STRATEGIC TASK FORCE AREA REPORT
EXECUTIVE SUMMARY

HEALTH SCIENCES

01.DECEMBER.2017

Finalized
22.DECEMBER.2017

ILLINOIS

In March 2017, the Health Sciences Strategy Task Force (HSSTF) was formed to contribute to a comprehensive strategy for growth and development of health sciences research, education, and engagement at the University of Illinois at Urbana-Champaign. The Task Force consists of 20 senior faculty members across six colleges, four institutes, and multiple centers:

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Chancellor Jones and Interim Provost Wilkin charged the Task Force to explicitly address the questions outlined in this Executive Summary.

IN WHAT AREAS DOES ILLINOIS HAVE THE GREATEST OPPORTUNITY TO POSITIVELY IMPACT STATE, NATIONAL, AND GLOBAL HEALTH THROUGH RESEARCH, EDUCATION, AND ENGAGEMENT?

The HSSTF reached consensus on five "Impact Areas" in which Illinois can have the greatest influence locally, nationally, and globally, together with two "Cross-cutting Threads" that help strengthen and guide activities in all the identified Impact Areas.

Impact Areas

- Cancer: Innovations through Engineering and Comparative Oncology Approaches
- Maternal and Child Health: Targeting the First 1,000 Days to Ensure a Healthy Future
- Microbes: Drivers of Health and Disease
- Neuroscience and Behavioral Health: Mechanisms and Interventions
- Progenerative Medicine: The Forward Design of Human Health

Cross-Cutting Threads

- Health Disparities: Promoting Health Equity Locally and Globally
- Technology for Health (Tech4Health): Computation, Imaging, and Devices

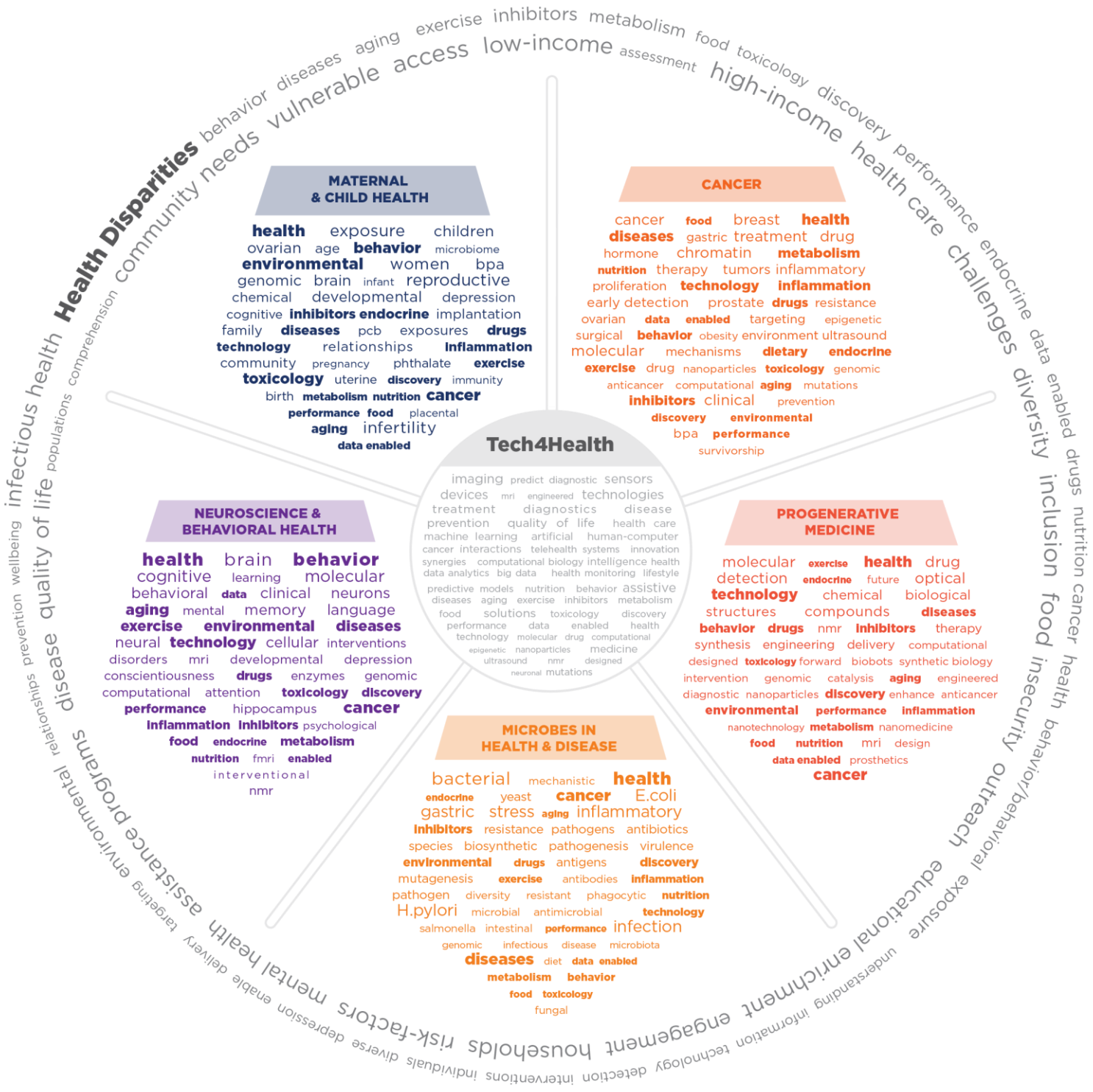


Figure 1: Impact Areas and Cross-Cutting Threads

The overall landscape of work in the health sciences at Illinois is remarkably extensive and wide-ranging, but we have identified five broad areas of particular strength and impact. As seen here,* they capture both unique and synergistic elements of campus activity and opportunity. Each area is strengthened by exceptional Illinois expertise in technology and each aspires to resolve challenges in health disparities.

*The words in this figure were derived from key word data searches from health sciences publications from Illinois faculty — this listing is not a complete inventory of all health sciences work or activity on campus.

We believe these selections represent areas at Illinois with the 1) greatest existing strengths, 2) most significant and impactful investments, and 3) clearest promise of attracting external funding. Alongside our campus-wide strengths in technology and engineering, and with additional directed investments, we can leverage these foundational strengths to seize the following opportunities:

- National Institutes of Health (NIH) designation of cancer and neuroscience for priority funding through the Cancer Moonshot and the BRAIN Initiative
- Increasing dependence on technology for health and medicine solutions
- The National Academy of Sciences' emphasis on transdisciplinarity as the key to science in the 21st century
- Increasing societal investment in health and wellness, disease prevention through healthy lifestyle choices, successful aging, survivorship from serious disease, and successful rehabilitation
- Growing awareness of the need to address disparities in healthcare access
- Increasing volume of patient data inundating our healthcare system

WHAT OPPORTUNITIES AND CHALLENGES DO WE FACE IN HEALTH-RELATED RESEARCH AND EDUCATION OVER THE NEXT FIVE TO TEN YEARS?

Our assessment of the current landscape at Illinois has uncovered exceptional strengths and powerful commitments to the health sciences, reflected in and building upon numerous investments, assets, and activities in many different programs, departments, colleges, and institutes. Despite Illinois' abundant strengths, we face substantial challenges in advancing our goals in the health sciences.

To benefit fully from the many foundational elements already in place, we must overcome three primary challenges:

Challenge #1: Leveraging Interdisciplinary Strengths

The existence of so many health sciences-related research activities, in so many different campus units, involving more than a quarter of our entire tenured faculty, is a testament to the scale of Illinois' commitment. But the wide distribution of Illinois' health sciences activities and investments around campus creates a challenging environment for identifying and seizing growth and funding opportunities.

Challenge #2: Obtaining Large-Scale, Long-Term NIH Funding

Though Illinois has successfully positioned itself as a leader in basic sciences and engineering by obtaining about 2.4 percent of all National Science Foundation (NSF) funding, we struggle to reach the same status in the health sciences, receiving only about 0.19 percent of all NIH funding. A historical reliance on R01 (Research Project Grant) funding, along with uneven

success across campus units in garnering funding, has created a challenging environment for obtaining larger, more permanent NIH Center Grants that would support further growth and national visibility.

Challenge #3: Making Strategic Decisions that Broadly Benefit Campus-Wide Health Sciences

Illinois does not have a structured process to mine, analyze, and capture health sciences funding data for campus-wide strategic visioning. Instead, various units distributed across campus are typically left to collect their own funding data and make their own investment decisions, including faculty hiring and research initiatives, without sufficient knowledge about campus-wide strengths and opportunities. This creates a challenging environment to engage in fully informed and truly collaborative strategic planning for campus health sciences.

> Because we have exceptional strengths and advantages at Illinois and many foundational elements already in place, we believe our greatest opportunities lie in overcoming our challenges through more purposeful and strategic leveraging and supplementing of our existing strengths.

We propose three strategies that build upon one another toward a bold, integrated vision for the health sciences at Illinois:

Strategy #1: Campus-Wide Commitment to Identified Impact Areas and Cross-Cutting Threads

In answering the first charge question, we identified five Impact Areas and two Cross-cutting Threads as areas of greatest opportunity to positively impact state, national, and global health. By strategically committing to focus efforts and resources around these areas, we overcome the challenges created by our broadly distributed environment and create a unified roadmap for success.

Strategy #2: Centers of Excellence for National Leadership in Identified Impact Areas

NIH-funded Centers of Excellence provide support for multiple investigators brought together to conduct research projects around a unifying grand theme or major objective, advancing research by focusing on innovative, collaborative, and multi-disciplinary activities, and providing shared resources and core facilities. In addition to catalyzing targeted research activities, Centers of Excellence emphasize research training and education, the broad dissemination of research findings, and the promotion of community engagement.

The Impact Areas discussed above are ideal themes around which to develop Centers of Excellence, as they capture both Illinois' strengths and national funding priorities. In this way, Strategy #1 and Strategy #2 converge – having identified areas that can strategically leverage

existing strengths and investments, we propose a commitment to build these areas with the explicit goal of developing them into NIH-funded Centers.

Strategy #3: Infrastructure Providing Critical Support for Broadly Catalyzing and Coordinating Campus-Wide Health Sciences Growth

To successfully compete for external funding and advance clinical and translational research activities, a level of infrastructure support in the form of research cores, administrative support, seed funding to initiate promising new projects, and research engagement with clinical and community partners is required. The three health-related, campus-wide interdisciplinary research institutes – the Beckman Institute, Carl R. Woese Institute for Genomic Biology (IGB), and Interdisciplinary Health Sciences Institute (IHSI) – are all organized around themes and have provided critical support to various research programs on campus. However, these resources alone do not adequately enable all the identified Impact Areas, nor, more generally, respond to the kind of grand challenges that would require the conjoint application of larger campus-wide units.

We believe that health sciences at Illinois would be best served by a more defined and resourced structure, recognized and funded through the NIH's Clinical and Translational Science Award (CTSA) program. We propose the formation of a committee to explore CTSA strategy, focus, and requirements in more detail. Commitment is needed from both the University of Illinois and the Carle Health System, to advise on how to best develop an ecosystem to enable a successful application for a CTSA, which would eventually lead to the establishment of a Clinical and Translational Science Institute (CTSI). In doing so, Illinois would thereby:

- Create the core infrastructure needed to catalyze and support leading-edge translational research, attract and support research with clinical partners, and benefit patients
- Access the CTSA network and benefit from new inter-university collaborations and support
- Compete much more successfully for additional NIH funding

WHAT SPECIFIC ACTIONS WOULD BE MOST EFFECTIVE IN REALIZING OUR POTENTIAL IN HEALTH EDUCATION, RESEARCH, AND ENGAGEMENT? WHAT NEW INVESTMENTS WOULD BE NECESSARY TO IMPLEMENT THOSE ACTIONS? PLEASE DISTINGUISH SHORT (24 MONTHS), MEDIUM (3-5 YEARS), AND LONG-TERM HORIZONS (5-10 YEARS) FOR THE ACTIONS.

Our specific, actionable recommendations are for a set of innovative investments and commitments that support the strategies outlined above. That is, they allow us to leverage and enhance our existing strengths, engage our partners and our community, and better position us to become recognized leaders in the health sciences.

Recommendation #1: Investments in Identified Impact Areas and Cross-Cutting Threads

For each of the identified Impact Areas and Cross-cutting Threads, we have identified a set of recommendations that would be most beneficial and impactful for Illinois. We have highlighted these recommendations in Section VII of the full HSSTF Report, Recommendations and Strategic Vision. These range in cost and scope, and include **short-, medium-, and long-term** investments.

Recommendation #2: Investments in Creating Centers of Excellence

With Strategy #2, we suggest building a set of Centers that align with our identified Impact Areas. Eventually, such Centers would be expected to become self-sustaining through external funding and/or philanthropy. To achieve that goal, we recommend an initial investment to seed a Center for each Impact Area, and make them a campus priority with recurring funds that will sunset after five years, by which time the Centers will be expected to have secured alternate, more permanent sources of funding. For the already established Cancer Center, investments would be **short-term** and fulfill very specific needs required for NIH-funded Cancer Centers. For other Centers, investments would be **medium-term** and broader in scope.

We recommend that such a commitment consist of the following elements:

- **Initial startup support for each Center**, in the form of physical space in an existing Interdisciplinary Research Institute, joint Carle Illinois space, or a Biomedical Translational Research Facility (that is currently receiving campus consideration), as well as discretionary operating funds (support for workshops to build awareness, collaboration, and education) and administrative staff (a research development manager, grant writing specialist, and communications professional)
- **Increased priority in advancement and development activities**, to identify and engage current and potential donors and to build relationships that yield additional support for the health sciences
- **Faculty hires**, aligned with commitments from our clinical partners (most particularly with Carle), presumably via Carle Illinois College of Medicine and the use of joint appointments, to advance clinical and translational aims, fill critical gaps, and build crucial strengths for garnering the Center designations and funding we seek

Recommendation #3: Investments in Infrastructure Providing Critical Support for Illinois Health Sciences

Strategy #3 was to assure the creation of shared infrastructure to advance clinical and translational research. The **long-term** model to which we aspire, one that is typical of major academic medical institutions, is the development of a Clinical and Translational Sciences Institute (CTSI), funded by NIH's Clinical and Translational Science Award (CTSA) program. In

the **short-term,** we recommend support for starting up cores that are not yet in place at Illinois that will help catalyze and support clinical and translational research, and put us on the path for competing successfully for a CTSA. We also recommend the establishment of two working groups to make recommendations to campus regarding a) institutional data analytics, and b) the development and maintenance of training grants.

HOW CAN WE BETTER LEVERAGE OUR RESEARCH STRENGTHS TO ENHANCE THE UNIVERSITY'S EDUCATIONAL MISSION IN HEALTH-RELATED FIELDS?

Our Task Force was constituted to represent campus-wide expertise from a research perspective and our report largely reflects this focus. We acknowledge that the expertise of the Graduate College, Deans, and others on campus is needed to inform larger strategic decisions affecting health education, and we hope that they will recommend and build upon the strategies offered in this report. That said, we offer some ideas for leveraging our research strengths and identifying opportunities for enhancing education:

- New majors, minors, and professional programs that leverage our current campus strengths in engineering, computation, and analytics and other Impact Area strengths to create unique skill sets that prepare students for careers in healthcare innovations (e.g., computational microbiome, drug discovery, genetic counseling, cancer and technology, and computational genomics)
- Educational opportunities with clinical and corporate partners for hands-on experience, as demonstrated through educational programs emerging from the Mayo Clinic and Illinois Alliance
- Enhanced research training and education resulting from the establishment of Centers of Excellence

THE AREA OF HEALTH PRESENTS MANY OPPORTUNITIES FOR COMMUNITY ENGAGEMENT. HOW BEST CAN WE ENGAGE OUR LOCAL COMMUNITY THROUGH THE HEALTH SCIENCES?

We believe that the integration of research, education, and engagement is critical for successful enhancement of health sciences at Illinois, and we support engaged research and engaged education efforts in the health sciences. Some specific ideas for engaging our local community through the health sciences include:

- Community outreach as an integrated part of research, bringing in the expertise of the University of Illinois Extension, the Health Communications Program, or others at the planning stages of the work
- Investment in a Health Sciences Community Engagement Core, eventually to be funded through the NIH CTSA program
    - Includes strengthening and building better connections to the existing university outposts (schools, libraries, recreation programs, extension offices, museums, mobile units) in the community, accomplished through theme-based

coordination (e.g. health sciences) and place-based engagement (e.g. with specific local, national, or global partners)

- Development and support for Scholars programs that motivate learning by showing the relevance of their studies to solving practical problems
    - Provides beneficial educational experiences for students as they are immersed in community organizations

PUTTING IT ALL TOGETHER: VISION FOR THE HEALTH SCIENCES ECOSYSTEM TO POSITION ILLINOIS AS A RECOGNIZED LEADER

Illinois has moved with great purpose and resolve over the past several years to add a health and medicine platform to our existing STEM platform, with the creation of the Carle Illinois College of Medicine, establishment of IHSI, naming of the Cancer Center at Illinois, and supporting collaborations with our clinical partners at Carle Health System, Mayo Clinic, OSF HealthCare, and others. Our Task Force now recommends bold new steps to build out several critical priority areas that leverage our many existing strengths and assets, and that come together to form a vibrant health sciences ecosystem designed to propel Illinois to be a recognized leader in innovative clinical and translational research.

The ecosystem we envision consists of the proposed Centers of Excellence, together with the following:

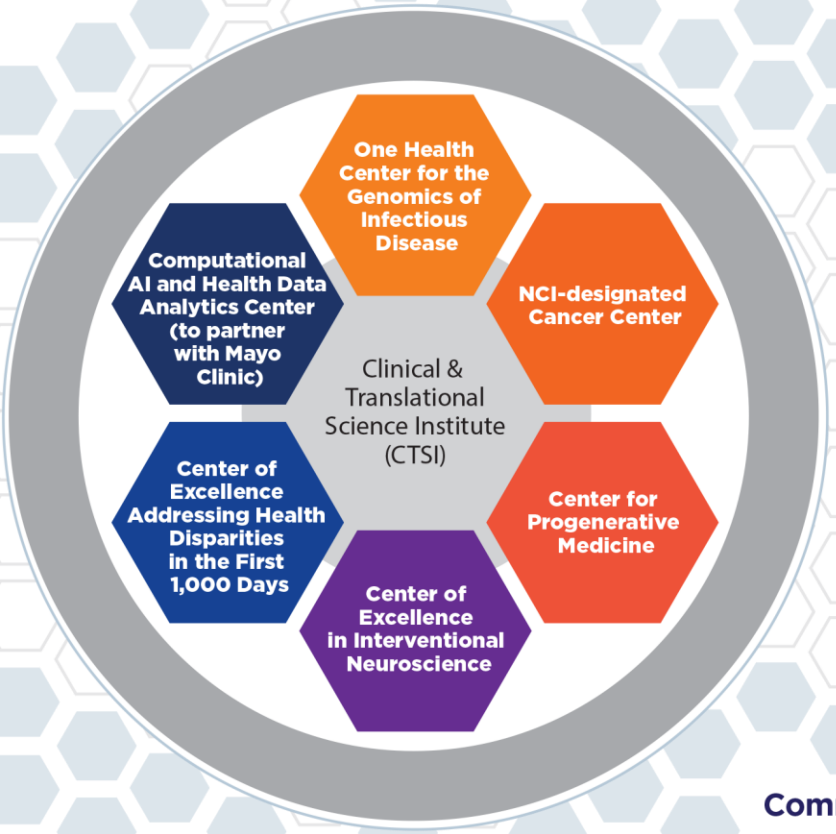
- **Academic Colleges,** fostering excellence and providing support for faculty and student accomplishment and growth, including the **Carle Illinois College of Medicine**, an attractor for Illinois physician-scientists who will enable cutting-edge clinical and translational research in various Impact Areas
- **Health-related Institutes and Centers**, providing critical shared resources for health sciences research at Illinois
- **Clinical Partners**, including Carle Health System, Order of Saint Francis (OSF) HealthCare System, and Mayo Clinic, all offering unique contributions and joint ventures
- **Corporate Partners**, investing in or partnering with Illinois engineers, scientists, and physicians on new ventures emerging from health sciences innovations

Proposed Resources

- Tumor Model Engineering and Phenotyping Core
- Gnotobiotic and Germ-Free Animal Facility
- Pharmacokinetics/Toxicology Facility
- Neurobehavioral Assessment Lab/Core for Humans and Animals
- Brain 'Omics Center
- Medical Maker Lab
- Programs to Address Health Disparities
- Multi-Modal Human Imaging Facility (including 7-Tesla scanner, cyclotron, and PET/CT System)
- Health Technology Faculty Seed and Team-Building Grants

Clinical and Corporate Partners

- Carle Health System (including the Biomedical Translational Research Facility)
- OSF HealthCare
- Mayo Clinic
- Various Corporations and Start-ups



Health-Related Institutes and Centers

- National Center for Supercomputing Applications (including Blue Waters)
- Roy J. Carver Biotechnology Center/Keck Center
- Interdisciplinary Health Sciences Institute
- Carl R. Woese Institute for Genomic Biology
- Health Care Engineering Systems Center
- Coordinated Science Lab
- Beckman Institute (with proposed build-out of Cancer shared resources/core facilities)
- Micro and Nanotechnology Lab
- Frederick Seitz Materials Research Lab

Community Outposts

- University of Illinois Extension
- Family Resiliency Center (with proposed program to reduce health disparities in the first 1,000 days)
- Recreation Programs
- Libraries
- Mobile Units
- Local Schools

Figure 2: Illinois Health Sciences Ecosystem

The proposed Centers of Excellence will supplement and provide critical substantive focus to the Illinois Health Sciences Ecosystem, joining the existing health-related Institutes and Centers, interacting with our clinical and corporate partners, reinforcing engagement activities via our community outposts, and leveraging both the existing resources that have arisen from the investments of the academic Colleges and the newly proposed resources–including the Biomedical Translational Research Facility.

One possible vision for the proposed Centers of Excellence is for some or all of them to be "tenants" in the proposed **Biomedical Translational Research Facility**, in whole or some critical hubs, perhaps once they mature to the level of securing NIH or other external funding that could then provide operating capital for the new facility. A CTSI would provide common core infrastructure and, in turn, support these Centers, together transforming this facility into a true leading player in clinical and translational research, and a lynchpin of the Illinois health sciences ecosystem. A campus committee is currently evaluating this and other possible models for the new facility. An alternative vision for the proposed Centers of Excellence, and for the CTSI, is for them to be more distributed, with critical bases in the health-related Institutes and Centers, including particularly the Beckman Institute and IGB.

This integrated vision of a health sciences ecosystem at Illinois can only truly be realized through collaboration, inclusion, and a shared goal by the University to improve our society, enhance people's lives, and expand the human experience. These values have long been part of our Illinois mission, and are embedded into this report and our recommendations. In this context, we note that the commitment to human health and well-being is not limited to the basic biomedical and applied health sciences, but is shared as well by the arts, humanities, and others.

Commitment to having an impact on human health and well-being can be a powerful uniting force that allows Illinois to achieve new levels of local, national, and global impact.