Computing Services Coordinator/DBA	
	Clint Kasinger	Computing Services Coordinator/Network Manager	
	Andy McDonald	Computing Services Programmer	
Enrollment Services			
	Brad Hammond	Registrar, Admissions & Judicial Affairs Director	
Financial Services			
	Jo Ann Hiemer	Interim Finance Director	
	Tracy Gasaway	Payroll Specialist	
Institutional Research			
	Lisa Smith	Institutional Researcher	
Financial Aid			
	Shaman Quinn	Financial Aid & Scholarships Director	
	Deb Karst	Scholarship Technician	
	Carleen Williams	FA Specialist	

WESTERN WYOMING COMMUNITY COLLEGE — Meeting Date - March 10, 2015

Primary Contact		*WWCC One Day meeting Schedule - Actual. docx*	
	Kay Cooley	Planning & Improvement Office Assistant	
President			
	Dr. Karla Leach	President	Met on March 9, 2015
Vice Presidents			
	Dr. Kim Farley	VP for Student Learning	
	Sheldon Flom	VP for Administrative Services	
	Dr. Jackie Freeze	VP for Student Success Services	Met via conference call on March 9, 2015
	Marty Kelsey	VP for Administrative Services (retiring)	
Institutional Research			
	Dianna Renz	Director of Planning & Improvement	
	Russell Bates	Data Analyst	
	Kay Cooley	Planning and Improvement Office Assistant	
Financial Aid			
	Nicole Castillon	Financial Aid Director	
Enrollment Services			
	Erin Gray	Director of Admissions	
	Nicole Castillon	Financial Aid Director	
	Kay Leum*	Registrar	Unable to attend
	Mark Rembacz	Director of Student Engagement & Completion	
Information Technology			
	Derek Robinson	Director Information Technology	
	Jean Larsen	Information Systems Administrator	
	Josh Powelson	Network Administrator	
Financial Services			
	Debbie Baker	Director of Finance and Controller	
	Carla Budd	Associate VP for Administrative Services	

CONTRIBUTING AGENCIES

UNIVERSITY OF WYOMING — Meeting Date - March 11, 2015

Primary Contact		*UW One Day Meeting Schedule - Actual. docx*	
	Jen Chavez	Director, Application & Database Services	
President			
	Dr. Richard McGinty*	President	Unable to attend

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Meeting	Attendee Name	Title	Notes
Vice Presidents			
	Robert Aylward	VP for Information Technology/CIO	
	Dr. Sara Axelson	VP for Student Affairs	
	Jen Chavez	Director, Application and Database Services	
	Dr. Jo Chytka	UW Representative SLDS	
	Janet Lowe*	Associate VP for Fiscal Administration	Unable to attend
	Arley Williams*	Special Assistant to the Vice President	Unable to attend
Institutional Analysis			
	Sue Koller	Associate Director of Institutional Analysis	
	Jen Chavez	Director, Application and Database Services	
	Patrice Noel	Director of Transfer Relations	
	Cony Pownall	Longitudinal Data Analyst	
	Tammy Scott	Information Specialist	
Student Affairs			
	Kathy Bobbitt*	Interim Director of Financial Aid	Unable to attend
	Christy Oliver	Associate Director of Admissions	
	Mary Aguayo	Enrollment and Policy Strategist	
	Lane Buchanan	Interim Registrar	
	Carrie Gose	Business Analyst, Executive Student Financial Aid	
	Steve Scott	Financial Aid	
Information Technology			
	Robert Aylward*	VP for Information Technology/CIO	Unable to attend
	Jennifer Chavez	Director IT/Application & Database Services	
	Cheryl Collins	Database Administrator	
	Cony Pownall	Longitudinal Data Analyst	
	Julie Schroyer	Project Manager Information Technology	
WYOMING DEPARTMENT OF EDUCATION			**Meeting Date - February 19, 2015**
Primary Contact			*WDE One Day Meeting Schedule - Actual. docx*
	Susan Williams	Data Collection & Reporting Supervisor	
Superintendent			
	Jillian Balow	Superintendent of Public Instruction	Attended briefly to welcome DC
	Brent Bacon	Chief Academic Officer	Attended for Dicky Shanor, Deputy Superintendent
	Dicky Shanor*	Deputy Superintendent	Unable to attend
	Brent Young	Chief Policy Officer	Attended for Dicky Shanor, Deputy Superintendent
Finance, Information Technology, Data			
	Dianne Bailey*	CFO	Unable to attend
	Susan Williams	Supervisor Data Collection and Reporting	
	Shannon Cranmore	Data Analyst EDFacts Coordinator	
	Liz Foster	Data Collection Specialist	
	Keith Geringer	Software Developer	
	Vince Meyer*	Senior Statistician	Unable to attend
	John Paul	Sr. Application Developer	
	Aaron H. Roberts*	Division of Information Management Director/ISO	Unable to attend
	Leslie Zimmerschield	Education Data Governance Coordinator	
DEPARTMENT OF WORKFORCE SERVICES			**Meeting Date - February 25, 2015**
Primary Contact			*DWS One Day Meeting Schedule - Actual. docx*
	Lisa M. Osvold	Deputy Director	
Director			
	Joan Evans	Director	Met via conference call

Data Management and Analytical Reporting Needs Analysis
Meeting Attendees
February 17 - March 19, 2015

Meeting	Attendee Name	Title	Notes
Research & Planning			
	Tom Gallagher	Research and Planning Administrator	
	Tony Glover*	Technical Resource	Unable to attend
	Michelle Holmes	Public Relations Specialist	
Wrap Up			
	Joan Evans	Director	Via conference call

ENTERPRISE TECHNOLOGY SERVICES **Meeting Date - March 19, 2015 - Via Conference Call**

WDE One Day Meeting Schedule - Actual. docx

Primary Contact			
	Marc Eskenas	Project Manager for Enterprise Education Initiatives	
Chief Information Officer			
	Flint Waters	State Chief Information Officer	ETS
	Andy Corbin	Manager, Business Analytics & Support Section	WCCC
	Matt Petry	Deputy Director / CFO	WCCC
Information Technology and Infrastructure			
	Meredith Bickell	State Deputy CIO	ETS
	Dr. Laurel Ballard	Education IT Enterprise Architect	ETS
	Ray Brand*	Supervisor – Office of Enterprise Architecture	ETS - Unable to attend
	Marc Eskenas	Project Manager for Enterprise Education Initiatives	ETS
	Barbara Grofe	IT Enterprise Security Architect, P20 Project Director	ETS
	Nicholas Gronski	Business Analyst for Enterprise Education Initiatives	ETS
	Scott Wagner*	Consultant – Six Actual Software	ETS - Unable to attend
	Nicole Anderson	Policy/Research Analyst	WCCC
	Andy Corbin	Business Analytics and Support Section	WCCC
	Tully Holmes	Systems Administrator	WCCC
	Matt Petry	Deputy Director/CFO	WCCC
	Geir Solvang*	SLDS Coordinator	WCCC - Unable to attend

Appendix F – List of Documentation Provided for Review

Document Summary
by College or Agency and File Type
April 2015

	DOCUMENT TYPE					
	WORD	PDF	EXCEL	PUBLISHER	VISIO	TOTAL
WYOMING COMMUNITY COLLEGE COMMISSION						
Documents	36	16	17	0	4	73
PARTICIPATING COLLEGES						
CC	12	1	1	0	0	14
CWC	1	0	0	0	0	1
EWC	2	2	0	0	0	4
LCCC	5	3	1	0	0	9
NWCCD	2	2	0	1	0	5
NWC	5	7	3	0	0	15
WWCC	2	7	0	0	0	9
CONTRIBUTING AGENCIES						
UW	4	1	0	0	0	5
WDE	1	4	0	0	0	5
DWS	0	1	0	0	0	1
ETS	2	1	0	0	0	3
DYNAMIC CAMPUS						
Documents	22	2	6	0	0	30
Totals	94	47	28	1	4	174
	WORD	PDF	EXCEL	PUBLISHER	VISIO	TOTAL DOCUMENTS

Note: Documents often contain links and references to additional information that fulfill the documentation requested by Dynamic Campus.

PROJECT DOCUMENTS

April 2015

Folder	Document	File Type
WYOMING COMMUNITY COLLEGE COMMISSION (WCCC)		
WCCC Documents		
	CCW Data Template	EXCEL
	DataFlow	VISIO
	DataMart	VISIO
	Distance Report Format	PDF
	Enrollment Report Format2	PDF
	Letter to DoE	WORD
	Letter to DWS	WORD
	Letter to ETS	WORD
	Letter to UW	WORD
	Metrics Operational Guide 120814	WORD
	NeedsAnalysisFinal (considering UW's input)	WORD
	OrgChart	PDF
	OutOfTheBoxWarehouse	PDF
	Persistence2	PDF
	WCCC - Report Review Process 09242014	PDF
	WCCC Data Gov Framework	PDF
	WCCC-PreAssessmentdocs	WORD
	wcccstrategicplan2.0_16x10brochure	PDF
	WorkFlowForColleges	VISIO
	WorkFlowForDataTransfer	VISIO
	Wyoming Community College Commission Chapter 1 Definitions	PDF
	Wyoming Community College System Spring 2014 Enrollment Report	PDF
IR Councils		
	Academic Affairs Council List	PDF
	Administrative Services Council List	PDF
	Chief Information Officer Council	PDF
	Executive Council--Contact List	PDF
	Institutional_Research_Council_List	PDF
	Student Services Council List	PDF
IRC Agendas & Minutes		
	IRC 1.28.15.Cheyenne.MtgNotes	WORD
	IRC Phone Mtg. Agenda 090214	WORD
	IRC.Phone.Conf.1-13-15	WORD
	IRC.Phone.Conf.011315	WORD
	IRC.Phone.Conf.100214	WORD
	IRC.Phone.Conf.11614	WORD
	IRC.Phone.Conf.120414	WORD
	IRC.Phone.Conf.Template	WORD
IRC Common Data Elements		
	Agreed Data Standards- do not edit	EXCEL
	All Rules in CROA Validation	EXCEL
	Code Standardization Efforts	EXCEL
	IRC Common Code Rules in CROA Validation	EXCEL
	IRC Copy of Data Element Naming	EXCEL
IRC Reporting		
	Data Collection and Reporting Handbook	WORD

PROJECT DOCUMENTS

April 2015

Folder	Document	File Type
	Non-Typical Term Value Feedback	
	CC - Non- Typical Term Value Feedback	EXCEL
	EWC - Non- Typical Term Value Feedback	EXCEL
	LCCC - Non- Typical Term Value Feedback	EXCEL
	NWC - Non- Typical Term Value Feedback	EXCEL
	NWCCD - Non- Typical Term Value Feedback	EXCEL
	WWCC - Non- Typical Term Value Feedback	EXCEL
	Validation	
	Changing ODS Fields to Numerical	EXCEL
	Checking Caroles Scripts for New or Changed Fields	EXCEL
	Checking Preferred Name Filter	WORD
	Compare Relational to History	EXCEL
	Data Element Naming	EXCEL
	Field Length Changes	WORD
	Queries to Validate College Data	WORD
	Track Data Quality	WORD
	Validating Person Corp Indicator	WORD
	WY - State Report Documents	
	Colleague Screen ESR Rpt	WORD
	Colleague Screen Fixed Var Rpt	WORD
	Colleague Screen FS Rpt	WORD
	Colleague Screen Fund 10 Rpt	WORD
	Colleague Screen Pers Rpt	WORD
	Colleague Screen Subs Rpt	WORD
	Colleague Screens of State Retirement Rpt	WORD
	Custom Data Entry Guide for the Hathaway Scholarship Report	WORD
	Enrollee Success Rate Report Programming Logic Guide	WORD
	ER and IPEDS Detail File Dictionaries 102214	EXCEL
	Flex Spend Report Programming Logic	WORD
	Hathaway Report Programming Logic	WORD
	Main Colleague Screen Hath Rpt.	WORD
	Persistence Report Programming Logic	WORD
	Success in Subsequent Coursework Report Program Logic	WORD
	WCC Enrollment Reporting Methods	WORD
PARTICIPATING COLLEGES		
CASPER COLLEGE (CC)		
	20150206.informationtechnology organization chart	WORD
	Administrative - Enterprise Applications Coordinator Dallen Griffith	WORD
	Administrative - Enterprise Software Coordinator - David Dutton Final 2011	WORD
	Administrative - Enterprise Systems Administrator Joe Dutro 3-2014	WORD
	Administrative - Enterprise Database Coordinator Don King	WORD
	CC Backup and Recovery Plan_Final_2	WORD
	ColleagueERPEnvironmentQuestionaire	WORD
	Colleges-PreAssesmentdocsCC	WORD
	Community College Reporting Needs - Common Categories	PDF
	Contacts Needs Analysis	WORD
	Data Collections	EXCEL

PROJECT DOCUMENTS

April 2015

Folder	Document	File Type
	Director Information Technology Kent Brooks 2011	WORD
	DynamicCampusNetworkingInfo	WORD
	ITGovernanceatCasperCollege	WORD
CENTRAL WYOMING COLLEGE (CWC)		
	CentralWyomingCollegePre-Assessment	WORD
EASTERN WYOMING COLLEGE (EWC)		
	EWC - National Community College Benchmark Project Report	PDF
	EWC Organizational Chart - Data Personnel	PDF
	EWC PreAssessmentdocs_2 6 2015	WORD
	EWC PreAssessmentdocs_2 10 2015	WORD
LARAMIE COUNTY COMMUNITY COLLEGE (LCCC)		
	Colleague ERP Environment Questionnaire -LCCC	WORD
	Colleague products	EXCEL
	Colleges-PreAssesmentdocs - LCCC	WORD
	DSOC_guidelines_revised outline_20150202	WORD
	ITS Org Chart 12.31.14	PDF
	LCCC IR Master Calendar 20140708 DRAFT	WORD
	LCCC Policy and Procedure FED 01 - Identity Theft Prevention Program	PDF
	LCCC Program Review Manual 2014-15	PDF
	Program Analysis System Overview 20150107	WORD
NORTHERN WYOMING COMMUNITY COLLEGE DISTRICT (NWCCD)		
	Colleges-PreAssessmentdocs	WORD
	ITS Management Tree	PDF
	NWCCD Colleague ERP Environment Questionnaire	WORD
	Org Chart 12-22-14 (PDF)	PDF
	Org Chart 12-22-14 (Word doc)	PUBLISHER
NORTHWEST COLLEGE (NWC)		
	14FA NWC Enrollment Report - to WCCC	PDF
	2013-14 BHB HS Report - Powell - July 2014 - Tables 1-5	PDF
	2014_CCA_Data_Perparation_Workbook_V1_1 - NWC - to WCCC	EXCEL
	Colleague ERP Environment Questionnaire	WORD
	Completions Report - through 2013-14 - NWC	PDF
	Dynamic Campus - NWC Pre-Assessment - Organization Charts	WORD
	Dynamic Campus - NWC Pre-Assessment Tracking Form	WORD
	Enrollee Success Rate Report - 2012-13 - NWC - to WCCC	PDF
	Enrollment Report to BOT - Oct 2014 final - 11-5-14	PDF
	Governance and Committees	WORD
	IPEDS 2014_Student_Financial_Aid_Data	PDF
	NCCBP Report 2013	PDF
	SP - Tracking Report - Spring 2014 - final	WORD
	SUMMARY Enrollment by Course and Designator - 04SU through 14SU	EXCEL
	Summary Number of Majors - 04SU through 15SP	EXCEL
WESTERN WYOMING COMMUNITY COLLEGE (WWCC)		
	Admin Org Chart	PDF
	administrative_services_2014	PDF
	Colleague ERP Environment Questionnaire	WORD
	Colleges-PreAssessmentdocs	WORD
	President Org Chart	PDF
	Student Learning Org Chart	PDF

PROJECT DOCUMENTS

April 2015

Folder	Document	File Type
	Student Learning Outreach Org Chart	PDF
	Student Success Org Chart	PDF
	WWCC Ellucian Action Plan FINAL 7.25.14	PDF
AGENCIES		
UNIVERSITY OF WYOMING (UW)		
	Reporting - Phase I ScopeFY14	WORD
	Reporting-Phase I Visual	WORD
	uw organizational chart 6-29	PDF
	UW reporting	WORD
	UW-PreAssessment - Item	WORD
WYOMING DEPARTMENT OF EDUCATION (WDE)		
	Data Security Report Final	PDF
	DoE-PreAssessmentdocs	PDF
	Letter to Director Rose	WORD
	Operations Group Org Chart (DRAFT)	PDF
	WDE 4 Year Information Management Strategic Plan (DRAFT)	PDF
DEPARTMENT OF WORKFORCE SERVICES (DWS)		
	DWS-PreAssesmentdocs	PDF
ENTERPRISE TECHNOLOGY SERIVCES (ETS)		
	2014-12-03 Org Chart by Functions	PDF
	ETS POC	WORD
	ETS PreAssessmentdocs	WORD
DYNAMIC CAMPUS		
Documents		
	Colleague ERP Environment Questionnaire	WORD
	Colleges-PreAssessmentdocs	WORD
	ContributingAgencies-PreAssesmentdocs	WORD
	Document Lists	EXCEL
	Document Totals	EXCEL
	Dynamic Campus Project Team Bios	WORD
	Meeting Attendees	EXCEL
	Kickoff Meeting Agenda	WORD
	New Position Descriptions	WORD
	Primary Contacts	EXCEL
	WCCC Data Management Needs Analysis Project Overview	PDF
	WCCC Handout	WORD
	WCCC-PreAssessmentdocs	WORD
	WCCC Proposed Org Chart	EXCEL
	WCCC Data Management and Analytical Reporting Needs Analysis	WORD
	WCCS RA Staff	EXCEL
	WY CC Commission Proposal - Final	WORD
	WY Meetings Itinerary - Actual	WORD
Meeting Schedules and Attendees- with Times		
	Casper College-One Day Meeting - Actual	WORD
	CWC One Day Meeting Schedule - Actual	WORD
	DWS- One Day Meeting Schedule - Actual	WORD
	ETS-One Day Meeting Schedule - Actual	WORD
	EWC One Day Meeting Schedule - Actual	WORD
	LCCC One Day Meeting Schedule - Actual	WORD

PROJECT DOCUMENTS

April 2015

Folder	Document	File Type
	NWC One Day Meeting Schedule - Actual	WORD
	NWCCD One Day Meeting Schedule - Actual	WORD
	UW One Day Meeting Schedule - Actual	WORD
	WCCC One Day Meeting Schedule - Actual	WORD
	WDE One Day Meeting Schedule - Actual	WORD
	WWCC One Day Meeting Schedule - Actual	WORD

Appendix G – Wyoming Community College Commission Data Governance Framework

Wyoming Community College Commission

2020 Carey Avenue, 8th Floor, Cheyenne WY 82002

Commissioners
Mr. Larry Atwell, Cheyenne
Ms. Charlene Bodine, Sheridan
Mr. Bruce Brown, Devils Tower
Ms. Sherri Lovercheck, La Grange
Ms. Saundra Meyer, Evanston
Mr. Jack Russell, Cody
Ms. Wendy Sweeny, Worland

WYOMING COMMUNITY COLLEGES

Exofficio
Governor Matt Mead
State Superintendent Cindy Hill
Executive Director
Dr. James O. Rose

Phone: 307-777-7763
Fax: 307-777-6567
www.communitycolleges.wy.edu

To: Dr. Jim Rose, WCCC Executive Director

From: The Community College Data System (CCDS) Committee

Date: January 16, 2013

Subject: Request for approval of a Community College Data Transfer Path and a Data Governance Framework

---

Dear Dr. Rose,

As we work to meet the increasing demands of producing and delivering information to various stakeholders, the CCDS Committee was established to form policy that will control the security and flow of data from the colleges to the Statewide Longitudinal Data System (SLDS), and the generation and distribution of community college information/reports.

To continue our efforts in policy development in these areas, there are two foundational components that the committee proposes to establish first:

1. A data transfer path
2. A community college data governance structure

1. Data Transfer Path (Attachment A)

As you know, the transfer of data from the local community college systems to the WCCC and subsequently to the SLDS are necessary events in order to effectively produce required state level community college reports, as well as to help enable data driven decision making at all levels within the education community.

The data transfer path that the committee proposes is one that incorporates the already in-progress Colleague Reporting and Operating Analytics (CROA) system where each college will transfer a specified data set at certain intervals to WCCC's instance of CROA. The WCCC will in turn forward the

specified data set, or a subset of these elements, to the SLDS postsecondary staging area to make it available for cross sectional and longitudinal studies that incorporates data from other agencies.

Below is a list of the more specific areas where the committee will need to develop policy.

- Data elements to be transferred from each community college
- Frequency of data transmittal to WCCC's instance of CROA
- Data storage timeframes in WCCC's instance of CROA
- Matching of individual students across colleges and assignment
- Data extraction and report generation from data in WCCC's instance of CROA
- Archiving historical data from WCCC's instance of CROA
- Data elements to be passed from WCCC's instance of CROA to the SLDS
- Frequency of data transmittal from WCCC's instance of CROA to the SLDS

2. Community College Data Governance Framework (Attachment B)

The CCDS Committee proposes that a framework be put in place to help the community college system to thoroughly and systematically generate and maintain policy as it relates to the movement and storage of data, as well as the production and distribution of information.

"Data Governance" is defined by the Data Governance Institute (http://www.datagovernance.com) as *"… a system of decision rights and accountabilities for information-related processes, executed according to agreed-upon models which describe who can take what actions with what information, and when, under what circumstances, using what methods".*

The Data Governance Framework that the committee proposes is a three tier decision making/implementation hierarchy with distinct purposes and responsibilities at each level. This is the same model as is being proposed by the SLDS Taskforce for oversight of the multi-agency data system, but calibrated differently to fit our internal (community college system) surveillance of data management.

a) The hierarchical structure

Bottom tier: CCDS Committee

The CCDS Committee will serve as the working group of the data governance system. It will be this group's responsibility to develop and propose data management and reporting related policies to the middle tier, as well as ensuring documentation and implementation of all approved policies.

Middle tier: Institutional Research (IR) Council *

The Institutional Research Council will serve as the approval authority for data management and reporting related policies, and is responsible for addressing and proposing higher level policies to the top tier as it relates to legislative issues and data feeds to the Statewide Longitudinal Data System (SLDS).

Top tier: Executive Council

The Executive Council will serve as the ultimate authority on higher level policy decisions as well as the authority on data management and reporting policy proposals that the IR Council selects to escalate.

* The committee concluded that the middle tier responsibilities of the proposed framework fall more in line with IR group functions than they do with CIO group functions. This entails promoting the IR Committee to a Council so that the working group (CCDS Committee) reports to a higher level entity. If this promotion is approved, then the WCCC Consultation Policy will need to be amended accordingly. CCDS Committee membership will also be reviewed since it currently consists of several IR Committee members.

b) Group expectations and goals

Expectations and goals are spelled out for each level of the hierarchy in Attachment B. We see this as a first version of a living document that will see changes over time as we adjust to this new era of moving data and delivering more college enrollment and completion information to stakeholders.

Wyoming Community College Commission

2020 Carey Avenue, 8th Floor, Cheyenne WY 82002

Commissioners
Mr. Larry Atwell, Cheyenne
Ms. Charlene Bodine, Sheridan
Mr. Bruce Brown, Devils Tower
Ms. Sherri Lovercheck, La Grange
Ms. Saundra Meyer, Evanston
Mr. Jack Russell, Cody
Ms. Wendy Sweeny, Worland

WYOMING COMMUNITY COLLEGES

Exofficio
Governor Matt Mead
State Superintendent Cindy Hill
Executive Director
Dr. James O. Rose

Phone: 307-777-7763
Fax: 307-777-6567
www.communitycolleges.wy.edu

Should you have any questions regarding these proposals, please don't hesitate to contact Geir Solvang of the WCCC, or any of the other CCDS Committee members.

Thank you for your consideration.

Best regards,

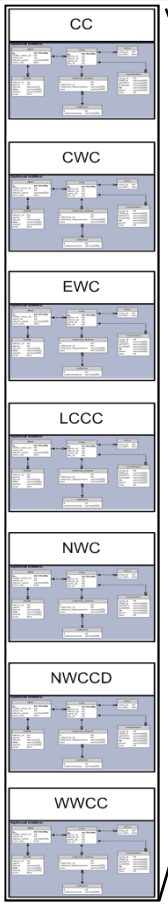
CCDS Committee

CC - Lynn Fletcher	NWC - Lisa Smith
CC - Don King	NWCCD - Brady Fackrell
CWC - John Wood	NWCCD - Sharon Elwood
CWC - Martha Davey	WWCC -Jackie Freeze
EWC - Kimberly Russell	WWCC - Jean Larsen
EWC - Jim Maffe	WCCC - Tully Holmes
LCCC - Ann Murray	WCCC - Geir Solvang
LCCC - Chad Marley	
NWC - Casey Dearcorn	

Attachment A

Data Transfer Path: From Community Colleges to the Statewide Longitudinal Data System (SLDS)

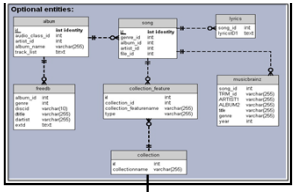
Community College CROA ODS



Community College Data System (CCDS)

Core Reporting Elements Approved by IR Council

WCCC CROA ODS

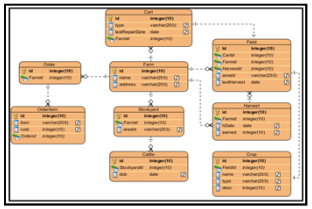


State Report Staging and Production

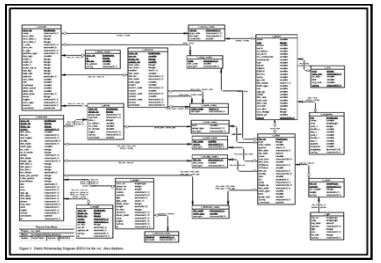
(Preliminary reports and/or report scripts will be sent to the colleges to verify that aggregate information reflects accurate unit level data before data is passed to postsecondary staging.
WCCC generates final reports here until SLDS is in production)

UW

Postsecondary Data Staging



SLDS Data Warehouse Environment



Longitudinal Reporting/Analysis

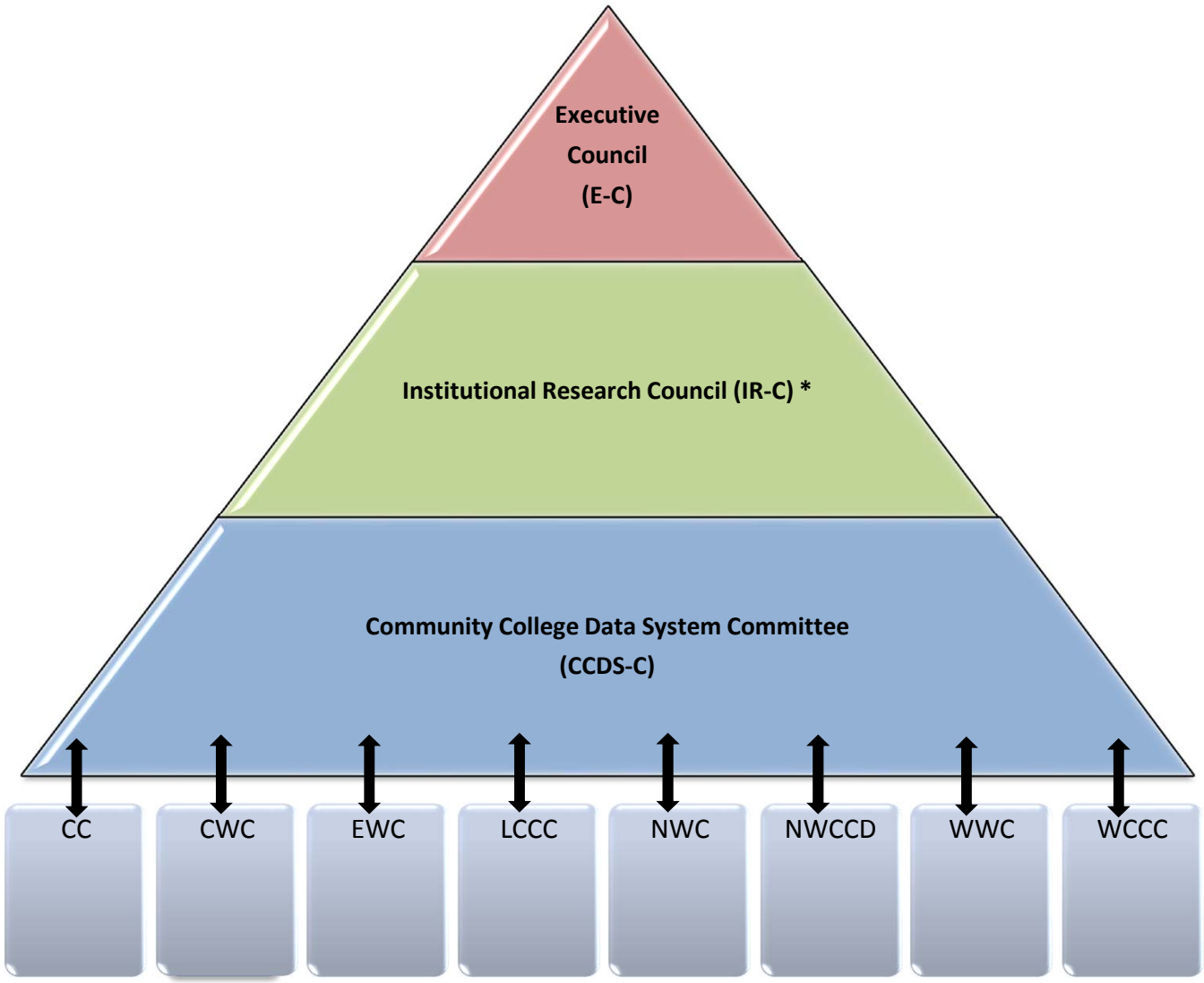
Attachment B

Wyoming Community College Data System (CCDS)

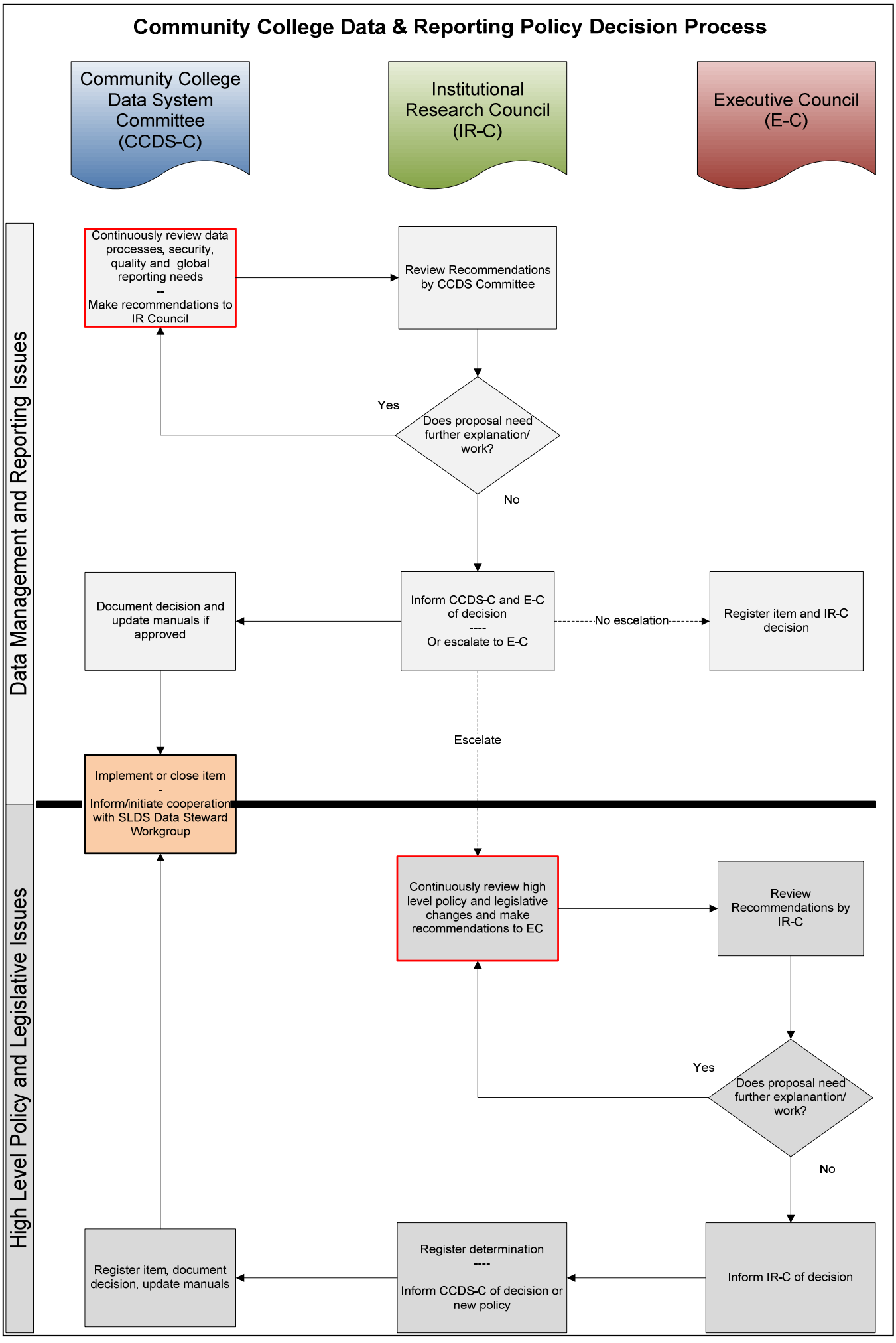
Data Governance Framework

It is acknowledged that due to turnover, some of the members shown on the following tables no longer work for either the Commission or the colleges. However, given that these tables are part of a dated document, the names were not changed to reflect current staffing that continues to change.

CCDS Data Governance



* Requires an amendment to the WCCC Consultation Policy


Community College Data & Reporting Policy Decision Process
Community College Data System Committee (CCDS-C)
Institutional Research Council (IR-C)
Executive Council (E-C)
Data Management and Reporting Issues
High Level Policy and Legislative Issues
Continuously review data processes, security, quality and global reporting needs
--
Make recommendations to IR Council
Review Recommendations by CCDS Committee
Yes
Does proposal need further explanation/ work?
No
Document decision and update manuals if approved
Inform CCDS-C and E-C of decision

Or escalate to E-C
No escelation
Register item and IR-C decision
Escelate
Implement or close item
-
Inform/initiate cooperation with SLDS Data Steward Workgroup
Continuously review high level policy and legislative changes and make recommendations to EC
Review Recommendations by IR-C
Yes
Does proposal need further explanantion/ work?
No
Register item, document decision, update manuals
Register determination

Inform CCDS-C of decision or new policy
Inform IR-C of decision

Community College Data Governance

Community College Data System Committee (CCDS-C)

Team Purpose

To ensure the Community College Data System (CCDS) is a secure and resourceful system that supports effective reporting and analysis for the community colleges and the WCCC, and to manage the release of data to the Statewide Longitudinal Data System (SLDS).

Team Responsibilities

1. Develop and maintain the security rules for data transfers, extraction and reporting
2. Develop and maintain rules/procedures for generating reports and extracting data sets
3. Develop and maintain rules/procedures for report disbursement
4. Develop and maintain queries to support approved reports
5. Maintain log and document team activities in a central location

Team Members

CC - Lynn Fletcher	NWC - Lisa Smith
CC - Don King	NWCCD - Brady Fackrell
CWC - John Wood	NWCCD - Sharon Elwood
CWC - Martha Davey	WWCC -Jackie Freeze
EWC - Kimberly Russell	WWCC - Jean Larsen
EWC - Jim Maffe	WCCC - Tully Holmes
LCCC - Ann Murray	WCCC - Geir Solvang
LCCC - Chad Marley	
NWC - Casey Dearcorn	

Team Member Expectations

- Flag CCDS issues and propose solutions
- Communicate changes in local systems that may impact the CCDS
- Maintain a global perspective of how the CCDS can benefit the education community
- Have representation on the SLDS Data Steward Workgroup

Goals

1. Provide the CCDS and SLDS data warehouses with quality relevant data
2. Provide stakeholders with access to quality reports and analysis tools

Decision Making Process

- Collaborative
- Vote to decide whether to forward proposals to IR-C:
1 vote per college, 1 vote WCCC
- a tie (4-4) constitutes sending the proposal w/ no recommendation
- See Community College Data & Reporting Policy decision making flowchart

Community College Data Governance

Institutional Research Council (IR-C)

Council Purpose

To establish and enforce policies related to the management of the Community College Data System (CCDS), and to set policy for connectivity and data feeds to the Statewide Longitudinal Data System (SLDS).

Council Responsibilities

1. Coordinate with the CCDS Committee
2. Ensure data governance policies are being followed
3. Make high level policy recommendations to the Executive Council
4. Recommend approve/deny data requests
5. Control element inclusion and frequency of data transfers to the SLDS

Council Members

CC - Lynn Fletcher	NWCCD - Sharon Elwood
CC - Kathy Thatcher	NWCCD - Steffie Rawlings
CWC - Martha Davey	WWCC - Jackie Freeze
CWC - Xiaoying Liu	WWCC - Sandy Caldwell
EWC - Kimberly Russell	WWCC - Dianna Renz
EWC - Dee Ludwig	WCCC - George Pitt
LCCC - Ann Murray	WCCC - Tully Holmes
NWC - Casey Dearcorn	
NWC - Lisa Smith	

Council Member Expectations

- Inform institution staff of CCDS regulations and procedures
- Maintain a global perspective of how the CCDS can benefit the education community
- Develop policy questions that the CCDS should help answer
- Track proposed legislation that affects CCDS policy
- Have representation on the SLDS Data Governance Board

Goals

1. Ensure confidentiality and security of all student level data
2. Ensure that the CCDS provides value to all stakeholders

Decision Making Process

- Use established procedures
- Escalate recommendations from the CCDS Committee to the Executive Council as needed
- See Community College Data & Reporting Policy decision making flowchart

Community College Data Governance

Executive Council (E-C)

Council Purpose

To provide oversight of the Community College Data System (CCDS) and data governance structure.

Council Responsibilities

1. Ultimate authority on CCDS related procedures, rules and policy
2. Ensure commitment of human and capital resources
3. Provide vision and direction to the IR-C

Council Members

CC - Walter Nolte	
CWC - Jo Anne McFarland	
EWC - Tom Armstrong	
LCCC - Joe Schaffer	
NWC - Paul Prestwich	
NWCCD - Paul Young	
WWCC - Karla Leach	
WCCC - Jim Rose	

Council Member Expectations

- Communicate impact of the CCDS to legislators and education/workforce leaders
- Maintain a global perspective of how the CCDS can benefit the education community
- Have representation on the SLDS Executive Board

Goals

1. Ensure CCDS sustainability through the provision of appropriate resources and funding
2. Promote a culture of data driven decision making that fosters increased student achievement

Decision Making Process

- Use established procedures
- Communicate decisions to the IR-C
- See Community College Data & Reporting Policy decision making flowchart

Appendix H – Dimensional Modeling

Dimensional Modeling

Model Design

The dimensional model design was first introduced to the data warehouse/business industry in 1996.[i] This approach uses a pragmatic view of the underlying database platform and selects the most appropriate physical model based on usability, flexibility, performance, and maintenance.

Dimensional Modeling (DM)

DM is a logical design technique often used for data warehouses. It is specifically focused on understandability and performance. This model differs greatly from the entity-relation (ER) modeling used in a transactional system such as Ellucian's Colleague ERP. DM is specifically designed to support end-user queries in a data warehouse in contrast to ER which is very useful for transactional capture, processing and maintenance of data.

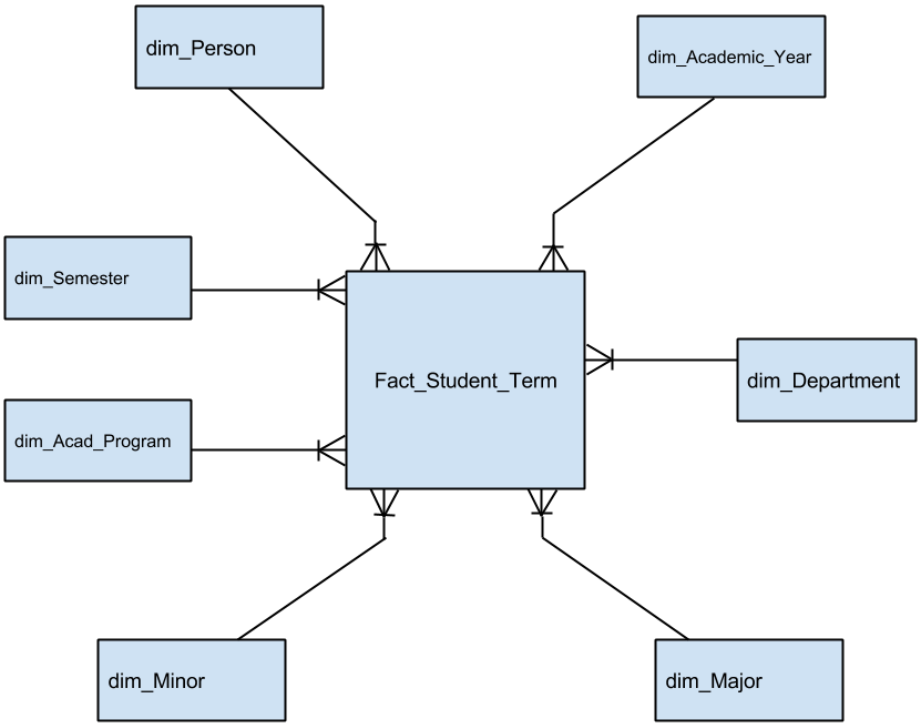
DM uses the concept of facts (measures), and dimensions (context). Facts are quantifiable measures that are often numeric such as number of students registered or the amount of financial aid awarded. Facts can also reflect "existence" data, in cases where it isn't measuring a value but simply indicating it exists in a particular condition. Dimensions are descriptors that define the facts. Examples of a dimension would be academic year, semester, academic program, or financial aid award.

Dimensional models are built to represent business process areas. By organizing and grouping data in coherent categories the information is easier to understand, more intuitive to users, and easier to retrieve.

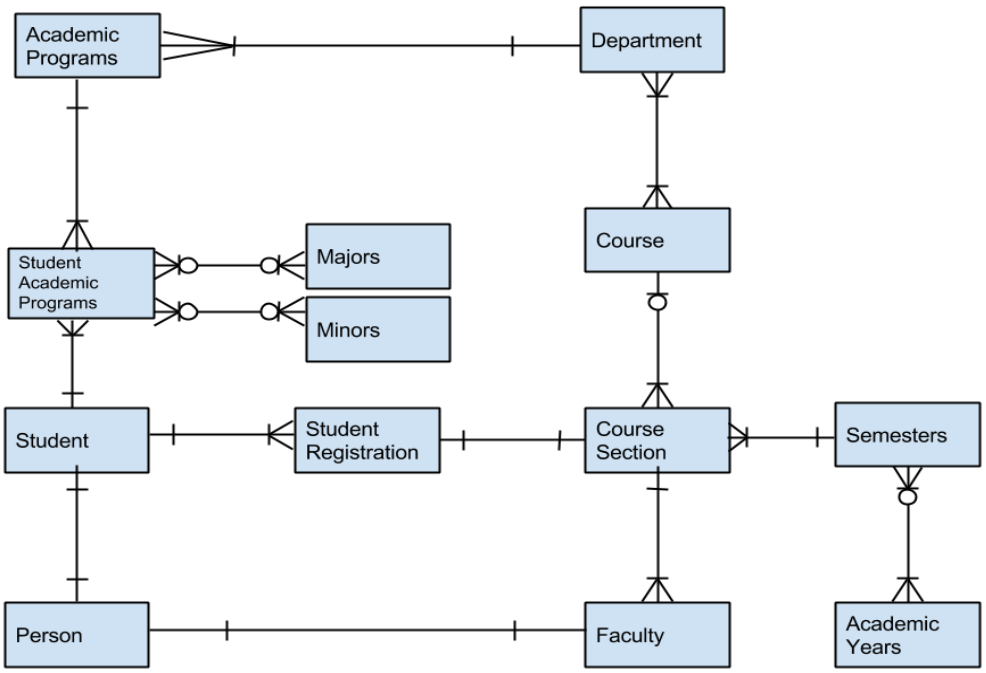
The dimensional model consists of a star-like schema where dimensions surround a fact table. The charts below show examples of common dimensions in higher education in a DM model and its representation in a transactional (ER) system.

Registered Students Example

DM Model



ER Model



These examples are just a hypothetical, however, they demonstrate a clear contrast between the modeling structures. In the ER or transactional model it is much more complex to join data together to achieve measures.

Benefits of dimensional modeling include:

- Understandability - Easy to understand, grouped into business categories.
- Performance - De-normalized and optimized for data queries and BI tools.
- Extensibility - Scalable, easy to add new data or accommodate change.

Measuring Data in Time

A fundamental feature employed with the DM model is the ability to measure data in time. For instance, an administrator wants to compare applications submitted, accepted, and confirmed for a date in the admissions cycle to the same date in the past two years. This shows progress toward the admissions goal and identifies if the program is trending lower or higher. This information can be used to change marketing and admissions strategies accordingly. In a transactional student system dates can be manipulated to achieve processing objectives. However, this can make comparing data for time periods inaccurate. Also, as mentioned previously, querying the transactional model to accurately report historical data can be cumbersome and confusing. That is why when asked for the number of students admitted, institutions with transactional systems may receive various answers depending on how the query is constructed.

Time affects all data in a data warehouse. Data can change unexpectedly. Examples include; addresses, faculty positions, course descriptions, student program enrollment, etc. For historical and analytical purposes it may be necessary to keep a record of a fact that changed.

This concept is referred to as Slowly Changing Dimensions (SCDs). Changes in facts can be managed in different ways depending on the data and the institutional reporting requirements. Below are examples of three common SCDs used to manage change in a higher education data warehouse.

- **SCD Type 1**: Overwrite. As change to a member occurs the record is overwritten, losing history. This dimension type is suitable for time dimensions, such as the date or term dimension. An example of this would be, the end date of a semester was changed. Since this is a correction of an error, history would not need to be maintained.

- **SCD Type 2**: Versioned history. As change to a member occurs the prior record is given an end date and the new version is inserted. Individual member versions are joined via their surrogate key. This type of SCD is useful for person demographics and descriptive attributes. An example of this would be, a student or employee updated their marital status. This gives the ability to report the person as single or married at a certain point in time.

- **SCD Type 3**: Prior value. As a change to a particular member attribute occurs, the prior value is retained in a separate column. This type of dimension gives a direct way to always view the prior value of an attribute. An example of this SCD could be used is for tracking course fee changes.

The three SCD approaches to handling time variance in dimensions are applicable to situations encountered in a higher education data warehouse. Type 2, in particular, provides the method to preserve transaction history to compare data for particular time periods needed in IPEDS reporting.

OLAP Cubes

The DM model establishes dimensions based on business processes or business areas such as registration or admissions. By defining these measures the model provides the ability to mine data by grouping measures into logical groups. These logical groups are called cubes. Cubes allow the user to slice data into different views through the use of dimensions.

OLAP stands for On-Line Analytical Processing. This is the technical infrastructure used to provide ad hoc user query capability and multi-dimensional analysis. OLAP gives non-technical users the power to find answers. OLAP creates the mechanism for simple analytical reporting over time and trend analysis.

Although OLAP Cubes can be built from transactional or ER models, these systems inherently lack the ability to ensure change history is retained, and the analytical data produced from these cubes can often be inaccurate.

OLAP Cubes are usually accessed by users using software tools or OLAP servers like Microsoft Analysis Services and Cognos. The implementation of OLAP Cubes in conjunction with a dimensional data warehouse provides the ability to deliver powerful strategic data analysis to all users.

Conclusion

The DM model organizes data into an understandable, optimized, and extendable structure based on a business process or area. It differs greatly from the ER model used in transactional systems and it is structured to deliver data to end users rather than optimize transactions.

The use of Slowly Changing Dimensions to manage data history is critical to providing point in time reporting and retaining historic data.

The implementation of the DM model in conjunction with SCDs provides for the development of OLAP Cubes. OLAP provides non-technical users with the ability to slice data in different ways to answer strategic questions.

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[i] Kimball, R. *The Data Warehouse Toolkit, 3rd Edition*, Wiley, 2013

Appendix I – Data Warehouse Ongoing Support Costs

Estimated Data Warehouse Ongoing Support Costs

April 30, 2015

In addition to the initial costs for the development of the data warehouse, there will be ongoing development, maintenance and software support costs. Costs for the first full year after deployment are shown by item in the table below.

Estimated Ongoing Support Costs	Low	High
Data Warehouse Coordination & Project Management	$ 45,000	$ 45,000
Systems Administration	$ 30,000	$ 35,000
Database Administration	$ 120,000	$ 130,000
Data Warehouse Programming Support	$ 95,000	$ 110,000
Train/Develop Data Analysts (due to attrition)	$ 10,000	$ 10,000
Annual Hardware & Software Support	$ 50,000	$ 60,000
New Report Writing	$ 35,000	$ 45,000
New KPI/Dashboard Programming	$ 65,000	$ 75,000
Total	**$ 450,000**	**$ 510,000**