Connecting Libraries and Learning Analytics for Student Success (CLLASS)
Abstract

CLLASS is a one-year grant designed to perform preliminary planning activities to pioneer the integration of library data in institutional learning analytics and develop detailed proofs of concept and models to guide academic libraries preparing to engage in this emerging and important use of data to support student success. The lead applicant, Syracuse University, is joined by advisory group members and project participants from ACRL, Blackboard, CNI, DePaul University, EDUCAUSE Learning Initiative, IMS Global Learning Consortium, Jisc, Lewis and Clark Community College, OCLC, Susquehanna University, the University of California, Berkeley, the University of Michigan, the University of Minnesota, and Unizin.

The foremost purpose of higher education is to educate students, and a key component of any educational endeavor is assessment. As active contributors to the educational mission of their institutions, academic librarians use assessment to expand student access to learning; ensure students are able to persist and attain their goals; scaffold student experiences to aid attainment of independent learning capacity; and develop productive self-awareness, metacognition, and self-actualization in a variety of contexts, including their immediate learning environments, the broader community, and the world around them. Now, as institutions of higher education commence and commit to the next wave of assessment capability in the form of learning analytics initiatives, it is time for librarians to explore the opportunity to engage with emergent institutional learning analytics tools, systems, and strategies as well. Learning analytics "is the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs." Essentially, learning analytics employ data to improve learning contexts and help learners succeed. Learning analytics help educators discover, diagnose, and predict challenges to learning and learner success and point the way to successful and active interventions to benefit students.

The CLLASS project will analyze feasibility, solidify partnerships, develop work plans, and design prototypes in order to create proofs of concept that can guide academic libraries seeking to support student learning and success by connecting library data with institutional learning analytics. The project will be enacted by participants in three task teams working together at two face-to-face meetings; progress and documentation will be shared with the academic library and higher education community via a formal white paper and conference presentation proposals. Through this process, the CLASS project seeks to achieve four goals:

1) cement sustaining partnerships and collaborations among academic librarians and learning analytics lynchpins, including institutional information technology and library systems professionals as well as library and higher education technology vendor communities;
2) design three library prototypes that serve as proofs of concepts and models for future projects connecting library data with institutional learning analytics;
3) as a part of prototype planning, develop library data profiles for a common interoperability standard, enabling the integration of library data with institutional data repositories; and
4) recommend ways in which drafted prototypes can enable the use of library data to expand library support for student learning and success in ways that are achievable, scalable, actionable, and ethical.

The CLLASS project coalesces a diverse group of library and higher education leaders and experts to develop models for library inclusion in institutional learning analytics, anticipate strategies for bringing the models to fruition, develop technologies to support library-enabled learning analytics, and anticipate ways in which this work will increase library impact on student learning and success. Through these actions, CLLASS will:

- advance the role of libraries as anchors within their higher education communities,
- enable libraries to provide indispensable data and contribute to a complete picture of institutional student learning, and ultimately,
- facilitate student learning and success by contributing to the identification, development, and assessment of the curricular and instructional improvements resulting from learning analytics initiatives.

Connecting Libraries and Learning Analytics for Student Success (CLLASS)

Syracuse University requests $50,000 and will provide an additional $11,030 in costshare to perform preliminary planning activities to pioneer the integration of library data in institutional learning analytics and develop detailed proofs of concept and models to guide academic libraries preparing to engage in this emerging and important use of data to support student success.

Statement of National Need – The foremost purpose of higher education is to educate students, and a key component of any educational endeavor is assessment. Indeed, it is hard to overstate the importance of assessment; it is the lifeblood of teaching and learning. Without assessment, educators sever their relationships with learners, resulting in instructional efforts that succeed only by chance and may often fail to reach, support, or empower learners. In contrast, educational practitioners who conduct assessments 1) gain insights into the needs, goals, and values of their learners; 2) design learning experiences that meet students where they are, engage them in meaningful ways, and enable them to attain greater agency in their own lives; and 3) reflect and improve throughout each iterative teaching cycle, ultimately increasing the value of education for their present and future learners. As active contributors to the educational mission of their institutions, academic librarians can expand student access to learning, ensure students are able to persist and attain their goals, and scaffold student experiences to aid attainment of independent learning capacity. They can support students as they develop productive self-awareness, metacognition, and self-actualization in a variety of contexts, including their immediate learning environments, the broader community, and the world around them. They *can* fulfill these educational roles; however, to *ensure* that they do, librarians must engage in assessment. Academic librarians who practice assessment participate in "triple-loop" learning, thereby exploring whether they're providing library services, resources, and facilities in the "right" ways, for the "right" reasons, and whether those "right" reasons align with professional convictions about information, education, and the role of libraries in higher education. For these reasons, academic librarians have addressed the challenge of learning assessment for many years. Early on, librarians used surveys to gauge students' satisfaction, confidence, and self-efficacy. More than a decade ago, librarians invested heavily in a variety of homegrown, vendor-supplied, and IMLS-funded information literacy tests including Project SAILS and TRAILS (Blixrud, 2003; Morriston, 2007). In the last ten years, many librarians have embraced the use of rubrics to assess artifacts of students' information literacy learning, due in large part to the IMLS-funded RAILS project (Belanger, et. al., 2015; Holmes, 2013; Oakleaf, 2011). And since the 2010 publication of the ACRL *Value of Academic Libraries* report and subsequent IMLS-funded library value studies, library research correlating student library interactions with student learning surrogates has proliferated (ACRL, 2012; ACRL, 2015; ACRL, 2016; Soria, Fransen, & Nackerud, 2013; Soria, Fransen, & Nackerud, 2014; Odeh, 2012; Bowles-Terry, 2012; Cox & Jantti, 2012; Emmons & Wilkinson, 2011; Jantti & Cox 2013; Stone & Ramsden, 2013; Vance, Kirk, & Gardner, 2013; Oakleaf, 2014).

A New Opportunity – Now, as institutions of higher education commence and commit to the next wave of assessment capability in the form of learning analytics initiatives, it is time for librarians to explore the opportunity to engage with emergent institutional learning analytics tools, systems, and strategies as well. In many ways, the trajectory from librarian engagement in learning assessment to involvement in learning analytics is a natural one. Past learning assessments and new learning analytics share a number of common values that librarians espouse. Both approaches demonstrate the importance librarians place on students' opinions, positive affect, confidence, self-efficacy, attainment of learning outcomes, commitment to growth and improvement, and ultimate success—whether that success is represented by retention in a program, minimized time to degree, GPA or similar achievement measures, speedy and appropriate employment, lifelong learning, or some other long range goal. Given these shared values, librarians will likely find learning analytics an intriguing and worthwhile next step of engagement in the development and assessment of student learning (Oakleaf, 2016; Oakleaf & Kryillidou; 2016; Oakleaf, Walter, & Brown, 2017; Oakleaf, Whyte, Lynema, & Brown, 2017). In recognition of this need, IMLS has continued their commitment to empowering librarians to study their impact on student learning and success by funding a series of learning analytics focused projects. First, IMLS funded the Library Integration into Institutional Learning Analytics (LIILA) project to explore ideas and develop use cases to guide library involvement in higher education learning analytics and student

success efforts; this grant project leads directly to the CLLASS project. In addition, recent months have seen IMLS support two projects that complement the present proposal. The first is a project investigating student perspectives on library involvement in learning analytics (Getting to Know their Data Doubles, PI Kyle Jones) and the second is a project developing a secure learning analytics research data set including library data (The Impact of the Academic Library on Learning in the University, PI Felix Kabo). Following this work, as the next step in using library data to help students learn and succeed, librarians need to investigate feasibility, secure partnerships, compose work plans, and map out prototypes that enable librarians to leverage library data in learning analytics contexts in ways that are practical, scalable, actionable, and ethical.

Learning Analytics in a Nutshell – Learning analytics "is the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs" (Conole, Gasevic, Long, & Siemens, 2011, para. 3). Essentially, learning analytics employs data to improve learning contexts and help learners succeed. Learning analytics helps educators discover, diagnose, and predict challenges to learning and learner success and points the way to successful and active interventions that benefit all students, but especially those who are less familiar with the unwritten rules of higher education, including first-generation students, community college students, students of diverse backgrounds, students with disabilities, and veterans. In this way, learning analytics provides an especially valuable tool to support the success of students of diverse populations.

In general, learning analytics initiatives seek to 1) increase student learning and 2) improve institutional business models associated with student success. Institutional leaders are cognizant of the national dialogue about higher education value (or the lack thereof). They are mindful of stakeholder expectations that students will be retained from one academic period to another; complete courses, programs, and degrees in a timely fashion; achieve learning outcomes; and graduate ready to gain appropriate employment and contribute to their communities. They are aware that their institutions are increasingly asked to demonstrate that they are delivering valuable learning experiences for students, assessing those learning experiences effectively, and intervening to assist struggling students when necessary. Institutional leaders know they are expected to be responsible stewards of the tuition dollars they accept, and that they need to reduce the costs of education while maintaining high standards (ECAR-ANALYTICS Working Group, 2015). To achieve these goals, they need to streamline business processes, demonstrate accountability, make data-driven financial decisions (EDUCAUSE, 2011), increase organizational productivity, and respond rapidly to challenges (Long & Siemens, 2011). Learning analytics initiatives are intended to address and support the achievement of all these goals.

To achieve the goals of improved learning and increased student success at both the individual and institutional level, learning analytics systems input data from a variety of sources and output descriptive information about student populations and cohorts which is then used to discover behaviors, characteristics, or other attributes that appear to lead to student difficulties or successes. Many learning analytics systems attempt to predict, based on known attributes, which students are "at risk" so that educators can intervene quickly. Interventions emanating from learning analytics systems include notifications to students, advisors, or faculty; requirements for students to meet with support services; changes to institutional processes or policies; or other actions that support improved student outcomes (ECAR-ANALYTICS Working Group, 2015).

Learning analytics systems come in a variety of forms and draw from a wide range of data sources. Many are "home grown" by individual higher education institutions, and even more are offered by vendors either as single offerings or suites of learning analytics "solutions." The learning analytics landscape is growing and fast changing; it's difficult to obtain a census of all the options. Typically, the data used by learning analytics systems comes from student information systems, learning management systems, clickers, publishers, video-streaming and web-conference tools, surveys, and co-curricular and extracurricular involvement systems (ECAR-ANALYTICS Working Group, 2015). At this time, library data is generally omitted from learning analytics systems. However, librarians are actively working to determine how to close this gap.

Libraries & Learning Analytics – Visioning produced by the LIILA project articulated nearly 100 user stories exemplifying the potential purpose and utility of including library data in learning analytics might produce. Even a few examples of librarian-focused user stories help demonstrate and ideate the ways in which librarians might use library-infused learning analytics to improve library services, resources, collections, and facilities:

As a librarian,	I want to know whether students who interact with library reference services	attain more learning outcomes, earn better assignment or course grades, are more engaged, are retained, transfer successfully, graduate/complete on time, get jobs, and/or earn more money	so that I can advocate for more (or more appropriate) reference resources, encourage more faculty and students to interact with reference librarians, and improve reference services.
As a librarian,	I want to know whether students who participate in library instruction	attain more learning outcomes, earn better assignment or course grades, are more engaged, are retained, transfer successfully, graduate/complete on time, get jobs, and/or earn more money	so that I can advocate for more (or more appropriate) instruction resources, encourage more faculty and students to schedule/participate in library instruction, and improve library instructional services and decision-making.
As a librarian,	I want to know whether the amount, degree, or relative rank of student library resource use or other library participation	impacts learning outcomes attainment, assignment or course grades, GPA or test scores, engagement indicators, and/or semester-to-semester retention, transfer success, employment rates or earnings after graduation/completion	so that I can encourage faculty to require use of more library resources in their teaching content and assignment design, and encourage students to increase their library resource use.
As a librarian,	I want to know whether any relationships between the use of library services/resources and institutional outcomes	vary by student population/status/characteristics	so that I can tailor library services/resources to meet the needs of populations with specialized needs and engage in appropriate instruction, outreach, etc. and help the institution prepare for changing student demographics.

Of course, many other stakeholders stand to benefit from the inclusion of library data in learning analytics. Once patterns of student-library interactions can be established and linked to success outcomes, faculty, administrators, student support and co-curricular professionals, institutional researchers, and—most importantly—students themselves can arm themselves with knowledge of best student practices with relationship to library engagement and pattern their own library use to more closely match their personal and educational goals. Equipping students with awareness of the ways in which libraries can and do support student learning and success, backed with analytics-based research, uncovers previously opaque keys to higher education success, enables them to make more informed choices, and empowers them take actions that result in greater individual agency and increased likelihood of success.

Impetus to Act – While academic librarians have monitored student success issues in higher education and engaged in the use of library data to study student success, their pursuit of learning analytics initiatives is in its infancy. In order to facilitate learning, improve assessment, partner with other educational organizations, help higher education institutions respond to the challenges of improving student learning and increasing student success, and develop as contributing and valued partners in the lives of their institutions, librarians can participate and help guide the ethical and responsible use of learning analytics to improve student success outcomes. In this way, this project answers the IMLS call for academic libraries to become higher education Community Anchors. Libraries are essential in the life of higher education institutions and are dedicated to the

improvement of student learning—in short, they serve as anchors in the academic community. At the same time, they are the only major sector of higher education not currently engaged in learning analytics initiatives.

Now, while learning analytics systems are being developed at a rapid pace and have captured the attention of higher education administrators and researchers nationwide, librarians can join the rest of the academy in the pursuit of improved student learning and success. Building upon existing IMLS-funded projects that are spearheading the creation of the vision, strategies, and technologies required to ensure that librarians seize the opportunity to initiate involvement in institutional learning analytics, the CLLASS grant will enact the planning necessary to launch the integration of library data in institutional learning analytics by developing three detailed models to aid academic libraries seeking to engage in this emerging and important use of data to support student success. Academic libraries that assess their impact on student learning and success and do so in the most current, most responsible, and most evidence-driven ways are well positioned to serve as anchors of the higher education community focused on ensuring student learning and success.

Privacy, Confidentiality, Security, & Assurance in Practice – As higher education environments continue to move inexorably toward the use of learning analytics as a critical pathway to enhance and ensure student success, librarians must determine how to engage in their institutions' efforts to identify student trouble-spots, share information with students, and intervene in order to improve student learning experiences and environments. Such new advances offer librarians the opportunity to reflect upon the use of individual-level data, the granularity of data maintained within in-house or via vendor partners, and the possibility of true opt-in or opt-out choices. This landscape seemed simpler to navigate in the past, but now requires renewed consideration, given the recent advent of data capture potential and the increasing need to support students in enrolling in, persisting through, learning throughout, and completing their higher education careers. As a result, librarians can revisit long-held beliefs that are entrenched in the practice of librarianship. Librarians also can consider new and unprecedented options to support institutional student success work, determine what library could or should contribute to the larger picture of student success at their institution, and envision the ways in which libraries could transform their services and resources to better meet student learning needs. This provides an opportunity for librarians to reimagine their role as educators who contribute actively to the learning, engagement, and success of students at their institutions, individually and in aggregate. In short, learning analytics brings to the fore a potential conflict. When library and educational responsibilities appear in conflict, how can librarians chose to honor the values of both roles? And how might librarians who expand upon their educational mission navigate the historical conventions of the library profession?

Within the context of the CLLASS project, librarians will seek a common ground in which libraries can maximize, even revolutionize, the ways in which they support student learning and success, while continuing to uphold the values of our profession. The PI, advisory group, and task teams all recognize the importance of adherence to professional ethics, and all conduct their practice under institutional and organizational policies and in alignment with state and federal law. Examples of these statements include the ALA Code of Ethics, the NISO Consensus Principles on User's Digital Privacy in Library, Publisher, and Software-Provider Systems, the Association of Institutional Research Code of Ethics, the Unizin Assurance Framework, the NIST Cybersecurity Framework, and the IMS Global Learning Data and Analytics Key Principles as well as institutional policies and practices such as the University of Michigan Learning Analytics Guiding Principles and Library Privacy Statement and the library and campus privacy policies at the University of Minnesota and Lewis & Clark Community College (see Privacy Resources addendum). Throughout the proposed project, all participants will seek ways to develop methodologies and adapt technologies to ensure continued integrity with existing high standards for privacy and confidentiality as well as data security and assurance. Participants will also surface and articulate questions on this subject that arise as the planning process evolves; such a list in itself is a valuable contribution to a profession seeking to support student success while simultaneously developing strategies to guard user privacy and confidentiality and maintain data security and assurance.

Project Design – *Goal* – The CLLASS planning project will analyze feasibility, solidify partnerships, develop work plans, and design prototypes in order to create proofs of concept and models that can guide academic libraries seeking to support student learning and success by connecting library data with institutional learning analytics. The project will be enacted by participants in three task teams working together at two face-to-face meetings; progress and documentation will be shared with the academic library and higher education community via a formal white paper and conference presentation proposals.

Outcomes – There are four expected outcomes from this project:

1) cement sustaining partnerships and collaborations among academic librarians and learning analytics lynchpins, including institutional information technology and library systems professionals as well as library and higher education technology vendor communities;
2) design three library prototypes that serve as proofs of concepts and models for future projects connecting library data with institutional learning analytics;
3) as a part of prototype planning, develop library data profiles for the Caliper standard, enabling the integration of library data with institutional data repositories; and
4) recommend ways in which drafted prototypes can enable the use of library data to expand library support for student learning and success in ways that are achievable, scalable, actionable, and ethical.

Phases – Three phases comprise this project's activities:

1) Preparatory task team work and the first meeting focuses on inceptive planning efforts of three tasks including feasibility studies, finalization of necessary partnerships, and beginning work plan drafts using a modified lean canvas approach.
2) The second meeting centers on developing and finishing the specifications and finalizing prototype plans.
3) Findings and conclusions from the meetings will be disseminated in a formal white paper and via follow-up conference presentations.

The full-day facilitated work meetings will be held in the winter and summer of 2019 at OCLC Headquarters meeting space in Dublin, Ohio, a central location for task team participants. Meetings will be facilitated by Dr. Oakleaf, the national advisory group (see below), and task team participants (see below). Any additional participant invitations will be based on potential contributions and a desire to cultivate a diversity of experiences, perspectives, and institution types.

Task 1 – Summary – To investigate the impact on library resource use on student learning and success, task team members from the University of Minnesota, OCLC, and IMS Global will plan to enable EZproxy data to a) be used to identify student library use across a variety of vendor platforms and resource types and b) comply with interoperability standards that integrate library resource use data with larger data repositories and learning analytics systems on a near-real time basis. Access to this granular level of student library use data could enable improvements to library service provision, collections decisions, and up-to-the-minute advising and teaching interventions for students in need. *In Detail* – Since 2011, the University of Minnesota (UMN) Libraries has collected student library usage data and combined it with student-level data from institutional records. In that time, librarians have uncovered correlations between library use and success measures important to the university, such as retention and four-year graduation rates. To advance beyond episodic correlation studies and more fully integrate into institutional efforts to support student success, UMN Libraries need to participate in campus-level learning analytics initiatives. However, such initiatives require campus units to collect and retain personally identifiable information. To meet the dual needs of participation in institutional student success practice and adherence to an acceptable level of user privacy, librarians collect student usage data that is de-specified, but not de-identified. In other words, the UMN Libraries retains the specific Internet IDs of students who use the libraries, but those IDs are tied to broad levels of library use such as LOAN, DATABASE, EJOURNAL, WORKSHOP, and more (User X used a "DATABASE" or USER Y accessed an "EJOURNAL"). In these instances, transaction specifics are not retained. This student usage data (both on- and off-campus) is collected using EZproxy logs, a technology common to thousands of libraries worldwide. Currently, UMN "cleans" the EZproxy logs on a nightly basis using homegrown scripts to de-specify library

transactions. This process requires multiple steps, is time-consuming, does not produce the "real time" data needed for learning analytics participation, and is difficult to share with other interested institutions. Thus, Task 1 focuses on a partnership among UMN Libraries, OCLC, and IMS Global aimed at more efficiently capturing on- and off campus student library usage, determining and defining library resource usage captured by EZproxy, bringing EZproxy into compliance with Caliper (an interoperability standard enabling data sharing with learner record stores and other learning analytics tools), and developing mechanisms for de-specifying student library usage data that all libraries can use. This last focus, the de-specification of library data, is envisioned as a turn on/off functionality that would enable individual libraries to align EZproxy use with their organizational privacy policies and practices. At Meeting 1, Task 1 participants will develop EZproxy efficient capture of off-campus and on-campus student library usage; define usage types that can be captured by EZproxy; develop mechanisms and processes within EZproxy itself to de-specify student library usage data; extend Caliper vocabulary to better describe library interactions/transactions for inclusion in EZproxy, and create Caliper metric profiles of library usage data that can be incorporated into EZproxy. At Meeting 2, participants will evaluate functionality changes to EZproxy, develop EZproxy log data as Caliper-ready serialized, linked data JSON, enable EZproxy to share Caliper event data in “real time” as events are being produced; and coordinate with Team 3 to test and/or ship Caliperized EZproxy data into Unizin Data Platform. Intended deliverables include: a new version of EZproxy with extended learning analytics functionality, including privacy guards and Caliper outputs, available to all institutions that use the tool; new EZproxy log data that can be shared as Caliper events, including real-time data; and a proof of concept of sharing of EZproxy Caliperized data with a data repository, such as the Unizin Data Platform.

Task 2 – Summary – To investigate the impact of library service use on student learning and success, task team members from Lewis and Clark Community College and the IMS Global will plan a prototype to enable library swipe card data to a) be used to identify student library use of library services such as reference and instruction and b) comply with interoperability standards that integrate library service use data with larger data repositories and learning analytics systems to inform library service improvements as well as faculty and advisor support for student learning and success. *In Detail* – In recent years, librarians at Lewis & Clark Community College (LCCC) have used SARS Track swipe card technology to capture student participation in reference and instruction transactions. Over time, librarians have correlated participation in these library services with higher grades and increased retention in both the general student population and within specific demographic groups. The collected data also provides insights into the types and frequency of questions fielded as well as their distribution across the curriculum. Furthermore, the reference desk data set is used both to improve services and demonstrate the continued relevance of library reference services in community college instruction and student success measures. Two challenges confront librarians when attempting to record these interactions. First, there is no requirement that students identify themselves (though since inception, none have refused). Second, associating a student question with the appropriate course context requires additional data capture on the part of the reference librarian. Currently, librarians encourage students to voluntarily identify themselves by “swiping in” at the reference desk to begin the process of linking the student’s question(s) to their current course schedule. Using the swipe system, librarians link to the institutional data warehouse and connect the student’s question(s) posed and answer(s) provided to one or more of the student’s current course enrollments. The data collected is then saved to the data warehouse. Reference desk data is also made available to administrators and faculty via reports and visualizations using Pyramid Analytics reporting tool. While this method works at LCCC, it is not easily transferable to other libraries and institutions because the data utilizes a non-standard vocabulary and an idiosyncratic data format. Combining this data with other event data in order to discern patterns and behaviors that span application contexts could prove a time-consuming and costly exercise. One way to ameliorate this issue is to develop and leverage a Caliper library “participation” profile. Typically, educational technologies (like LCCC’s swipe card provider) implement Caliper in order to provide consumers with Caliperized message streams targeting one or more endpoints. In such a scenario, Caliper instrumentation occurs at the source. When vendors cannot or choose not to implement Caliper, an alternative approach involves implementing a downstream Caliper brokering service that generates Caliper event data from existing sources based on a publish/subscribe model. In this scenario, incoming messages flow to an intermediary message

broker or event bus. Data consumers (people and/or services) register with the broker, subscribing to one or more filtered message feeds that, in this case, would be delivered as a Caliper events. Task 2 participants intend to explore the efficacy of this approach. Thus, Task 2 centers on a review LCCC's existing swipe card data capture infrastructure in order to design a draft Caliper participation profile for describing reference desk student/librarian interactions using a controlled vocabulary, design a prototype broker service that implements the participation profile and publishes reference desk data as Caliper participation event data, and extend the service to permit consumers to subscribe to serialized Caliper data feeds published by the broker either in the form of individual messages or batched JSON log files. At Meeting 1, Team 2 participants will draft a Caliper profile for library participation and define the JSON object that would carry that data from the library an institutional record store; identify relevant library data sources and data elements, including elements that are not currently being captured; and create a work plan for testing the new Caliper profile. After Meeting 1, participants will test the data capture and transfer for the participation profile. At Meeting 2, participants will evaluate compare notes and results from profile testing, including successes, failures, and unexpected findings; evaluate gaps and identify modifications to the prototype; and determine whether additional testing is merited. Intended deliverables include: a Caliper data model for library participation; proof of concept results to show the relevance of sharing Caliperized library participation data with an institutional data warehouse; and documentation of the successes, gaps, and potential next steps for operationalizing the prototype, sharing it with other libraries, and conducting analysis on the results.

Task 3 – Summary – To investigate how a library data pool may be used to visualize the use of library resources and services and how it may augment institutional learner data repositories, task team members from the University of Michigan and Unizin will utilize a prototype library data pool to a) capture library data as it is generated, b) extract salient data elements, and c) send those data elements using serialized data streams via API to institutional data repositories for use in near-real time student support. *In Detail* – In 2015, the University of Michigan (U-M) Library changed its privacy policy in order to be more transparent with U-M researchers and students about the collection of library usage data to "improve services and to integrate with broader University teaching and learning initiatives." This change acknowledged a number of realities, including the varying independent policies and practices of third-party vendors licensed by the Library. More importantly, the change reflected a recognition that the U-M Library, in order to add value for U-M researchers and students, needed to align its understanding of library services with a deeper, individualized understanding of patterns of user behaviors across a broad array of library services, and that developing such understanding required identifiable data. The U-M Library, as the policy makes clear, is committed to protecting the privacy and confidentiality of that data; at the same time, the Library intends to use that data to provide and improve services and resources. Recently, after years of experimentation, the U-M Library has begun to build a secure technical infrastructure and policy framework that will enable three key goals: retaining all data produced by its systems; incorporating secure identity and transaction-level information; and maintaining a consistent, longitudinal record of systems, services, and user behavior. Building this infrastructure is supported by the IMLS-funded "The Impact of the Academic Library on Learning in the University" grant. In parallel to these developments, the University of Michigan in 2014 became a founding member of Unizin, a higher education consortium of 12 institutions. Currently, Unizin is developing a Unizin Data Platform (UDP), built upon the Common Education Data Standards, which will enable aggregated, scalable access to learning analytics systems. At this time, library data is not one of the sources that feed the UDP; consequently, library activity is absent from the learning outcomes and research picture that UDP provides. Thus, Task 3 leverages a partnership among the U-M Library, Unizin, and IMS Global to investigate how a library data pool may be used to visualize the use of library resources and services and to augment institutional learner data repositories. Specifically, Task 3 participants will develop plans for working with a prototype library data pool to create a Caliper semantic model (e.g., a JSON object) for library data; identify the data (such as click-stream data and unique identifiers) from library systems and processes likely to be relevant in the context of learning analytics in order to populate the Caliper JSON object; conduct prototypes to send those JSON packets to a learning record store (e.g., Unizin) to validate the data structure; and attempt to generalize the data model to select library data, serialize it, and send it to a second learning record store (e.g., the U-M campus data warehouse) via API. At Meeting 1, Task 3 participants will

create a Caliper semantic model for library event data and define the JSON object that will carry that data from the library data warehouse to the Unizin Data Platform; identify relevant library data sources and data elements, including elements that are not currently being captured; and create a work plan and key metrics for testing the work of Meeting 1. After Meeting 1, participants would hold a one-week development sprint (Sprint 1) to ensure the capture of the correct data from library origin applications (e.g. event data and unique identifiers), extract salient data elements and model them in the standardized, canonical data format modeled at Meeting 1, and send those data elements using serialized data streams via API to the Unizin Data Platform. At Meeting 2, participants will compare notes and results from prototype experiments, including successes, failures, deltas, and unexpected findings; evaluate gaps and identify modifications to the prototype; and recalibrate the experiments, validate key metrics, and create a work plan for a second one-week development sprint (Sprint 2). Intended deliverables include: a Caliper data model for library event data; a documented method for exchanging data in JSON-LD between a library data warehouse and a central Learning Record Store; proof-of-concept results to show the relevance of sharing Caliperized library data with a data repository, such as the Unizin Data Platform; and documentation of the successes, gaps, and potential next steps for operationalizing developed prototypes; taking them to scale; and conducting analysis on the results.

Project Team – The CLLASS project will be conducted by the PI and an advisory group with complementary areas of expertise. Dr. Megan Oakleaf (PI) has researched and advocated for academic library assessment and learner support through the IMLS-funded RAILS grant, extensive work with the academic library value agenda, and the recent IMLS-funded Library Integration in Learning Analytics (LIILA) grant. A international advisory group includes: Malcolm Brown, Director of Learning Initiatives, EDUCAUSE; Rob Abel, CEO, IMS Global Learning Consortium; Andrew K. Pace, Executive Director for Technical Research, OCLC; Joan Lippincott, Associate Executive Director, Coalition of Networked Information; Mary Ellen Davis, Executive Director, Association of College & Research Libraries; Scott Walter, University Librarian, DePaul University; Jenn Stringer, Chief Academic Technology Officer and Assistant Vice Chancellor, University of California, Berkeley; Dennis Krieb, Director of Institutional Research and Library Services, Lewis and Clark Community College; Tim McKay, Arthur F. Thurnau Professor of Physics, Astronomy, Education and Director of the Digital Innovation Greenhouse, University of Michigan; Katherine Furlong, University Librarian, Susquehanna University; Sean DeMonner, Executive Director of Teaching and Learning, Information Technology and Services, University of Michigan; John Whitmer, Learning Analytics and Research Director, Blackboard; Ross McIntyre, Head of Library Analytics, Jisc.

Diversity within the advisory group and task teams is intentional in order to ensure that multiple institutional perspectives are surfaced and that project impact is felt across all higher education sectors. The advisory group includes senior library administrators, academic library association directors, institutional research and effectiveness administrators, representatives from the library vendor and education technology sectors, and learning analytics experts, and it is anchored by an EDUCAUSE director—establishing a key partnership with the association that has conducted most of the learning analytics research to date. Diversity is also designed into the project via the inclusion of the varying institution types (community college, liberal arts, research/doctoral), genders, nationalities, and disciplinary backgrounds. Task team participants include:

Name	Title	Institution	Team
Shane Nackerud	Technology Lead, Libraries Initiatives	University of Minnesota	1
Jan Fransen	Service Lead, Research Information Management Systems	University of Minnesota	1
Don Hamparian	Senior Product Manager, EZproxy and Identity Management	OCLC	1
Dennis Krieb	Director of Institutional Research and Library Services	Lewis & Clark Community College	2
Maurice York	Associate University Librarian for Library Information Technology	University of Michigan	3

Ken Varnum	Senior Program Manager for Discovery, Delivery, and Library Analytics	University of Michigan	3
Sebastien Korner	Head, Architecture and Engineering, Library Information Technology	University of Michigan	3
Etienne Pelaprat	Director of Product Management	Unizin	3
Anthony Whyte	ITS Program Manager Caliper, Technical Lead	University of Michigan IMS Global Learning Consortium	1, 2, 3
Markus Gylling	Head IMS Europe, Solutions Architect	IMS Global Learning Consortium	1, 2, 3
Mark Leuba	Vice President, Product Management	IMS Global Learning Consortium	1, 2, 3
Lisa Mattson	Chief Operating Officer	IMS Global Learning Consortium	1, 2, 3

Evaluation – The project will utilize an outcome-based evaluation model to measure the achievement of outcomes. Each evaluation chart includes *indicators* (observable result of the outcome), data *source* (where the information will be found), data *interval* (when the data will be collected), and *target* (expected change).

Indicators	Source	Interval	Target
Task team participants and advisory group members including academic librarians, learning analytics lynchpins, information technology professionals, and higher education vendor community members will commit to development of three task team projects.	Project materials	June 2018	• Letters of support • Commitment to work on task teams • Commitment to attend facilitated work meetings
Task team participants will draft three library proofs of concept or models integrating library data into learning analytics, including feasibility studies, finalization of any additional necessary partnerships, and beginning work plan drafts using a modified lean canvas approach.	Meeting 1 materials	Feb 2018	• Draft planning, workflow, wireframe, and project management documents. • Draft list of key opportunities to leverage and key challenges to ameliorate, including of privacy, confidentiality, security, or assurance concerns. • Participant survey at close of meeting to elicit any unsurfaced feedback. Surveys will elicit information about the degree to which participants are better able to provide services to, engage with, develop relationships with, share knowledge, address needs, and solve problems of the community, in compliance with IMLS requirements.
Task team participants will develop the specifications and prototype plans.	Meeting 2 materials	July 2018	• Developed planning, workflow, wireframe, and project management documents. • Augmented list of key opportunities to leverage and challenges to ameliorate, including of privacy, confidentiality, security, or assurance concerns. • Participant survey at close of meeting to elicit any unsurfaced feedback. Surveys will elicit information about the degree to which participants are better able to provide services to, engage with, develop relationships with, share knowledge, address needs, and solve problems of the community.

Task team participants will finalize the specifications and prototype plans.	Final project documents	Dec 2019	• Finalized and detailed planning, workflow, wireframe, and project management documents. • Finalized list of key opportunities to leverage with suggested practices and key challenges to ameliorate, including of privacy, confidentiality, security, or assurance concerns with strategies for minimization or avoidance.
The PI, in collaboration with participants, will disseminate meeting outputs.	Project materials	At close of grant	• Formal white paper (Winter 2020) including all meeting outputs. • At least 5 conference proposals.

Risks – As with any cutting edge topic, participants may be challenged by new ideas, some of which are concerning. In the area of learning analytics, privacy, confidentiality, security, and assurance are all issues that present potential risks, and project participants will devise strategies for developing proofs of concepts and models that align with professional, institutional, organizational, and legal practices and policies. An additional risk to the project could be a difficulty with a meeting location. Advisory group members have secured positions for our meetings at a central location (OCLC in Columbus, Ohio), but in case of a weather event, meetings may need to be moved to a professional conference, to reach completion during the grant period.

Management Plan – The PI will participate in every aspect of the project. The PI will communicate with the advisory group, manage task teams, compile documentation and feedback, compose the white paper, and develop conference proposals. Together with all participants, the PI will craft meeting agendas, develop meeting materials, and finalize the white paper.

National Impact – By continuing the arc of assessment efforts in academic libraries, expanding the boundaries of library data used to enhance student learning, accelerating librarian involvement in institutional learning analytics initiatives, and initiating the integration of library data into learning analytics systems, CLLASS will have a number of national impacts, derived from the project goals and outcomes. The CLLASS project will bring together a diverse group of library and higher education leaders and experts to develop proofs of concepts and models for library inclusion in institutional learning analytics, anticipate strategies for bringing the models to fruition, develop technologies to support library-enabled learning analytics, and anticipate ways in which this work will increase library impact on student learning and success. Through these actions, LIILA will advance the role of libraries as anchors within their higher education communities; enable libraries to provide indispensable data and contribute to a complete picture of institutional student learning; and ultimately, facilitate student learning and success by contributing to the identification, development, and assessment of the curricular and instructional improvements resulting from learning analytics initiatives. In short, CLLASS will enable future academic library involvement in learning analytics at institutions nationwide. Integrating libraries into learning analytics initiatives will simultaneously enrich institutional learning analytics efforts and expand academic library impact on and value to their higher education communities.

Budget – The bulk of the $50,000 will support team members to attend two meetings ($14,940). The budget also includes $17,543 summer salary and fringe for Dr. Oakleaf, who will oversee the project, $5,200 for meeting costs, $2000 to help cover publication costs, and $10,317 in indirect costs. An additional $11,030 will be costshared.

Activity	Dec 2018	Jan 2019	Feb 2019	Mar 2019	Apr 2019	May 2019	Jun 2019	July 2019	Aug 2019	Sept 2019	Oct 2019	Nov 2019
PREPARATION												
Initial team communication and meeting planning												
MEETING 1												
Preparation of Meeting 1 materials												
Participant pre-work for Meeting 1												
Meeting 1 in Columbus, Ohio (February 2019)												
Survey and summary of Meeting 1 progress sent to all participants												
MEETING 2												
Preparation of Meeting 2 materials												
Participant pre-work for Meeting 2												
Meeting 2 in Columbus, Ohio (July 2019)												
Survey and summary of Meeting 2 progress sent to all participants												
POST-MEETING WORK												
Continuing on-site development and finalization												
DISSEMINATION												
Ongoing drafting of white paper												
Development and submission of conference proposals												
Final revisions of white paper												
Publication of white paper												

DIGITAL PRODUCT FORM

Introduction
The Institute of Museum and Library Services (IMLS) is committed to expanding public access to federally funded digital products (i.e., digital content, resources, assets, software, and datasets). The products you create with IMLS funding require careful stewardship to protect and enhance their value, and they should be freely and readily available for use and re-use by libraries, archives, museums, and the public. However, applying these principles to the development and management of digital products can be challenging. Because technology is dynamic and because we do not want to inhibit innovation, we do not want to prescribe set standards and practices that could become quickly outdated. Instead, we ask that you answer questions that address specific aspects of creating and managing digital products. Like all components of your IMLS application, your answers will be used by IMLS staff and by expert peer reviewers to evaluate your application, and they will be important in determining whether your project will be funded.

Instructions
You must provide answers to the questions in Part I. In addition, you must also complete at least one of the subsequent sections. If you intend to create or collect digital content, resources, or assets, complete Part II. If you intend to develop software, complete Part III. If you intend to create a dataset, complete Part IV.

PART I: Intellectual Property Rights and Permissions

A.1 What will be the intellectual property status of the digital products (content, resources, assets, software, or datasets) you intend to create? Who will hold the copyright(s)? How will you explain property rights and permissions to potential users (for example, by assigning a non-restrictive license such as BSD, GNU, MIT, or Creative Commons to the product)? Explain and justify your licensing selections.

The deliverable (white paper) will be available under a Creative Commons license (CC Attribution - NonCommerical - NoDerivs 4.0). This is the standard EDUCAUSE arrangement and ACRL gives authors the choice of which CC license to use.

A.2 What ownership rights will your organization assert over the new digital products and what conditions will you impose on access and use? Explain and justify any terms of access and conditions of use and detail how you will notify potential users about relevant terms or conditions.

EDUCAUSE and ACRL will serve as distribution points for the project deliverable but will not assert any ownership rights.

A.3 If you will create any products that may involve privacy concerns, require obtaining permissions or rights, or raise any cultural sensitivities, describe the issues and how you plan to address them.

No privacy concerns.

Part II: Projects Creating or Collecting Digital Content, Resources, or Assets

A. Creating or Collecting New Digital Content, Resources, or Assets

A.1 Describe the digital content, resources, or assets you will create or collect, the quantities of each type, and format you will use.

CLLASS will generate a white paper, summarizing the content and progress of the project, which will be distributed via EDUCAUSE and ACRL. ACRL uses WordPress for blogs. The white paper will be in .docx or .pdf format.

A.2 List the equipment, software, and supplies that you will use to create the content, resources, or assets, or the name of the service provider that will perform the work.

Regular business-grade computers and word processing software.

A.3 List all the digital file formats (e.g., XML, TIFF, MPEG) you plan to use, along with the relevant information about the appropriate quality standards (e.g., resolution, sampling rate, or pixel dimensions).

ACRL uses WordPress for blogs. The white paper will be in .docx or .pdf format.

B. Workflow and Asset Maintenance/Preservation

B.1 Describe your quality control plan (i.e., how you will monitor and evaluate your workflow and products).

The Advisory Group will review and oversee the workflow and products.

B.2 Describe your plan for preserving and maintaining digital assets during and after the award period of performance. Your plan may address storage systems, shared repositories, technical documentation, migration planning, and commitment of organizational funding for these purposes. Please note: You may charge the federal award before closeout for the costs of publication or sharing of research results if the costs are not incurred during the period of performance of the federal award (see 2 C.F.R. § 200.461).

The project deliverables will be available via the EDUCAUSE and ACRL web sites indefinitely.

C. Metadata

C.1 Describe how you will produce any and all technical, descriptive, administrative, or preservation metadata. Specify which standards you will use for the metadata structure (e.g., MARC, Dublin Core, Encoded Archival Description, PBCore, PREMIS) and metadata content (e.g., thesauri).

Not applicable.

C.2 Explain your strategy for preserving and maintaining metadata created or collected during and after the award period of performance.

Not applicable.

C.3 Explain what metadata sharing and/or other strategies you will use to facilitate widespread discovery and use of the digital content, resources, or assets created during your project (e.g., an API [Application Programming Interface], contributions to a digital platform, or other ways you might enable batch queries and retrieval of metadata).

Not applicable.

D. Access and Use

D.1 Describe how you will make the digital content, resources, or assets available to the public. Include details such as the delivery strategy (e.g., openly available online, available to specified audiences) and underlying hardware/software platforms and infrastructure (e.g., specific digital repository software or leased services, accessibility via standard web browsers, requirements for special software tools in order to use the content).

The project deliverable will be available via the EDUCAUSE and ACRL web sites, and therefore openly available online. These sites are well known and utilized by interested audiences, both in higher education and academic librarianship.

D.2 Provide the name(s) and URL(s) (Uniform Resource Locator) for any examples of previous digital content, resources, or assets your organization has created.

The CLLASS project has not created any previous resources. An example of ACRL white papers and blog posts can be found at http://www.acrl.ala.org/value/, the EDUCAUSE Library is located at https://www.educause.edu/library, and the EDUCAUSE Transforming Higher Ed blog is online at http://er.educause.edu/columns/transforming-higher-ed.

Part III. Projects Developing Software

A. General Information

A.1 Describe the software you intend to create, including a summary of the major functions it will perform and the intended primary audience(s) it will serve.

N/A

A.2 List other existing software that wholly or partially performs the same functions, and explain how the software you intend to create is different, and justify why those differences are significant and necessary.

N/A

B. Technical Information

B.1 List the programming languages, platforms, software, or other applications you will use to create your software and explain why you chose them.

N/A

B.2 Describe how the software you intend to create will extend or interoperate with relevant existing software.

N/A

B.3 Describe any underlying additional software or system dependencies necessary to run the software you intend to create.

N/A

B.4 Describe the processes you will use for development, documentation, and for maintaining and updating documentation for users of the software.

N/A

B.5 Provide the name(s) and URL(s) for examples of any previous software your organization has created.

N/A

C. Access and Use

C.1 We expect applicants seeking federal funds for software to develop and release these products under open-source licenses to maximize access and promote reuse. What ownership rights will your organization assert over the software you intend to create, and what conditions will you impose on its access and use? Identify and explain the license under which you will release source code for the software you develop (e.g., BSD, GNU, or MIT software licenses). Explain and justify any prohibitive terms or conditions of use or access and detail how you will notify potential users about relevant terms and conditions.

N/A

C.2 Describe how you will make the software and source code available to the public and/or its intended users.

N/A

C.3 Identify where you will deposit the source code for the software you intend to develop:

Name of publicly accessible source code repository:N/A

URLN/A

Part IV: Projects Creating Datasets

A.1 Identify the type of data you plan to collect or generate, and the purpose or intended use to which you expect it to be put. Describe the method(s) you will use and the approximate dates or intervals at which you will collect or generate it.

N/A

A.2 Does the proposed data collection or research activity require approval by any internal review panel or institutional review board (IRB)? If so, has the proposed research activity been approved? If not, what is your plan for securing approval?

The CLLASS project is likely to be IRB exempt and, the PI will seek IRB approval prior to the start of the project.

A.3 Will you collect any personally identifiable information (PII), confidential information (e.g., trade secrets), or proprietary information? If so, detail the specific steps you will take to protect such information while you prepare the data files for public release (e.g., data anonymization, data suppression PII, or synthetic data).

No.

A.4 If you will collect additional documentation, such as consent agreements, along with the data, describe plans for preserving the documentation and ensuring that its relationship to the collected data is maintained.

N/A

A.5 What methods will you use to collect or generate the data? Provide details about any technical requirements or dependencies that would be necessary for understanding, retrieving, displaying, or processing the dataset(s).

N/A

A.6 What documentation (e.g., data documentation, codebooks) will you capture or create along with the dataset(s)? Where will the documentation be stored and in what format(s)? How will you permanently associate and manage the documentation with the dataset(s) it describes?

N/A

A.7 What is your plan for archiving, managing, and disseminating data after the completion of the award-funded project?

The project deliverable will be available online indefinitely via ACRL and EDUCAUSE.

A.8 Identify where you will deposit the dataset(s):

Name of repository: N/A - no dataset

URL: N/A

A.9 When and how frequently will you review this data management plan? How will the implementation be monitored?

N/A. (If unforeseen changes occur in CLLASS planning, the PI will consult with IMLS to ensure compliance with all rules and requirements.)