

Strategic Initiative 4: Harnessing Information, Multiplying Knowledge

SWOT Summary

Strengths (internal)	Weaknesses (internal)
<ul style="list-style-type: none"> • World class researchers using informatics and “big data” in systematic programs of scholarly inquiry across the sciences, arts, and humanities • KU leadership values research • Excellence among existing academic programs and centers with bridges already built • Existing relationships with external organizations and corporations • Willingness and capacity to partner with commercial entities and government agencies • Commitment and experience in international arenas • New Advanced Computing Facility (ACF) funded by NIH grant • Use of ScholarWorks and taking the lead on open access policy • Online museum and library collections • Collegial campus • Expanding research on universal design for learning in assistive technologies to access information • Pockets of excellent individual faculty in many departments 	<ul style="list-style-type: none"> • KU lacks Washington presence with federal funding agencies • No mechanism for sustaining a large research proposal effort until it comes to fruition • Computing infrastructure is at least 10 years behind • Lack of incentives or models for innovation • Graduate recruiting and funding • Statistical knowledge/education at KU is lagging behind our peers • Scarcity mindset that inhibits unexpected discoveries and expansive projects • Lack of forums for identifying research partners and collaborators • Lack of programmatic approach to life cycle management of information • Lack of critical mass in social media research • Lack of support for researchers who need help accessing and mining “big data” • Pockets of faculty excellence remain isolated and have no way of connecting to others with similar interests • Small computing faculty relative to peers
Opportunities (external)	Threats (external)
<ul style="list-style-type: none"> • Major NSF Requests for Proposal (RFPs) that deal with interdisciplinary data and computing • Computing in Humanities and Social Sciences is growing exponentially • Proximity to Ft. Leavenworth, the Army’s cyber infrastructure center, and McConnell AFB, headquarters for the Air Force Information Aggressor Squadron • Expanding corporate funding for research at KU • International opportunities for funding and project development • Urgent environmental, social, and economic challenges that require research universities • Technological advances that shrink geographical isolation • Increasing the computer support for “big data” projects at KU which would lead to more federal dollars 	<ul style="list-style-type: none"> • Impending decrease in research funding at the federal level • The regulatory infrastructure we exist in, be it KU or Kansas, makes contracting with industry difficult and slows contracting with government agencies other than NSF or NIH • Collaboration mechanisms with regional schools are not well developed; physical distance causes difficulties when establishing regional collaborations • Without better support of “big data” projects at KU we will lose both federal dollars and faculty over the next five years; it will be difficult to recruit new faculty in “big data” areas of research; and we will not be able to perform state of the art (let alone ahead of the art) research projects • Global financial instability leading to risk aversion • Reputation the state of Kansas has with respect to science makes it more challenging to attract good, young scientists

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SWOT – Expanded List of Strengths, Weaknesses, Opportunities, and Threats

Strengths (internal)	Weaknesses (internal)
<ul style="list-style-type: none"> • Excellence among existing academic programs and centers with bridges already built <ul style="list-style-type: none"> ○ The Commons@KU ○ Museums and Libraries ○ New Bachelor of Science degree in Interdisciplinary Computing represents an important collaboration between EECS and Physics and Astronomy ○ Bioinformatics ○ Journalism (Social Media) ○ Computational Physics and Astronomy ○ Institute for Digital Research in the Humanities ○ Center for Research Methods and Data Analysis ○ Biodiversity Institute ○ Communication Studies ○ Psychology ○ ITTC ○ Public Administration • New KU leadership not only values research, they also understand it and have demonstrated excellence • KU Information and Telecommunication Technology Center (ITTC) is a National Security Agency (NSA)/Department of Homeland Security (DHS) Center of Excellence in Information Assurance • Existing relationships with corporations and external organizations such as: <ul style="list-style-type: none"> ○ Cerner ○ Sprint ○ Stowers Institute • People working on KU strategic initiatives are excited and more interested in success than who gets credit • Commitment and experience in international arenas • Islands of existing domain specific expertise <ul style="list-style-type: none"> ○ Particle physicists have experience extracting information from the extremely large amount of experimental data produced by facilities such as the Large Hadron Collider (LHC) ○ Astronomers are beginning to develop that same experience from extracting information from large survey databases ○ KU Astrobiology has experience extracting information from large amounts of data on mass extinctions • World class researchers in chemistry, physics, molecular biosciences, engineering, bioinformatics and pharmacy who require “big data” and bring in significant federal funding to the university 	<ul style="list-style-type: none"> • KU must establish a Washington presence to be competitive beyond National Science Foundation (NSF) and National Institutes of Health (NIH) style agencies • No mechanism for sustaining a large research proposal effort until it comes to fruition; we talk about opportunities, get excited, write a proposal, and if we don't hit the first time the effort ends • Lack of KU Lawrence-KUMC collaborations • New skills and courses necessary to make the computational astronomy degree relevant to new astronomical databases • Statistical knowledge/education at KU is spread out in Business, Mathematics, Economics, Education, Engineering, Psychology, etc., with little collaboration and coordination in course offerings, etc. • Insufficient infrastructure that supports the organization, validation, visibility, and dissemination of scholarly communication in diverse and longitudinal forms along a continuum of research and creativity • Tendency to work in information silos and not necessarily seek (or be willing and able to wait for) campus-wide solutions. Small solutions and small steps are easier than scaled solutions and big steps. We are very early still in formulating standards in some areas that can cross disciplines. • Legacies ... things we keep doing because we must, or feel we must, even as new opportunities are not embraced • Inconsistent opportunities for faculty to come together around ideas and indulge the imagination • Lack of bridge building and engagement of people across disciplines from the outset of a research project • KU's world class researchers cannot compete with other institutions with regard to computing power on campus. They either design their own (haphazardly) or rely on other institutions

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Strengths (internal) (cont.)	Weaknesses (internal) (cont.)
<ul style="list-style-type: none"> • Our museums, archives, and libraries are “hidden gems” that support and advance research and creativity • Special Education has taken the lead on assistive technology and the ways that technology and learning can interface both for students in classrooms and also for teacher education • Expertise in visualization and more subjective uses of data which offers many possibilities between humanist artists and scientists • People with metadata experience which can be applied to the practical problems of managing enormous amounts of data • KU was one of the very first university art museums to have collections online and continues to develop the museum plus databases now being used across the country 	<ul style="list-style-type: none"> • Senior faculty may be poorly-equipped to take maximum advantage of the availability of new, huge data sets; new tools and training may be required • Insufficient numbers of computing faculty to support collaboration across all academic disciplines, particularly engineering and sciences

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Opportunities (external)	Threats (external)
<ul style="list-style-type: none"> • Department of Defense (DoD) and NIH are already in this space and potentially represent larger, longer funding than NSF. However, we have to walk the halls in Washington if we hope to have success with these agencies. • With the growth of computing in Humanities and Social Sciences, KU's position as one of the top liberal arts universities in the Midwest will serve us well • Expanding corporate funding research for KU <ul style="list-style-type: none"> ○ Kansas City, KS and Kansas City, MO are Google infrastructure cities; KU has exceptionally strong alumni ties with Google ○ Kansas Bioscience Authority ○ Bioscience and Technology Business Center • Physical size of Kansas results in need for information technology and bioinformatics to communicate with people across the state • Availability of massive data sets that bridge several disciplines on campus • If KU can provide the tools to access the “big data” that are available then we can level the playing field with institutions that have historically had access to greater facilities • International opportunities for funding and project development • Urgent environmental, social, and economic challenges that require research universities including those identified in previous summits; specific examples include cybersecurity, data access, and data stewardship; smart communities; climate change; health and well-being • Technological advances that shrink geographical isolation including online collaboration tools; data sharing capabilities; virtual libraries; interactive media; high-speed, resilient networks; social networks • Buyer's market for new faculty <ul style="list-style-type: none"> ○ KU overcomes the disadvantage compared to other institutions of not having easy access to major astronomical facilities • Partnering environment among institutions is strong <ul style="list-style-type: none"> ○ New Large Synoptic Survey Telescope (LSST) is the top priority in the recently released Decadal Survey from the American Astronomical Society ○ Large data sets are generally freely available to all researchers without the need to be part of a consortium or to write a proposal ○ Priorities of the Decadal Survey are used by NSF and NASA in funding decisions 	<ul style="list-style-type: none"> • The general area of our strategic initiative thrust is well-trodden from a computer science perspective. There is still significant work to be done, but others are ahead of us. We must find niches and focus on them. • Generational shifts in protocols of knowledge transfer • Increasing demand to reduce complexity in the media and other forms of communication • Impending decrease in federal funding for research • Space Telescope (JWST) is likely to constrain the astrophysics budget at NASA

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Opportunities (external) (cont.)	
<ul style="list-style-type: none"> • A large majority of future projects in the physical and life sciences areas will require the storage, archiving and access to big data sets. Increasing the computer support for "big data" projects at KU would lead to more federal dollars, retention of faculty and recruitment of new faculty. • Department of Defense (DoD) and NIH are already in the space this strategic initiative addresses and potentially represent larger, longer funding than NSF. However, we have to walk the halls in Washington if we hope to have success with these agencies. • Individuals in the research community with loyalty to KU • Expertise in extraction of information from large data sets could enable new funding opportunities from DOE as part of specific new initiatives. Examples of other universities that are building collaborative approaches to research infrastructure and information management that might serve to model possibilities for KU — [Indiana University Pervasive Technology Institute, http://pti.iu.edu/; Yale Information Management office, http://www.odai.yale.edu/; DataOne; HUBzero; CaliforniaDigital Library; and UC3, http://www.cdlib.org/services/uc3/partners/index.html] • We can position ourselves to train the next generation in the combination of computing and scientific skills that will be needed 	