**Kent State University**

## Library Knowledge Extensions (KNEXT): Data Analytics to Support Innovation Communities

Kent State University (KSU-SLIS), in collaboration with the University of Maryland (UMD-CIS), requests $451,934 in grant funding for a three-year project. This project aimed at bringing advanced data analytics and business intelligence (DA&BI) services to public libraries in order to support small businesses, entrepreneurs, and community advocates. This project will be implemented in partnership with local public libraries, small business development centers (SBDCs), economic development organizations (EDOs), and community advocacy groups. This **Research** project will address the Institute of Museum and Library Services' **National Leadership Grants for National Digital Platform category by addressing the research question**: *How can we integrate advances in big data and data analytics into libraries as essential community anchors in a way that empowers those communities while encouraging economic development and well-being?* This project aims to address the agency's strategic goal to "promote the use of technology to facilitate discovery of knowledge" through libraries within local communities.

Access to relevant data can make the difference between success and failure. A small business owner making kitchen cabinets could determine the latest trends in countertop material by analyzing social media posts. An entrepreneur could analyze the pros and cons of competitors' products based on online reviews. Community advocates could view the impact of a new development project on their community through visual analysis of census data on the maps. Can these patrons access these services through their local public libraries? KNEXT is an attempt to understand such needs and develop a platform to materialize such services within public libraries.

**NEED AND IMPACT.** As data production grows, the needs of local community actors (e.g., small business, entrepreneurs, and community advocates) for tools and methods to make sense of the complex data landscape increase as well. Developing a community-accessible framework for accessing, learning, and utilizing these tools and methods is an overarching focus of this proposal. In recent years, we have witnessed massive growth in computational methods and discoveries. Advances in information and communication technologies (ICTs) are addressing a wide range of economic and societal challenges; however, we do not yet know *how to successfully and effectively deploy such technologies in community decision making* and *what their role should be in innovation processes.* It is still unclear *how communities can directly benefit from the advances in big data and data analytic technologies*. Further, we are unsure *how such technologies can create an innovation-supporting environment for civic advocates, small businesses, and entrepreneurs that will stimulate growth in recovering communities.*

The present study addresses these questions by creating a hub for advanced data analytics and business intelligence (DA&BI) services and integrating it into the existing networks within two recovering communities in Ohio and Maryland. KNEXT will play two roles in this scenario: 1. As an integrated point of access to public open data by aggregating and curating local and public data (e.g., open government data, census data, social media data, etc.); and 2. As the provider of DA&BI services to small businesses, entrepreneurs, civic advocates, and community decision makers.

Multiple kinds of data analytics could be helpful to local small business owners and community decision makers. KNEXT could perform data analytics on potential customers in a specific geographic area extracted from census data and visualized on maps. A small business that sells to other businesses (B2B) with 30 clients seeking to grow would need to identify other potential clients. To address this need, KNEXT will design a recommender system using machine learning methods to identify potential clients. KNEXT could also use social media data to assist entrepreneurs in predicting market trends.

KNEXT will also improve our understanding of the innovation ecosystem by exploring a model for public knowledge institutions such as libraries and universities to work in tandem with small business development centers (SBDCs), economic development organizations (EDOs), and community advocacy groups. Working together, they can enhance the community's capabilities and transform knowledge into innovation that encourages economic and community development. Previous pilot research has identified a clear need for data that is more meaningful to local decision makers, neighborhood data, and service supply and demand assessments. Filling these needs will require libraries to build their capability to make use of local data (Bertot,

Butler, & Travis 2014). Demonstration projects such as KNEXT will play a crucial role in building a viable community of practice to broaden and maintain data use capacity.

**PROJECT MANAGEMENT AND WORK PLAN.** This research is a collaborative project led by the Kent State University School of Information and the iSchool at the University of Maryland. KSU will be responsible for the overall management and coordination of the project. Dr. Emad Khazraee, of Kent State University, will be the Primary Investigator and lead sociotechnical data scientist on this project. He will work with Karen MacDonald, Business & Entrepreneurship Outreach Librarian at KSU Libraries (senior personnel). Additional contributors will include Anastasia Diamond-Ortiz, Director of Lorain County Public Library system; William Southards, Director of Small Business Development Center at KSU; and David Jurca at the Cleveland Urban Design Collaborative. Dr. Susan Winter will serve as Co-Primary Investigator and is the lead sociotechnical information scientist on the University of Maryland team. She will work with Andrew Fellows (senior personnel) as well as representatives from the Prince George's County Memorial Library System, the Prince George's County Chamber of Commerce, Prince George's County Economic Development Corporation, and the Maryland Small Business Development Center.

***In the first year of the project***, researchers at both KSU and UMD will identify and assess the needs of small businesses for business information and data analysis. This will be accomplished through engagement efforts with public libraries, Small Business Development Centers, Chambers of Commerce, and economic development agencies. The research team will conduct interviews and focus groups, working closely with the stakeholders to identify and define community members' needs and concerns that can be addressed through access to business intelligence services. The needs assessment will consider demand for information resources including access to scientific or technical literature, information on regulatory landscape, assistance with prior art or patent searching, and market assessment. In particular, this research will assess the need for services and tools to assist small business owners with social media marketing and the related data analytics. This is an emerging area of business and access to this type of service could be invaluable.

***In the second year of the project***, researchers will study the needs assessment data and develop strategies to meet these needs. Researchers will define the needed business intelligence products and services and identify the most effective and efficient methods to deploy these products to the local community. Dr. Khazraee will work with a full-time developer and two doctoral students, one at each university, and use advanced computational methods such as machine learning and data mining. Using these methods, along with existing data, the team will turn the identified business intelligence needs of the community into accessible routines available via a GUI dashboard to be used by the librarians in the partner libraries. Dr. Khazraee has access to a hybrid cloud computing infrastructure at his research lab at KSU (100 CPU Core, 512 GB RAM, 30 TB of storage) with the capability of extending to Amazon's public cloud.

***In the final year of the project***, the research teams will deploy products and services. They will also partner with community agencies to evaluate the effectiveness of the programs.

**OUTCOMES AND PERFORMANCE GOALS.** Initially two sets of metrics will be used for the assessment of the success of project: 1) ***Application-oriented metrics:*** a. The number of successful DA&BI requests; b. Change in the number and variety of patrons served by libraries; c. The effectiveness of KNEXT measured by identifying whether use of KNEXT services yielded tangible results for the community to make better decisions or innovate; d. Plans for sustainable implementation of business intelligence service programs. 2). ***Conceptual metrics***: a. Develop model(s) of DA&BI programs that can be adopted by other communities beyond the two initial sites; b. The number of barriers to the integration of DA&BI services identified and/or resolved by the end of project.

**BUDGET.** The estimated total budget is $677,594 over the 3-year period, of which $451,934 is requested from the IMLS and $225,660 will be cost shared. Kent State University is the leading institution, receiving $268,203, and providing $152,064 in cost share. The University of Maryland College Park is the sub-awardee, receiving $183,731 of the grant and providing $73,596 in cost share. The breakdown of requested funds (prime and subaward combined) includes: salaries ($139,652); fringe benefits ($51,117); graduate student support ($89,819); travel ($18,000); materials and supplies ($3,000); and administrative and indirect cost ($150,344).